

**LITTLE BAY SUBAQUEOUS
WATER TRANSMISSION MAIN
DURHAM/NEWINGTON, NEW HAMPSHIRE**

**CITY OF PORTSMOUTH
PORTSMOUTH, NEW HAMPSHIRE
BID #04-24**

**BIDDING AND CONTRACT REQUIREMENTS
AND SPECIFICATIONS**

JULY 2023

14202A

CITY OF PORTSMOUTH

**BIDDING AND CONTRACT REQUIREMENTS
AND SPECIFICATIONS**

FOR

**LITTLE BAY SUBAQUEOUS WATER TRANSMISSION MAIN
DURHAM/NEWINGTON, NEW HAMPSHIRE**

BID #04-24

JULY 2023



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Section A: Bidding Documents

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Advertisement for Bids

Owner Name: City of Portsmouth		Project Number: 14202	
Project Address:	Little Bay	Durham/Newington	NH
	Street # and name	City/Town	State ZIP

Separate sealed BIDS for the construction of: "Bid # 04-24 Little Bay Subaqueous Water Transmission Main" including connection to existing PCCP water main and site restoration will be received by City of Portsmouth at the office of the Finance Department, 1 Junkins Avenue, Portsmouth, NH 03801 until 2:00 PM Local Time on August 21, 2023, and then at said office publicly opened and read aloud.

1. Completion time for the project will be calculated as calendar days from the date specified in the "Notice to Proceed" as follows:
 - 275 calendar days for substantial completion.
 - 305 calendar days for final completion

Liquidated damages will be in the amount of \$1,000 for each calendar day of delay from the date established for substantial completion, and \$1,000 for each calendar day of delay from the date established for final completion.
2. Each General Bid shall be accompanied by a Bid Security in the amount of 5% of the Total Bid Price.
3. The successful Bidder must furnish 100% Performance and Payment Bonds and will be required to execute the Contract Agreement within 10 days following notification of the acceptance of their Bid.
4. Any contract or contracts awarded under this Advertisement for Bids are expected to be funded in whole or in part by:
 - ☐ A loan from the NH Clean Water State Revolving Fund.
 - ☐ A loan from the NH Drinking Water State Revolving Fund.
 - ☐ A loan from the NH Drinking Water and Groundwater Trust Fund.
 - ☐ A grant from the NH Drinking Water and Groundwater Trust Fund.
 - ☐ A State Aid Grant from the NH Department of Environmental Services (SAG).
 - ☐ A grant from the American Rescue Plan Act from the NH Department of Environmental Services (ARPA).
 - ☐ A loan or grant from USDA Rural Development.
 - ☒ Congressionally Directed Spending (CDS).
5. The successful Bidder on this work is required to comply with the President's Executive Order No. 11246 entitled "Equal Employment Opportunity" as amended by Executive Order 11375, and amendments or supplements thereto, and as supplemented in Department of Labor Regulations (41 CFR Part 60). The requirements for bidders and contractors under this order are explained in the Information For Bidders.
6. Utilization of Minority and Women's Business Enterprises (MBEs and WBEs). The successful Bidder on this work must demonstrate compliance with the U.S. Environmental Protection Agency's MBE/WBE rule in order to be deemed a responsible bidder. The requirements for bidders and contractors covered by this rule are explained in the Information for Bidders.
7. The successful Bidder on this work is subject to U.S. Department of Labor's Davis Bacon wage provisions.
8. The successful bidder on this work is subject to the "American Iron and Steel (AIS)" requirements of P.L. 113-76.
9. The successful Bidder on this work is subject to Build America, Buy America (BABA) provisions of P.L. 117-58.
10. No Bidder may withdraw a Bid within 60 days after the actual date of opening thereof.
11. There will be a MANDATORY pre-bid meeting on August 7, 2023, at 10:00 AM held at City of Portsmouth Water Treatment Facility, 60 Freshet Road, Madbury, NH 03823 to be followed by site visits to Durham and Newington project sites.

The Contract Documents may be examined at the following locations:

Electronic copies may be viewed at the Wright-Pierce website: www.wright-pierce.com

Or at: www.cityofportsmouth.com/finance/purchasing-bids-and-proposals.com

Questions shall be directed to purchasing@cityofportsmouth.com no later than August 14, 2023, at 4:30 PM. Addenda to this proposal document, if any, including written answers to questions, will be posted on the City of Portsmouth website. Addenda and updates will NOT be sent directly to vendors.

The City of Portsmouth reserves the right to reject any or all proposals, to waive technical or legal deficiencies, and to accept and negotiate the terms of any proposal that it may deem to be in the best interest of the City.

Information for Bidders

All Contracts

Bids will be received by: City of Portsmouth herein called the "OWNER" at:

Address: 1 Junkins Avenue Portsmouth NH 03801

Each BID must be submitted in a sealed envelope, addressed to:

Finance/Purchasing Department at 1 Junkins Avenue, Portsmouth, NH 03801.

Each sealed envelope containing a BID must be plainly marked on the outside as BID for Little Bay Subaqueous Water Transmission Main and the envelope should bear on the outside the BIDDER's name, address, and license number if applicable and the name of the project for which the BID is submitted. If forwarded by mail, the sealed envelope containing the BID must be enclosed in another envelope addressed to the OWNER at 1 Junkins Avenue, Portsmouth, NH 03801.

All BIDS must be made on the required BID form. All blank spaces for BID prices must be filled in, in ink or typewritten, and the BID form must be fully completed and executed when submitted. Only one copy of the BID form is required.

The OWNER may waive any informalities or minor defects or reject any and all BIDS. Any BID may be withdrawn prior to the above scheduled time for the opening of BIDS or authorized postponement thereof. Any BID received after the time and date specified shall not be considered. No BIDDER may withdraw a BID within 60 days after the actual date of the opening thereof. Should there be reasons why the contract cannot be awarded within the specified period, the time may be extended by mutual agreement between the OWNER and the BIDDER.

BIDDERS must satisfy themselves of the accuracy of the estimated quantities in the BID SCHEDULE by examination of the site and a review of the drawings and specifications including ADDENDA. After BIDS have been submitted, the BIDDER shall not assert that there was a misunderstanding concerning the quantities of WORK or of the nature of the WORK to be done.

The OWNER shall provide to BIDDERS prior to BIDDING, all information which is pertinent to, and delineates and describes, the land owned, and rights-of-way acquired or to be acquired.

The CONTRACT DOCUMENTS contain the provisions required for the construction of the PROJECT. Information obtained from an officer, agent, or employee of the OWNER or any other person shall not affect the risks or obligations assumed by the CONTRACTOR or relieve them from fulfilling any of the conditions of the contract.

Each BID must be accompanied by a BID BOND payable to the OWNER in the amount of five percent (5%) of the total amount of the BID. As soon as the BID prices have been compared, the OWNER will return the BONDS of all except the three lowest responsive BIDDERS. When the AGREEMENT is executed, the bonds of the two remaining unsuccessful BIDDERS will be returned. The BID BOND of the successful BIDDER will be retained until the PAYMENT BOND and PERFORMANCE BOND have been executed and approved, after which it will be returned. A certified check may be used in lieu of a BID BOND.

A PERFORMANCE BOND and a PAYMENT BOND, each in the amount of 100 percent of the CONTRACT PRICE, with a corporate surety approved by the OWNER, will be required for the faithful performance of the contract.

Attorneys-in-fact who sign BID BONDS or PAYMENT BONDS and PERFORMANCE BONDS must file with each BOND a certified and effective dated copy of their power of attorney.

The party to whom the contract is awarded will be required to execute the AGREEMENT and obtain the PAYMENT BOND and PERFORMANCE BOND within ten (10) calendar days from the date when NOTICE OF AWARD is delivered to the BIDDER. The NOTICE OF AWARD shall be accompanied by the necessary AGREEMENT and BOND forms. In case of failure of the BIDDER to execute the AGREEMENT, the OWNER may at their option consider the BIDDER in default, in which case the BID BOND accompanying the proposal shall become the property of the OWNER.

The OWNER within ten (10) days of receipt of acceptable PAYMENT BOND, PERFORMANCE BOND and AGREEMENT signed by the party to whom the AGREEMENT was awarded shall sign the AGREEMENT and return to such party an executed duplicate of the AGREEMENT. Should the OWNER not execute the AGREEMENT within such period, the BIDDER may by WRITTEN NOTICE withdraw their signed AGREEMENT. Such notice of withdrawal shall be effective upon receipt of the notice by the OWNER.

The NOTICE TO PROCEED shall be issued within ten (10) days of the execution of the Agreement by the OWNER. Should there be reasons why the NOTICE TO PROCEED cannot be issued within such period, the time may be extended by mutual agreement between the OWNER and CONTRACTOR. If the NOTICE TO PROCEED has not been issued within the ten (10) day period or within the period mutually agreed upon, the CONTRACTOR may terminate the AGREEMENT without further liability on the part of either party.

The OWNER may make such investigations as Owner deems necessary to determine the ability of the BIDDER to perform the WORK, and the BIDDER shall furnish to the OWNER all such information and data for this purpose as the OWNER may request. The OWNER reserves the right to reject any BID if the evidence submitted by, or investigation of, such BIDDER fails to satisfy the OWNER that such BIDDER is properly qualified to carry out the obligations of the AGREEMENT and to complete the WORK contemplated therein.

A conditional or qualified BID will not be accepted.

Award will be made to the lowest responsive and responsible BIDDER.

All applicable laws, ordinances, and the rules and regulations of all authorities having jurisdiction over construction of the PROJECT shall apply to the contract throughout.

Each BIDDER is responsible for inspecting the site and for reading and being thoroughly familiar with the CONTRACT DOCUMENTS. The failure or omission of any BIDDER to complete any of the foregoing shall in no way relieve any BIDDER from any obligation in respect to their BID.

The low BIDDER shall supply the names and addresses of major material SUPPLIERS and SUBCONTRACTORS when requested to do so by the OWNER.

MANUFACTURER'S EXPERIENCE

Wherever it may be written that an equipment manufacturer must have a specified period of experience with their product, equipment which does not meet the specified experience period can be considered if the equipment supplier or manufacturer is willing to provide a bond or cash deposit for the duration of the specified time period which will guarantee replacement of that equipment in the event of failure.

PROJECT SIGN

The Contractor shall construct a sign in accordance with the Standard Detail included in these specifications. The sign shall be erected in a location selected by the Engineer or Owner. The Contractor shall maintain the sign throughout the duration of the contract.

SAFETY AND HEALTH REGULATIONS

This project is subject to all the Safety and Health Regulations (CFR 29 Part 1926 and all subsequent amendments) as promulgated by the U.S. Department of Labor on June 24, 1974. Contractors shall comply with the requirements of these regulations.

NONDISCRIMINATION IN EMPLOYMENT

Contracts for work under this proposal will obligate the contractors and sub-contractors not to discriminate in employment practices.

STATE INSPECTION

Work performed on this project shall be subject to inspection by representatives of the New Hampshire Department of Environmental Services (NHDES). Such inspection shall in no sense make the State Government a party to this contract, unless said Government is also the Owner, and will in no way interfere with the rights of either party hereunder.

Representatives of NHDES shall be given Right of Access to all portions of the proposed work, including but not limited to actual work site, storage yards, offsite manufacturing and fabricating location and job records.

COPIES OF THE CONTRACT

There shall be at least five (5) executed copies of the Contract to be distributed as follows:

- a) One (1) copy each to the Owner, Engineer, and Contractor.
- b) Additional copies as required for other federal or state agencies contributing to or participating in project costs.

NON-RESIDENT CONTRACTORS

The successful bidder, if a corporation established under laws other than the State of New Hampshire, shall file, at the time of the execution of the contract, with the Owner, notice of the name of its resident attorney, appointed as required by the laws of the State of New Hampshire.

The successful bidder, if not a resident of New Hampshire, and not a corporation, shall file, at the time of execution of the contract, with the Owner a written appointment of a resident of the state of New Hampshire, having an office or place of business therein, to be their true and lawful attorney upon whom all lawful processes in any actions or proceedings against them may be served; and in such writing, which shall set forth said attorney's place of residence, shall agree that any lawful process against them which is served on said attorney shall be of the same legal force and validity as if served on them and that the authority shall continue in force so long as any liability remains outstanding against them in New Hampshire.

The power of attorney shall be filed in the office of the Secretary of State if required, and copies certified by the Secretary shall be sufficient evidence thereof. Such appointment shall continue in force until revoked by an instrument in writing, designating in a like manner some other person upon whom such processes may be served, which instrument shall be filed in the manner provided herein for the original appointment.

A Non-resident Contractor shall be deemed to be:

- a) A person who is not a resident of the State of New Hampshire.
- b) Any partnership that has no member thereof resident of the State of New Hampshire.
- c) Any corporation established under laws other than those of the State of New Hampshire.

BIDDERS QUALIFICATIONS

No award will be made to any Bidder who cannot meet all of the following requirements:

- A. The Bidder shall not have defaulted nor turned the work over to the bonding company on any contract within three years prior to the bid date.
- B. The Bidder shall maintain a permanent place of business.
- C. The Bidder shall have adequate personnel and equipment to perform the work expeditiously.
- D. The Bidder shall have suitable financial status to meet obligations incidental to the work.
- E. The Bidder shall have appropriate technical experience satisfactory to the Engineer and the Division in the class of work involved.
- F. The Bidder shall be registered with the Secretary of State to do business in New Hampshire.
- G. The Bidder shall have performed to the satisfaction of the Engineer and the Division on previous contracts of a similar nature.
- H. The Bidder shall not have failed to complete previous contracts on time, including approved time extensions.
- I. The Bidder shall have experience with the installation of subaqueous pipe.

WITHDRAWAL OF BIDS

Prior to Bid Opening, bids may be withdrawn upon written or telegraphic request of the Bidder provided confirmation of any telegraphic withdrawal over the signature of the Bidder is placed in the mail and postmarked prior to the time set for Bid Opening. Bid documents and security of any Bidder withdrawing their bid in accordance with the foregoing conditions will be returned.

INTERPRETATIONS AND ADDENDA

All questions about the meaning or intent of the Bidding Documents shall be addressed to the Purchasing Coordinator at purchasing@cityofportsmouth.com

Interpretations or clarifications considered necessary by Owner in response to such questions will be issued by Addenda which will be posted to the City's website at <https://www.cityofportsmouth.com/finance/purchasing-bids-and-proposals>.

Questions received less than seven days prior to the date for opening of Bids may not be answered. Only questions answered by Addenda will be binding. Oral and other interpretations or clarifications will be without legal effect.

Addenda may be issued to clarify, correct, supplement, or change the Bidding Documents. Addenda will be issued not later than five working days before the bid opening. Bidders are responsible for determining that they have received all Addenda issued.

RESERVATION OF RIGHTS

The City of Portsmouth reserves the right to reject any or all proposals, to waive technical or legal deficiencies, and to accept and negotiate the terms of any proposal that it may deem to be in the best interest of the City.

EQUAL EMPLOYMENT OPPORTUNITY

Further, the BIDDER agrees to abide by the requirements under Executive Order No. 11246, as amended, including specifically the provisions of the equal opportunity clause set forth in the GENERAL CONDITIONS.

Bidders shall, if requested, submit a compliance report concerning their employment practices and policies in order to maintain their eligibility to receive the award of contract.

Successful bidders shall, if requested, submit a list of all subcontractors who will perform work on the project, and written signed statements from authorized agents of labor pools with which they will or may deal for employees on the

work together with supporting information to the effect that such labor pools' practices and policies are in conformity with Executive Order No. 11246; that they will affirmatively cooperate in or offer no hindrance to the recruitment, employment, and equal treatment of employees seeking employment and performing work under the contract or, a certification as to what efforts have been made to secure such statements when such agents or labor pools have failed or refused to furnish them prior to award of the contract.

Successful bidders must be prepared to comply in all respects with the contract provisions regarding non-discrimination.

DAVIS-BACON WAGE RATES

This project is associated with a project funded in whole or in part by a Congressional Directed Spending program of the US Environmental Protection Agency, and hence is subject to federal Davis-Bacon wage provisions.

All laborers and mechanics employed by contractors or subcontractors on this project shall be paid wages at rates not less than those prevailing on projects of a character similar in the locality as determined by the U.S. Department of Labor (DOL) in accordance with Subchapter IV of Chapter 31 of Title 40, United States Code.

The following General Wage Decisions (GWD) apply to this project:

For work in Durham: The "Heavy" GWD for Strafford County, NH 26, publication date 4/7/2023

For work in Newington: The "Heavy" GWD for Rockingham County, NH 25, publication date 4/7/2023.

A copy of the applicable DOL wage determination(s) is included in Attachment B in PART D- FEDERAL PROVISIONS, RULES, REGULATIONS AND FORMS in these project documents.

If the applicable wage determination does not provide a rate for a classification of work to be performed, the Contractor must request additional classifications and wage rates to be added in conformance to the contract wage determination after contract award. You can find additional information on [DBA Conformances](#) in the US Department of Labor Learning Center.

If multiple wage determinations apply, the Contractor shall be responsible for keeping track of all work performed under each wage rate determination. The Contractor is responsible for designating which wage rates are applicable to each employee on each certified payroll, including subcontractor payrolls.

Bidders shall refer to the above-referenced PART D for additional information on Davis-Bacon requirements.

AMERICAN IRON AND STEEL (AIS) PROVISIONS

The successful bidder on this work is subject to the "American Iron and Steel (AIS)" requirements of the Congressional Directed Spending program of the US Environmental Protection Agency, which require the use of iron and steel products that are produced in the United States.

The BIDDER'S AMERICAN IRON AND STEEL ACKNOWLEDGEMENT shall be completed and signed by each Bidder and included with each bid. Additionally, CONTRACTOR shall certify and document to OWNER with each Application for Payment, and upon completion of the project that all iron and steel goods subject to this provision have been produced in the United States.

Bidders shall refer to PART D - FEDERAL PROVISIONS, RULES, REGULATIONS AND FORMS for additional information and guidance on AIS requirements.

BUILD AMERICA, BUY AMERICA (BABA) PROVISIONS

The successful bidder on this work is subject to the "Build America, Buy America (BABA)" requirements of the Congressional Directed Spending program of the US Environmental Protection Agency, that requires all of the iron and steel, manufactured products, and construction materials used in the project to be produced in the United States ("Build America, Buy America Requirements") including iron and steel, manufactured products, and construction materials provided by the Contactor.

The BIDDER'S BABA ACKNOWLEDGEMENT shall be completed and signed by each Bidder and included with each bid. Additionally, CONTRACTOR shall certify and document to OWNER with each Application for Payment, and upon completion of the project that all iron and steel goods, manufactured products, and construction materials subject to this provision have been produced in the United States.

Bidders shall refer to PART D - FEDERAL PROVISIONS, RULES, REGULATIONS AND FORMS for additional information and guidance on BABA requirements.

DBE RULE PROGRAM REQUIREMENTS (MBEs and WBEs)

Bidders on this project are required to demonstrate compliance with the US Environmental Protection Agency's MBE/WBE rules in order to be deemed responsive. The MBE/WBE documentation, DBE Subcontractor Utilization Form and DBE Subcontractor Performance Forms (Formerly EPA Forms 6100-4 and 6100-3), shall be submitted with the bid.

The requirements for bidders and contractors are as follows:

CDS fundings recipients and their contractors must comply with the following DBE Rule requirements throughout the SRF loan project period:

- 1) Good Faith Efforts.
- 2) Annual Reporting of MBE/WBE accomplishments.
- 3) Contract Administration Requirements.
- 4) Bidders List Requirements.
- 5) Record Keeping.

Bidders shall refer to PART D - FEDERAL PROVISIONS, RULES, REGULATIONS AND FORMS for additional information on MBE/WBE requirements.

SUSPENSION AND DEBARMENT

Bidders and contractors must comply with Subpart B and Subpart C of 2 CFR Part 180 and 2 CFR Part 1532. The eligibility of the successful bidder will be verified through the federal government's Excluded Parties List System prior to the approval of the contract award. Furthermore, no part of this contract shall be subcontracted to a debarred or suspended person or firm. The Contractor shall compare the names of its proposed subcontractors against the searchable list in the federal ["System for Award Management \(SAM\)" database](#).

Bidders shall refer to PART D - FEDERAL PROVISIONS, RULES, REGULATIONS AND FORMS for additional information on suspension and debarment requirements.

PROHIBITION ON CERTAIN TELECOMMUNICATIONS AND VIDEO SURVEILLANCE SERVICES OR EQUIPMENT:

This term and condition implements 2 CFR 200.216 and is effective for obligations and expenditures of EPA financial assistance funding on or after 8/13/2020. Bidders/contractors and their subcontractors must comply with the above provision when procuring or obtaining equipment, services, or systems that use covered telecommunications equipment or services as a substantial or essential component of any system, or as critical technology as part of any system.

Bidders shall refer to PART D - PROHIBITION ON CERTAIN TELECOMMUNICATIONS AND VIDEO SURVEILLANCE SERVICES OR EQUIPMENT for additional information on procuring or obtaining equipment, services, or systems using covered telecommunications equipment or services.

Bid

Proposal of _____ [company](hereinafter called the "BIDDER", organized and existing under the laws of the State of ____ doing business as Corporation, Partnership, Individual to the City of Portsmouth (herein after called "OWNER").

In compliance with your Advertisement for Bids, BIDDER hereby proposes to perform all WORK For the construction of Little Bay Subaqueous Water Transmission Main in strict accordance with the CONTRACT DOCUMENTS, within the time set forth therein, and at the prices stated below.

By submission of this BID, each BIDDER certifies, and in the case of a joint BID each party thereto certifies as to their own organization, that this BID has been arrived at independently, without consultation, communication, or agreement as to any matter relating to the BID with any other BIDDER or with any competitor.

BIDDER hereby agrees to commence WORK under this contract on or before a date to be specified in the NOTICE TO PROCEED and to complete the PROJECT within:

275 calendar days for substantial completion.

305 calendar days for final completion

Liquidated damages will be in the amount of \$1,000 for each calendar day of delay from the date established for substantial completion and \$1,000 for each calendar day of delay from the date established for final completion, as provided in Section 18 of the General Conditions.

BIDDER acknowledges receipt of the following ADDENDUM:

- 1 _____
- 2 _____
- 3 _____
- 4 _____
- 5 _____

The Bidder shall state below what works of a similar character to that of the proposed contract they have performed and provide such references as will enable the Owner to judge their experience, skill, and business standing.

All questions must be answered, and the data given must be clear and comprehensive. This statement must be notarized. If necessary, add separate sheets.

Bidder Name:		
Permanent Main		
Office Address:	Street # and name	City/Town State ZIP
When was it organized:		Where incorporated?
<input type="checkbox"/> Yes	<input type="checkbox"/> No	Is the bidder registered with the Secretary of State to do business in NH?
For how many years has your firm engaged in the contracting business under its present name?		
Please list previous firm names and dates if applicable.		
Years	Previous Name	
Contracts on hand, attach a schedule or list showing gross amount of each contract and the approximate anticipated dates of completion.		
Describe the general character of work performed by your company.		
<input type="checkbox"/> Yes	<input type="checkbox"/> No	Have you ever failed to complete any work awarded you in the scheduled contract time, including approved time extensions? If so where and why?
<input type="checkbox"/> Yes	<input type="checkbox"/> No	Have you ever defaulted on a contract? If so where and why?
<input type="checkbox"/> Yes	<input type="checkbox"/> No	Have you ever had liquidated damages assessed on a contract? If so where and why?
List the more important contracts recently executed by your company:		
Recent Contract Name	Approximate Cost	Month/Year Completed
List your major equipment available for this contract: (Attach additional sheets as necessary.)		
List your key personnel available for this contract: (Attach additional sheets as necessary.)		
Staff Name	Role (i.e. Project Superintendent, Foreman)	

BID SCHEDULE

BASE BID

Item No.	Qty	Unit	Brief Description of Item with Unit Bid Price in Words	Unit Bid In Figures	Amount In Figures
1	1	LS	Mobilization & Demobilization (Max 5%) The sum of \$ _____ _____ Per Lump Sum	\$ _____	\$ _____
2	1	LS	Stormwater Pollution Prevention Plan The sum of \$ _____ _____ Per Lump Sum	\$ _____	\$ _____
3*	100	HR	Monitoring SWPPP and Sediment Controls The sum of \$ _____ _____ Per Hour	\$ _____	\$ _____
4	1	LS	Erosion Controls The sum of \$ _____ _____ Per Lump Sum	\$ _____	\$ _____
5	1	LS	Site Preparation The sum of \$ _____ _____ Per Lump Sum	\$ _____	\$ _____
6*	4,000	SY	Furnish and install Geotextile for Temporary Road The sum of \$ _____ _____ Per Square Yard	\$ _____	\$ _____
7*	1,500	CY	Furnish and Install Gravel (NHDOT 304.3) The sum of \$ _____ _____ Per Cubic Yard	\$ _____	\$ _____
8*	200	CY	Furnish and Install Screened Stone The sum of \$ _____ _____ Per Cubic Yard	\$ _____	\$ _____
9*	3,000	SY	Furnish and Install Timber Mats The sum of \$ _____ _____ Per Square Yard	\$ _____	\$ _____
10*	120	LF	Furnish and Install Temp. 12" HDPE Culvert The sum of \$ _____ _____ Per Linear Foot	\$ _____	\$ _____

Item No.	Qty	Unit	Brief Description of Item with Unit Bid Price in Words	Unit Bid In Figures	Amount In Figures
11	1	LS	Little Bay Subaqueous Water Main complete with all appurtenances The sum of \$ _____	\$ _____	\$ _____
Per Lump Sum					
12	1	LS	Marine Traffic Management The sum of \$ _____	\$ _____	\$ _____
Per Lump Sum					
13*	100	CY	Submarine Rock Relocation The sum of \$ _____	\$ _____	\$ _____
Per Cubic Yard					
14	1	EA	6-inch Water Service Tap for Wagon Hill The sum of \$ _____	\$ _____	\$ _____
Per Each					
15	1	LS	Salt Marsh Maintenance & Restoration The sum of \$ _____	\$ _____	\$ _____
Per Lump Sum					
16*	26,000	SY	Turf Establishment with Till, Harrow, Mulch & Tackifiers The sum of \$ _____	\$ _____	\$ _____
Per Square Yard					
17	1	LS	Site Restoration – Durham The sum of \$ _____	\$ _____	\$ _____
Per Lump Sum					
18	1	LS	Site Restoration – Newington The sum of \$ _____	\$ _____	\$ _____
Per Lump Sum					
19	1	AL	Roadway Restoration – Newington The sum of \$ <u>Fifty thousand dollars</u>	<u>\$50,000</u>	<u>\$50,000</u>
Per Allowance					

* Indeterminate quantities assumed for comparison of bids. Quantities are not guaranteed. Payment will be based on actual quantities installed/constructed.

Total Base Bid (Sum of Items 1 through 19) \$ _____

Sum of _____

Total Base Bid (Sum of Items 1 through 19) in Words Above

Determination of the low Bidder shall be based on the lowest Total Base Bid cost. See Specification Sections 01150 Measurement and Payment for a complete description of the Bid Items 1 through 19.

The BIDDER hereby certifies, by checking the boxes below, that the following documents are included with this bid proposal:	
<input type="checkbox"/>	DBE Subcontractor Utilization Form NHDES Form #NHDES-W-09-059 (Formerly EPA Form 6100-4).
<input type="checkbox"/>	DBE Subcontractor Performance Forms NHDES-09-NHDES-W-09-058 (Formerly EPA Form 6100-3) Submit one form for each DBE subcontractor.
<input type="checkbox"/>	Bidder's American Iron and Steel acknowledgement.
<input type="checkbox"/>	Bidder's Build America, Buy America acknowledgement.

All of these forms are in the SRF Federal Provisions: Section D of the front-end documents.

Bid Bond

KNOW ALL MEN BY THESE PRESENTS, that we, the undersigned as _____ Principal, and as _____ Surety, are hereby held and firmly bound unto _____ as OWNER in the penal sum of _____ for the payment of which, well and truly to be made, we hereby jointly and severally bind ourselves, successors and assigns.

Signed, this _____ day of _____ in the year ____.

The condition of the above obligation is such that whereas the Principal has submitted to _____ a certain BID, attached hereto and hereby made a part hereof to enter into a contract in writing, for the _____

NOW, THEREFORE,

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

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

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

Principal Signature

Witnessed By:

Surety Signature

Witnessed By:

IMPORTANT-Surety companies executing BONDS must appear on the Treasury Department's most current list (Circular 570 as amended) and be authorized to transact business in the state of New Hampshire.

NHDES Front End Documents

Section B: Contract

Section B: Contract

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NOTICE OF AWARD

Dated _____

TO: _____

ADDRESS: _____

Street Address

City/Town

State

ZIP

Project Number 14202A

Owner Contract Number

Project : Little Bay Subaqueous Water Transmission Main

Contract For: City of Portsmouth

Insert the name of the contract as it appears on the bid documents

You are notified that your bid dated _____ for the above contract has been considered. You are the apparent successful bidder and have been awarded a contract for:

(Indicate total Work, alternates or sections of 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. The same number of sets of the drawings will be delivered separately or otherwise made available to you immediately.

You must comply with the following conditions precedent within 10 days of receiving this Notice of Award.

1. You must deliver to the OWNER all of the fully executed counterparts of the Agreement including all the Contract Documents. This includes the sets of drawings. Each of the Contract Documents must bear your signature on (the cover) (every) page.
2. You must deliver with the executed Agreement the Contract Security (Bonds) as specified in the Information for Bidders and General Conditions.
3. (List all other conditions of precedent.)

Proof of Insurance Coverage

Failure to comply with these conditions within the time specified will entitle OWNER to consider your bid abandoned, to annul this Notice of Award and to declare your Bid Security forfeited.

Within 10 days after receipt of acceptable performance BOND, payment BOND and agreement signed by the party to whom the Agreement was awarded, the OWNER will return to you, if requested, one fully signed counterpart of the Agreement with the Contract Documents attached.

(OWNER)

(Authorized Signature)

(Title)

ACKNOWLEDGEMENT OF NOTICE

Receipt of the above NOTICE OF AWARD is hereby acknowledged:

By: _____, The _____ day of _____, 20____ by
_____ title _____.

Copy to ENGINEER (Use Certified Mail, Return Receipt Requested)

AGREEMENT

THIS AGREEMENT, made this _____ day of _____, 20____ by and between City of Portsmouth, hereinafter called "OWNER" and _____ doing business as _____ (an individual, a partnership or a corporation) hereinafter called "CONTRACTOR".

WITNESSETH: That for and in consideration of the payments and agreements hereinafter mentioned:

1. The CONTRACTOR will commence and complete the construction of Little Bay Subaqueous Water Transmission Main.
2. The CONTRACTOR will furnish all of the material, supplies, tools, equipment, labor and other services necessary for the construction and completion of the PROJECT described herein.
3. The CONTRACTOR will commence the work required by the CONTRACT DOCUMENTS within 30 calendar days after the date of the NOTICE TO PROCEED unless the period for completion is extended otherwise by the CONTRACT DOCUMENTS. Completion time for the project will be calculated as calendar days from the date specified in the NOTICE TO PROCEED as follows:
275 calendar days for substantial completion.
305 calendar days for final completion.
Liquidated damages will be in the amount of \$1,000 for each calendar day of delay from the date established for the substantial completion and \$1,000 for each calendar day of delay from the date established for final completion.
4. The CONTRACTOR agrees to perform all of the WORK described in the CONTRACT DOCUMENTS and comply with the terms therein for the sum of \$_____ or as shown in the BID schedule.
5. The term "CONTRACT DOCUMENTS" means and includes the following:
 - a. ADVERTISEMENT FOR BIDS
 - b. INFORMATION FOR BIDDERS
 - c. BID
 - d. BID BOND
 - e. NOTICE OF AWARD
 - f. AGREEMENT
 - g. PAYMENT BOND
 - h. PERFORMANCE BOND
 - i. CERTIFICATE OF INSURANCE
 - j. NOTICE TO PROCEED
 - k. CHANGE ORDER(S)
 - l. CERTIFICATION OF SUBSTANTIAL COMPLETION
 - m. CERTIFICATION OF FINAL COMPLETION
 - n. CONTRACTOR'S AFFIDAVIT
 - o. CONTRACTOR'S RELEASE
 - p. GENERAL CONDITIONS
 - q. SUPPLEMENTAL GENERAL CONDITIONS
 - r. SPECIAL CONDITIONS
 - s. FEDERAL PROVISIONS, RULES, REGULATIONS AND FORMS
 - t. DRAWINGS prepared by: Wright-Pierce numbered _____ through _____ and dated _____, 20____
 - u. SPECIFICATIONS prepared or issued by: Wright-Pierce and dated _____, 20____

v. ADDENDA

No. _____ dated _____, 20__

No. _____ dated _____, 20__

No. _____ dated _____, 20__

No. _____ dated _____, 20__

6. The OWNER will pay to the CONTRACTOR in the manner and at such times as set forth in the General Conditions such amounts as required by the CONTRACT DOCUMENTS.
7. This agreement shall be binding upon all parties hereto and their respective heirs, executors, administrators, successors and assigns.

IN WITNESS WHEREOF, the parties hereto have executed, or caused to be executed by their duly authorized officials this Agreement in ____ copies, each of which shall be deemed an original on the date first above written.

OWNER: _____

By: _____

NAME: _____

(SEAL)

ATTEST: _____

NAME: _____

TITLE: _____

CONTRACTOR: _____

BY: _____

NAME: _____

ADDRESS: _____

(SEAL)

ATTEST: _____

NAME: _____

TITLE: _____

PAYMENT BOND

KNOW ALL MEN BY THESE PRESENTS: that

_____, (contractor name),
_____, (contractor address), a
_____(corporation partnership, individual), hereinafter called
Principal, and _____, (surety name),
_____, (surety address) herein after called
surety, are held and firmly bound unto _____,
(owner name), _____, (owner address)
hereinafter called OWNER and unto all persons, firms, and corporations who or which may furnish labor, or who furnish
materials to perform as described under the contract and to their successors and assigns, in the total aggregate penal
sum of _____dollars, (\$_____) in lawful money of the United States, for the payment
of which sum well and truly to be made, we bind ourselves, our heirs, executors, administrators, successors, and assigns,
jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION is such that whereas, the Principal entered into a certain contract with the
OWNER, dated the _____ day of _____, 20____, a copy of which is hereto attached and made a part
hereof for the construction of _____.

NOW, THEREFORE, if the Principal shall promptly make payment to all persons, firms, and corporations furnishing
materials for or performing labor in the prosecution of the WORK provided for in such contract, and any authorized
extension or modification thereof, including all amounts due for materials, lubricants, oil, gasoline, coal and coke,
repairs on machinery, equipment and tools, consumed or used in connection with the construction of such WORK, and
for all labor cost incurred in such WORK including that be a subcontractor, and to any mechanic or materialman
lienholder whether it acquires its lien by operation of State or Federal Law; then this obligation shall be void; otherwise
to remain in full force and effect.

PROVIDED, that beneficiaries or claimants hereunder shall be limited to the subcontractors, and persons, firms, and
corporations having a direct contract with the PRINCIPAL or its SUBCONTRACTORS.

PROVIDED FURTHER, that the said Surety for value received hereby stipulates and agrees that no change, extension of
time, alteration or addition to the terms of the contract or to the WORK to be performed thereunder or the
SPECIFICATIONS accompanying the same shall in any way affect its obligation on this BOND, and it does hereby waive
notice of any such change, extension of time, alteration or addition to the terms of the contract or to the WORK or to
the SPECIFICATIONS.

PROVIDED, FURTHER that no suit or action shall be commenced hereunder by any claimant: (a) Unless claimant, other
than one having a direct contract with the PRINCIPAL shall have given written notice to any two of the following: The
PRINCIPAL, the OWNER, or the SURETY above named within ninety (90) days after such claimant did or performed the
last of the work or labor, or furnished the last of the materials for which said claim is made, stating with substantial
accuracy the amount claimed and the name of the party to whom the materials were furnished, or for whom the work
or labor was done or performed. Such notice shall be served by mailing the same by registered mail or certified mail,
postage prepaid, in an envelope addressed to the PRINCIPAL, OWNER, or SURETY, at any place where an office is
regularly maintained for the transaction business, or served in any manner in which legal process may be served in the
state in which the aforesaid project is located, save that such service need not be made by a public officer; (b) After the
expiration of one (1) year following the date on which PRINCIPAL ceased work on said CONTRACT, it being understood,
however, that if any limitation embodied in the BOND is prohibited by any law controlling the construction hereof, such
limitation shall be deemed to be amended so as to be equal to the minimum period of limitation permitted by such law.

PROVIDED, FURTHER, that it is expressly agreed that this BOND shall be deemed amended automatically and immediately, without formal and separate amendments hereto, upon amendment to the Contract not increasing the contract price more than 20 percent, so as to bind the PRINCIPAL and the SURETY to the full and faithful performance of the Contract as so amended. The term "Amendment", wherever used in this BOND and whether referring to this BOND, the contract or the loan Documents shall include any alteration, addition, extension or modification of any character whatsoever.

PROVIDED FURTHER, that no final settlement between the OWNER and the CONTRACTOR shall abridge the right of any beneficiary hereunder, whose claim may be unsatisfied.

IN WITNESS WHEREOF, this instrument is executed in _____
counterparts, each one of which shall be deemed an original this day of _____, 20____

ATTEST:

BY: _____
(Principal) Secretary

BY: _____
Witness as to Principal

(ADDRESS)

ATTEST:

BY: _____
Witness to Surety

(PRINCIPAL)

BY: _____

(ADDRESS)

(SURETY)

BY: _____
(ATTORNEY in FACT)

(ADDRESS)

NOTE: Date of BOND must not be prior to date of Contract.
If CONTRACTOR is partnership, all partners should execute BOND.

IMPORTANT: Surety companies executing BONDS must appear on the Treasury Department's most current list (Circular 570 as amended) and be authorized to transact business in the State of New Hampshire.

PERFORMANCE BOND

KNOW ALL MEN BY THESE PRESENTS: that

_____, (contractor name),
_____, (contractor address), a
_____(corporation partnership, individual), hereinafter called
Principal, and _____, (surety name),
_____, (surety address) herein after called
surety, are held and firmly bound unto _____, (owner name),
_____, (owner address) hereinafter called
OWNER in the total aggregate penal sum of _____ dollars, (\$_____) in lawful money
of the United States, for the payment of which sum well and truly to be made, we bind ourselves, our heirs, executors,
administrators, successors, and assigns, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION is such that whereas, the Principal entered into a certain contract with the
OWNER, dated the _____ day of _____, 20____, a copy of which is hereto attached and made a part
hereof for the construction of _____.

NOW, THEREFORE, if the Principal shall well, truly and faithfully perform its duties, all the undertakings, covenants,
terms, conditions, and agreements of said contract during the original term thereof, and any extension thereof which
may be granted by the OWNER, with or without notice to the Surety and during the one year guaranty period, and if the
PRINCIPAL shall satisfy all claims and demands incurred under such contract, and shall fully indemnify and save harmless
the OWNER from all costs and damages which it may suffer by reason of failure to do so, and shall reimburse and repay
the OWNER all outlay and expense which the OWNER may incur in making good any default, then this obligation shall
be void: otherwise to remain in full force and effect.

PROVIDED, FURTHER, that the said surety, for value received hereby stipulates and agrees that no change, extension of
time, alteration or addition to the terms of the contract or to WORK to be performed thereunder or the specifications
accompanying same shall in any way affect its obligation on this BOND, and it does hereby waive notice of any such
change, extension of time alteration or addition to the terms of the contract or to the WORK or to the specifications.

PROVIDED, FURTHER, that it is expressly agreed that this BOND shall be deemed amended automatically and
immediately, without formal and separate amendments hereto, upon amendment to the Contract not increasing the
contract price more than 20 percent, so as to bind the PRINCIPAL and the SURETY to the full and faithful performance of
the Contract as so amended. The term "Amendment", wherever used in this BOND and whether referring to this BOND,
the contract or the loan Documents shall include any alteration, addition, extension or modification of any character
whatsoever.

PROVIDED, FURTHER, that no final settlement between the OWNER and the CONTRACTOR shall abridge the right of any
beneficiary hereunder, whose claim may be unsatisfied.

IN WITNESS WHEREOF, this instrument is executed in _____ counterparts, each one of which shall be deemed an original this day of _____, 20____

ATTEST:

BY: _____
(Principal) Secretary

BY: _____
Witness as to Principal

(ADDRESS)

ATTEST:

BY: _____
Witness to Surety

(PRINCIPAL)

BY: _____

(ADDRESS)

(SURETY)

BY: _____
(ATTORNEY in FACT)

(ADDRESS)

NOTE: Date of BOND must not be prior to date of Contract.
If CONTRACTOR is partnership, all partners should execute BOND.

IMPORTANT: Surety companies executing BONDS must appear on the Treasury Department's most current list (Circular 570 as amended) and be authorized to transact business in the State of New Hampshire.

NOTICE TO PROCEED

Dated _____, 20____

TO: _____
(Insert Name of Contractor as it appears in the Bid Documents)

ADDRESS: _____

OWNER'S PROJECT NO. _____

PROJECT: Little Bay Subaqueous Water Transmission Main

OWNER'S CONTRACT NO. _____

CONTRACT FOR: _____

You are notified that the Contract Time under the above contract will commence to run on _____, 20____. By that date, you are to start performing your obligations under the Contract Documents. In accordance with paragraph 3 of the Agreement, the dates of Substantial Completion and Final Completion are _____, 20____ and _____, 20____, respectively.

Before you may start any Work at the site, paragraph 27 of the General Conditions provides that you and Owner must each deliver to the other (with copies to ENGINEER) 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:

Copy to ENGINEER

(Use Certified Mail, return receipt Requested)

OWNER: _____

BY: _____

(Authorized Representative)

NAME: _____

(Title)

ACKNOWLEDGEMENT OF NOTICE

Receipt of the above NOTICE TO PROCEED is hereby acknowledged by:

(Contractor)

This the _____, day of 20____, by _____

Employee Identification Number: _____

CHANGE ORDER

No. _____

PROJECT NAME: _____ DATE OF ISSUANCE: _____

OWNER: _____ OWNER PROJECT NO. _____

OWNER ADDRESS: _____

Street Name

City/Town

State

ZIP

CONTRACTOR: _____

CONTRACT FOR: _____

ENGINEER: _____ ENG. PROJECT NO. _____

ENGINEER ADDRESS: _____

Street Name

City/Town

State

ZIP

You are directed to make the following changes in the Contract Documents.

Description: _____

Purpose of Change Order: _____

Justification: _____

Attachments: (List documents supporting change)

CHANGE IN CONTRACT PRICE	CHANGE IN CONTRACT TIME
Original Contract Price	Original Contract Time days date
Previous Change Orders	Net change from previous Change Orders days date
Contract Price prior to this Change Order	Contract Time prior to this Change Order days date
Net Increase (Decrease) of this Change Order	Net Increase (decrease) this Change Order days date
Contract Price with all approved Change Orders	Contract Time with all Change Orders days date

This document will become a supplement to the CONTRACT and all provisions will apply hereto. The attached Contractor's Revised Project Schedule reflects increases or decreases in Contract Time as authorized by this Change Order.

Stipulated price and time adjustment includes all costs and time associated with the above described change. Contractor waives all rights for additional time extension for said change. Contractor and Owner agree that the price(s) and time adjustment(s) stated above are equitable and acceptable to both parties.

RECOMMENDED BY:

APPROVED BY:

APPROVED BY:

Engineer_____
Owner_____
Contractor_____
Date_____
Date_____
Date

CERTIFICATE OF SUBSTANTIAL COMPLETION

Owner Project No. _____ Engineer Project No. _____
Project: _____
Contractor: _____
Contract For: _____ Contract Date: _____

This Certificate of Substantial Completion applies to all work under the Contract Documents or to the following specified parts thereof:

To _____
(Owner)

And to _____
(Contractor)

The Work to which this Certificate applies has been inspected by authorized representatives of OWNER, CONTRACTOR and ENGINEER, and that Work is hereby declared to be substantially complete in accordance with the Contract Documents on Documents on _____.
(Date of Substantial Completion)

A tentative list of items to be completed or corrected is attached hereto. This list may not be all-inclusive, and the failure to include an item in it does not alter the responsibility of CONTRACTOR to complete all the work in accordance with the Contract Documents. The items in the tentative list shall be completed or corrected by CONTRACTOR within _____ calendar days of the above Substantial Completion.

The responsibilities between OWNER and CONTRACTOR for security, operation, safety, maintenance, heat, utilities, insurance and warranties shall be as follows:

RESPONSIBILITIES:

OWNER: _____

CONTRACTOR: _____

The following documents are attached to and made a 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 the Engineer on _____, 20__

(Engineer)

By: _____

CONTRACTOR accepts this Certificate of Substantial Completion on _____, 20__

(Contractor)

By: _____

OWNER accepts this Certificate of Substantial Completion on _____, 20__

(Owner)

By: _____

CERTIFICATE OF FINAL COMPLETION

Owner Project No. _____ Engineer Project No. _____
Project: _____
Owner: _____
Contractor: _____
Engineer: _____
Agreement Date: _____
Notice to Proceed Date: _____
Contractual Substantial Completion
date as modified by change orders: _____
Actual Substantial Completion date _____
Contractual final completion date
as modified by Change Orders _____

The work to which this certificate applies has been inspected by authorized representatives of Owner, Contractor, Engineer, the punch list has been completed and the work of the contract is hereby declared to be Finally Complete in accordance with the Contract Documents on _____.

(Date of Final Completion)

This certificate does not constitute an acceptance of any 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. The warranty for all work completed subsequent to the date of Substantial Completion expires one year from the date of this Final Acceptance.

Executed by Engineer on _____, 20__

By: _____

Contractor Accepts this Certificate of Final Completion on _____, 20__

By: _____

Owner Accepts this Certificate of Final Completion on _____, 20__

By: _____

CONTRACTORS AFFIDAVIT

STATE OF: _____

COUNTY OF: _____

Before me the undersigned a _____ (Notary Public, Justice of the Peace, Alderman) in and for said County and State Personally appeared _____ (Individual, partner or duly) who being duly sworn according to law deposes and says that the cost of all the Work, and outstanding claims and indebtedness of whatever nature arising out of the performance of the contract between _____ (Owner) and _____ (Contractor) of _____ (Contractor Address) dated _____ for the construction of the _____ (Project Name) and necessary appurtenant installations have been paid in full.

(Individual, Partner, or duly authorized representative of corporate contractor)

(Title)

Sworn to and subscribed before me
this _____ day of _____, 20__

(Notary Public)

CONTRACTOR'S FINAL RELEASE AND WAIVER OF LIEN

Project Name:				
Project Address:				
	Street Name	City/Town	State	ZIP
Owner Name:				
Contractor Name:				
Contractor Address:				
	Street Name	City/Town	State	ZIP

TO ALL WHOM IT MAY CONCERN:

For good and valuable consideration, the receipt and sufficiency of which is hereby acknowledged, the undersigned Contractor hereby waives, discharges, and releases any and all liens, claims, and rights to liens against the above-mentioned project, and any and all other property owned by or the title to which is in the name of the above-referenced Owner and against any and all funds of the Owner appropriated and available for the construction of said project, and any and all warrants drawn upon or issued against any such funds or monies, which the undersigned Contractor may have or may hereafter acquire or process as a result of the furnishing of labor, materials and/or equipment, and the performance of work by the Contractor on or in connection with said project, whether under and pursuant to the above-mentioned contract between the Contractor and the Owner pertaining to said project or otherwise, and which said liens, claims or rights of lien may arise and exist.

The undersigned further hereby acknowledges that the sum of:

_____ Dollars (\$ _____) constitutes the entire *unpaid* balance due the undersigned in connection with said project whether under said contract or otherwise and that the payment of said sum to the contractor will constitute payment in full and will fully satisfy any and all liens, claims, and demands which the contractor may have or assert against the owner in connection with said contract or project.

Dated this _____ day of _____, 20__

(Contractor)

Witness to Signature

BY:	BY:
_____	_____
Title	Title

NHDES Front End Documents

Section C: General Conditions

General Conditions

Section C: General Conditions

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General Conditions

1. Contract and Contract Documents.

The plans, information for bidders, bids, advertisement for bids, bid payment and performance bonds, agreements, change orders, notice to proceed, specifications and addenda, hereinafter enumerated in the agreement, shall form part of this Contract and the provisions thereof shall be as binding upon the parties hereto as if they were herein fully set forth. The table of contents, titles, headings, running headlines and marginal notes contained herein and in said documents are solely to facilitate reference to various provisions of the Contract Documents and in no way affect, limit or cast light on the interpretation of the provisions to which they refer.

2. Definitions.

- 2.1 "Addenda" means written or graphic instruments issued prior to the execution of the agreement which modify or interpret the Contract Documents, drawings and specifications, by additions, deletions, clarifications or corrections. Such written or graphic instruments will be issued no less than five days before the bid opening.
- 2.2 "Bid" means the offer or proposal of the bidder submitted on the prescribed form setting forth the prices for the work to be performed.
- 2.3 "Bidder" means any person, firm or corporation submitting a bid for the work.
- 2.4 "Bonds" means bid, performance, and payment bonds and other instruments of security, furnished by the Contractor and his surety in accordance with the Contract Documents.
- 2.5 "Change Order" means a written order to the Contractor authorizing an addition, deletion or revision in the work within the general scope of the Contract Documents, or authorizing an adjustment in the Contract Price or Contract Time.
- 2.6 "Contract Documents" means the Contract, including any advertisement for bids, information for bidders, bid, bid bond, agreement, payment bond, performance bond, notice of award, notice to proceed, change orders, drawings, specifications and addenda.
- 2.7 "Contract Price" means the total monies payable to the Contractor under the terms and conditions of the Contract Documents.
- 2.8 "Contract Time" means the number of calendar days stated in the Contract Documents for the completion of the work.
- 2.9 "Contractor" means the person, firm or corporation with whom the owner has executed the agreement.
- 2.10 "Division" means the state of New Hampshire Department of Environmental Services, Water Division. "Drawings" mean the part of the Contract Documents which show the characteristics and scope of the work to be performed and which have been prepared or approved by the engineer.
- 2.11 "Engineer" means the person, firm or corporation named as such in the Contract Documents.
- 2.12 "Field order" means a written order effecting a change in the work not relating to an adjustment in the Contract price or an extension of the Contract time and issued by the engineer to the Contractor during construction.
- 2.13 "Notice of Award" means the written notice of the acceptance of the bid from the owner to the successful Bidder.

General Conditions

- 2.14 "Notice to Proceed" means the written communication issued by the owner to the Contractor authorizing him to proceed with the Work and establishing the date of commencement of the work.
- 2.15 "Owner" means a public or quasi-public body or authority, corporation, association, partnership, or individual for whom the work is to be performed.
- 2.16 "Plans" means the Contract drawings or exact reproductions thereof which show the scope, character, dimensions and details of the work and which have been prepared or approved by the engineer.
- 2.17 "Project" means the undertaking to be performed as provided in the Contract Documents.
- 2.18 "Resident Project Representative" means the authorized representative of the owner who is assigned to the project site or any part thereof.
- 2.19 "Shop Drawings" means all drawings, diagrams, illustrations, brochures, schedules and other data which are prepared by the Contractor, a subcontractor, manufacturer, supplier or distributor, which illustrates how specific portions of the work shall be fabricated or installed.
- 2.20 "Special conditions" means revisions or additions to these general conditions, supplemental general conditions or specifications applicable to an individual project.
- 2.21 "Specifications" means a part of the Contract Documents consisting of written descriptions of a technical nature of materials, equipment, construction systems, standards and workmanship.
- 2.22 "Subcontractor" means an individual, firm or corporation having a direct Contract with the Contractor or with any other Subcontractor for the performance of a part of the work at the site.
- 2.23 "Substantial Completion" means that date as certified by the engineer when the construction of the Project or a specified part thereof is sufficiently completed, in accordance with the Contract Documents, so that the project or specified part can be utilized for the purposes for which it is intended.
- 2.24 "Supplemental General Conditions" means modifications to these general conditions required by a federal agency for participation in the Project and approved by the agency in writing prior to inclusion in the Contract Documents, or such documents that may be imposed by applicable state laws.
- 2.25 "Supplier" means any person or organization who supplies materials or equipment for the work, including that fabricated to a special design, but who does not perform labor at the site.
- 2.26 "Work" means all labor necessary to produce the construction required by the Contract Documents, and all materials and equipment incorporated or to be incorporated in the project.
- 2.27 "Written Notice" means any notice to any party of the agreement relative to any part of this agreement in writing and considered delivered and the service thereof completed, when posted by certified or registered mail to the said party at his last given address, or delivered in person to said party or his authorized representative on the work.

3. Additional Instructions and Detail Drawings.

The Contractor may be furnished additional instructions and detail drawings as necessary to carry out the work included in the Contract. The additional drawings and instructions thus supplied to the Contractor will coordinate with the Contract Documents and will be so prepared that they can be reasonably interpreted as part thereof.

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- 4. Shop or Setting Drawings.** Shop or setting drawings shall be in accordance with the following:
- 4.1 The Contractor shall furnish 6 copies of the manufacturer's shop drawings, specific design data as required in the detailed specifications, and technical literature covering all equipment and fabricated materials which he proposes to furnish under this Contract in sufficient detail to indicate full compliance with the specifications. Shop drawings shall indicate the method of installing, the exact layout dimensions of the equipment or materials, including the location, size and details of valves, pipe connections, etc.
 - 4.2 No equipment or materials shall be shipped until the manufacturer's shop drawings and specifications or other identifying data, assuring compliance with these specifications, are approved by the engineer.
 - 4.3 The Contractor shall check and verify all field measurements and shall be responsible for the prompt submission of all shop and working drawings so that there shall be no delay in the work.
 - 4.4 Regardless of corrections made in or approval given to such drawings by the engineer, the Contractor will nevertheless be responsible for the accuracy of such drawings and for their conformity to the plans and specifications. The Contractor shall notify the engineer in writing of any deviations at the time he furnishes such drawings. He shall remain responsible for the accuracy of the drawings showing the deviations but not for the acceptance of the deviations from the original design shown in the plans and specification. Approval by the engineer and the owner of any deviation in material, workmanship or equipment proposed subsequent to approval of the shop drawings or design data, shall be requested in writing by the Contractor.
 - 4.5 When submitted for the engineer's review, shop drawings shall bear the Contractor's certification that he has reviewed, checked and approved the shop drawings and that they are in conformance with the requirements of the Contract Documents.
- 5. Materials, Services, Facilities and Workmanship** shall be furnished as follows:
- 5.1 Except as otherwise specifically stated in the Contract Documents, the Contractor shall provide and pay for all materials, labor, tools, equipment, water, light, power, transportation, superintendence, temporary construction of every nature, and all other services and facilities of every nature whatsoever necessary to execute, complete, and deliver the work within the specified time.
 - 5.2 Unless otherwise specifically provided for in the specifications, all workmanship, equipment, materials and articles incorporated in the work shall be new and the best grade of the respective kinds for the purpose.
 - 5.3 The Contractor shall furnish to the engineer for approval the manufacturer's detailed specifications for all machinery, mechanical and other special equipment, which he contemplates installing together with full information as to type, performance characteristics, and all other pertinent information as required.
 - 5.4 Materials which are specified by reference to the number or symbol of a specific standard, such as an ASTM standard, a federal specification or other similar standard, shall comply with requirements in the latest revision thereof and any amendment or supplement thereto in effect on the date of the advertisement for bids, except as limited to type, class or grade, or modified in such reference. The standards referred to shall have full force and effect as though printed therein.
 - 5.5 For equipment or for materials, when requested by the engineer, the Contractor shall submit certificates of compliance from the manufacturer, certifying that the equipment or the materials comply with the requirements of the specifications or the standards.

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- 5.6 Manufactured articles, materials, and equipment shall be applied, installed, connected, erected, used, cleaned and conditioned as directed by the manufacturer.
- 5.7 Materials, supplies, and equipment shall be in accordance with samples submitted by the Contractor and approved by the engineer.

6. Contractor's Title To Materials.

No material, supplies, or equipment to be installed or furnished under this Contract shall be purchased subject to any chattel mortgage or under a conditional sale, lease purchase or other agreement by which an interest therein or in any part thereof is retained by the seller or supplier. The Contractor shall warrant good title to all materials, supplies, and equipment installed or incorporated in the work and upon completion of all work, shall deliver the same together with all improvements and appurtenances constructed or placed thereon by him to the owner free from any claims, liens, or charges. Neither the Contractor nor any person, firm or corporation furnishing any material or labor for any work covered by this Contract shall have any right to a lien upon any improvement or appurtenance thereon. Nothing contained in this paragraph, however, shall defeat or impair the right of persons furnishing materials or labor to recover under any bond given by the Contractor for their protection or any rights under any law permitting such persons to look to funds due the Contractor in the hands of the owner. The provisions of this paragraph shall be inserted in all Subcontracts and material Contracts and notice of its provisions shall be given to all persons furnishing materials for the work when formal Contract is entered into for such materials.

7. Inspection and Testing of Materials shall be as follows:

- 7.1 All materials and equipment used in the construction of the project shall be subject to inspection and testing by the engineer in accordance with accepted standards at any and all times during manufacture or during the project construction and at any or all places where such manufacture is carried on.
- 7.2 The Contractor shall furnish promptly upon request by the engineer, all materials required to be tested. All tests made by the engineer shall be performed in such manner and ahead of scheduled installation, as not to delay the work of the Contractor. When required, testing of concrete, masonry, soils, pipe and pipe materials will be made in accordance with provisions in the specifications.
- 7.3 Material required to be tested which is delivered to the job site shall not be incorporated into the work until the tests have been completed and approval or acceptance given in writing by the engineer.
- 7.4 Each sample submitted by the Contractor for testing shall carry an identification label containing such information as is requested by the engineer. It shall also include a statement that the samples are representative of the remaining materials to be used on the project.
- 7.5 Approval of any materials shall be general only and shall not constitute a waiver of the owner's right to demand full compliance with the Contract requirements.
- 7.6 The engineer may, at his own discretion, undertake the inspection of materials at the source. In the event plant inspection is undertaken, the following conditions shall be met:
 - a. The engineer shall have the cooperation and assistance of the Contractor and the producer with whom he has Contracted for materials.
 - b. The engineer shall have full entry at all reasonable times to such areas as may concern the manufacture or production of the materials being furnished.

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- c. If required, the Contractor shall arrange for a building for the use of the inspector; such building to be located near the plant, independent of any building used by the material producer, in which to house and use the equipment necessary to carry on the required tests. Cost for such arrangement shall be paid by the owner as a stated allowance in the bid.
 - d. Adequate safety measures shall be provided and maintained at all times.
- 7.7 Except as otherwise specifically stated in the Contract, the costs of sampling and testing will be divided as follows:
- a. The Contractor shall furnish the engineer, without extra cost, all samples required for testing purposes. All sampling and testing including the number and selection of samples shall be determined by the engineer for his own information and use.
 - b. When testing of materials is specified in the appropriate section of the specifications, the cost of the same shall be charged to the owner or Contractor, as detailed in the specifications. However, costs of equipment performance tests shall be borne by the Contractor, as detailed in the appropriate section of the specifications.
 - c. When the Contractor proposes a material, article or component as equal to the ones specified, reasonable tests may, or may not, be required by the engineer. If the engineer requires tests of a proposed equal item, the Contractor will be required to assume all costs of such testing.
 - d. Any material, article or component which fails to pass tests required by the Engineer or by the specifications, will be rejected and shall be removed from the project site. However, if, upon request of the Contractor, retesting or further tests are permitted by the Engineer, the Contractor shall assume all costs related to such retesting or further tests.
 - e. Neither the Owner nor the Engineer will in any way be charged for the manufacturer's costs in supplying certificates of compliance.
- 7.8 If the Contract Documents, laws, ordinances, rules, regulations or orders of any public authority having jurisdiction require any Work to specifically be inspected, tested or approved by someone other than the Contractor, the Contractor will give the Engineer timely notice of readiness. The Contractor will then furnish the Engineer with the required certificates of inspection, testing or approval.
- 7.9 Inspections, tests, or approvals by the engineer or others shall not relieve the Contractor from obligations to perform the Work in accordance with the requirements of the Contract Documents.
- 8. "Or Equal " Clause, Substitutions and Contractor Options.**
- 8.1 Whenever a material, article, or piece of equipment is identified on the plans or in the specifications by reference to manufacturer's or vendor's names, trade names, catalogue numbers, etc., it is intended merely to establish a standard of quality and performance. Any material, article, or equipment of other manufacturers and vendors, which will perform satisfactorily the duties imposed by the general design, shall be considered equally acceptable provided the material, article, or equipment so proposed is, in the opinion of the Engineer, of equal quality and function. The Engineer shall determine equality based on such information, tests, or other supporting data that may be required of the Contractor.
- 8.2 Upon acceptance and approval by the Engineer of an equal product, it shall remain the responsibility of the Contractor to coordinate installation of the item with all other items to be furnished to assure proper fitting together of all items. Similar responsibility applies to items which are left to the Contractor's option. Any

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additional cost of equal items and any additional cost incidental to the coordination and/or fitting together of such items shall be borne by the Contractor at no extra cost to the Owner.

- 8.3 If a specified or equal item is not available to meet the construction schedule, the Contractor may propose a substitute item of less than equal performance and quality. If this substitute is acceptable to the Engineer, any difference in purchase cost or costs incidental to the installation of such item will be negotiated between the parties to the Contract.
- 8.4 Neither equal nor substitute items shall be installed without written approval of the Engineer.
- 8.5 The Contractor shall warrant that if substitutes are approved, no major changes in the function or general design of the Project will result.
- 9. Patents.** Patent information is as follows:
 - 9.1 The Contractor shall hold and save the owner and its officers, agents, servants, and employees harmless from liability of any nature or kind, including cost and expenses for, or on account of, any patented or unpatented invention, process, article, or appliance manufactured or used in the performance of the Contract, including its use by the owner, unless otherwise specifically stipulated in the Contract Documents.
 - 9.2 License and/or royalty fees for the use of a process used in wastewater plant design which is authorized by the owner for the project, must be reasonable, and paid to the holder of the patent, or his authorized licensee.
 - 9.3 If the Contractor uses any design, device or materials in the construction methods for the project covered by patents or copyrights, he shall provide for such use by suitable agreement with the owner of such patented or copyrighted design, device or material. It is mutually agreed and understood, that, without exception, the Contract prices shall include all royalties or costs arising from the use of such design, device or materials, in any way involved in the work. The Contractor and/or his sureties shall indemnify and save harmless the owner of the project from any and all claims for infringement by reason of the use of such patented or copyrighted design, device or materials or any trademark or copyright in connection with work agreed to be performed under this Contract, and shall indemnify the Owner for any cost, expense or damage which it may be obliged to pay by reason of such infringement at any time during the construction of the work or after completion of the work.
- 10. Surveys. Surveys of land, property and construction** shall be as follows:
 - 10.1 The owner will provide all land surveys and will establish and locate all property lines relating to the project.
 - 10.2 For structures, the Engineer will establish and stake out one or more base lines as needed and will establish bench marks in and around the project site for the use of the Contractor and for the Engineer's own reference in checking the work in progress. For structures such as pipelines, the Engineer will establish the location of the pipe, manholes and other appurtenances, and will establish bench marks along the route of the pipeline at intervals for the using of the Contractor and for his own reference in checking the pipe and manhole inverts and other elevations throughout the project. The Contractor shall utilize the lines and bench marks established by the Engineer to set up whatever specific detail controls he may need for establishing location, elevation lines and grades of all structures. All this work is subject to checking, approval, and continuous surveillance by the Engineer to avoid error. The Contractor shall provide the Engineer with a qualified man or men to assist in this checking as needed and on request of the Engineer.
 - 10.3 For construction other than pipelines and appurtenances in roadways and cross country, the Contractor shall be responsible for the location and setting lines and grades. The Contractor shall establish the location for pump

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station and wastewater treatment facility structures, associated yard piping including electrical conduits, internal piping and all equipment. Base lines and benchmarks for setting of the lines and grades for the above shall be provided by the Engineer.

- 10.4 Protection of stakes. The Contractor shall protect and preserve all of the established baseline stakes, bench marks, or other controls placed by the Engineer. Any of these items destroyed or lost through fault of the Contractor will be replaced by the Engineer at the Contractor's expense.

11. Contractor's Obligations are as follows:

The Contractor shall and in good workmanlike manner, do and perform all work and furnish and pay for all supplies and materials, machinery, equipment, facilities and means, except as herein otherwise expressly specified, necessary or proper to perform and complete all the work required by this Contract, within the time stated in the proposal in accordance with the plans and drawings covered by this Contract, and any and all supplemental plans and drawings, in accordance with the directions of the Engineer as given from time to time during the progress of the work, whether or not he considers the direction in accordance with the terms of the Contract. He shall furnish, erect, maintain and remove such construction plant and such temporary works as may be required. The Contractor shall observe, comply with, and be subject to all terms, conditions, requirements, and limitations of the Contract Documents, and shall do, carry on and complete the entire work to the satisfaction of the Engineer and Owner.

Contractor shall carry on the work and adhere to the progress schedule during all disputes, disagreements or unresolved claims with the owner. No work shall be delayed or postponed pending the resolution of any disputes, disagreements, or claims except as the owner and Contractor may otherwise agree in writing.

12. Weather Conditions.

In the event of temporary suspension of work, or during inclement weather, or whenever the Engineer shall direct, the Contractor and his Subcontractors shall protect their work and materials against damage or injury from the weather. If, in the opinion of the Engineer, any work or material shall have been damaged or injured by reason of failure on the part of the Contractor or any of his Subcontractors to so protect his work, such materials shall be removed and replaced at the expense of the Contractor.

13. Protection of Work and Property shall be provided as follows:

- 13.1 The Contractor shall at all times safely guard the Owner's property from injury or loss in connection with this Contract. He shall at all times safely guard and protect his own work, and that of adjacent property, from damage. The Contractor shall replace or make good any such damage, loss or injury unless caused directly by errors contained in the Contract, or by the Owner, or his authorized representatives. The Contractor will notify owners of adjacent utilities when prosecution of the Work may affect them.
- 13.2 The Contractor shall take all necessary precautions for the safety of employees on the work site, and shall comply with all applicable provisions of federal, state and municipal safety laws and building codes to prevent accidents or injury to persons on, about or adjacent to the premises where the work is being performed. He shall erect and properly maintain at all times, as required by the conditions and progress of the work, all necessary safeguards for the protection of the workmen and the public and shall post danger signs warning against the hazards created by such features of construction as protruding nails, hoists, well holes, elevator hatchways, scaffolding, window openings, stairways, trenches and other excavations, and falling materials, and he shall designate a responsible member of his organization on the work, whose duty shall be the prevention of accidents. The name and position

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of any person so designated shall be reported to the Engineer by the Contractor. The person so designated shall be available by phone during nonworking hours.

- 13.3 In case of emergency which threatens loss or injury of property, and/or safety of life, the Contractor is allowed to act, without previous instructions from the Engineer. He shall notify the Engineer immediately thereafter. Any claim for compensation by the Contractor due to such extra work shall be promptly submitted in writing to the Engineer for approval.
- 13.4 When the Contractor has not taken action but has notified the Engineer of an emergency threatening injury to persons or damage to the work or any adjoining property, he shall act as instructed or authorized by the Engineer.
- 13.5 The intention is not to relieve the Contractor from acting, but to provide for consultations between Engineer and Contractor in an emergency which permits time for such consultations.
- 13.6 The amount of reimbursement claimed by the Contractor on account of any emergency action shall be determined in the manner provided in Article 17 (extra work and change orders) of the general conditions.

14. Inspection of work for conformance with plans and specifications.

- 14.1 For purposes of inspection and for any other purpose, the Owner, the Engineer, and agents and employees of the Division or of any funding agency may enter upon the work and the premises used by the Contractor, and the Contractor shall provide safe and proper facilities therefore. The Engineer shall be furnished with every facility for ascertaining that the work is in accordance with the requirements and intention of this Contract, even to the extent of uncovering or taking down portions of finished work.
- 14.2 During construction and on its completion, all work shall conform to the location, lines, levels and grades indicated on the drawings or established on the site by the Engineer and shall be built in a workmanlike manner, in accordance with the drawings and specifications and the supplementary directions given from time to time by the Engineer. In no case shall any work which exceeds the requirements of the drawings and specifications be paid for as extra work unless ordered in writing by the Engineer.
- 14.3 Unauthorized work and work not conforming to plans and specifications shall be handled as follows:
 - a. Work considered by the Engineer to be outside of or different from the plans and specifications and done without instruction by the Engineer, or in wrong location, or done without proper lines or levels, may be ordered by the Engineer to be uncovered or dismantled.
 - b. Work done in the absence of the Engineer or his agent may be ordered by the Engineer to be uncovered or dismantled.
 - c. Should the work thus exposed or examined prove satisfactory, the uncovering or dismantling and the replacement of material and rebuilding of the work shall be considered as "Extra Work" to be processed in accordance with article 17.
 - d. Should the work thus exposed or examined prove to be unsatisfactory the uncovering or dismantling and the replacement of material and rebuilding of the work shall be at the expense of the Contractor.

- 15. **Reports, Records and Data** shall be furnished as follows: The Contractor shall submit to the owner such schedule of quantities and costs, progress schedules, payrolls, reports, estimates, records and other data as are required by the Contract Documents or as the owner, division or any funding agency may request concerning work performed or to be performed under this Contract.

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- 16. Superintendence by Contractor** shall be furnished as follows: At the site of the work, the Contractor shall employ a competent construction superintendent or foreman who shall have full authority to act for the Contractor. The superintendent or foreman shall have been designated in writing by the Contractor as the Contractor's representative at the site. It is understood that such representative shall be acceptable to the Engineer and shall be the one who can be continued in that capacity for the particular job involved unless he ceases to be on the Contractor's payroll. Such representative shall be present on the site at all times as required to perform adequate supervision and coordination of the Work.
- 17. Extra Work and Change Orders** shall be processed as follows:
- 17.1 The Engineer may at any time by written order and without notice to the sureties require the performance of such extra work or changes in the work as may be found necessary. The amount of compensation to be paid to the Contractor for any extra work so ordered shall be made in accordance with one or more of the following methods in the order of precedence listed below:
- a. A price based on unit prices previously approved; or
 - b. A lump sum price agreed upon between the parties and stipulated in the order for the extra work;
 - c. A price determined by adding 15 percent to the "reasonable cost" of the extra work performed, such "reasonable cost" to be determined by the Engineer in accordance with the following paragraph.
- 17.2 The Engineer shall include the reasonable cost to the Contractor of all materials used, of all labor, both common and skilled, of foreman, trucks, and the fair-market rental rate for all machinery and equipment for the period employed directly on the work. The reasonable cost for extra work shall include the cost to the Contractor of any additional insurance that may be required covering public liability for injury to persons and property, the cost of workmen's compensation insurance, federal social security, and any other costs based on payrolls, and required by law. The cost of extra work shall not include any cost or rental of small tools, buildings, or any portion of the time of the Contractor, his project supervisor or his superintendent, as assessed upon the amount of extra work, these items being considered covered by the 15 percent added to the reasonable cost. The reasonable cost for extra work shall also include the premium cost, if any, for additional bonds and insurance required because of the changes in the work.
- 17.3 In the case of extra work which is done by Subcontractors under the specific Contract, or otherwise if so approved by the Engineer, the 15 percent added to the reasonable cost of the work will be allowed only to the Subcontractor performing the work. On such work an additional 5 percent for reasonable cost will be paid to the Contractor for their work in directing the operations of the Subcontractor, for administrative supervision, and for any overhead costs. If two or more tiers of Subcontractors are involved in the extra work, a maximum of 27 percent of the cost incurred by the Subcontractor actually performing the work will be allowed to be added to the reasonable cost of the work. The 27 percent maximum represents 15 percent added to the reasonable cost of the work allowed by the Subcontractor performing the work, an additional 5 percent allowed to the next tier higher subcontractor and 5 percent allowed to the Contractor for their work in directing the operations of the Subcontractor, for administrative supervision, and for any overhead costs.
- 17.4 The Engineer may authorize minor changes or alterations in the work not involving extra cost and not inconsistent with the overall intent of the Contract Documents. These shall be accomplished by a written field order. However, if the Contractor believes that any minor change or alteration authorized by the Engineer entitles him to an increase in the Contract price, he may make a claim therefore as provided in article 21.

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18. Time For Completion and Liquidated Damages. The following paragraphs address time for completion and liquidated damages:

- 18.1 It is hereby understood and mutually agreed, by and between the Contractor and the Owner, that the date of beginning and the time for completion as specified in the Contract of the work to be done hereunder are Essential Conditions of this Contract; and it is further mutually understood and agreed that the work embraced in this Contract shall be commenced on a date to be specified in the "Notice to Proceed."
- 18.2 The Contractor agrees that said work shall be pursued regularly, diligently and continuously at such rate of progress as will insure full completion thereof within the time specified. It is expressly understood and agreed, by and between the Contractor and the Owner, that the time for the completion of the work described herein is a reasonable time, taking into consideration the average climatic range and usual industrial conditions prevailing in this locality.
- 18.3 If the Contractor shall neglect, fail or refuse to complete the work within the time herein specified, or any proper extension thereof granted by the Owner, then the Contractor does hereby agree, as a part consideration for the awarding of this Contract, to pay to the Owner the amount specified in the Contract, not as a penalty but as liquidated damages for such breach of Contract as hereinafter set forth, for each and every calendar day that the Contractor shall be in default after the time stipulated in the Contract for completing the work.
- 18.4 The liquidated damages amount is fixed and agreed upon by and between the Contractor and the Owner because of the impracticability and extreme difficulty of fixing and ascertaining the actual damages the Owner would in such event sustain. Said amount is agreed to be the amount of damages which the Owner would sustain and said amount shall be deducted from time to time by the owner from current periodical payments.
- 18.5 It is further agreed that "time is of the essence" of each and every portion of this Contract and of the specifications wherein a definite and certain length of time is fixed for the performance of any act whatsoever; and where under the Contract an additional time is allowed for the completion of any work, the new time limit fixed by such extension shall "be of the essence." Provided, that the Contractor shall not be charged with liquidated damages or any excess cost when the Owner determines that the Contractor is without fault and the Contractor's reasons for the time extension are acceptable to the Owner; provided, further, that the Contractor shall not be charged with liquidated damages or any excess cost when the delay in the completion of the work is due to:
- a. A preference, priority or allocation order duly issued by the government.
 - b. An unforeseeable cause beyond the control and without the fault or negligence of the Contractor, including, but not restricted to, acts of God, or of the public enemy, acts of the Owner, acts of another Contractor in the performance of a Contract with the Owner, fires, floods, epidemics, quarantine restrictions, strikes, freight embargoes and severe weather.
 - c. Any delays of Subcontractors or suppliers occasioned by any of the causes specified in subsections (a) and (b) of this article.
- 18.6 The Contractor shall promptly notify the Owner in writing of the causes of the delay. The Owner shall ascertain the facts and extent of the delay and notify the Contractor within a reasonable time of his decision in the matter.

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19. Defective Work. Defective work shall be processed as follows:

- 19.1 The Contractor shall promptly remove from the premises all materials and work condemned by the Engineer as failing to meet Contract requirements, whether incorporated in the work or not, and the Contractor shall promptly replace and re-execute his own work in accordance with the Contract and without expense to the Owner and shall bear the expense of making good all work of other Contractors which was destroyed or damaged by such removal or replacement.
- 19.2 All removal and replacement work shall be done at the Contractor's expense. If the Contractor does not take action to remove such condemned work and materials within 10 days after receipt of written notice, the Owner may remove them and store the material at the expense of the Contractor. If the Contractor does not pay the expense of such removal and storage within 10 days time thereafter, the Owner may, upon 10 days written notice, sell such materials at auction or at private sale and shall pay to the Contractor any net proceeds thereof, after deducting all the costs and expenses that should have been borne by the Contractor.

20. Differing Site Conditions. Claims for differing site conditions shall be processed as follows:

- 20.1 The Contractor shall promptly and before such conditions are disturbed, notify the Engineer in writing of:
- a. Subsurface or latent physical conditions at the site differing materially from those indicated in this Contract; or,
 - b. Unknown physical conditions at the site, differing materially from those ordinarily encountered and generally recognized as inherent in the type of work provided for in this Contract.
- 20.2 The Engineer shall promptly investigate the conditions. If he finds that conditions differ materially and will cause an increase or decrease in the Contractor's cost or the time required to perform any part of the work under this Contract whether or not changed as a result of such conditions, the Engineer will notify the Owner and recommend an equitable adjustment. Contractor and Owner will enter into negotiations via the Engineer to modify the contract in writing.
- 20.3 No claim of the Contractor under this clause shall be allowed unless the Contractor has given proper notice as required in paragraph 20.1 of this clause.
- 20.4 No claim by the Contractor for an equitable adjustment shall be allowed if asserted after final payment under this Contract.

21. Claims For Extra Cost. Claims for extra cost shall be processed as follows:

- 21.1 No claim for extra work or cost shall be allowed unless the same was done pursuant to a written order by the Engineer, approved by the Owner and the claim presented for payment with the first estimate after the changed or extra work is done. When work is performed under the terms of article 17, the Contractor shall furnish satisfactory bills, payrolls and vouchers covering all items of cost when requested by the Owner and shall allow the Owner access to accounts relating thereto.
- 21.2 If the Contractor claims that any instructions by drawings or similar documents issued after the date of the Contract involve extra cost under the Contract, he shall give the Engineer written notice after the receipt of such instruction and before proceeding to execute the work, except in an emergency which threatens life or property, then the procedure shall be as provided for under article 17, "Extra Work & Change Orders." No claim shall be valid unless so made.

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22. Right of Owner to Terminate Contract.

- 22.1 In the event that any of the provisions of this Contract are violated by the Contractor, or by any of his Subcontractors, the Owner may serve written notice upon the Contractor and the surety of its intention to terminate the Contract, and unless within 10 days after the serving of such notice upon the Contractor, such violation or delay shall cease and satisfactory arrangement for correction be made, the Contract shall, upon the expiration of said 10 days cease and terminate. In the event of any such termination, the Owner shall immediately serve notice thereof upon the surety and the Contractor and the surety shall have the right to take over and perform the Contract; provided, however, that if the surety does not commence performance thereof within 10 days from the date of the mailing to such surety of notice of termination, the Owner may take over the work and prosecute the same to completion by Contract or by force account for the account and at the expense of the Contractor and the Contractor and his surety shall be liable to the Owner for any excess cost occasioned the Owner thereby, and in such event the Owner may take possession of and utilize in completing the work, such materials, appliances, and plant as may be on the site of the work and necessary therefore.
- 22.2 If the Contractor should be adjudged bankrupt, or if he should make a general assignment for the benefit of his creditors, or if a receiver should be appointed on account of his insolvency, or if he should refuse or should fail, except in cases for which extensions of time are provided, to supply enough skilled workmen or materials, or if he should fail to make payments to Subcontractors or for material or labor, so as to affect the progress of the work, or be guilty of a violation of the Contract, then the Owner, upon the written notice of the Engineer that sufficient cause exists to justify such action may, without prejudice to any other right or remedy and after giving the Contractor and his surety 7 days' written notice, terminate the employment of the Contractor and take possession of the premises and of all materials, tools, equipment and other facilities installed on the work and paid for by the Owner, and finish the work by whatever method he may deem expedient. In the case of termination of this Contract before completion from any cause whatever, the Contractor, if notified to do so by the Owner, shall promptly remove any part or all of his equipment and supplies at the expense of the Contractor. If such expense exceeds such unpaid balance, the Contractor shall pay the difference to the Owner. The expense incurred by the Owner as herein provided, and the damage incurred through the Contractor's default, shall be approved by the Engineer.
- 22.3 Where the Contract has been terminated by the Owner, said termination shall not affect or terminate any of the rights of the Owner as against the Contractor or his surety then existing or which may thereafter accrue because of such default. Any retention or payment of monies by the Owner due the Contractor under the terms of the Contract, shall not release the Contractor or his surety from liability for his default.
- 22.4 After ten (10) days from delivery of a Written Notice to the Contractor and the Engineer, the Owner may, without cause and without prejudice to any other remedy, elect to abandon the Project and terminate the Contract. In such case the Contractor shall be paid for all Work executed and any expense sustained plus reasonable profit.
- 22.5 If through no act or fault of the Contractor, the work is suspended for a period of more than ninety (90) days by the Owner or under an order of court or other public authority, or the Engineer fails to act on any request for payment within thirty (30) days after approved by the engineer, or the Owner fails to pay the Contractor substantially the sum approved by the Engineer or awarded by arbitrators within thirty (30) days of its approval and presentation, then the Contractor may, after ten (10) days from delivery of a Written Notice to the Owner and the Engineer terminate the Contract and recover from the Owner payment for all Work executed and all expenses sustained. In addition and in lieu of terminating the Contract, if the Engineer has failed to act on a request for payment or if the Owner has failed to make any payment as aforesaid, the Contractor may upon ten (10) days written notice to the Owner and the Engineer stop the Work until paid all amounts then due, in which event and

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upon resumption of the Work Change Orders shall be issued for adjusting the Contract Price or Extending the Contract Time or both to compensate for the costs and delays attributable to the stoppage of the work.

- 22.6 If the performance of all or any portion of the Work is suspended, delayed, or interrupted as a result of failure of the Owner or Engineer to act within the time specified in the Contract Documents, or if no time is specified, within a reasonable time, an adjustment in the Contract Price or an extension of the Contract Time, or both, shall be made by Change Order to compensate the Contractor for the costs and delays necessarily caused by the failure of the Owner or Engineer.

23. Construction Schedule and Periodic Estimates shall provide for the following:

- 23.1 Before starting the work or upon request by the Engineer during its progress, the Contractor shall submit to the Engineer a work plan showing construction methods and the various steps he intends to take in completing the work.
- 23.2 Before the first partial payment is made, the Contractor shall prepare and submit to the Engineer:
- a. A written schedule fixing the dates for submission of drawings; and
 - b. A written schedule fixing the respective dates for the start and completion of segments of the work. Each such schedule shall be subject to review and change during the progress of the work.
 - c. Respective dates for submission of Shop Drawings and for the beginning of manufacture, the testing, and the installation of materials, supplies, and equipment.
 - d. A schedule of payments that the Contractor anticipates will be earned during the course of the Work.

24. Payments to Contractor. Payments to the Contractor shall be made as follows:

- 24.1 Progress payments. The Owner will once each month make a progress payment to the Contractor on the basis of an estimate of the total amount of work done to the time of the estimate and its value as prepared by the Contractor and approved by the Engineer.
- 24.2 Retainage by Owner. The Owner will retain a portion of the progress payment, each month, in accordance with the following procedures:
- a. The Owner will establish an escrow account in the bank of the Owner's choosing. The account will be established such that interest on the principal will be paid to the Contractor. The principal will be the accumulated retainage paid into the account by the Owner. The principal will be held by the bank, available only to the Owner, until termination of the Contract.
 - b. Until the work is 50% complete, as determined by the Engineer, retainage shall be 10% of the monthly payments claimed. The computed amount of retainage will be deposited in the escrow account established above.
 - c. After the work is 50% complete, and provided the Contractor has satisfied the Engineer in quality and timeliness of the work, and provided further that there is no specific cause for withholding additional retainage no further amount will be withheld. The escrow account will remain at the same balance throughout the remainder of the project, unless drawn upon by the Owner in accordance with articles 19, 22, and 56.
 - d. Upon substantial or final completion (as defined in article 25), the amount of retainage will be reduced to 2% of the total Contract Price plus an additional retainage based on the Engineer's estimate of the fair value of

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the punch list items and the cost of completing and/or correcting such items of work, with specified amounts for each incomplete or defective item of work. As these items are completed or corrected, they shall be paid for out of the retainage until the entire project is declared completed (See article 25). The final 2% retainage shall be held during the one-year warranty period and released only after the Owner has accepted the project.

- 24.3 In reviewing monthly estimates for payments of the value of work done, the Engineer may accept in the estimate, prior to subtracting the retainage, the delivered cost of certain equipment and nonperishable material which have been delivered to the site or off-site location and which are properly stored and protected from damage. With the estimate, the Contractor shall submit to the Engineer invoices as evidence that the material has been delivered to the site. Prior to submitting the next monthly estimate, the Contractor shall provide the Engineer with paid invoices or other evidence that the materials have been paid for. If the Contractor fails to submit such evidence, the Engineer may then subtract the value of such materials or equipment for which the Owner has previously paid, from the next monthly estimate. The type of equipment and material eligible for payment prior to being incorporated in the work will be at the Engineer's discretion. Material and equipment made specifically for the subject job will be eligible for payment.
- 24.4 All material and work for which partial payments have been made shall thereupon become the sole property of the Owner. This provision shall not be construed as relieving the Contractor from the sole responsibility for the care and protection of materials and work upon which payments have been made or for the restoration of any damaged work, or as a waiver of the right of the Owner to require compliance with all of the terms of the Contract.
- 24.5 Owner's right to withhold payments and make application. The Contractor agrees that he will indemnify and save the Owner or the Owner's agents harmless from all claims growing out of the lawful demands of Subcontractors, laborers, workmen, mechanics, material men, and furnishers of machinery and parts, equipment, power, tools and all supplies, including commissary, incurred in the furtherance of the performance of this Contract. The Contractor shall, at the Owner's request, furnish satisfactory evidence that all claims of the nature hereinabove designated have been paid, discharged, or waived. If the Contractor fails to do so, then the Owner may, upon written notice to the Contractor either pay unpaid bills of which the Owner has written notice directly, or withhold from the Contractor's unpaid compensation a sum of money to pay any and all such lawful claims until satisfactory evidence is furnished that all liabilities have been fully discharged. Payment to the Contractor shall then be resumed in accordance with the terms of this Contract but in no event shall the above provisions be construed to impose any obligations upon the Owner to either the Contractor or his surety or any third party. In paying any unpaid bills of the Contractor, the Owner shall be deemed the agent of the Contractor, and any payment so made by the Owner shall be considered as payment made under Contract by the Owner to the Contractor and the Owner shall not be liable to the Contractor for any such payments made in good faith.
- 24.6 If the Owner fails to make payment forty-five (45) days after approval by the Engineer, in addition to other remedies available to the Contractor, there shall be added to each such payment interest at an annual rate of 10% commencing on the first day after said payment is due and continuing until the payment is received by the Contractor.
- 25. Acceptance and Final Payment** provisions shall be as follows:
- 25.1 Substantial completion and payment.
- a. Substantial completion shall be that point, as certified by the Engineer, at which the Contract or specified part thereof, has been completed to the extent that the Owner may occupy and/or make use of the work

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performed for the purposes for which it was intended. Upon substantial completion there may be minor items, such as seeding, landscaping, etc., yet to be completed or items of work to be corrected.

- b. Upon receipt of written notice from the Contractor that the work is substantially complete, the Engineer shall promptly make an inspection, and when he finds the work complies with the terms of the Contract and the Contract is substantially completed, he will issue a signed and dated certificate, and a list of all items to be completed or corrected, stating that the work required by this Contract has been substantially completed and is accepted by him.
 - c. Upon substantial completion, the entire balance due and payable to the Contractor less 2 percent of the Contract Price, and less a retention based on the Engineer's estimate of the fair value for the cost of completing or correcting listed items of work with specified amounts for each incomplete or defective item of work shall be made.
 - d. The general guarantee period for the work shall begin on the date certified by the Engineer that the work is substantially completed.
- 25.2 Final completion shall be that point at which all work has been completed and all defective work has been corrected. Unless the Engineer has issued a certificate of substantial completion, the general guarantee period shall begin upon certification by the Engineer of final completion.
- 25.3 At the end of the general guarantee period for the entire Contract which has been certified finally completed or substantially completed, the Owner, through the Engineer, shall make a guarantee inspection of all or portions of the work. When it is found that the work is satisfactory and that no work has become defective under the terms of the Contract, the Owner will accept the entire project and make final payment, including the reimbursement of monies retained pursuant to the guarantee period.
- 25.4 If the guarantee inspection discloses any work as being unsatisfactory, the Engineer will give the Contractor the necessary instructions for correction of such work, and the Contractor shall immediately execute such instructions. Upon correction of the work, another inspection will be made which shall constitute the guarantee inspection, provided the work has been satisfactorily completed.
- 25.5 Before issuance of final payment, the Contractor shall certify in writing to the Engineer that all payrolls, material bills, and other indebtedness connected with the work have been paid or otherwise satisfied; except that in case of disputed indebtedness or liens, if the Contract does not include a payment bond, the Contractor may submit in lieu of certification of payment a surety bond in the amount of the disputed indebtedness or liens, guaranteeing payment of all such disputed amounts, including all related costs and interest in connection with said disputed indebtedness or liens which the Owner may be compelled to pay upon adjudication.
- 25.6 If upon substantial completion, full completion is delayed through no fault of the Contractor, and the Engineer so certifies, the Owner may, upon certificate of the Engineer, and without termination of the Contract, make payment of the balance due for that portion of the work fully completed and accepted. Such payment shall be made under the terms and conditions governing final payment, except that it shall not constitute a waiver of claims.
- 25.7 The acceptance by the Contractor of final payment shall release the Owner from all claims and all liability to the Contractor for all things relating to this work and for every act and neglect of the Owner and others relating to or arising out of this work. No payment, however, final or otherwise, shall operate to release the Contractor or his sureties from any obligations of the performance and payment bond under this Contract.

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26. Payments by Contractor. The Contractor shall pay the costs:

- 26.1 For all transportation and utility services not later than the 20th day of the calendar month following that in which services are rendered;
- 26.2 For all materials, tools, and other expendable equipment to the extent of 90 percent of the cost thereof, not later than the 20th day of the calendar month following that in which such materials, tools and equipment are delivered at the site of the work and the balance of the cost thereof not later than the 30th day following the completion of that part of the work in or on which such materials, tools and equipment are incorporated or used; and
- 26.3 To each of his Subcontractors, not later than the 5th day following each payment to the Contractor, the respective amounts allowed the Contractor on account of the work performed by his Subcontractors to the extent of each Subcontractor's interest therein.

27. Insurance. The Contractor and any Subcontractor shall obtain all the insurance required under this article and such insurance shall be approved by the Owner.

- 27.1 The Contractor and all Subcontractors shall procure and shall maintain during the life of this Contract workmen's compensation insurance as required by applicable state law. The Contractor shall provide and shall cause each Subcontractor to provide adequate employer's liability insurance.

Limits of Liability: \$100,000 each accident;
\$500,000 disease - policy limit;
\$100,000 disease - each employee.

- 27.2 The Contractor shall procure and shall maintain during the life of this Contract Commercial General liability insurance to include Contractual liability, explosion, collapse and underground coverages.

Limits of liability: \$1,000,000 each occurrence bodily injury and property damage;
\$2,000,000 general aggregate-include per project aggregate endorsement;
\$2,000,000 products/completed operations aggregate.

If blasting or demolition or both is required by the Contract, the Contractor or Subcontractor shall obtain the respective coverage and shall furnish the Engineer a certificate of insurance evidencing the required coverages prior to commencement of any operations involving blasting or demolition or both.

- 27.3 The Contractor shall procure and shall maintain during the life of this Contract comprehensive automobile liability insurance to include all motor vehicles including owned, hired, borrowed and non-owned vehicles. Limits of liability: \$1,000,000 combined single limit for bodily injury and property damage.

- 27.4 The Contractor shall either:

- a. Require each of his Subcontractors to procure and to maintain during the life of his subcontract commercial general liability insurance and comprehensive automobile liability insurance of the type and in the amounts specified in articles 27.2 and 27.3; or
- b. Insure the activities of his Subcontractors in his policy.

- 27.5 The required insurance shall provide adequate protection for the Contractor and his Subcontractors, respectively, against damage claims which may arise from work under this Contract, whether such work be by the insured or by anyone employed by him and also against any of the special hazards which may be encountered in the performance of this Contract.

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- 27.6 The Contractor shall furnish the Owner with certificates showing the type, amount, class of operations covered, effective dates and dates of expiration of policies. Such insurance shall not be canceled or materially altered, except after 10 days written notice has been received by the Owner.
- 27.7 For builder's risk insurance (fire and extended coverage) and until the work is completed and accepted by the Owner, the Contractor is required to maintain builder's risk type insurance on a 100 percent completed value basis on the insurable portion of the work for the benefit of the Owner, the Contractor, and Subcontractors as their interests may appear.
- 27.8 The Contractor shall take out and furnish to the Owner and maintain during the life of this Contract, complete Owner's protective liability insurance.
- Limits of Liability: \$1,000,000 each occurrence;
\$2,000,000 aggregate.
28. **Contract Security.** The Contractor shall within ten (10) days after the receipt of the Notice of Award furnish the Owner with a performance bond and a payment bond in penal sums equal to the amount of the Contract price conditioned upon the performance by the Contractor of all undertakings, covenants, terms, conditions and agreements of the Contract Documents, and upon the prompt payment by the Contractor to all persons supplying labor and materials in the prosecution of the Work provided by the Contract Documents. Such Bonds shall be executed by the Contractor and a corporate bonding company licensed to transact business in the state in which the Work is to be performed and named on the current list of "Surety Companies Acceptable on Federal Bonds" as published in the Treasury Department Circular Number 570. The expense of these Bonds shall be borne by the Contractor.
29. **Additional or Substitute Bond.** If at any time a surety on any such Bond is declared as bankrupt or loses its right to do business in the state in which the Work is to be performed, or is removed from the list of Surety Companies accepted on Federal Bonds, the Contractor shall within ten (10) days after notice from the Owner to do so, substitute an acceptable bond (or bonds) in such form and sum and signed by such other surety or sureties as may be satisfactory to the Owner. The premiums on such bond shall be paid by the Contractor. No further payments shall be deemed due nor shall be made until the new surety or sureties shall have furnished such an acceptable bond to the Owner.
30. **Assignments.** The Contractor shall not assign the whole or any part of this Contract or any monies due or to become due hereunder without written consent of the Owner. In case the Contractor assigns all or any part of any monies due or to become due under this Contract, the instrument of assignment shall contain a clause substantially to the effect that it is agreed that the right of the assignee in and to any monies due or to become due to the Contractor shall be subject to prior claims of all persons, firms and corporations for services rendered or materials supplied for the performance of the work called for in this Contract.
31. **Mutual Responsibility of Contractors.** If, through acts of neglect on the part of the Contractor, any other Contractor or any Subcontractor shall suffer loss or damage on the work site, the Contractor agrees to settle with such other Contractor or Subcontractor by agreement or arbitration if such other Contractor or Subcontractors will so settle. If such other Contractor or Subcontractors shall assert any claim against the Owner on account of any damage alleged to have been sustained, the Owner shall notify the Contractor, who shall indemnify and save harmless the Owner against any such claim.

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32. Subcontracting. When subcontracting, the Contractor:

- 32.1 May utilize the services of specialty Subcontractors on those parts of the work which, under usual Contracting practices, are performed by specialty Subcontractors.
- 32.2 Shall be as fully responsible to the Owner for the acts and omissions of his Subcontractors, and of persons either directly or indirectly employed by them, as he is for the acts and omissions of persons directly employed by him.
- 32.3 Shall cause appropriate provisions to be inserted in all subcontracts relative to the work to bind Subcontractors to the Contractor by the terms of the Contract Documents insofar as applicable to the work of Subcontractors and to give the Contractor the same power as regards terminating any subcontract that the Owner may exercise over the Contractor under any provision of the Contract Documents.
- 32.4 Shall not create any Contractual relation between any Subcontractor and the Owner.
- 32.5 Shall not award Work to Subcontractor(s), in excess of fifty percent (50%) of the Contract Price, without prior written approval of the Owner.

33. Authority of the Engineer. In performing his duties, the Engineer or his representative shall:

- 33.1 Have the authority to suspend the work in whole or in part for such periods as he may deem necessary due to the failure of the Contractor to carry out provisions of the Contract or for failure of the Contractor to suspend work in weather conditions considered by the Engineer to be unsuitable for the prosecution of the work. The Engineer shall give all orders and directions under this Contract, relative to the execution of the work. The Engineer shall determine the amount, quality, acceptability, and fitness of the several kinds of work and materials which are to be paid for under this Contract and shall decide all questions which may arise in relation to the work. The Engineer's estimates and decisions shall be final and conclusive, except as otherwise provided. In case any question shall arise between the parties hereto relative to said Contract or specifications, the determination or decision of the Engineer shall be a condition precedent to the right of the Contractor to receive any money or payment for work under this Contract affected to any extent by such question. The Engineer shall decide the meaning and intent of any portion of the specifications and of any plans or drawings where the same may be found unclear. Any differences or conflicts in regard to their work which may arise between the Contractor under this Contract and other Contractors performing work for the Owner shall be adjusted and determined by the Engineer.
 - a. The purpose of the above article is not in any way to relieve the Contractor of his responsibilities for the safety of workmen or general public in the execution of the work. Attention is drawn to Article 13 of these Conditions which refers to the safety obligations of the Contractor.
 - b. The Engineer, acting on behalf of the Owner, has the authority to enforce corrective action for work not in accordance with the specifications.
 - c. In addition, the Engineer, acting on behalf of the Owner, is to ensure that the work is in accordance with the Contract Documents. He is not held responsible, however, for the methods of construction, sequences, schedules and procedures in the execution of the work. The Engineer does have the opportunity under 33.1 to reject the method of construction, work plan schedule, procedures, as he thinks appropriate.
- 33.2 Appoint assistants and representatives as he desires, and they shall be granted full access to the work under the Contract. They have the authority to give directions pertaining to the work, to approve or reject materials, to suspend any work that is being improperly performed, to make measurements of quantities, to keep records of

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costs, and otherwise represent the Engineer in all matters except as provided below. The Contractor may, however, appeal from their decision to the Engineer himself, but any work done pending its resolution is at the Contractor's own risk. Except as permitted and instructed by the Engineer, the assistants and representatives are not authorized to revoke, alter, enlarge, relax, or release any requirements of these specifications, nor to issue instructions contrary to the plans and specifications. They are not authorized to act as superintendents or foremen for the Contractor, or to interfere with the management of the work by the Contractor. Any advice which the assistants or representatives of the Engineer may give the Contractor shall not be construed as binding the Engineer or the Owner in any way, nor as releasing the Contractor from the fulfillment of the terms of the Contract. All transactions between the Contractor and the representatives of the Engineer which are liable to protest or where payments are involved shall be made in writing.

- 34. Stated Allowances.** The Contractor shall include in his proposal for costs of materials not shown in his bid under "cash allowances" or "allowed materials," any cash allowances stated in the supplemental general conditions or other Contract Documents. The Contractor shall purchase the "allowed materials" as directed by the Owner on the basis of the lowest and best bid of at least 3 competitive bids. If the actual price for purchasing the "allowed materials" is more or less than the "cash allowance," the Contract price shall be adjusted accordingly. The adjustment in Contract price shall be made on the basis of the purchase price without additional charges for overhead, profit, insurance or any other incidental expenses. The cost of installation of the "allowed materials" shall be included in the applicable sections of the Contract specifications covering this work.
- 35. Use of Premises, Removal of Debris, Sanitary Conditions.** In the use of premises or removal of debris, the Contractor expressly undertakes at his own expense: to take every precaution against injuries to persons or damage to property; to maintain sanitary conditions; to store his apparatus, materials, supplies and equipment in such orderly fashion at the site of the work as will not interfere with the progress of his work or the work of any other Contractors; to place upon the work or any part thereof only such loads as are consistent with the safety of that portion of the work; to clean up frequently all refuse, rubbish, scrap materials and debris caused by his operations, to the end that at all times the site of the work shall present an orderly and workmanlike appearance; before final payment to remove all surplus material falsework, temporary structures, including foundations thereof, plant of any description and debris of every nature resulting from his operations, and to put the site in an orderly condition; to effect all cutting, fitting or patching of his work required to make the same conform to the plans and specifications and, except with the consent of the Engineer, not to cut or otherwise alter the work of any other Contractor; to provide and maintain in a sanitary condition such toilet accommodations for the use of his employees as may be necessary to comply with the requirements of the state and local boards of health, or of other bodies or authorities having jurisdiction.
- 36. Quantities of Estimate.** Wherever the estimated quantities of work to be done and materials to be furnished under this Contract are shown in any of the documents including the proposal, they are given for use in comparing bids and the right is specifically reserved except as herein otherwise specifically limited, to increase or decrease them as may be deemed reasonably necessary by the Owner to complete the work contemplated by this Contract, and such increase or decrease shall in no way invalidate this Contract, nor shall any such increase or decrease give cause for claims or liability for damages. Such increases or decreases shall not exceed 25 percent of the estimated quantities of work. An increase or decrease in quantities for subsurface materials (e.g. ledge, unsuitable backfill), which overrun or underrun by 25% or more of the bid quantity may be the basis for a Contract price adjustment, at the rate of a negotiated adjusted unit rate. Negotiated unit price rates shall be equitable and shall take into account, but not be limited to the following factors; bid unit rate, distribution of rates and bid balance, and the scope of work as affected by the changed quantities. Claims for extra work resulting from changed quantities shall be processed under article 21.

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- 37. Lands and Rights-of-Way.** Acquisition and usage of lands and rights-of-way shall be as follows:
- 37.1 Prior to issuing the Notice to Proceed, the Owner shall legally obtain all lands and rights-of-way necessary for carrying out and completing the work to be performed under this Contract.
 - 37.2 The Contractor shall not (except after written consent from the Owner) enter or occupy with men, tools, materials, or equipment, any land outside the rights-of-way or property of the Owner. A copy of the written consent shall be given to the Engineer.
 - 37.3 The Owner shall provide to the Contractor information which delineates and describes the lands owned and the rights-of-way acquired.
 - 37.4 The Contractor shall provide at its own expense and without liability to the Owner any additional land and access thereto that the Contractor may desire for temporary construction facilities, or for storage of materials.
- 38. General Guarantee.** With reference to warranties, neither the final certificate of payment nor any provision in the Contract Documents, nor partial or entire occupancy of the premises by the Owner, shall constitute an acceptance of work not done in accordance with the Contract Documents or relieve the Contractor of liability in respect to any express warranties or responsibility for faulty materials or workmanship. The Contractor shall remedy any defects in the work and pay for any damage to other work resulting therefrom, which appear within the warranty period one year or longer if required by the Contract, from the certified date of completion or substantial completion of the work. The Owner will give notice of observed defects within two working days of their discovery.
- 39. Errors and Inconsistencies.** With reference to errors and inconsistency in Contract Documents, any provisions in any of the Contract Documents which may be in conflict with the paragraphs in these general conditions shall be subject to the following order of precedence for interpretation:
- 39.1 Drawings will govern technical specifications.
 - 39.2 General conditions will govern drawings and technical specifications.
 - 39.3 Supplemental general conditions will govern general conditions, drawings and technical specifications.
 - 39.4 Special conditions will govern supplemental general conditions, general conditions, drawings and technical specifications.
 - 39.5 The Contractor shall take no advantage of any apparent error or omission in the plans or specifications. In the event the Contractor discovers such an error or omission, he shall notify the Engineer. The Engineer will then make such corrections and interpretations as may be deemed necessary for fulfilling the intent of the plans and specifications.
 - 39.6 Figure dimensions on Drawings shall govern over general drawings.
- 40. Notice and Service Thereof.** Any notice to the Contractor from the Owner relative to any part of this Contract will be in writing and will be considered delivered and the service completed, when said notice is mailed, by certified registered mail, to the Contractor at his last given address, or delivered in person to the Contractor or his authorized representative on the work.
- 41. Required Provisions Deemed Inserted.** Each and every provision of law and clause required by law to be inserted in this Contract shall be deemed to be inserted herein and the Contract shall be read and enforced as though it were included herein, and if through mistake or otherwise any such provision is not inserted or is not correctly

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inserted (example; miswording, etc.), then upon the application of either party the Contract shall forthwith be physically amended to make such insertion or correction.

- 42. Protection of Lives and Health.** The work under this Contract is subject to the safety and health regulations (CRF 29, part 1926, and all subsequent amendments) as promulgated by the U.S. Department of Labor on June 24, 1974. Contractors are urged to become familiar with the requirements of these regulations.
- 43. OSHA Construction Safety Program.**
- 43.1 Pursuant to NHRSA 277:5-a, the Contractor shall provide an Occupational Health and Safety Administration (OSHA) 10-hour construction safety program for its on-site employees. All employees are required to complete the program prior to beginning work. The training program shall utilize an OSHA-approved curriculum. Graduates shall receive a card from OSHA certifying the successful completion of the training program.
- 43.2 Any employee required to complete the OSHA 10-hour construction safety program, and who cannot within 15 days provide documentation of completion of such program, shall be subject to removal from the job site.
- 43.3 The following individuals are exempt from the requirements of the 10-hour construction safety program: law enforcement officers involved with traffic control or jobsite security; flagging personnel who have completed the training required by the Department of Transportation; all relevant federal, state and municipal government employees and inspectors; and all individuals who are not considered to be on the site of work under the federal Davis-Bacon Act, including, but not limited to, construction and non-construction delivery personnel and non-trade personnel.
- 44. Equal Employment Opportunity.** Under equal employment opportunity requirements and during the performance of this Contract the Contractor agrees to the following:
- 44.1 The Contractor will not discriminate against any employee or applicant for employment because of race, creed, color, national origin, or sex. The Contractor will take affirmative action to ensure that applicants are employed, and that employees are treated during employment, without regard to their race, creed, color, national origin, or sex. Such action shall include, but not be limited to, the following: employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. The Contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices to be provided setting forth the provisions of this nondiscrimination clause.
- 44.2 The Contractor will in all solicitations or advertisements for employees placed by or on behalf of the Contractor, state that all qualified applicants will receive consideration for employment, without regard to race, creed, color, national origin, or sex.
- 44.3 The Contractor will send to each labor union or representative of workers with which he has a collective bargaining agreement or other Contract or understanding, a notice to be provided advising the labor union or worker's representative of the Contractor's commitment under section 202 of executive order no. 11246 of September 24, 1965, and 11375 of October, 13, 1967, and shall post copies of the notice in conspicuous places available to employees and applicants for employment.
- 44.4 The Contractor will comply with all provisions of executive orders no. 11246 and 11375.
- 44.5 The Contractor will furnish all information and reports required by executive orders no. 11246 and 11375.

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- 44.6 In the event of the Contractor's noncompliance with the nondiscrimination clauses of this Contract or with any of such rules, regulations, or orders, this Contract may be canceled, terminated, or suspended in whole or in part by the Owner or the Department of Labor and the Contractor may be declared ineligible for further government Contracts or federally-assisted construction, however, that in the event the Contractor becomes involved in, or is threatened with, litigation with a Subcontractor or vendor as a result of such direction by the Department of Labor, the Contractor may request the United States to enter into such litigation to protect the interests of the United States.
- 44.7 A breach of this article may be grounds for termination of this Contract and for debarment as provided in 29 CFR 5.6.
- 45. Interest of Federal, State or Local Officials.** No federal, state or local official shall be admitted to any share or part of this Contract or to any benefit that may arise therefrom, but this provision shall not be construed to extend to this Contract if made with a corporation for its general benefit.
- 46. Other Prohibited Interests.** No official of the Owner who is authorized in such capacity and on behalf of the Owner to negotiate, make, accept or approve, or to take part in negotiating, making, accepting, or approving any architectural, Engineering, inspection, construction or material supply Contract or any subcontract in connection with the construction of the project, shall become directly or indirectly interested personally in this Contract or in any part hereof. No officer, employee, architect, attorney, Engineer or inspector of or for the Owner who is authorized in such capacity and on behalf of the Owner to exercise any legislative, executive, supervisory or other similar functions in connection with the construction of the project, shall become directly or indirectly interested personally in this Contract or in any part thereof, any material supply Contract, subcontract, insurance Contract, or any other Contract pertaining to the project.
- 47. Use and Occupancy Prior to Acceptance.** Use and occupancy of a portion or unit of the project, upon completion of that portion or unit, and before substantial completion of the project, shall be a condition of this Contract with the following provisions:
- 47.1 The Owner will make his request for use or occupancy to the Contractor in writing.
- 47.2 There must be no significant interference with the Contractor's work or performance of duties under the Contract.
- 47.3 The Engineer, upon request of the Owner and agreement by the Contractor, will make an inspection of the complete part of the work to confirm its status of completion.
- 47.4 Consent of the surety and endorsement of the insurance carrier must be obtained prior to use and/or occupancy by the Owner. Also, prior to occupancy, the Owner will secure the required insurance coverage on the building.
- 47.5 The Owner will have the right to exclude the Contractor from the subject portion of the project after the date of occupancy but will allow the Contractor reasonable access to complete or correct items.
- 47.6 The warranty period shall begin upon substantial completion.
- 48. Suspension of Work.** The Owner may, at any time and without cause, suspend the work or any portion thereof for a period of not more than 90 days by notice in writing to the Contractor and the Engineer. The Owner shall fix the date on which work shall be resumed. The Contractor will be allowed an increase in the Contract price or an extension of the Contract time, or both, directly attributable to any suspension if he makes a claim therefore as provided in articles 17 and 21.

General Conditions

49. [Reserved]

50. [Reserved]

51. [Reserved]

52. **Project Sign.** Furnish and erect a sign at the project site to identify the project and to indicate that the State Government is participating in the development of the project. Place the sign in a prominent location as directed by the Engineer. Do not place or allow the placement of other advertising signboards at the project site or along rights-of-way furnished for the project work. See Exhibit 1 for details of construction.

53. [Reserved]

54. **Public Convenience and Traffic Control** requirements:

54.1 The Contractor shall at all times so conduct his work as to assure minimal obstruction to traffic. The safety and convenience of the general public and the residents along the work site route and the protection of property shall be provided for by the Contractor. The Contractor shall be responsible for timely notification to local residents before causing any interruptions of their access.

54.2 Fire hydrants and water holes for fire protection on or adjacent to the work site shall be kept accessible to fire apparatus at all times, and no obstructions shall be placed within 10 feet of any such facility. No footways, gutters, drain inlets, or portions of highways adjoining the work site shall be obstructed. In the event that all or part of a roadway is officially closed to traffic during construction, the Contractor shall provide and maintain safe and adequate traffic accessibility, satisfactory to the Engineer, for residences and businesses along and adjacent to the roadway so closed.

54.3 When the maintenance of traffic is considered by the Engineer to be minimal, the Contract may not show this work as a pay item. In such cases, the Contractor shall bear all expense of maintaining traffic over the sections of road undergoing improvement and of constructing and maintaining such approaches, crossings, intersections, and other features as may be necessary, without direct reimbursement.

55. **Pre-Construction Conference.** The Contractor shall not commence work until a pre-construction conference has been held at which representatives of the Contractor, Engineer, Division and Owner are present. The pre-construction conference shall be scheduled by the Engineer.

56. **Maintenance During Construction.**

56.1 The Contractor shall maintain the work during construction and until it is accepted by the Owner. This maintenance shall be continuous and effective work prosecuted day by day, with adequate equipment and forces, to the end that roads or structures are kept in satisfactory condition at all times.

56.2 All cost of maintenance during construction and before the work is accepted by the Owner shall be included in the unit prices bid on the various pay items and the Contractor shall not be paid an additional amount for such maintenance.

56.3 If the Contractor, at any time, fails to comply with the provisions above, the Engineer may direct the Contractor to do so. If the Contractor fails to remedy unsatisfactory maintenance within the time specified by the Engineer, the Engineer may immediately cause the project to be maintained and the entire cost of this maintenance will be deducted from money to become due the Contractor on this Contract.

General Conditions

57. Cooperation with Utilities.

- 57.1 The Owner will notify all utility companies, all pipe line owners, or other parties affected, and have all necessary adjustments of the public or private utility fixtures, pipe lines, and other appurtenances within or adjacent to the limits of construction made as soon as practicable.
- 57.2 Water lines, gas lines, wire lines, service connections, water and gas meter boxes, water and gas valve boxes, light standards, cableways, signals, and all other utility appurtenances within the limits of the proposed construction which are to be relocated or adjusted are to be moved by the owners of such utilities at their expense, except as may otherwise be provided for in the special conditions or as noted on the plans.
- 57.3 It is understood and agreed that the Contractor has considered in his bid all of the permanent and temporary utility appurtenances in their present or relocated positions as shown on the plans and as evident on the site, and that no additional compensation will be allowed for any delays, inconvenience, damage sustained by him due to any interference from such utility appurtenances or the operation of moving them.
- 57.4 The Contractor shall cooperate with the Owners of any underground or overhead utility lines in their removal and rearrangement operations in order that these operations may progress in a reasonable manner, that duplication of rearrangements may be reduced to a minimum, and that services rendered by those parties will be minimal.
- 57.5 In the event of interruption to a water or utility service as a result of accidental breakage or as a result of being exposed or unsupported, the Contractor shall promptly notify the proper authority and shall cooperate with said authority in the restoration of services. If water service is interrupted, repair work shall be continuous until the service is restored. No work shall be undertaken around fire hydrants until provisions for continued service have been approved by the local fire authority. If any utility service is interrupted for more than 4 hours, the Contractor shall make provisions for temporary service at his own expense until service is resumed.

58. Work Performed at Night and on Sundays and Holidays shall comply with the following:

- 58.1 No work will be permitted at night or on Sundays or holidays except as approved in writing by the Engineer, and provided such work is not in violation of a local ordinance. When working at night, the Contractor shall provide flood lighting sufficient to insure the same quality of workmanship and the same conditions regarding safety as would be achieved in daylight.
- 58.2 Whenever Memorial Day or Fourth-of-July is observed on a Friday or a Monday and during the weekend of Labor Day, the Contractor may be required to suspend work for the 3 calendar days. Prior to the close of work, the work site shall be placed in a condition acceptable to the Engineer for the comfort and safety of the traveling public. An arrangement shall be made for responsible personnel acceptable to the Engineer to maintain the project in the above conditions.

59. Laws to be Observed. With reference to laws that shall be observed:

- 59.1 The Contractor shall keep fully informed of all federal and state laws, all local laws, ordinances, and regulations, and all orders and decrees of tribunals having any jurisdiction or authority, which in any manner affect those engaged or employed on the work. He shall at all times observe and comply with all such laws, ordinances, regulations, orders, and decrees; and shall protect and indemnify the state and its representatives against any claim or liability arising from or based on the violation of any such law, ordinance, regulation, order, or decree, whether by himself or his employees.

General Conditions

59.2 Indemnification

The Contractor will indemnify and hold harmless the Owner and the Engineer and their agents and employees from and against all claims, damages, losses, and expenses including attorney's fees arising out of or resulting from the performance of the Work, provided that any such claims, damage, loss or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property including the loss of use resulting therefrom; and is caused in whole or in part by any negligent or willful act or omission of the Contractor, and Subcontractor, anyone directly or indirectly employed by any of them or anyone for whose acts any of them may be liable.

In any and all claims against the Owner or the Engineer, or any of their agents or employees, by any employees of the Contractor, and Subcontractor, anyone directly or indirectly employed by any of them, or anyone for whose acts any of them may be liable, the indemnification obligation shall not be limited in any way by any limitation on the amount or type of damages, compensation or benefits payable by disability benefit or other employee benefit acts.

The obligation of the Contractor under this paragraph shall not extend to the liability of the Engineer, his agents or employees arising out of the preparation or approval of maps, Drawings, opinions, reports, surveys, Change Orders, designs or Specifications.

60. Permits. Permits to be obtained by the Contractor shall be in accordance with the following:

- 60.1 Permits and licenses of a temporary nature necessary for the prosecution of the work shall be obtained and paid for by the Contractor. Permits, licenses and easements for permanent structures or permanent changes in existing facilities will be secured and paid for by the Owner. Permits may include:
- a. New Hampshire Department of Transportation Highway Trench Permits.
 - b. RSA 485-A:17 and 483-A N.H. DES Wetlands Bureau Dredge and Fill Permit.
 - c. RSA 485-A:17 - N.H. DES Site Specific Permit (Water Quality)
 - d. RSA 149-M:10 N.H. DES Solid Waste Management Bureau - disposal of construction debris and/or demolition waste.
 - e. N.H. Department of Environmental Services Air Resources Division (burning permits).
 - f. Other permits, as required by State and Local laws and ordinances.
 - g. Notice of intent for coverage under EPA's General NPDES Permit for construction dewatering activities.

61. Control of Pollution due to construction shall comply with the following:

- 61.1 During construction, the Contractor shall take precautions sufficient to avoid the leaching or runoff of polluting substances such as silt, clay, fuels, oils, bitumens, calcium chloride and any other polluting materials which are unsightly or which may be harmful to humans, fish, or other life, into groundwaters and surface waters of the State.
- 61.2 In waters used for public water supply or used for trout, salmon, or other game or forage fish spawning or nursery, control measures must be adequate to assure that turbidity in the receiving water will be increased not more than 10 standard turbidity units (s.t.u.) in the absence of other more restrictive locally-established limitations, unless otherwise permitted by the Division. In no case shall the classification for the surface water be violated.

General Conditions

61.3 In water used for other purposes, the turbidity must not exceed 25 s.t.u. unless otherwise permitted by the Division.

62. Use of Explosives.

62.1 When the use of explosives is necessary for the prosecution of the Work, exercise the utmost care not to endanger life or property. The Contractor shall be responsible for any and all damage resulting from the use of explosives.

62.2 Store all explosives in a secure manner, in compliance with all State and local laws and ordinances, and legally mark all such storage places. Storage shall be limited to such quantity as may be needed for the work underway.

62.3 Designate as a "Blasting Area" all sites where electric blasting caps are located and where explosive charges are being placed. Mark all blasting areas with signs as required by law. Place signs as required by law from each end of the blasting area and leave in place while the above conditions prevail. Immediately remove signs after blasting operations or the storage of caps is over.

62.4 Notify each property Owner and public utility company having structures in proximity to the site of the work sufficiently in advance to enable the companies to take such steps as they may deem necessary to protect their property. Such notice shall not relieve the Contractor of any of his responsibility for damage resulting from his blasting operation. Warn all persons within the danger zone of blasting operations and do not perform blasting work until the area is cleared. Provide sufficient flagmen outside the danger zone to stop all approaching traffic and pedestrians. Provide watchmen during the loading period and until charges have been exploded. Place adequate protective covering over all charges before being exploded.

63. Arbitration by Mutual Agreement.

63.1 All claims, disputes, and other matters in question arising out of, or relating to, the Contract Documents or the breach thereof, except for claims which have been waived by making an acceptance of final payment as provided in Section 25, may be decided by arbitration if the parties mutually agree. Any agreement to arbitrate shall be specifically enforceable under the prevailing arbitration law. The award rendered by the arbitrators shall be final, and judgment may be entered upon it in any court having jurisdiction thereof.

63.2 Notice of the request for arbitration shall be filed in writing with the other party to the Contract Documents and a copy shall be filed with the Engineer. Request for arbitration shall in no event be made on any claim, dispute, or other matter in question which would be barred by the applicable statute of limitations.

63.3 The Contractor will carry on the Work and maintain the progress schedule during any arbitration proceedings, unless otherwise mutually agreed in writing.

64. Taxes. The Contractor shall pay all sales, consumer, use, and other similar taxes required by the laws of the place where the Work is performed.

65 Separate Contracts.

65.1 The Owner reserves the right to let other Contracts in connection with this Project. The Contractor shall afford other Contractors reasonable opportunity for the introduction and storage of their materials and the execution of their Work, and shall properly connect and coordinate the Work with theirs. If the proper execution or results of any part of the Contractor's Work depends upon the Work of any other Contractor, the Contractor shall inspect

General Conditions

and promptly report to the Engineer any defects in such Work that render it unsuitable for such proper execution and results.

- 65.2 The Owner may perform additional Work related to the Project or the Owner may let other Contracts containing provisions similar to these. The Contractor will afford the other Contractors who are parties to such Contracts (or the Owner, if the Owner is performing the additional Work) reasonable opportunity for the introduction and storage of materials and equipment and the execution of the Work, and shall properly connect and coordinate the Work with theirs.
- 65.3 If the performance of the additional Work by other Contractors or the Owner is not noted in the Contract Documents prior to the execution of the Contract, written notice shall thereof be given to the Contractor prior to starting such additional Work. If the Contractor believes that the performance of such additional Work by the Owner or others involves it in additional expense or entitles it to an extension of the Contract Time, the Contractor may make a claim thereof as provided in Sections 17 and 18.

General Conditions

EXHIBIT 1

Project Sign Detail

[Insert project sign detail here]

SPECIAL CONDITIONS

Supplements

The following supplements, modify, change, delete, or add to the General Conditions. Where any part of the General Conditions is modified or voided by these sections, the unaltered provisions of that part should remain in effect.

<u>Section No.</u>	<u>Section Title</u>	<u>Page No.</u>
SC-10	Surveys; Supplement to GC-10	C-2.2
SC-24	Retainage by Owner; Supplement to GC-24	C-2.2
SC-27	Insurance; Supplement to GC-27	C-2.2
SC-49	Nondiscrimination in City Contracts	C-2.3
SC-52	Project Sign; Supplement to GC-52	C-2.3
SC-58	Work Performed at Night and on Sundays and Holidays; Supplement to GC-58	C-2.3
SC-59	Indemnification	C
SC-60	Permits	C-2.4
SC-62	Use of Explosives	C-2.4

SPECIAL CONDITIONS

SC-10 SURVEYS (SUPPLEMENT TO GC10)

Add paragraph 10.5:

As follows:

- 10.5 The Engineer's layout of structures and pipelines will be general in nature to be adjusted by the Contractor based on location of other utilities as determined by the Contractor. All adjustments shall be approved by Engineer and Owner.

SC-24 RETAINAGE BY OWNER

Delete paragraph 24.2 in its entirety and **replace** with the following:

24.2 Retainage by Owner. The Owner will retain a portion of the progress payment, each month, in accordance with the following procedures:

- a. Until the work is 50% complete, as determined by the Engineer, retainage shall be 10% of the monthly payments claimed.
- b. After the work is 50% complete, and provided the Contractor has satisfied the Engineer in quality and timeliness of the work, and provided further that there is no specific cause for withholding additional retainage no further amount will be withheld, and the retained amount will remain at the same balance throughout the remainder of the project, unless drawn upon by the Owner in accordance with articles 19, 22, and 58.
- c. Upon substantial or final completion (as defined in article 25), the amount of retainage will be reduced to 2% of the total amount due the Contractor plus an additional retainage based on the Engineer's estimate of the fair value of the punch list items and the cost of completing and/or correcting such items of work, with specified amounts for each incomplete or defective item of work. As these items are completed or corrected, they shall be paid for out of retainage until the entire project is declared completed (See article 25). The final 2% retainage shall be held during the one-year warranty period and released only after the project has been accepted by the Owner.

SC-27 INSURANCE REQUIREMENTS

Add the following at the end of Paragraph 27.2 of the General Conditions:

Limits of liability for blasting or demolition or both shall be \$5,000,000 of personal injury and property damage liability insurance covering the permitted blasting operations, or such an amount as may be determined necessary by extraordinary circumstances. The Certificate shall name the City, the Town of Durham, and the Town of Newington as an additional insured.

Add the following after Paragraph 27.8 of the General Conditions:

27.9 The Contractor shall name the City of Portsmouth, the Town of Durham, the Town of

Newington and the Engineer as an additional insured for their general liability and automobile liability policies. The City shall be listed as follows:

City of Portsmouth
Attn: Legal Department
1 Junkins Avenue
Portsmouth, NH 03801

27.10 Umbrella or excess liability

Contractor shall purchase and maintain umbrella or excess liability insurance written over the underlying employer's liability, commercial general liability, and automobile liability insurance described in the paragraphs above. Subject to industry-standard exclusions, the coverage afforded shall follow form as to each and every one of the underlying policies.

Limits of Liability:

\$5,000,000 per occurrence

\$5,000,000 general aggregate

SC-49 NONDISCRIMINATION IN CITY CONTRACTS

Add paragraph 49.1 as follows:

- 49.1 Any entity that enters into a contract for goods or services with the City of Portsmouth or any of its boards, agencies, and departments and any recipient of city funds shall:
- a) Implement an employment nondiscrimination policy prohibiting discrimination in hiring, discharging, promoting, or demoting, matters of compensation, or any other employment-related decision or benefit on account of actual or perceived race, ethnicity, color, religion, national origin, gender, disability, age, military status, sexual orientation, gender identity, gender expression, or marital or familial status.
 - b) Not discriminate in the performance of the contract on account of actual or perceived race, ethnicity, color, religion, national origin, gender, disability, age, military status, sexual orientation, gender identity, gender expression, or marital or familial status.

SC-52 PROJECT SIGN

Delete "See Exhibit 1 for details of construction".

Add "See Specification Section 01580 for details of construction".

SC-58 WORK PERFORMED AT NIGHT AND ON SUNDAYS AND HOLIDAYS

Add "Saturdays" to the Section Title and to Paragraph 58.1. **Add** the following sentence to the beginning of Paragraph:

"The Contractor's work hours shall be from 7:00 AM to 4:30 PM, Monday through Friday,
14202A

unless authorized by the City of Portsmouth."

Add Paragraph 58.3.

"City Holidays includes New Year's Day, Dr. Martin Luther King Jr. Day, Presidents' Day, Good Friday, Memorial Day, Independence Day, Labor Day, Columbus Day, Veteran's Day, Thanksgiving Day, the Day after Thanksgiving Day, and Christmas Day.

SC-59 INDEMNIFICATION

Add the following to the first sentence of paragraph 59.2, after "Owner":

“, the Town of Durham, the Town of Newington,”.

SC-60 PERMITS

Add the following after Paragraph 60.1.g of the General Conditions:

- h. New Hampshire Department of Environmental Services Wetlands Permit (See Appendix D of the Specifications
- i. New Hampshire Department of Environmental Services Shoreland Permit (See Appendix D of the Specifications).
- j. US Army Corps of Engineers 404 Individual Permit (See Appendix D of the Specifications).
- k. New Hampshire Department of Environmental Services Water Quality Certification
- l. Coastal Zone Management Federal Consistency Certification
- m. NPDES Stormwater General Permit
- n. New Hampshire Department of Energy License (See Appendix E of the Specifications).
- o. Temporary Access Agreement between the City of Portsmouth and the Town of Durham (See Appendix E of the Specifications).
- p. Temporary Access Agreement between the City of Portsmouth and the Town of Newington (See Appendix E of the Specifications).

END OF SECTION

NHDES Front End Documents Section D: Federal Provisions Rules Regulations and Forms

Section D: Federal Provisions Rules Regulations and Forms

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Pertinent Federal Acts and Provisions

The Contractor shall comply with the regulations of the Davis-Bacon Act, the Contract Work Hours Standards Act, Executive Order 11246 (Federal Equal Employment Opportunity), and Title X of the Clean Air Act Amendments of 1990 (Disadvantage Business Enterprise), and any amendments or modifications thereto. The Contractor shall cause appropriate provisions to be inserted in subcontracts to ensure compliance with the above acts by all Subcontractors, as applicable.

The Contractor shall comply with the American Iron and Steel requirements of the Water Resources Reform and Development Act of 2014, the Consolidated Appropriations Act of 2014 (Public Law 113-76), and subsequent laws that continue the requirement for the use of American Iron and Steel products in State Revolving Fund construction projects.

The Contractor shall comply with Subpart B and Subpart C of 2 CFR Part 180 and 2 CFR Part 1532. By entering into this contract, the contractor certifies that neither the contractor's firm, nor any person or firm who has an interest in the contractor firm, is a debarred or suspended person or firm. Furthermore, by entering into this contract, the contractor certifies that no part of this contract will be subcontracted to a debarred or suspended person or firm. Contractors may access the federal government's Excluded Parties List System for verification of excluded parties at the following website: <http://www.sam.gov>.

The Contractor shall comply with prohibition on certain telecommunications and video surveillance services or equipment. This term and condition implements 2 CFR 200.216 and is effective for obligations and expenditures of EPA financial assistance funding on or after 8/13/2020. As required by 2 CFR 200.216, EPA recipients and subrecipients, including borrowers under EPA funded revolving loan fund programs, are prohibited from obligating or expending loan or grant funds to procure or obtain; extend or renew a contract to procure or obtain; or enter into a contract (or extend or renew a contract) to procure or obtain equipment, services, or systems that use covered telecommunications equipment or services as a substantial or essential component of any system, or as critical technology as part of any system. As described in Public Law 115-232, section 889, covered telecommunications equipment is telecommunications equipment produced by Huawei Technologies Company or ZTE Corporation (or any subsidiary or affiliate of such entities). Recipients, subrecipients, and borrowers also may not use EPA funds to purchase:

- a. For the purpose of public safety, security of government facilities, physical security surveillance of critical Page 4 of 29 infrastructure, and other national security purposes, video surveillance and telecommunications equipment produced by Hytera Communications Corporation, Hangzhou Hikvision Digital Technology Company, or Dahua Technology Company (or any subsidiary or affiliate of such entities).
- b. Telecommunications or video surveillance services provided by such entities or using such equipment.
- c. Telecommunications or video surveillance equipment or services produced or provided by an entity that the Secretary of Defense, in consultation with the Director of the National Intelligence or the Director of the Federal Bureau of Investigation, reasonably believes to be an entity owned or controlled by, or otherwise connected to, the government of a covered foreign country.

Consistent with 2 CFR 200.471, costs incurred for telecommunications and video surveillance services or equipment such as phones, internet, video surveillance, and cloud servers are allowable except for the following circumstances:

- a. Obligating or expending EPA funds for covered telecommunications and video surveillance services or equipment or services as described in 2 CFR 200.216 to:
 - (1) Procure or obtain, extend or renew a contract to procure or obtain;
 - (2) Enter into a contract (or extend or renew a contract) to procure; or
 - (3) Obtain the equipment, services, or systems. Certain prohibited equipment, systems, or services, including equipment, systems, or services produced or provided by entities identified in section 889, are recorded in the [System for Award Management](#) exclusion list.

Links for more Information

- [U.S.DOL Prevailing Wage Resources](#)
- [General Wage Determinations](#)
- [U.S. DOL Certified Payroll Form WH-347](#)
- [WH-1321 "Employee Rights Under the Davis-Bacon Act" poster](#)
- [EPA's DBE Resources](#)
- [NHDOT Certified Disadvantaged Business Enterprise \(DBE\) Directory](#)
- [EPA American Iron and Steel \(AIS\) Requirement - Guidance and Questions and Answers website](#)
- [AIS Approved National Waivers](#)
- [Sole Source Aquifers \(SDWA\)](#)
- [Protection and Enhancement of the Cultural Environment \(1971\)](#)
- [Fish and Wildlife Coordination Act](#)
- [Migratory Bird Treaty Act of 1918](#)
- [Systems for Award Management exclusion list](#)

CONTRACTOR'S PAYROLL CERTIFICATION
AND
AMERICAN IRON AND STEEL CERTIFICATION

PUBLIC LAW: 113-76

This form will be submitted with each payment request.

Project Name:	Project Number:
Project Location:	
Contractor Name:	
Contractor Address:	
Street # and name	City/Town State ZIP
Payment Application #	Payment Application End Date

I hereby certify that all of the contract requirements as specified under the Labor Standards Provision for Federal and Federally Assisted Contracts have been complied with by the above named Contractor, and by each Subcontractor employing Laborers or Mechanics at the site of the work, or there is an honest dispute with respect to the required provisions.

I hereby certify that the "American Iron and Steel" provisions of the Water Resources Reform and Development Act of 2014, the Consolidated Appropriations Act of 2014 ([Public Law 113-76](#)), and subsequent laws that continue the requirement for the use of American Iron and Steel products in State Revolving Fund construction projects as applicable, have been met, and that all iron and steel used in the project named above have been produced in the United States in a manner that complies with American Iron and Steel Requirements, and/or that applicable EPA-approved waivers have been obtained to comply with American Iron and Steel requirements.

Contractor Signature:	Printed Name:
Title:	Date:

NOTICE TO LABOR UNIONS OR OTHER ORGANIZATIONS OF WORKERS NONDISCRIMINATION IN EMPLOYMENT

PUBLIC LAW: 41 CFR Part 60-1.4(b)-3.1

THIS DOCUMENT MUST BE COMPLETED BY THE SUCCESSFUL BIDDER AND BOUND IN THE EXECUTED CONTRACT

The Contractor, and his subcontractors if applicable, shall send to each labor union or representative of workers with which he has a collective bargaining agreement or other contract or understanding, a notice to be provided advising the said labor union or workers' representatives of the contractor's commitments under this section, and shall post copies of the notice in conspicuous places available to employees and applicants for employment. To

_____(Union or Organization). The undersigned currently holds contract(s) with _____ (Applicant) involving funds or credit of the U.S. Government or (a) subcontract(s) with a prime contractor holding such contract(s).

You are advised that under the provisions of the above contract(s) or subcontract(s) and in accordance with Executive Order 11246, dated September 24, 1965, Executive Order 13665 dated April 8, 2014 and Executive Order 13672 dated July 21, 2014, the undersigned is obliged not to discriminate against any employee or applicant for employment because of race, color, religion, national origin, sexual orientation or gender identity. This obligation not to discriminate in employment includes, but is not limited to, the following

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

<input type="checkbox"/> Contractor		<input type="checkbox"/> Subcontractor	
Signature:		Printed Name:	
Title:		Date:	

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

EQUAL EMPLOYMENT OPPORTUNITY REQUIREMENTS (EO11246)

(Executive Order 11246, as amended)

The Contractor shall comply with the equal opportunity requirements of Executive Order 11246, as amended, and as supplemented by 41 CFR Part 60, including the Equal Opportunity Clause at 41 CFR Part 60-1.4(b), and specific affirmative action obligations required by the Standard Federal Equal Employment Opportunity Construction Contract Specifications, as set forth in 41 CFR Part 60-4.

A. Equal Opportunity Clause (41 CFR Part 60-1.4(b))

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

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

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

B. Federal Equal Employment Opportunity Construction Contract Specifications (41 CFR Part 60-4.3)

1. As used in these specifications:
 - a. "Covered area" means the geographical area described in the solicitation from which this contract resulted;
 - b. "Director" means Director, Office of Federal Contract Compliance Programs, United States Department of Labor, or any person to whom the Director delegates authority;
 - c. "Employer identification number" means the Federal Social Security number used on the employer's Quarterly Federal Tax Return, U.S. Treasury Department Form 941.
 - d. "Minority" includes:
 - (i) Black (all persons having origins in any of the Black African racial groups not of Hispanic origin);
 - (ii) Hispanic (all persons of Mexican, Puerto Rican, Cuban, Central or South American or other Spanish Culture or origin, regardless of race);
 - (iii) Asian and Pacific Islander (all persons having origins in any of the original peoples of the Far East, Southeast Asia, the Indian subcontinent, or the Pacific Islands); and
 - (iv) American Indian or Alaskan Native (all persons having origins in any of the original peoples of North America and maintaining identifiable tribal affiliations through membership and participation or community identification).
2. Whenever the Contractor, or any subcontractor at any tier, subcontracts a portion of the work involving any construction trade, it shall physically include in each subcontract in excess of \$10,000.00 the provisions of these specifications and the Notice which contains the applicable goals for minority and female participation and which is set forth in the solicitations from which this contract resulted.
3. If the Contractor is participating (pursuant to 41 CFR 60-4.5) in a Hometown Plan approved by the U.S. Department of Labor in the covered area either individually or through an association, its affirmative action obligations on all work in the Plan area (including goals and timetables) shall be in accordance with that Plan for those trades which have unions participating in the Plan. Contractors must be able to demonstrate their participation in and compliance with the provisions of any such Hometown Plan. Each Contractor or Subcontractor participating in an approved Plan is individually required to comply with its obligations under the EEO clause, and to make a good faith effort to achieve each goal under the Plan in each trade in which it

has employees. The overall good faith performance by other Contractors or Subcontractors toward a goal in an approved plan does not excuse any covered Contractor's or Subcontractor's failure to take good faith efforts to achieve the Plan goals and timetables.

4. The Contractor shall implement the specific affirmative action standards provided in paragraphs 7a through p of these specifications. The Goals set forth in the solicitation from which this contract resulted are expressed as percentages of the total hours of employment and training of minority and female utilization the Contractor should reasonably be able to achieve in each construction trade in which it has employees in the covered area. Covered Construction Contractors performing construction work in geographical areas where they do not have a Federal or federally-assisted construction contract shall apply the minority and female goals established for the geographical area where the work is being performed. Goals are published periodically in the *Federal Register* in notice form, and such notices may be obtained from any Office of Federal Contract Compliance Programs office or from Federal procurement contracting officers. The Contractor is expected to make substantially uniform progress in meeting its goals in each craft during the period specified.
5. Neither the provisions of any collective bargaining agreement, nor the failure by a union with whom the Contractor has a collective bargaining agreement, to refer either minorities or women shall excuse the Contractor's obligations under these specifications, Executive Order 11246, or the regulations promulgated pursuant thereto.
6. In order for the nonworking training hours of apprentices and trainees to be counted in meeting the goals, such apprentices and trainees must be employed by the Contractor during the training period, and the Contractor must have made a commitment to employ the apprentices and trainees at the completion of their training, subject to the availability of employment opportunities. Trainees must be trained pursuant to training programs approved by the U.S. Department of Labor.
7. The Contractor shall take specific affirmative actions to ensure equal employment opportunity. The evaluation of the Contractor's compliance with these specifications shall be based upon its effort to achieve maximum results from its actions. The Contractor shall document these efforts fully, and shall implement affirmative action steps at least as extensive as the following:
 - a. Ensure and maintain a working environment free of harassment, intimidation and coercion at all sites, and in all facilities at which the Contractor's employees are assigned to work. The Contractor, where possible, will assign two or more women to each construction project. The Contractor shall specifically ensure that all foremen, superintendents, and other on-site supervisory personnel are aware of and carry out the Contractor's obligation to maintain such a working environment, with specific attention to minority or female individuals working at such sites or in such facilities.
 - b. Establish and maintain a current list of minority and female recruitment sources, provide written notification to minority and female recruitment sources and to community organizations when the Contractor or its unions have employment opportunities available, and maintain a record of the organization responses.
 - c. Maintain a current file of the names, addresses and telephone numbers of each minority and female off-the-street applicant and minority or female referral from a union, a recruitment source or community organization and of what action was taken with respect to each such individual. If such individual was sent to the union hiring hall for referral and was not referred back to the Contractor by the union or, if referred, not employed by the Contractor, this shall be documented in the file with the reason therefore, along with whatever additional actions the Contractor may have taken.
 - d. Provide immediate written notification to the Director when the union or unions with which the Contractor has a collective bargaining agreement has not referred to the Contractor a minority person or woman sent by the Contractor, or when the Contractor has other information that the union referral process has impeded the Contractor's efforts to meet its obligation.

- e. Develop on-the-job training opportunities and/or participate in training programs for the area which expressly include minorities and women, including upgrading programs and apprenticeship and trainee programs relevant to the Contractor's employment needs, especially those programs funded or approved by the Department of Labor. The Contractor shall provide notice of these programs to the sources compiled under 7b above.
- f. Disseminate the Contractor's EEO policy by providing notice of the policy to unions and training programs and requesting their cooperation in assisting the Contractor in meeting its EEO obligations; by including it in any policy manual and collective bargaining agreement; by publicizing it in the company newspaper, annual report, etc.; by specific review of the policy with all management personnel and with all minority and female employees at least once a year; and by posting the company EEO policy on bulletin boards accessible to all employees at each location where construction work is performed.
- g. Review, at least annually, the company's EEO policy and affirmative action obligations under these specifications with all employees having any responsibility for hiring, assignment, layoff, termination or other employment decisions including specific review of these items with on-site supervisory personnel such as Superintendents, General Foremen, etc., prior to the initiation of construction work at any job site. A written record shall be made and maintained identifying the time and place of these meetings, persons attending, subject matter discussed, and disposition of the subject matter.
- h. Disseminate the Contractor's EEO policy externally by including it in any advertising in the news media, specifically including minority and female news media, and providing written notification to an discussing the Contractor's EEO policy with other Contractors and Subcontractors with whom the Contractor does or anticipates doing business.
- i. Direct its recruitment efforts, both oral and written, to minority, female and community organizations, to schools with minority and female students, and to minority and female recruitment and training organizations serving the Contractor's recruitment area and employment needs. Not later than one month prior to the date for the acceptance of applications for apprenticeship or other training by any recruitment source, the Contractor shall send written notification to organizations such as the above, describing the openings, screening procedures, and tests to be used in the selection process.
- j. Encourage present minority and female employees to recruit other minority persons and women and, where reasonable, provide after school, summer and vacation employment to minority and female youth both on the site and in other areas of a Contractor's work force.
- k. Validate all tests and other selection requirements where there is an obligation to do so under 41 CFR Part 60-3.
- l. Conduct, at least annually, an inventory and evaluation at least of all minority and female personnel for promotional opportunities and encourage these employees to seek or to prepare for, through appropriate training, etc., such opportunities.
- m. Ensure that seniority practices, job classifications, work assignments and other personnel practices do not have a discriminatory effect by continually monitoring all personnel and employment-related activities to ensure that the EEO policy and the Contractor's obligations under these specifications are being carried out.
- n. Ensure that all facilities and company activities are non-segregated, except that separate or single-user toilet and necessary changing facilities shall be provided to assure privacy between the sexes.
- o. Document and maintain a record of all solicitations of offers for subcontracts from minority and female construction contractors and suppliers, including circulation of solicitations to minority and female contractor associations and other business associations.
- p. Conduct a review, at least annually, of all supervisors' adherence to and performance under the Contractor's EEO policies and affirmative action obligations.

8. Contractors are encouraged to participate in voluntary associations which assist in fulfilling one or more of their affirmative action obligations (7a through p). The efforts of a contractor association, joint contractor-union, contractor-community, or other similar group of which the contractor is a member and participant, may be asserted as fulfilling any one or more of its obligations under 7a through p of these Specifications provided that the Contractor actively participates in the group, makes every effort to assure that the group has a positive impact on the employment of minorities and women in the industry, ensures that the concrete benefits of the program are reflected in the Contractor's minority and female work force participation, makes a good faith effort to meet its individual goals and timetables, and can provide access to documentation which demonstrates the effectiveness of actions taken on behalf of the Contractor. The obligation to comply, however, is the Contractor's and failure of such a group to fulfill an obligation shall not be a defense for the Contractor's noncompliance.
9. A single goal for minorities and a separate single goal for women have been established. The Contractor, however, is required to provide equal employment opportunity and to take affirmative action for all minority groups, both male and female, and all women, both minority and non-minority. Consequently, the Contractor may be in violation of the Executive Order if a particular group is employed in a substantially disparate manner.
10. The Contractor shall not use the goals and timetables or affirmative action standards to discriminate against any person because of race, color, religion, sex, or national origin.
11. The Contractor shall not enter into any subcontract with any person or firm debarred from Government contracts pursuant to Executive Order 11246.
12. The Contractor shall carry out such sanctions and penalties for violation of these specifications and of the Equal Opportunity Clause, including suspension, termination and cancellation of existing subcontracts as may be imposed or ordered pursuant to Executive Order 11246, as amended, and its implementing regulations, by the Office of Federal Contract Compliance Programs. Any Contractor who fails to carry out such sanctions and penalties shall be in violation of these specifications and Executive Order 11246, as amended.
13. The Contractor, in fulfilling its obligations under these specifications, shall implement specific affirmative action steps, at least as extensive as those standards prescribed in paragraph 7 of these specifications, so as to achieve maximum results from its efforts to ensure equal employment opportunity. If the Contractor fails to comply with the requirements of the Executive Order, the implementing regulations, or these specifications, the Director shall proceed in accordance with 41 CFR 60-4.8.
14. The Contractor shall designate a responsible official to monitor all employment-related activity to ensure that the company EEO policy is being carried out, to submit reports relating to the provisions hereof as may be required by the Government and to keep records. Records shall at least include for each employee the name, address, telephone numbers, construction trade, union affiliation if any, employee identification number when assigned, social security number, race, sex, status (e.g., mechanic, apprentice, trainee, helper, or laborer), dates of changes in status, hours worked per week in the indicated trade, rate of pay, and locations at which the work was performed. Records shall be maintained in an easily understandable and retrievable form; however, to the degree that existing records satisfy this requirement, Contractors shall not be required to maintain separate records.
15. Nothing herein provided shall be construed as a limitation upon application of other laws which establish different standards of compliance or upon the application of requirements for the hiring of local or other area residents (e.g., those under the Public Works Employment Act of 1977 and the Community Development Block Grant Program).

CERTIFICATION OF NONSEGREGATED FACILITIES

Public Law: 41 CFR 60 (a) §60-1.8

APPLICABLE TO FEDERALLY ASSISTED CONSTRUCTION CONTRACTS AND RELATED SUBCONTRACTS EXCEEDING \$10,000 WHICH ARE NOT EXEMPT FROM THE EQUAL OPPORTUNITY CLAUSE.

THIS DOCUMENT MUST BE COMPLETED BY THE SUCCESSFUL BIDDER AND BOUND IN THE EXECUTED CONTRACT.

The federally assisted construction contractor certifies that he does not maintain or provide for his employees any segregated facilities at any of his establishments, and that he does not permit his employees to perform their services at any location, under his control, where segregated facilities are maintained.

The federally assisted construction contractor certifies that facilities provided for employees are provided in such a manner that segregation on the basis of race, color, religion, sex, sexual orientation, gender identity, or national origin cannot result.

The federally assisted construction contractor agrees that a breach of this certification is a violation of the Equal Opportunity clause in this contract.

As used in this certification, the term "segregated facilities" means any waiting rooms, work area, rest rooms and wash rooms, restaurants and other eating areas, time clocks, locker rooms, and other storage or dressing areas, parking lots, drinking fountains, recreation or entertainment areas, transportation and housing facilities provided for employees which are segregated by explicit directive or are in fact segregated on the basis of race, color, religion, sex, sexual orientation, gender identity or national origin, because of habit, local custom, or otherwise.

The federally assisted construction contractor agrees that (except where he had obtained identical certifications from proposed subcontractors for specific time periods) he will obtain identical certifications from proposed subcontractors prior to the award of subcontracts exceeding \$10,000 which are not exempt from the provisions of the Equal Opportunity clause, and that he will retain such certification in his files

<input type="checkbox"/> Contractor	<input type="checkbox"/> Subcontractor
Signature:	Printed Name:
Title:	Date:

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

Disadvantaged Business Enterprises Rule- Program Requirements

Purpose: The Environmental Protection Agency (EPA) rule titled "Participation by Disadvantaged Business Enterprises in United States Environmental Protection Agency Programs", at 40 CFR Part 33 (DBE Rule), sets forth an EPA program that serves the compelling government interest to increase and encourage the utilization and participation of Disadvantaged Business Enterprises (DBEs) in procurements funded by EPA assistance agreements. Because the New Hampshire State Revolving Fund (SRF) Loan Programs receive funding from EPA, the DBE rule requirements apply to all SRF funded projects.

State Revolving Fund loan recipients and their contractors must comply with the following DBE Rule requirements throughout the SRF loan project period:

1. Good Faith Efforts.
2. Annual Reporting of MBE/WBE accomplishments (for projects that exceed \$250,000.
3. Contract Administration Requirements.
4. Bidders List Requirements.
5. Other Reporting.

1. Good Faith Efforts

The Contractor shall make the following good faith efforts whenever procuring construction, equipment, services and supplies:

- a. Ensure DBEs are made aware of contracting opportunities to the fullest extent practicable through outreach and recruitment activities; including placing DBEs on solicitation lists and soliciting them whenever they are potential sources.
- b. Make information on forthcoming opportunities available to DBEs and arrange time frames for contracts and establish delivery schedules, where the requirements permit, in a way that encourages and facilitates participation by DBEs in the competitive process. This includes, whenever possible, posting solicitation for bids or proposals for a minimum of 30 calendar days before the bid or proposal closing date.
- c. Consider in the contracting process whether firms competing for large contracts could be contracted with DBEs. This will include dividing total requirements when economically feasible into smaller tasks or quantities to permit maximum participation by DBEs in the competitive process.
- d. Encourage contracting with a consortium of DBEs when a contract is too large for one of these firms to handle individually.
- e. Use the services and assistance of the Small Business Administration and the Minority Business Development Agency of the U. S. Department of Commerce.
- f. Contractor shall maintain all records documenting Contractor's compliance with the requirements of 40 CFR Part 33, including documentation of Contractor's good faith efforts. Such records shall be provided to Owner upon request.

2. Annual Reporting of MBE/WBE Accomplishments

The Owner is required to report MBE/WBE utilization accomplishments to EPA by October 30 of each year. The Contractor shall keep records of its MBE/WBE utilization, and prepare periodic reports in a timely manner as requested by the Owner to allow the Owner to complete and submit the required annual MBE/WBE reports to EPA by the October 30 deadline. Contractor's utilization reports shall include the following for all MBE/WBE costs incurred in the reporting period (i.e., the October 1 through September 30 federal fiscal year):

- a. Name, address and telephone number of MBE/WBE
- b. Business enterprise status (MBE or WBE)
- c. Dollar value of cost(s) (Amount(s) paid to MBE/WBE in reporting period)
- d. Date(s) of cost(s) (Date(s) of payment(s) to MBE/WBE, mm/dd/yyyy)
- e. Type of product or services (Construction/Supplies/Services/Equipment)

Note that only costs incurred with certified MBE/WBE's are counted as MBE/WBE accomplishments.

3. Contract Administration Requirements

The Contractor shall:

- a. Pay all subcontractors for satisfactory performance no more than 30 days from the prime contractor's receipt of payment from the loan recipient.
- b. Notify Owner in writing prior to the termination of any DBE subcontractor for Contractor's convenience.
- c. Employ the good faith efforts when soliciting a replacement subcontractor if a DBE subcontractor fails to complete work under the subcontract for any reason.
- d. Employ the good faith efforts even if the prime contractor has achieved its fair share objective
- e. Comply with the following term and condition, as required by 40 CFR, Section 33.106:

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

4. Bidders List Requirements

The Owner is required to maintain a bidders list in accordance with 40 CFR Section 33.501, and the Contractor shall provide bidders list information to the Owner for Owner's use in complying with this requirement. The Contractor shall maintain a Bidders List, which must include all firms that bid or quote on subcontracts under this Contract, including both MBE/WBEs and non-MBE/WBEs.

The Bidders List shall include the following information for all subcontractors who submit bids or quotes for subcontract work:

- (a) Entity's name with point of contact;
- (b) Entity's mailing address, telephone number, and e-mail address;
- (c) The procurement on which the entity bid or quoted, and when; and
- (d) Entity's status as an MBE/WBE or non-MBE/WBE.

6. Other Reporting

a. DBE Subcontractor Performance and Utilization Forms

The Bidder shall submit with its bid completed DBE Subcontractor Performance Forms NHDES W-09-58(formally EPA Form 6100-3), and DBE Subcontractor Utilization Form NHDES W-09-59(formally EPA Form 6100-4).

b. DBE Subcontractor Participation form

The contractor shall provide a copy of the DBE Subcontractor Participation Form NHDES-W-09-57 (formally EPA Form 6100-2) to each of its DBE subcontractors.

c. Bidders List Reporting

The Contractor shall provide the updated Bidders List to the Owner periodically upon Owner's request, and at project substantial completion.

NHDES-W-09-057

**DISADVANTAGED BUSINESS ENTERPRISE
(DBE) PROGRAM
SUBCONTRACTOR PARTICIPATING FORM
CLEAN WATER AND DRINKING WATER
STATE REVOLVING LOAN FUND**



FEDERAL RULE: 40 CFR Part 33



FORMERLY EPA-6100-2

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

Subcontractor Name:		Project Name:	
Bid/Proposal No:	Assistance Agreement ID: (if known)	Point of Contact:	
Address:			
Street # and Name		City/Town	State ZIP
Telephone No:		Email:	
Prime Contractor Name:		Issuing Funding Entity:	
Contract Item Number	Description of Work Receive from the Prime Contractor Involving Construction, Services, Equipment or Supplies	Amount Received by Prime Contractor	
Please use the space below to report any concerns regarding the above EPA-funded project:			
Subcontractor Signature:		Printed Name:	
Title:		Date:	

NHDES-W-09-058

DISADVANTAGED BUSINESS ENTERPRISE (DBE) PROGRAM

SUBCONTRACTOR PERFORMANCE FORM

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

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

This form is intended to capture the DBE³ subcontractor's⁴ description of work to be performed and the price of the work submitted to the prime contractor. An EPA Financial Assistance Agreement Recipient must require its prime contractor to have its DBE subcontractors complete this form and include all completed forms in the prime contractor's bid or proposal package. You will find NHDES bid information in [Section A](#) of the front-end documents.

Subcontractor Name:		Project Name:	
Bid/Proposal No:		Assistance Agreement ID: (if known)	Point of Contact:
Address:			
Street # and Name		City/Town	State ZIP
Telephone No:		Email:	
Prime Contractor Name:		Issuing Funding Entity:	
Contract Item Number	Description of Work Submitted to the Prime Contractor Involving Construction, Services, Equipment or Supplies		Price of work submitted to the Prime Contractor
DBE Certified by: <input type="checkbox"/> DOT <input type="checkbox"/> SBA		Meets/exceeds EPA Certification Standards?	
<input type="checkbox"/> Other:		<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown	
Prime Contractor Signature:		Printed Name:	
Title:		Date:	
Subcontractor Signature:		Printed Name:	
Title:		Date:	

³ A DBE is a Disadvantaged, Minority, or Woman Business Enterprise that has been certified by an entity from with EPA accepts certifications as described in 40CFR 33.204-33.205. EPA accepts certifications from entities that meet or exceed EPA certification standards as described in 40 CFR 33.202.

⁴ Subcontractor is defined as a company, firm, joint venture, or individual who enters into an agreement with a contractor to provide services pursuant to an EPA award of financial assistance.

DISADVANTAGED BUSINESS ENTERPRISE (DBE) PROGRAM

SUBCONTRACTOR UTILIZATION FORM

CLEAN WATER AND DRINKING WATER STATE REVOLVING LOAN FUND



FEDERAL RULE: 40 CFR Part 33

FORMERLY EPA FORM 6100-4

This form is intended to capture the prime contractor's actual and/or anticipated use of identified certified DBE subcontractors and the estimated dollar amount of each subcontract. An EPA Financial Assistance Agreement Recipient must require its prime contractors to complete this form and include it in the bid or proposed package. Prime contractors should also maintain a copy of this form on file. You will find NHDES bid information in [Section A](#) of the front-end documents.

THIS DOCUMENT MUST BE COMPLETED BY THE SUCCESSFUL BIDDER AND BOUND IN THE EXECUTED CONTRACT

Prime Contractor Name:		Project Name:	
Bid/Proposal No:	Assistance Agreement ID: (if known)	Point of Contact:	
Address:			
Street # and Name		City/Town	State ZIP
Telephone No:		Email:	
Issuing Funding Entity:			
I have identified potential DBE certified subcontractors:		<input type="checkbox"/> Yes	<input type="checkbox"/> No
If yes please complete the table below. If no, please explain:			
Subcontractor Name Company Name	Company Contact Information Street Number and Name, City/Town, State, ZIP Phone and Email	Est. Dollar Amount	Currently DBE Certified?
			<input type="checkbox"/> Yes <input type="checkbox"/> No
			<input type="checkbox"/> Yes <input type="checkbox"/> No
			<input type="checkbox"/> Yes <input type="checkbox"/> No
			<input type="checkbox"/> Yes <input type="checkbox"/> No
			<input type="checkbox"/> Yes <input type="checkbox"/> No
			<input type="checkbox"/> Yes <input type="checkbox"/> No
I certify under penalty of perjury that the forgoing statements are true and correct. Signing this form does not signify a commitment to use the subcontractors above. I am aware that in the event of a replacement of a subcontractor, I will adhere to the replacement requirements set forth in 40 CFR Part 33 Section 33.302(c).			
Prime Contractor Signature:		Printed Name:	
Title:		Date:	



NEW HAMPSHIRE STATE REVOLVING FUND: BIDDERS LIST

NHDES CLEAN WATER AND DRINKING WATER STATE REVOLVING LOAN FUND



PUBLIC LAW: 40 CFR § 33.501

The Contractor shall maintain and submit to the owner a bidders list, which the owner will use for compliance with the recordkeeping requirements of 40 CFR § 33.501. The list must include information regarding all entities that bid or quote on subcontracts under this contract, including both MBEs/WBEs and non-MBEs/WBEs. Projects funded by loan(s) of \$250,000 or less may be exempt from the requirement to maintain a bidders list [reference 40 CFR § 33.501(c)].

Project Name and Number:				Prime Contractor:			
Contact Information to include Company Name, Contact Name, Phone, Street Address, Town/City, Email, State/ZIP				Contract Item Number and Work Description Item # Description		Bid/Quote Date	Entity Status MBEs/WBEs
						/ /	<input type="checkbox"/> Yes <input type="checkbox"/> No
() -						/ /	
						/ /	
						/ /	<input type="checkbox"/> Yes <input type="checkbox"/> No
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						/ /	
						/ /	<input type="checkbox"/> Yes <input type="checkbox"/> No
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						/ /	<input type="checkbox"/> Yes <input type="checkbox"/> No
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						/ /	<input type="checkbox"/> Yes <input type="checkbox"/> No
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						/ /	

American Iron and Steel

The Water Resources Reform and Development Act of 2014, the Consolidated Appropriations Act of 2014 ([Public Law 113-76](#)), and subsequent laws that continue the American Iron and Steel requirements of Public Law 113-76 include “American Iron and Steel (AIS)” requirements for the Clean Water and Drinking Water State Revolving Fund (SRF) programs. Under these laws, all Clean Water and Drinking Water SRF funded construction, alteration, maintenance, or repair of public water systems or treatment works projects must use iron and steel products that are produced in the United States. The Contractor shall comply with these AIS requirements.

1. EPA AIS Guidance

[EPA's State Revolving Fund American Iron and Steel Requirement](#) website includes detailed information on American Iron and Steel requirements and waivers.

The paragraphs in *italics* below are excerpts from the EPA AIS guidance available at the EPA website. Words in plain text are clarifications added by NHDES.

(a) Iron and Steel Products ^[5]

An iron or steel product is one of the following made primarily of iron or steel that is permanently incorporated into the project:

- *Lined or unlined pipes and fittings.*
- *Manhole covers.*
- *Municipal castings (defined in more detail below).*
- *Hydrants.*
- *Tanks. Flanges.*
- *Pipe clamps and restraints.*
- *Valves.*
- *Structural steel (defined in more detail below).*
- *Reinforced precast concrete and.*
- *Construction materials (defined in more detail below).*

(b) Permanently Incorporated into the Project⁶

Only items on the above list made primarily of iron or steel, permanently incorporated into the project must be produced in the US. For example, trench boxes, scaffolding or equipment, which are removed from the project site upon completion of the project, are not required to be made of U.S. Iron or Steel.

(c) Primarily Iron or Steel⁷

Primarily iron or steel places constraints on the list of products above. For one of the listed products to be considered subject to the AIS requirements, it must be made of greater than 50% iron or steel, measured by cost. The cost should be based on the material costs.⁸

⁵ EPA guidance dated March 20, 2014, Question 11.

⁶ EPA guidance dated March 20, 2014, Question 18.

⁷ EPA guidance dated March 20, 2014, Question 12.

⁸ See example at EPA guidance March 20, 2014, Question 13.

(d) If a product is composed of more than 50% iron or steel, but is not listed in the above list of items, must the item be produced in the US? Alternatively, must the iron or steel in such a product be produced in the US?⁹

The answer to both question is no. Only items on the above list must be produced in the US. Additionally, the iron or steel in a non-listed item can be sourced from outside the US.

(e) Steel ¹⁰

Steel means an alloy that includes at least 50 percent iron, between .02 and 2 percent carbon, and may include other elements. Metallic elements such as chromium, nickel, molybdenum, manganese, and silicon may be added during the melting of steel for the purpose of enhancing properties such as corrosion resistance, hardness, or strength. The definition of steel covers carbon steel, alloy steel, stainless steel, tool steel and other specialty steels.

(f) Production in the United States¹¹

Production in the United States of the iron or steel products used in the project requires that all manufacturing processes¹², including application of coatings, must take place in the United States, with the exception of metallurgical processes involving refinement of steel additives. All manufacturing processes includes processes such as melting, refining, forming, rolling, drawing, finishing, fabricating and coating. Further, if a domestic iron and steel product is taken out of the US for any part of the manufacturing process, it becomes foreign source material. However, raw materials such as iron ore, limestone and iron and steel scrap are not covered by the AIS requirement, and the material(s), if any, being applied as a coating are similarly not covered. Non-iron or steel components of an iron and steel product may come from non-US sources. For example, for products such as valves and hydrants, the individual non-iron and steel components do not have to be of domestic origin.*

* External Coatings Applied Outside of the United States¹³

Any coating processes that are applied to the external surface of iron and steel components that would otherwise be AIS compliant would not disqualify the product from meeting the AIS requirements regardless of where the coating processes occur, provided that final assembly of the product occurs in the United States.

The exemption above only applies to coatings on the external surface of iron and steel components. It does not apply to coatings or linings on internal surfaces of iron and steel products, such as the lining of lined pipes. All manufacturing processes for lined pipes, including the application of pipe lining, must occur in the United States for the product to be compliant with AIS requirements.

(g) Municipal Castings¹⁴

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

- *Ballast Screen;*
- *Benches (Iron or Steel);*
- *Bollards;*
- *Cast Bases;*
- *Cast Iron Hinged Hatches, Square and Rectangular;*
- *Cast Iron Riser Rings;*
- *Catch Basin Inlet;*
- *Cleanout/Monument Boxes;*

⁹ EPA guidance dated March 20, 2014, Question 14.

¹⁰ EPA guidance dated March 20, 2014, Question 15.

¹¹ EPA guidance dated March 20, 2014, Question 16.

¹² Assembly and all other steps in the manufacturing process must take place in the US, except metallurgical processes involving refinement of steel additives in accordance with the EPA guidance dated March 20, 2014, Question 23]. There is also an additional exception for application of exterior coating.

¹³ EPA guidance dated March 16, 2015, Q/A No. 6.

¹⁴ EPA guidance dated March 20, 2014, Question 19.

- Construction Covers and Frames;
 - Curb and Corner Guards;
 - Inlets;
 - Junction Boxes;
 - Steel Hinged Hatches, Square and Rectangular;
- (g) Municipal Castings (Cont.)
- Curb Openings;
 - Detectable Warning Plates;
 - Downspout Shoes (Boot, Inlet);
 - Drainage Grates, Frames and Curb Inlets;
 - Lampposts;
 - Manhole Covers, Rings and Frames, Risers;
 - Meter Boxes;
 - Service Boxes;
 - Steel Riser Rings;
 - Trash receptacles;
 - Tree Grates;
 - Tree Guards;
 - Trench Grates; and
 - Valve Boxes, Covers and Risers.

(h) Structural Steel¹⁵

Structural steel is rolled flanged shapes, having at least one dimension of their cross-section three inches or greater, which are used in the construction of bridges, buildings, ships, railroad rolling stock, and for numerous other constructional purposes. Such shapes are designated as wide-flange shapes, standard I-beams, channels, angles, tees and zees. Other shapes include H-piles, sheet piling, tie plates, cross ties, and those for other special purposes.

(i) Construction Materials¹⁶

Construction materials are those articles, materials, or supplies made primarily of iron and steel, that are permanently incorporated into the project, not including mechanical and/or electrical components, equipment and systems. Some of these products may overlap with what is also considered "structural steel". This includes, but is not limited to, the following products: wire rod, bar, angles, concrete reinforcing bar, wire, wire cloth, wire rope and cables, tubing, framing, joists, trusses, fasteners (i.e., nuts and bolts), welding rods, decking, grating, railings, stairs, access ramps, fire escapes, ladders, wall panels, dome structures, roofing, ductwork, surface drains, cable hanging systems, manhole steps, fencing and fence tubing, guardrails, doors, and stationary screens.

[As noted above, ductwork is considered a "construction material" and must comply with the AIS requirements. Steel dampers, grilles and registers that are a permanently incorporated part of the ductwork are also subject to the AIS requirements.]

(j) Construction Materials (Additional Guidance¹⁷)

The AIS requirements include a list of specifically covered products, one of which is construction materials, a broad category of potential products. For construction materials, EPA's AIS guidance includes a set of example items that it considers construction materials composed primarily of iron and steel and covered by the Act. This example list in the guidance is not an all-inclusive list of potential construction materials. However, the guidance also includes a list of items that EPA specifically does not consider construction materials, generally those of electrical or complex-mechanical nature. If a product is similar to the ones in the non-construction material list (and it is also not specifically listed by the Act), it is not a construction material. For all other items specifically included in the Act, coverage is generally self-evident.

(k) Items that are not Construction Materials¹⁸

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

¹⁵ EPA guidance dated March 20, 2014, Question 20.

¹⁶ EPA guidance dated March 20, 2014, Question 21.

¹⁷ EPA guidance dated September 10, 2014, Q/A No. 10.

¹⁸ EPA guidance dated March 20, 2014, Question 22.

The following examples (including their appurtenances necessary for their intended use and operation) are NOT considered construction materials: pumps, motors, gear reducers, drives (including variable frequency drives (VFDs)), electric/pneumatic/manual accessories used to operate valves (such as electric valve actuators), mixers, gates (i.e., common sluice and slide gates), motorized screens (such as traveling screens), blowers/aeration equipment**, compressors, meters***), sensors, controls and switches, supervisory control and data acquisition (SCADA), membrane bioreactor systems, membrane filtration systems, filters, clarifiers and clarifier mechanisms, rakes, grinders, disinfection systems, presses (including belt presses), conveyors, cranes, HVAC (excluding ductwork), water heaters, heat exchangers, generators, cabinetry and housings (such as electrical boxes/enclosures), lighting fixtures, electrical conduit, emergency life systems, metal office furniture, shelving, laboratory equipment, analytical instrumentation, and dewatering equipment.*

** If products come from one manufacturer and are shipped together as a system, then this is generally considered a “packaged system” and those items used to connect the system are appurtenances. However, if the borrower or contractor must purchase items to connect the system (valves, piping, etc.) separately from another manufacturer, then these items would need to be domestic, or otherwise obtain a waiver.¹⁹*

***Aerators, similar to pumps, are mechanical equipment that do not need to meet the AIS requirements. “Blowers/aeration equipment, compressors” are listed in EPA’s guidance as non-construction materials.²⁰*

****“Meters” includes any type of meter, including: flow meters, wholesale meters, and water meters/service connections.²¹*

(l) Assembled Products²²

AIS requirements only apply to the final product as delivered to the work site and incorporated into the project. Assemblies, such as a pumping assembly or a reverse osmosis package plant, are distinct products not listed and do not need to be made in the U.S. or composed of all U.S. parts. If a listed iron and steel product is used as a part for an assembled product that is nondomestic, the components, even if specifically listed in the Act, do not have to be domestically produced.

(m) Sluice and Slide Gates are not Valves, and are not Subject to AIS²³

Valves are products that are generally encased / enclosed with a body, bonnet, and stem. Examples include enclosed butterfly, ball, globe, piston, check, wedge, and gate valves. Furthermore, “gates” (meaning sluice, slide or weir gates) are listed in EPA’s guidance as non-construction materials.

(n) Gate Valves are Subject to AIS²⁴

Valves are specifically listed in the Consolidated Appropriations Act of 2014 as an “iron and steel product” and therefore, absent a waiver, must be produced in the U.S. to be in compliance with the requirement if they are “primarily” iron and steel. Gates as referenced in the EPA March 20, 2014 guidance refer only to common sluice and slide gates, and not to gate valves.

(o) Reinforced Precast Concrete²⁵

While reinforced precast concrete may not be at least 50% iron or steel, in this particular case, the reinforcing bar and wire must be produced in the US and meet the same standards as for any other iron or steel product. Additionally, the

¹⁹ EPA AIS Refresher Webinar, December 15, 2016.

²⁰ EPA guidance dated September 10, 2014, Q/A No. 19 on aerators.

²¹ EPA guidance dated September 10, 2014, Q/A No. 14 on meters.

²² EPA guidance dated September 10, 2014, Q/A No. 11, AIS Refresher Webinar, December 15, 2016.

²³ EPA guidance dated September 10, 2014, Q/A No. 20.

²⁴ EPA guidance dated May, 30, 2014, Q/A No. 4.

²⁵ EPA guidance dated March 20, 2014, Question 24.

casting of the concrete product must take place in the US. The cement and other raw materials used in concrete production are not required to be of domestic origin.

If the reinforced concrete is cast at the construction site, the reinforcing bar and wire are considered to be a construction material and must be produced in the US.

(p) Pre-stressed Concrete Cylinder Pipe²⁶

Pre-stressed concrete cylinder pipe (PCCP) or other similar concrete cylinder pipes would be comparable to pre-cast concrete which is specifically listed in the Consolidated Appropriations Act of 2014 as a product subject to the AIS requirement

(q) Valves and Actuators²⁷

Valves and actuators, while often purchased and shipped together, are two unique products that are manufactured separately and typically attached together during the final step of the process. Valves are included in the definition of "iron and steel products" in the AIS requirement. Actuators, whether manual, electric, hydraulic or pneumatic, are not listed as an "iron and steel product" under the AIS requirement of the Consolidated Appropriations Act of 2014, nor are they considered construction materials. Therefore, they do not need to be domestically produced in the U.S. in order to comply with the requirement.

(r) Electric Powered Motor Operated Valves²⁸

Electric powered motor operated valves are not excluded based on the valve being motorized equipment. The actuator, a motor that controls the valve, is considered a separate product, which is not listed as an "iron and steel product" under the AIS requirement of the Consolidated Appropriations Act of 2014, nor is it considered a construction material. Therefore, the actuator does not need to be domestically produced in the U.S. in order to comply with the requirement. See Q2 for further clarification.

(s) Tanks Used on Filtration Systems²⁹

Tanks that are specifically designed to be filters, or as parts of a filtration system, do not have to be domestically produced because these parts are no longer simply tanks, even if the filter media has not been installed and will be installed at the project site, as is customary to do for shipping purposes. These parts have only one purpose which is to be housing for filters and cannot be used in another fashion.

(t) Flanged Pipe³⁰

While the Consolidated Appropriations Act of 2014 does not specifically mention flanged pipe, since it does mention both pipe and flanges, both products would need to be domestically produced. Therefore, flanged pipe would also need to be domestically produced.

(u) Couplings, Expansion Joints, and other Similar Pipe Connectors³¹

These products would be considered specialty fittings, due to their additional functionality, but still categorized under the larger "fitting" categorization. Fittings are defined as a material that joins pipes together or connects to a pipe (AWWA,

²⁶ EPA guidance dated September 10, 2014, Q/A No. 2.

²⁷ EPA Q/A guidance dated May 30, 2014, Q/A No. 2.

²⁸ EPA guidance dated May 30, 2014, Q/A No. 3

²⁹ EPA guidance dated September 10, 2014, Q/A No. 4

³⁰ EPA guidance dated September 10, 2014, Q/A No. 5

³¹ EPA guidance dated September 10, 2014, Q/A No. 6

The Drinking Water Dictionary, 2000). Therefore, these products must comply with the AIS requirements and be produced domestically.

(v) Saddles and tapping Sleeves³²

These products are necessary for pipe repair, to tap a water main, or to install a service or house connection. Therefore, they are included under the larger "pipe restraint" category which is a specifically identified product subject to the domestic preference in the Consolidated Appropriations Act of 2014.

(w) Reused Items (i.e., existing pipe fittings, used storage tanks, reusing existing valves)³³

The AIS guidance does not address reuse of items. Reuse of items that would otherwise be covered by AIS is acceptable provided that the item(s) was originally purchased prior to January 17, 2014, the reused item(s) is not substantially altered from original form/function, and any restoration work that may be required does not include the replacement or addition of foreign iron or steel replacement parts. EPA recommends keeping a log of these reused items by including them on the assistance recipient's de minimis list, and stating therein that these items are reused products. The donation of new items (such as a manufacturer waiving cost for certain delivered items because of concerns regarding the origin of a new product) is not, however, considered reuse.

2. Certification

The Contractor, through its subcontractors, suppliers and manufacturers shall provide to the Owner written certification that all AIS materials provided for the project comply with the AIS requirements of the SRF programs, Manufacturer certification letters must include the following:

- Manufacturer name;
- SRF construction project name and location;
- A list of specific product(s) delivered to the project site;
- A statement that the product is in compliance with the American Iron and Steel requirement as mandated in EPA's SRF programs;
- The location of the foundry/mill/factory where the product was manufactured (City and State); and
- A signature by a manufacturer's responsible party.

EPA AIS guidance dated March 20, 2014 contains additional guidance on manufacturer certifications. [A sample certification letter is included in this guidance.](#)

3. Installation

All iron and steel products, as defined herein, shall be produced in the United States in accordance with the American Iron and Steel requirements of the Clean Water and Drinking Water State Revolving Fund programs. If a potentially non-compliant product is installed in the permanent work, the Contractor will be required to remove the non-domestic item from the project.

4. De Minimis Waiver

EPA's April 15, 2014 [Nationwide Waiver](#) for De Minimis incidental AIS components is part of this guidance, and is available for use on this project. Contractors who wish to use this waiver must consult with the Owner when determining the items to be covered by this waiver, and shall retain and provide to the Owner relevant documentation (i.e., invoices) for those items for the Owner's project files. The Contractor shall summarize in reports to the Owner: the types and/or categories of items to which this waiver is applied; the total cost of incidental components covered by the waiver for each type or category (including copies of invoices); and the calculations by which Contractor determined the total cost of materials used in and incorporated into the project. The Contractor shall include a complete and up-to-

³² EPA guidance dated September 10, 2014, Q/A No. 7

³³ EPA guidance dated September 10, 2014, Q/A No. 8

date [De Minimis Report](#) in each application for payment. The Contractor shall also provide the report to the Owner upon request.

(a) Fasteners under the De Minimis Waiver³⁴ []

There is no broad exemption for fasteners from the American Iron and Steel (AIS) requirements. Significant fasteners used in SRF projects are not subject to the de minimis waiver for projects and must comply with the AIS requirements. Significant fasteners include fasteners produced to industry standards (e.g., ASTM standards) and/or project specifications, special ordered or those of high value. When bulk purchase of unknown-origin fasteners that are of incidental use and small value are used on a project, they may fall under the national de minimis waiver for projects. The list of potential items could be varied, such as big-box/hardware-store-variety screws, nails, and staples. The key characteristics of the items that may qualify for the de minimis waiver would be items that are incidental to the project purpose (such as drywall screws) and not significant in value or purpose (such as common nails or brads). You can find further information on the [EPA Website](#).

³⁴ EPA guidance dated September 10, 2014, Q/A No. 1

Build American, Buy American

The Bipartisan Infrastructure Law (also known as the Infrastructure Investment and Jobs Act, (Public Law 117-58), includes the Build America, Buy America (BABA) Act. Projects funded under the BIL must comply with BABA. BABA requires that all iron, steel, manufactured products, and construction materials permanently incorporated into an infrastructure project must be produced in the United States. The Contractor shall comply with BABA requirements.

The following BABA requirement summary is based on the Initial Implementation Guidance on Application of Buy America Preference in Federal Financial Assistance Programs for Infrastructure (OMB Guidance M-22-11). Additional guidance can be found on the EPA's BABA website: <https://www.epa.gov/cwsrf/build-america-buy-america-baba>

Articles, Materials, and Supplies for Infrastructure

A Buy America preference only applies to the iron and steel, manufactured products, and construction materials used for the infrastructure project under an award. A Buy America preference applies to an entire infrastructure project, even if it is funded by both Federal and non-Federal funds under one or more awards. A Buy America preference only applies to articles, materials, and supplies that are consumed in, incorporated into, or affixed to an infrastructure project. As such, it does not apply to tools, equipment, and supplies, such as temporary scaffolding, brought to the construction site and removed at or before the completion of the infrastructure project. Nor does a Buy America preference apply to equipment and furnishings, such as movable chairs, desks, and portable computer equipment, that are used at or within the finished infrastructure project, but are not an integral part of or permanently affixed to the structure. For the purposes of this guidance, an article, material, or supply should only be classified into one of the following categories: (1) iron or steel; (2) a manufactured product; or (3) a construction material. For ease of administration, an article, material, or supply should not be considered to fall into multiple categories. Agencies should apply the iron and steel test to items that are predominantly iron or steel, unless another standard applies under law or regulation. Any waivers from these requirements must be in writing and meet the requirements of section 70914(b).

Preliminary Guidance for Construction Materials

For construction materials, the Act requires that each manufacturing process required for the manufacture of the construction material and the inputs of the construction material occurs in the United States. They must also reflect efforts to maximize the direct and indirect jobs benefited or created in the production of the construction material. The IIJA finds that "construction materials" includes an article, material, or supply— other than an item of primarily iron or steel; a manufactured product; cement and cementitious materials; aggregates such as stone, sand, or gravel; or aggregate binding agents or additives— that is or consists primarily of:

- non-ferrous metals;
- plastic and polymer-based products (including polyvinylchloride, composite building materials, and polymers used in fiber optic cables);
- glass (including optic glass);
- lumber;
- drywall.

For example, a plate of glass would be a construction material under BABA, but a framed window that incorporates the glass into a frame would be a manufactured product. Another common construction material for water infrastructure projects would be polyvinyl chloride (PVC) pipe and fittings. However, if PVC components are incorporated into a more complex product such as instrumentation and control equipment or a water treatment unit, those items would be manufactured products.

Waivers

Assistance recipients and their authorized representatives may apply for a project specific waiver. EPA does not accept waiver requests from suppliers, distributors, or manufacturers unless the assistance recipient endorses and submits the request on its own behalf to the funding authority. In the case where multiple programs are providing federal funds to the

project, the assistance recipient should submit the waiver request to the cognizant program, the one providing the greatest amount of federal funds for the project. Project-specific waiver requests should generally include: (1) a brief summary of the project, (2) a description and explanation of the need for the waiver for the product(s) in question, (3) a brief summary of the due diligence conducted in search of domestic alternatives (which could include correspondence between assistance recipient and supplier/distributors), (4) the quantity and materials of the product(s) in question, (5) all engineering specifications and project design considerations relevant to the product(s) in question, (6) the approximate unit cost of items (both foreign and domestic) in addition to an estimated cost of the materials and overall project, (7) the date any products will be needed on site in order to avoid significant project schedule disruptions, and (8) any other pertinent information relevant to EPA's consideration of the waiver (e.g., if relevant for SRF projects: whether the project is designated as an equivalency project, the date the plans and specifications were submitted to the state, the date of construction initiation, expected date of project completion, any special considerations such as local zoning and building ordinances, seismic requirements, or noise or odor control requirements).

Build American, Buy American Manufacturer Example Certification

Date

Manufacturer Name

Manufacturer Street Address

City, State ZIP

RE: Project Name, Project Location

I, _____ (Authorized Manufacturer Representative), certify that the following products and/or materials shipped/provided to the subject project are in full compliance with the Build American, Buy American requirement as mandated in the Infrastructure Investment and Jobs Act..

Item, Product and/or Materials
Item, Product and/or Materials
Item, Product and/or Materials
Item, Product and/or Materials
Item, Product and/or Materials

Manufacturing of the above items, products and/or materials took place at the following location(s):

Additionally, if any of the above compliance statements change while providing material to this project

_____ (Manufacturer) will immediately notify _____
(Contractor) and the _____ (Owner).

Manufacturer's Signature

Note: The signature must be by manufacturer's authorized responsible party, not the material distributor or supplier.

Manufacturer Certification Checklist

- ✓ Manufacturer name;
- ✓ Construction project name and location;
- ✓ A list of specific product(s) delivered to the project site;
- ✓ A statement that the product is in compliance with the Build American, Buy American requirement as mandated in Infrastructure Investment and Jobs Act;
- ✓ The location of the foundry/mill/factory where the product was manufactured (City and State); and
- ✓ A signature by a manufacturer's responsible party.

American Iron and Steel Required Subcontract and Purchase Agreement Language

The Contractor shall include in all contracts and purchase agreements for this project the following American Iron and Steel contract language:

" _____ (Subcontractor/Supplier) acknowledges to and for the benefit of the _____ (Owner) and the State of New Hampshire (State) that it understands the goods and service under this contract or purchase agreement (Agreement) are being funded with monies that are subject to statutory requirements commonly known as "American Iron and Steel" (the Water Resources Reform and Development Act of 2014, the Consolidated Appropriations Act of 2014 ([Public Law 113-76](#)), and subsequent laws that continue the requirement for the use of American Iron and Steel products in State Revolving Fund construction projects); that requires all of the iron and steel products used in the project to be produced in the United States ("American Iron and Steel Requirement") including iron and steel products provided under this contract or Agreement. The Subcontractor/Supplier hereby represents and warrants to and for the benefit of the Owner and the State that (a) the Subcontractor/Supplier has reviewed and understands the American Iron and Steel Requirement, (b) all of the iron and steel products used in the project will be and/or have been produced in the United States in a manner that complies with the American Iron and Steel Requirement, unless a waiver of the requirement is approved, and (c) the Subcontractor/Supplier will provide any further verified information, certification or assurance of compliance with this paragraph, or information necessary to support a waiver of the American Iron and Steel Requirement, as may be requested by the Owner or the State."

BIDDERS AMERICAN IRON AND STEEL ACKNOWLEDGEMENT

Public Law 113-76

Instructions: This acknowledgement form must be completed and signed by the bidder's authorized representative, and conveyed to owner with bid submittal. You will find bid information in [Section A](#) of the front-end documents.

Project Name _____ City/ Town/ Entity _____

Bidder Name _____ Bidder Address _____

With submittal of this Bid, the Bidder acknowledges to and for the benefit of the Owner and the Funding Agency that it understands that this project is subject to the "[American Iron and Steel \(AIS\)](#)" requirements of the Water Resources Reform and Development Act of 2014, the Consolidated Appropriations Act of 2014 ([Public Law 113-76](#)), and subsequent laws that continue the requirement for the use of American Iron and Steel products in construction projects, and these laws require that all of the iron and steel used in the project be produced in the United States ("American Iron and Steel Requirement") including all iron and steel goods provided by the Bidder pursuant to this Bid.

The Bidder hereby presents and warrants to and for the benefit of the Owner and Funding Agency that (a) the Bidder has reviewed and understands the American Iron and Steel Requirement, (b) all of the iron and steel products used in the project will be and/or have been produced in the United States in a manner that complies with the American Iron and Steel Requirement, unless a waiver of the requirement is approved, and (c) the Bidder will provide any further verified information, certification or assurance of compliance with this Acknowledgement, or information necessary to support a waiver of the American Iron and Steel Requirement, as may be requested by the Owner or the State

Notwithstanding any other provision of the Contract Documents, any failure to comply with this Acknowledgement by the Bidder shall permit the Owner or State to recover as damages against the Bidder any loss, expense, or cost (including without limitation attorney's fees) incurred by the Owner or State resulting from any such failure (including without limitation any impairment or loss of funding, whether in whole or in part, from the State or any damages owed to the State by the Owner).

Additionally, The Bidder hereby acknowledges that Bidder must include in all contracts and purchase agreements for this project the following American Iron and Steel contract language:

" (Subcontractor/Supplier) acknowledges to and for the benefit of the (Owner) and the Funding Agency that it understands the goods and service under this contract or purchase agreement (Agreement) are being funded with monies that are subject to statutory requirements commonly known as "American Iron and Steel" (the Water Resources Reform and Development Act of 2014, the Consolidated Appropriations Act of 2014 ([Public Law 113-76](#)), and subsequent laws that continue the requirement for the use of American Iron and Steel products in State Revolving Fund construction projects); that requires all of the iron and steel products used in the project to be produced in the United States ("American Iron and Steel Requirement") including iron and steel products provided under this contract or Agreement. The Subcontractor/Supplier hereby represents and warrants to and for the benefit of the Owner and the State that (a) the Subcontractor/Supplier has reviewed and understands the American Iron and Steel Requirement, (b) all of the iron and steel products used in the project will be and/or have been produced in the United States in a manner that complies with the American Iron and Steel Requirement, unless a waiver of the requirement is approved, and (c) the Subcontractor/Supplier will provide any further verified information, certification or assurance of compliance with this paragraph, or information necessary to support a waiver of the American Iron and Steel Requirement, as may be requested by the Owner or the State.

(Signature of Certifying Bidder Representative)

Date

Printed Name



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

OFFICE OF WATER

DECISION MEMORANDUM

SUBJECT: De Minimis Waiver of Section 436 of P.L. 113-76, Consolidated Appropriations Act (CAA), 2014

FROM: Nancy K. Stoner
Acting Assistant Administrator

The EPA is hereby granting a nationwide waiver pursuant to the "American Iron and Steel (AIS)" requirements of P.L. 113-76, Consolidated Appropriations Act, 2014 (Act), section 436 under the authority of Section 436(b)(1) (public interest waiver) for de minimis incidental components of eligible water infrastructure projects. This action permits the use of products when they occur in de minimis incidental components of such projects funded by the Act that may otherwise be prohibited under section 436(a). Funds used for such de minimis incidental components cumulatively may comprise no more than a total of 5 percent of the total cost of the materials used in and incorporated into a project; the cost of an individual item may not exceed 1 percent of the total cost of the materials used in and incorporated into a project.

P.L. 113-76, Consolidated Appropriations Act, 2014 (Act), includes an "American Iron and Steel" (AIS) requirement in section 436 that requires Clean Water State Revolving Loan Fund (CWSRF) and Drinking Water State Revolving Loan Fund (DWSRF) assistance recipients to use specific domestic iron and steel products that are produced in the United States if the project is funded through an assistance agreement executed beginning January 17, 2014 (enactment of the Act), through the end of Fiscal Year 2014, unless the agency determines it necessary to waive this requirement based on findings set forth in Section 436(b). The Act states, "[the requirements] shall not apply in any case or category of cases in which the Administrator of the Environmental Protection Agency...finds that— (1) applying subsection (a) would be inconsistent with the public interest" 436(b)(1).

In implementing section 436 of the Act, the EPA must ensure that the section's requirements are applied consistent with congressional intent in adopting this section and in the broader context of the purposes, objectives, and other provisions applicable to projects funded under the SRF. Water infrastructure projects typically contain a relatively small number of high-cost components incorporated into the project. In bid solicitations for a project, these high-cost components are generally described in detail via project specific technical specifications. For these major components, utility owners and their contractors are generally familiar with the conditions of availability, the potential alternatives for each detailed specification, the approximate cost, and the country of manufacture of the available components.

Every water infrastructure project also involves the use of thousands of miscellaneous, generally low-cost components that are essential for, but incidental to, the construction and are incorporated into the physical structure of the project. For many of these incidental components, the country of manufacture and the availability of alternatives is not always readily or reasonably identifiable prior to procurement in the normal course of business; for other incidental components, the country of manufacture may be known but the miscellaneous character in conjunction with the low cost, individually and (in total) as typically procured in bulk, mark them as properly incidental. Examples of incidental components could include small washers, screws, fasteners (i.e., nuts and bolts), miscellaneous wire, corner bead, ancillary tube, etc. Examples of items that are clearly not incidental include significant process fittings (i.e., tees, elbows, flanges, and brackets), distribution system fittings and valves, force main valves, pipes for sewer collection and/or water distribution, treatment and storage tanks, large structural support structures, etc.

The EPA undertook multiple inquiries to identify the approximate scope of de minimis incidental components within water infrastructure projects during the implementation of the American Reinvestment and Recovery Act (ARRA) and its requirements (Buy American provisions, specifically). The inquiries and research conducted in 2009 applies suitably for the case today. In 2009, the EPA consulted informally with many major associations representing equipment manufacturers and suppliers, construction contractors, consulting engineers, and water and wastewater utilities, and performed targeted interviews with several well-established water infrastructure contractors and firms who work in a variety of project sizes, and regional and demographic settings to ask the following questions:

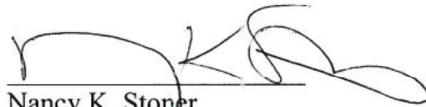
- What percentage of total project costs were consumables or incidental costs?
- What percentage of materials costs were consumables or incidental costs?
- Did these percentages vary by type of project (drinking water vs. wastewater treatment plant vs. pipe)?

The responses were consistent across the variety of settings and project types, and indicated that the percentage of total costs for drinking water or wastewater infrastructure projects represented by these incidental components is generally not in excess of 5 percent of the total cost of the materials used in and incorporated into a project. In drafting this waiver, the EPA has considered the de minimis proportion of project costs generally represented by each individual type of these incidental components within the many types of such components comprising those percentages, the fact that these types of incidental components are obtained by contractors in many different ways from many different sources, and the disproportionate cost and delay that would be imposed on projects if the EPA did not issue this waiver.

Assistance recipients who wish to use this waiver should in consultation with their contractors determine the items to be covered by this waiver and must retain relevant documentation (i.e., invoices) as to those items in their project files.

If you have any questions concerning the contents of this memorandum, please contact Timothy Connor, Chemical Engineer, Municipal Support Division, at connor.timothy@epa.gov or (202) 566-1059 or Kirsten Anderer, Environmental Engineer, Drinking Water Protection Division, at anderer.kirsten@epa.gov or (202) 564-3134.

Issued on: APR 15 2014

Approved by: 
Nancy K. Stoner
Acting Assistant Administrator



AMERICAN IRON AND STEEL DE MINIMIS TRACKING REPORT

NHDES CLEAN WATER AND DRINKING WATER STATE REVOLVING FUND

(To be submitted with each application for payment.)



Public Law 113-76 Consolidated Appropriations Act

De Minimis Waiver Section 436

Contractors who wish to use the AIS De Minimis waiver must consult with the owner when determining the items to be covered by this waiver, and shall retain and provide to the owner relevant documentation (i.e., invoices) for those items. The contractor shall summarize in reports to the owner the types and/or categories of items to which this waiver is applied; the total cost of incidental components covered by the waiver for each type or category (including copies of invoices); and the calculations by which contractor determined the total cost of materials used in and incorporated into the project. The contractor shall include a complete and up-to-date De Minimis Tracking Report in each application for payment. The contractor shall also provide the report to the owner upon request.

Owner:				Project Name:		
Contractor:				CWSRF/DWSRF Project #:		
Has the contractor purchased or used AIS materials that will be covered under this waiver?						
<input type="checkbox"/> Yes. Please continue to the next section. <input type="checkbox"/> No. Please simply sign below.						
Total cost of materials incorporated into the project.				De Minimis 5% Limit		De Minimis 1% Limit
<input type="checkbox"/> Yes <input type="checkbox"/> No						
Is this your final report? In order to be considered a final report all materials have been delivered for the project.						
Component Description	Date Added	County of Origin (if available)	Quantity (if applicable)	Cost Per Unit (if applicable)	Component Total Cost	How is cost documented ³⁵ ?
Total Cost of De Minimis Components						

Contractor Signature:		Printed Name:	
Title:		Date:	

NOTE: The De Minimis waiver is only applicable to the cost of materials incorporated into the project. Do not include other project costs (labor, installation costs, etc.) in the "Total Cost of Materials." The cost of a material must include delivery to the site and any applicable tax. Contractor must provide sufficient documentation to support all costs included in this calculation.

³⁵ Documentation must demonstrate confirmation of the components' actual costs (invoice etc.).



AMERICAN IRON AND STEEL PROJECT CERTIFICATION

NHDES CLEAN WATER AND DRINKING WATER STATE REVOLVING FUND



Public Law 113-76 Consolidated Appropriations Act

De Minimis Waiver Section 436

This certification must be completed and signed by the authorized representative of the contractor, acknowledged by the authorized representative of the owner, and submitted to the New Hampshire Department of Environmental Services upon substantial completion of the project.

Project Name:		Town/ City/ Entity:	
Contractor name:		CWSRF/DWSRF Project #:	
Contractor			
Address:	Street # and Name	City/Town	State ZIP
<p>I hereby certify on behalf of the above named contractor. (Please check one of the following and provide documentation as necessary.)</p> <p><input type="checkbox"/> That the "American Iron and Steel" provisions of the Water Resources Reform and Development Act of 2014, the Consolidated Appropriations Act of 2014 (Public Law 113-76), and subsequent laws that continue the requirement for the use of American Iron and Steel products in State Revolving Fund construction projects (American Iron and Steel Requirement, AIS) have been met and that all iron and steel used in the project named above have been produced in the United States in a manner that complies with the American Iron And Steel Requirement.</p> <p>OR</p> <p><input type="checkbox"/> That the "American Iron and Steel" provisions of the Water Resources Reform and Development Act of 2014, the Consolidated Appropriations Act of 2014 (Public Law 113-76), and subsequent laws that continue the requirement for the use of American Iron and Steel products in State Revolving Fund construction projects (American Iron and Steel Requirement, AIS) were unable to be met. Not all of the iron and steel used in the project named above have been produced in the United States. Items that do not meet AIS requirements are as follows:</p> 			
Attach all documentation including EPA-approved waivers for all iron and steel that do not meet the Iron and Steel Requirement.			
Signature of Certifying Contractor Representative:		Printed Name:	
Title:		Date:	
Acknowledged by Authorized Owner Representative:		Printed Name:	
Title:		Date:	

BIDDERS BUILD AMERICA, BUY AMERICA (BABA) ACKNOWLEDGEMENT

Public Law 117-58

Instructions: This acknowledgement form must be completed and signed by the bidder's authorized representative, and conveyed to owner with bid submittal. You will find bid information in [Section A](#) of the front-end documents.

Project Name Little Bay Subaqueous Water Transmission Main City/ Town/ Entity City of Portsmouth

Bidder Name _____ Bidder Address _____

The Contractor acknowledges to and for the benefit of the City of Portsmouth ("Owner") and the EPA (the "Funding Authority") that it understands the goods and services under this Agreement are being funded with federal monies and have statutory requirements commonly known as "Build America, Buy America;" that requires all of the iron and steel, manufactured products, and construction materials used in the project to be produced in the United States ("Build America, Buy America Requirements") including iron and steel, manufactured products, and construction materials provided by the Contractor pursuant to this Agreement. The Contractor hereby represents and warrants to and for the benefit of the Owner and Funding Authority (a) the Contractor has reviewed and understands the Build America, Buy America Requirements, (b) all of the iron and steel, manufactured products, and construction materials used in the project will be and/or have been produced in the United States in a manner that complies with the Build America, Buy America Requirements, unless a waiver of the requirements is approved, and (c) the Contractor will provide any further verified information, certification or assurance of compliance with this paragraph, or information necessary to support a waiver of the Build America, Buy America Requirements, as may be requested by the Owner or the Funding Authority. Notwithstanding any other provision of this Agreement, any failure to comply with this paragraph by the Contractor shall permit the Owner or Funding Authority to recover as damages against the Contractor any loss, expense, or cost (including without limitation attorney's fees) incurred by the Owner or Funding Authority resulting from any such failure (including without limitation any impairment or loss of funding, whether in whole or in part, from the Funding Authority or any damages owed to the Funding Authority by the Owner). If the Contractor has no direct contractual privity with the Funding Authority, as a lender or awardee to the Owner for the funding of its project, the Owner and the Contractor agree that the Funding Authority is a third-party beneficiary and neither this paragraph (nor any other provision of this Agreement necessary to give this paragraph force or effect) shall be amended or waived without the prior written consent of the Funding Authority.

Notwithstanding any other provision of the Contract Documents, any failure to comply with this Acknowledgement by the Bidder shall permit the Owner to recover as damages against the Bidder any loss, expense, or cost (including without limitation attorney's fees) incurred by the Owner resulting from any such failure (including without limitation any impairment or loss of funding, whether in whole or in part, any damages owed to the Funding Authority by the Owner).

(Signature of Certifying Bidder Representative)

Date

Printed Name

NH Department of Environmental Services
Federal Labor Standards Provisions
29 CFR 5.5(a)

Contract and Subcontract provisions

(a) The Contractor shall insure that all sub contracts entered into for the actual construction, alteration and/or repair, including painting and decorating, of a treatment work under the CWSRF - financed in whole or in part from Federal funds or in accordance with guarantees of a Federal agency or financed from funds obtained by pledge of any contract of a Federal agency to make a loan, grant or annual contribution (except where a different meaning is expressly indicated), and which is subject to the labor standards provisions of any of the acts listed in § 5.1 or -FY 2015 Water Resource Reform and Development Act, contain the following clauses:

(1) Minimum Wage (i) All laborers and mechanics employed or working upon the site of the work will be paid unconditionally and not less often than once a week, and without subsequent deduction or rebate on any account (except such payroll deductions as are permitted by regulations issued by the Secretary of Labor under the Copeland Act (29 CFR part 3)), the full amount of wages and bona fide fringe benefits (or cash equivalents thereof) due at time of payment computed at rates not less than those contained in the wage determination of the Secretary of Labor which is attached hereto and made a part hereof, regardless of any contractual relationship which may be alleged to exist between the contractor and such laborers and mechanics. Contributions made or costs reasonably anticipated for bona fide fringe benefits under section 1(b)(2) of the Davis-Bacon Act on behalf of laborers or mechanics are considered wages paid to such laborers or mechanics, subject to the provisions of paragraph (a)(1)(iv) of this section; also, regular contributions made or costs incurred for more than a weekly period (but not less often than quarterly) under plans, funds, or programs which cover the particular weekly period, are deemed to be constructively made or incurred during such weekly period. Such laborers and mechanics shall be paid the appropriate wage rate and fringe benefits on the wage determination for the classification of work actually performed, without regard to skill, except as provided in § 5.5(a)(4). Laborers or mechanics performing work in more than one classification may be compensated at the rate specified for each classification for the time actually worked therein: Provided, that the employer's payroll records accurately set forth the time spent in each classification in which work is performed. The wage determination (including any additional classification and wage rates conformed under paragraph (a)(1)(ii) of this section) and the Davis-Bacon poster (WH-1321) shall be posted at all times by the contractor and its subcontractors at the site of the work in a prominent and accessible place where it can be easily seen by the workers. Wage determinations may be obtained from the [U.S. Department of Labor's website](http://www.dhs.gov/eis-offices/eis-100).

(ii)(A) The Loan recipient, shall require that any class of laborers or mechanics, including helpers, which is not listed in the wage determination and which is to be employed under the contract shall be classified in conformance with the wage determination. The State award official shall approve a request for an additional classification and wage rate and fringe benefits therefore only when the following criteria have been met:

(1) The work to be performed by the classification requested is not performed by a classification in the wage determination; and

(2) The classification is utilized in the area by the construction industry; and

(3) The proposed wage rate, including any bona fide fringe benefits, bears a reasonable relationship to the wage rates contained in the wage determination.

(B) If the contractor and the laborers and mechanics to be employed in the classification (if known), or their representatives, and the Loan recipient(s) agree on the classification and wage rate (including the amount designated for fringe benefits where appropriate), documentation of the action taken and the request, including the local wage determination shall be sent by the Loan recipient(s) to the State award official. The State award official will transmit the

request, to the Administrator of the Wage and Hour Division, Employment Standards Administration, U.S. Department of Labor, Washington, DC 20210 and to the EPA DB Regional Coordinator concurrently. The Administrator, or an authorized representative, will approve, modify, or disapprove every additional classification request within 30 days of receipt and so advise the State award official or will notify the State award official within the 30-day period that additional time is necessary.

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

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

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

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

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

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

written evidence of the registration of apprenticeship programs and certification of trainee programs, the registration of the apprentices and trainees, and the ratios and wage rates prescribed in the applicable programs.

(ii)(A) The contractor shall submit weekly, for each week in which any contract work is performed, a copy of all payrolls to the Loan recipient, that is, the entity that receives the sub-grant or Loan from the State capitalization grant recipient. Such documentation shall be available on request of the State recipient or EPA. As to each payroll copy received, the Loan recipient shall provide written confirmation in a form satisfactory to the State indicating whether or not the project is in compliance with the requirements of 29 CFR 5.5(a)(1) based on the most recent payroll copies for the specified week. The payrolls shall set out accurately and completely all of the information required to be maintained under 29 CFR 5.5(a)(3)(i), except that full social security numbers and home addresses shall not be included on the weekly payrolls. Instead the payrolls shall only need to include an individually identifying number for each employee (e.g., the last four digits of the employee's social security number). The required weekly payroll information may be submitted in any form desired. Optional Form WH-347 is available for this purpose from the Wage and Hour Division Web site at <http://www.dol.gov/esa/whd/forms/wh347instr.htm> or its successor site. The prime contractor is responsible for the submission of copies of payrolls by all subcontractors. Contractors and subcontractors shall maintain the full social security number and current address of each covered worker, and shall provide them upon request to the Loan recipient(s) for transmission to the State or EPA if requested by EPA, the State, the contractor, or the Wage and Hour Division of the Department of Labor for purposes of an investigation or audit of compliance with prevailing wage requirements. It is not a violation of this section for a prime contractor to require a subcontractor to provide addresses and social security numbers to the prime contractor for its own records, without weekly submission to the Loan recipient(s).

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

(3) Withholding for unpaid wages and liquidated damages. The Loan recipient, upon written request of the Contracting Official or an authorized representative of the Department of Labor, shall withhold or cause to be withheld, from any moneys payable on account of work performed by the contractor or subcontractor under any such contract or any other Federal contract with the same prime contractor, or any other federally-assisted contract subject to the Contract Work Hours and Safety Standards Act, which is held by the same prime contractor, such sums as may be

determined to be necessary to satisfy any liabilities of such contractor or subcontractor for unpaid wages and liquidated damages as provided in the clause set forth in paragraph (b)(2) of this section.

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

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

"General Decision Number: NH20230025 04/07/2023

Superseded General Decision Number: NH20220025

State: New Hampshire

Construction Type: Heavy

County: Rockingham County in New Hampshire.

HEAVY CONSTRUCTION PROJECTS

Note: Contracts subject to the Davis-Bacon Act are generally required to pay at least the applicable minimum wage rate required under Executive Order 14026 or Executive Order 13658. Please note that these Executive Orders apply to covered contracts entered into by the federal government that are subject to the Davis-Bacon Act itself, but do not apply to contracts subject only to the Davis-Bacon Related Acts, including those set forth at 29 CFR 5.1(a)(2)-(60).

If the contract is entered into on or after January 30, 2022, or the contract is renewed or extended (e.g., an option is exercised) on or after January 30, 2022:	<ul style="list-style-type: none">. Executive Order 14026 generally applies to the contract.. The contractor must pay all covered workers at least \$16.20 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on the contract in 2023.
If the contract was awarded on or between January 1, 2015 and January 29, 2022, and the contract is not renewed or extended on or after January 30, 2022:	<ul style="list-style-type: none">. Executive Order 13658 generally applies to the contract.. The contractor must pay all covered workers at least \$12.15 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on that contract in 2023.

The applicable Executive Order minimum wage rate will be adjusted annually. If this contract is covered by one of the Executive Orders and a classification considered necessary for performance of work on the contract does not appear on this wage determination, the contractor must still submit a conformance request.

Additional information on contractor requirements and worker protections under the Executive Orders is available at <http://www.dol.gov/whd/govcontracts>.

Modification Number	Publication Date
0	01/06/2023
1	01/13/2023
2	02/24/2023

* ELEC0490-008 01/01/2023

	Rates	Fringes
ELECTRICIAN.....	\$ 33.30	22.05

* IRON0007-039 03/16/2023

	Rates	Fringes
IRONWORKER (Reinforcing and Structural).....	\$ 30.08	24.72

PLUM0131-005 06/06/2022

	Rates	Fringes
PIPEFITTER.....	\$ 38.50	25.05

SUNH2015-011 06/16/2017

	Rates	Fringes
CARPENTER, Includes Form Work....	\$ 28.17	8.09
CEMENT MASON/CONCRETE FINISHER...	\$ 25.49	18.11
LABORER: Asphalt, Includes Raker, Shoveler, Spreader and Distributor.....	\$ 23.70	1.54
LABORER: Common or General.....	\$ 18.61	4.49
LABORER: Pipelayer.....	\$ 30.35	17.03
OPERATOR: Backhoe/Excavator/Trackhoe.....	\$ 28.51	10.16
OPERATOR: Bulldozer.....	\$ 21.70	4.09
OPERATOR: Crane.....	\$ 29.91	6.60
OPERATOR: Drill.....	\$ 28.78	15.26
OPERATOR: Loader.....	\$ 30.49	19.06
OPERATOR: Paver (Asphalt, Aggregate, and Concrete).....	\$ 27.10	5.69
OPERATOR: Roller.....	\$ 23.02	4.52
PAINTER (Brush and Roller).....	\$ 33.55	19.15
TRAFFIC CONTROL: Flagger.....	\$ 17.24	1.54
TRUCK DRIVER: Dump Truck.....	\$ 19.02	5.73

WELDERS - Receive rate prescribed for craft performing operation to which welding is incidental.

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Note: Executive Order (EO) 13706, Establishing Paid Sick Leave for Federal Contractors applies to all contracts subject to the Davis-Bacon Act for which the contract is awarded (and any solicitation was issued) on or after January 1, 2017. If this contract is covered by the EO, the contractor must provide employees with 1 hour of paid sick leave for every 30 hours they work, up to 56 hours of paid sick leave each year. Employees must be permitted to use paid sick leave for their own illness, injury or other health-related needs, including preventive care; to assist a family member (or person who is like family to the employee) who is ill, injured, or has other health-related needs, including preventive care; or for reasons resulting from, or to assist a family member (or person who is like family to the employee) who is a victim of, domestic violence, sexual assault, or stalking. Additional information on contractor requirements and worker protections under the EO is available at <https://www.dol.gov/agencies/whd/government-contracts>.

Unlisted classifications needed for work not included within the scope of the classifications listed may be added after award only as provided in the labor standards contract clauses (29CFR 5.5 (a) (1) (ii)).

The body of each wage determination lists the classification and wage rates that have been found to be prevailing for the cited type(s) of construction in the area covered by the wage determination. The classifications are listed in alphabetical order of ""identifiers"" that indicate whether the particular rate is a union rate (current union negotiated rate for local), a survey rate (weighted average rate) or a union average rate (weighted union average rate).

Union Rate Identifiers

A four letter classification abbreviation identifier enclosed in dotted lines beginning with characters other than ""SU"" or ""UAVG"" denotes that the union classification and rate were prevailing for that classification in the survey. Example: PLUM0198-005 07/01/2014. PLUM is an abbreviation identifier of the union which prevailed in the survey for this classification, which in this example would be Plumbers. 0198 indicates the local union number or district council number where applicable, i.e., Plumbers Local 0198. The next number, 005 in the example, is an internal number used in processing the wage determination. 07/01/2014 is the effective date of the most current negotiated rate, which in this example is July 1, 2014.

Union prevailing wage rates are updated to reflect all rate changes in the collective bargaining agreement (CBA) governing this classification and rate.

Survey Rate Identifiers

Classifications listed under the ""SU"" identifier indicate that no one rate prevailed for this classification in the survey and the published rate is derived by computing a weighted average rate based on all the rates reported in the survey for that classification. As this weighted average rate includes all rates reported in the survey, it may include both union and

non-union rates. Example: SULA2012-007 5/13/2014. SU indicates the rates are survey rates based on a weighted average calculation of rates and are not majority rates. LA indicates the State of Louisiana. 2012 is the year of survey on which these classifications and rates are based. The next number, 007 in the example, is an internal number used in producing the wage determination. 5/13/2014 indicates the survey completion date for the classifications and rates under that identifier.

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Union Average Rate Identifiers

Classification(s) listed under the UAVG identifier indicate that no single majority rate prevailed for those classifications; however, 100% of the data reported for the classifications was union data. EXAMPLE: UAVG-OH-0010 08/29/2014. UAVG indicates that the rate is a weighted union average rate. OH indicates the state. The next number, 0010 in the example, is an internal number used in producing the wage determination. 08/29/2014 indicates the survey completion date for the classifications and rates under that identifier.

A UAVG rate will be updated once a year, usually in January of each year, to reflect a weighted average of the current negotiated/CBA rate of the union locals from which the rate is based.

WAGE DETERMINATION APPEALS PROCESS

1.) Has there been an initial decision in the matter? This can be:

- * an existing published wage determination
- * a survey underlying a wage determination
- * a Wage and Hour Division letter setting forth a position on a wage determination matter
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On survey related matters, initial contact, including requests for summaries of surveys, should be with the Wage and Hour National Office because National Office has responsibility for the Davis-Bacon survey program. If the response from this initial contact is not satisfactory, then the process described in 2.) and 3.) should be followed.

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U.S. Department of Labor
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2.) If the answer to the question in 1.) is yes, then an interested party (those affected by the action) can request review and reconsideration from the Wage and Hour Administrator (See 29 CFR Part 1.8 and 29 CFR Part 7). Write to:

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The request should be accompanied by a full statement of the interested party's position and by any information (wage payment data, project description, area practice material, etc.) that the requestor considers relevant to the issue.

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END OF GENERAL DECISIO"

"General Decision Number: NH20230026 04/07/2023

Superseded General Decision Number: NH20220026

State: New Hampshire

Construction Type: Heavy

County: Strafford County in New Hampshire.

HEAVY CONSTRUCTION PROJECTS

Note: Contracts subject to the Davis-Bacon Act are generally required to pay at least the applicable minimum wage rate required under Executive Order 14026 or Executive Order 13658. Please note that these Executive Orders apply to covered contracts entered into by the federal government that are subject to the Davis-Bacon Act itself, but do not apply to contracts subject only to the Davis-Bacon Related Acts, including those set forth at 29 CFR 5.1(a)(2)-(60).

If the contract is entered into on or after January 30, 2022, or the contract is renewed or extended (e.g., an option is exercised) on or after January 30, 2022:	<ul style="list-style-type: none">. Executive Order 14026 generally applies to the contract.. The contractor must pay all covered workers at least \$16.20 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on the contract in 2023.
If the contract was awarded on or between January 1, 2015 and January 29, 2022, and the contract is not renewed or extended on or after January 30, 2022:	<ul style="list-style-type: none">. Executive Order 13658 generally applies to the contract.. The contractor must pay all covered workers at least \$12.15 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on that contract in 2023.

The applicable Executive Order minimum wage rate will be adjusted annually. If this contract is covered by one of the Executive Orders and a classification considered necessary for performance of work on the contract does not appear on this wage determination, the contractor must still submit a conformance request.

Additional information on contractor requirements and worker protections under the Executive Orders is available at <http://www.dol.gov/whd/govcontracts>.

Modification Number	Publication Date
0	01/06/2023
1	01/13/2023
2	02/24/2023

* IRON0007-039 03/16/2023

	Rates	Fringes
IRONWORKER (Reinforcing and Structural).....	\$ 30.08	24.72

PLUM0131-005 06/06/2022

	Rates	Fringes
PIPEFITTER.....	\$ 38.50	25.05

SUNH2015-012 06/16/2017

	Rates	Fringes
CARPENTER, Includes Form Work....	\$ 26.83	6.94
CEMENT MASON/CONCRETE FINISHER...	\$ 27.46	13.30
ELECTRICIAN.....	\$ 25.70	11.47
LABORER: Asphalt, Includes Raker, Shoveler, Spreader and Distributor.....	\$ 23.70	1.54
LABORER: Common or General.....	\$ 17.36	2.19
LABORER: Pipelayer.....	\$ 24.54	9.84
OPERATOR: Backhoe/Excavator/Trackhoe.....	\$ 25.55	5.74
OPERATOR: Bulldozer.....	\$ 21.70	4.09
OPERATOR: Crane.....	\$ 28.37	9.74
OPERATOR: Drill.....	\$ 27.15	13.39
OPERATOR: Loader.....	\$ 26.37	12.98
OPERATOR: Paver (Asphalt, Aggregate, and Concrete).....	\$ 27.10	5.69
OPERATOR: Roller.....	\$ 24.09	4.43
PAINTER (Brush and Roller).....	\$ 33.55	19.15
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contract is covered by the EO, the contractor must provide employees with 1 hour of paid sick leave for every 30 hours they work, up to 56 hours of paid sick leave each year. Employees must be permitted to use paid sick leave for their own illness, injury or other health-related needs, including preventive care; to assist a family member (or person who is like family to the employee) who is ill, injured, or has other health-related needs, including preventive care; or for reasons resulting from, or to assist a family member (or person who is like family to the employee) who is a victim of, domestic violence, sexual assault, or stalking. Additional information on contractor requirements and worker protections under the EO is available at <https://www.dol.gov/agencies/whd/government-contracts>.

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END OF GENERAL DECISIO"

SECTION 01010

SUMMARY OF WORK

PART 1 - GENERAL

1.1 DESCRIPTION:

- A. Location: The Work locations include, but are not limited to, locations within the right-of-ways on the following easements in the Town of Newington and Town of Durham.
 - 1. Fox Point (Newington)
 - 2. Little Bay (State of New Hampshire)
 - 3. Wagon Hill Farm (Durham)
 - 4. Off Piscataqua Road (Durham)
- B. Work Included: The Work includes, but is not limited to, the following:
 - 1. New Water System:
 - a. Water main and valves
 - b. Water services
 - c. Disinfection of water mains and appurtenances
 - d. Removal and disposal or abandonment of existing water main and valves.
 - 2. Testing of water mains, valves and manholes for proper installation and performance.
 - 3. Salt marsh salvage and restoration.
 - 4. All related site work including trench excavation, ledge excavation, groundwater dewatering, disposal of excess excavated materials, filter fabric, bedding, backfill, compaction, loam/seed and landscaping.
 - 5. All related marine work including temporary trestle and cofferdam construction and removal, cofferdam excavation and backfill, pipeline placement, required boat and barge support, diver inspection of pipeline, and any required marine safety provisions.
 - 6. Other miscellaneous work shown in the Specifications for a complete and operational system.
- C. Related Work Specified Elsewhere
 - 1. Coordination: Section 01050.
 - 2. Construction Schedules: Section 01310.
 - 3. Temporary Facilities and Controls: Section 01500.
 - 4. Traffic Regulation: Section 01570.
 - 5. Site work, piping, structures, testing requirements are specified in Division 2.
- D. Removals, Relocations and Rearrangements
 - 1. Examine the existing site for the work of all trades which will influence the cost of the work under the bid. This work shall include removals, relocations and rearrangements which may interfere with, disturb or complicate the performance of the work under the general bid involving systems, equipment and related service lines, which shall continue to be utilized as part of the finished project. The Contractor is responsible for all coordination in this regard.

2. Provide in the bid a sufficient amount to include all removals, relocations, rearrangements, and reconnections herein specified, necessary or required to provide approved operation and coordination of the combined new and existing systems and equipment.
 3. Provide in the bid a sufficient amount to include all temporary facilities required to maintain flows during the construction period, including bypass pumping, temporary piping, temporary metering, etc. The cost shall include the cost for all labor, tools, equipment, and materials necessary.
- E. Permits
1. All work shall be completed in accordance with federal, state, and local permits.
 - a. Federal
 - i. US Army Corp of Engineers 404 Individual Permit
 - ii. NPDES Stormwater Construction General Permit
 - b. State
 - i. NHDES Shoreland Permit
 - ii. NHDES Wetlands Permit
 - iii. NHDOE License
 - iv. NHDES Water Quality Certificate
 - v. Coastal Zone Management Federal Consistency Certification
 - c. Local
 - i. NHDOT District 6 Driveway Permit

PART 2 - PRODUCTS (NOT APPLICABLE)

PART 3 - EXECUTION

3.1 MAINTAIN EXISTING WORKS

- A. Continuous Operations Criteria:
1. The Contractor shall conduct operations in such a manner and sequence which shall neither result in a disruption of, nor interfere with, the functional workings of any existing utilities.
 2. The Contractor shall furnish, install, and operate any piping, equipment, and appurtenances necessary to provide the temporary services/facilities required during construction including, but not limited to, bypass pumping, flow barriers and diversions. Temporary facilities, if required, shall have pumping capacity equal to or greater than the existing maximum capacity of the piping as determined by their size and slope.
 3. The Owner will operate and maintain all existing systems and equipment not modified or impacted by the project. The Contractor shall notify and coordinate with the Owner whenever Contractor's temporary facilities or construction will interface with existing utilities. The City of Portsmouth water department will be responsible for operating all water valves.
 4. The Contractor shall be responsible for the operation and maintenance of all new and temporary facilities until such time as the new facilities are accepted by the Owner.

B. Minimize Interference

1. The Contractor shall, at all times, conduct 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.
2. Work of connecting with, cutting into, and reconstructing existing pipes or structures shall be planned to interfere with the operation of the existing facilities for the shortest possible time and when the demands on the facilities best permit such interference. It may be necessary to work outside of normal working hours to minimize interference. 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.
3. The Contractor shall conduct their work so as to interfere as little as possible with the public's use of Wagon Hill Farm and Fox Point outside the defined work areas.

3.2 CONSTRUCTION SEQUENCE

- A. Construction of the proposed facilities will disrupt the existing structures and operations. To maintain continuous operations, the construction must be divided into phases or sequenced appropriately.
- B. The Contractor shall submit to the Engineer, for review and acceptance, a complete schedule of the proposed sequence of construction operations prior to commencing any work. This schedule shall include the Contractor's plans for doing the work.
- C. The Contractor shall submit to the Engineer a written request to deviate from the above sequence with adequate supporting information to demonstrate to the Engineer that the continuity and degree of treatment will not be adversely affected.
- D. The Contractor shall sequence construction such that the following criteria can be complied with:
 1. Install landside erosion controls on both sides.
 2. Mobilize and stage construction on the Newington side of the crossing.
 3. Deliver and fabricate HDPE water main in Newington staging area.
 4. Install sheeted excavations for tapping sleeves and valves (TS&V) both ends.
 5. Install TS&V's both ends.
 6. Excavate and install water service tap on PCCP pipe for Wagon Hill Farm building water service.
 7. Install sectional DI pipe from TS&V's to water's edge, both ends.
 8. Construct in-water trestles, both sides.
 9. Install sheet pile cofferdams, both sides.
 10. Complete subaqueous pipeline trench excavation within cofferdams, both sides.
 11. Remove cofferdam end caps.
 12. Float the HDPE pipeline, install concrete anchors, and place pipeline across the bay.
 13. Sink the pipe along pipeline route and within cofferdams.
 14. Connect pipeline on both ends.

15. Backfill HDPE pipeline within cofferdams, both sides.
16. Flush, pressure test, and disinfect pipeline.
17. Place new pipeline into service.
18. Remove sheet piles, both sides.
19. Remove trestles, both sides.
20. Perform dive or ROV final inspection of the submerged pipeline to detail pipe location and condition.
21. Install temporary line stops on PCCP to isolate existing crossing pipes.
22. Replace existing isolation valves in valve vaults.
23. Remove temporary line stops.
24. Restore surface, both ends.

3.3 SITE ACCESS LIMITATIONS

- A. Construction access, staging, and disturbance shall not occur outside of the easements shown on the Drawings and the impact areas permitted.
- B. Contractor shall access the Durham side of the site from the temporary access drive on the Wagon Hill property. All access will be within the limits shown on the temporary access plans. Maintenance of the temporary access drive on the Wagon Hill property is the responsibility of the Contractor during the active construction period. Six-foot chain-link temporary barrier fencing shall be installed along the easement lines on 180 Piscataqua, as delineated by the Engineer. No work shall be allowed outside these easement lines.
- D. Contractor shall access the Newington side of the project through Fox Point. Use of Fox Point as a construction staging area is subject to the conditions of an agreement between the City of Portsmouth and the Town of Newington. Contractor shall comply with all requirements in the agreement. Refer to Appendix E.

3.4 SCHEDULE LIMITATIONS AND WORK RESTRICTIONS/ REQUIREMENTS

- A. Work Hours:
 1. Work hours are defined in the Section C (General Conditions and Supplemental Conditions).
 2. All Work shall be prohibited on Saturdays, Sundays, and legal holidays.
 3. All Work on weekdays shall be performed between the hours of 7:00 AM and after 4:30 PM, except during emergencies.
 4. The Contractor shall request permission to work outside the work hours specified above at least 72-hours in advance of the proposed work. The Contractor shall not commence work outside of the work hours specified above unless or until granted such permission from the Owner and Engineer.
- B. Temporary Facilities Plan:
 1. A project Temporary Facilities Plan shall be submitted prior to the Pre-Construction Meeting. The Temporary Facilities Plan shall identify the approach for maintaining continuous operations for each impacted utility.
- C. Maintain Services:
 1. Maintain all existing water services.
- D. Traffic Control Plan:
 1. A project-specific Traffic Control Plan shall be submitted prior to the Pre-Construction Meeting (refer to Section 01570). The Traffic Control Plan shall

identify traffic management requirements for each distinct component of the project.

- a. For the Town of Durham:
 - i. Contractor shall detail provisions for turning into the site from busy Route 4.
- b. For the Town of Newington:
 - i. All construction vehicle traffic shall exclusively utilize Shattuck Road, Nimble Hill Road and Fox Point Road to access the project site.
 - ii. All vehicle traffic on Nimble Hill Road and Fox Point Road is limited to 80,000 LB GVW.
 - iii. Vehicles will be prohibited from using engine (Jake) brakes along Nimble Hill Road and Fox Point Road.
2. Contractor shall provide one lane for the passage of traffic within any work zone unless approved by the Owner.
3. Contractor shall maintain access to all residences and businesses at all times.
4. Contractor shall maintain access for garbage collection and mail services to all residences and businesses at all times. Contractor shall coordinate with these service providers.
5. Contractor shall maintain access for bus routes, schools, day care facilities, etc. at all times. Contractor shall coordinate efforts with local school district to ensure access.

E. Special Coordination Requirements:

1. In-water work shall be coordinated with the New Hampshire Port Authority Harbormaster. The Harbormaster shall be notified 30 days in advance of start of construction.
2. In accordance with NHDES Permit 2020-02959, work within tidal waters shall occur between November 15 and March 15. Contractor shall comply with all conditions in the permit.
3. Portions of work are on private property. Easements have been obtained for this work. The property owners may have a project representative that will participate in project meetings. Work restrictions and requirements specified herein. Contractor shall comply with all conditions outlined in the easements, and absolutely no work will be performed outside of the easement limits.

All work throughout the project shall be coordinated at weekly construction meetings with the Owner, Engineer, and other interested parties. This coordination specifically includes scheduling of material deliveries/removals, concrete placements, and cranes.

F. Tree Cutting/Clearing:

1. Tree cutting and/or clearing is prohibited between June 1 and July 31 to protect the Northern Long-eared Bat.

G. Water Quality Monitoring:

1. Water quality monitoring shall be conducted in accordance with the approved water quality monitoring plan.

- H. Site Restoration: All impacted areas shall be fully restored. Restoration requirements are specified in project easements, access agreements, and environmental permits and as specified herein. Contractor shall comply with all restoration requirements.

END OF SECTION

SECTION 01050COORDINATIONPART 1 - GENERAL1.1 DESCRIPTION

- A. Contractor is required to work in close proximity to Owner's existing facilities. The Contractor, under this Contract, will be responsible for coordinating construction activities with Owner to ensure that services, facilities, and safe working conditions are maintained.
- B. Any damage to existing structures, equipment and property, accepted equipment or structures, and property or work in progress by others; as a result of the Contractor's or their subcontractor's operations shall be made good by the Contractor at no additional cost to the Owner.

1.2 COORDINATION WITH OTHERS

- A. Town of Newington:
 - 1. Contractor shall coordinate access, egress, detours and traffic control, if required, at each site with the Newington Police Department as applicable. The Contractor shall notify Newington Police, Fire Department and Rescue Squad at least 24 hours in advance of any street closings or detours as applicable.
 - 2. Contractor shall submit a health and safety plan for work over and around the water to the Newington Fire and Police departments for review and approval prior to any work over the bay.
 - 3. Contractor shall participate in a pre and post construction inspection of Nimble Hill road and Fox Point Road with City of Portsmouth and Town of Newington officials.
 - 4. The Contractor shall be responsible for coordinating and maintaining public services to all public and private properties.
- B. City of Durham:
 - 1. Contractor shall coordinate access, egress, detours and traffic control, if required, at each site with the Durham Police Department as applicable. The Contractor shall notify Durham Police, Fire Department and Rescue Squad at least 24 hours in advance of any street closings or detours as applicable.
 - 2. Contractor shall take extra care when accessing the Durham side of the site to not adversely affect the use of the wagon hill property by the residents of Durham.
 - 3. The Contractor shall be responsible for coordinating and maintaining public services to all public and private properties.
- C. City of Portsmouth Water Operations (Department of Public Works)
 - 1. Contractor shall be responsible for coordinating all work in the vicinity of water lines with the City of Portsmouth DPW Contractor shall bear all costs for the City's inspection requirements, temporary facilities, water main adjustments and other requirements.
- D. Eversource:

1. The Contractor shall be responsible for coordinating all work around Eversource facilities with Eversource and shall bear all costs of inspection requirements, temporary facilities relocation and other requirements.
- E. Unitil Corporation
 1. The Contractor shall be responsible for coordinating all work around Unitil facilities with Unitil and shall bear all costs of inspection requirements, temporary facilities relocation and other requirements.
- F. Metrocast Cablevision
 1. The Contractor shall be responsible for coordinating all work around Metrocast facilities with Metrocast and shall bear all costs of inspection requirements, temporary facilities relocation and other requirements.
- G. Fairpoint Communications:
 1. The Contractor shall be responsible for coordinating and providing telephone service to all construction sites, both temporary and permanent. The Contractor shall be responsible for coordinating all work around Fairpoint facilities with Fairpoint and shall bear all costs of inspection requirements, temporary facilities relocation and all other requirements.
 2. The Contractor shall be responsible for coordinating and providing temporary internet service to the temporary Engineer's field office.
- H. The Contractor shall provide the Resident Project Representative and Chief Operator a construction schedule indicating the times to perform the work required. The Contractor shall update the schedule when required and give the water system one week notice before the start of any work. The Contractor shall provide the system personnel enough time to obtain materials and perform the work required of them. The Contractor shall daily communicate with the Resident Project Representative and Chief Operator concerning updating the schedule, job progress, delay or early starts that affect the treatment process, facility staffing, etc.
- I. Weekly coordination meetings shall be held between the Contractor, Owner's Chief Operator/Superintendent and the Resident Project Representative. This meeting shall cover the following:
 1. Work to be completed the following week
 2. Project Schedule
 3. Shop Drawing and O&M issues
 4. Outstanding RFIs and Clarifications
 5. Change Orders and Field Orders
 6. Review of Record Drawing Information
 7. Discussion/Resolution of any old issues
 8. New issues discussion
 9. Contractor's Safety and Health Plan Updates
- J. The Contractor shall be responsible for explicitly notifying all equipment suppliers, electrical subcontractor, and the instrumentation supplier that they are required to coordinate their work with the instrumentation supplier by providing operating sequences, input/out specifications with wiring diagrams for all equipment, and that they shall review and comment on each other's shop drawings to ensure that all interfaces are compatible.
- K. Snow Removal Coordination: The Contractor shall be responsible for all snow

removal activities in construction and laydown areas onsite. This is especially important on the Durham temporary access drive.

END OF SECTION

SECTION 01070

ABBREVIATIONS & SYMBOLS

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Where any of the following abbreviations are used in these Specifications, they shall have the meaning set forth opposite each.

AASHTO	American Association of State Highway & Transportation Officials
AC	Alternating Current
ACI	American Concrete Institute
ACP	Asbestos Cement Pipe
AGA	American Gas Association
AIC	Ampere Interrupting Capacity
AGMA	American Gear Manufacturers Association
AIEE(IEEE)	American Institute of Electrical Engineers (Institute of Electrical and Electronics Engineers, Inc.)
AISC	American Institute of Steel Construction
AMP	Ampere 125-16
Amer. Std.	American Standard for Cast Iron Pipe Flanges and Flanged Fittings, Class 125 (ASA B16 11960)
ANSI	American National Standards Institute
API	American Petroleum Institute
ASA	American Standards Association
ASCE	American Society of Civil Engineers
ASHRAE	American Society of Heating, Refrigerating and Air Conditioning Engineers
ASME	American Society of Mechanical Engineers
ASTM	American Society for Testing and Materials
AWG	American or Brown and Sharpe Wire Gage
AWWA	American Water Works Association
CCTV	Closed Circuit Television
CF	Cubic Foot
CFM	Cubic Foot Per Minute
CFS	Cubic Foot Per Second
CI	Cast Iron
CIPP	Cured-in-Place Pipe
CIPRA	Cast Iron Pipe Research Association
CSI	Construction Specifications Institute
CY	Cubic Yard
DC	Direct Current
DEP	Department of Environmental Protection
DI (DIP)	Ductile Iron (Pipe)
DOT	Department of Transportation
EDR	Equivalent Directional Radiation

EPA	U.S. Environmental Protection Agency
FPS	Feet Per Second
FT	Feet
GAL	Gallons
GPD	Gallons Per Day
GPM	Gallons Per Minute
HDPE	High Density Polyethylene
HP	Horsepower
IBR	Institute of Boiler and Radiator Manufacturers
IN	Inches
ISA	Instrument Society of America
KVA	Kilovolt-ampere
KW	Kilowatt
LB	Pound
MACP	Manhole Assessment and Certification Program
MAX	Maximum
MGD	Million Gallons Per Day
MIN	Minimum
NACE	National Association of Corrosion Engineers
NASSCO	National Association of Sewer Service Companies
NBS	National Bureau of Standards
NEC	National Electrical Code, Latest Edition
NEMA	National Electrical Manufacturers Association
NEWWA	New England Water Works Association
NPT	National Pipe Thread
OS&Y	Outside Screw and Yoke
PCA	Portland Cement Association
PPM	Parts Per Million
PSI	Pounds Per Square Inch
PSIG	Pounds Per Square Inch Gage
PVC	Polyvinyl Chloride
RPM	Revolutions Per Minute
RUS	Rural Utility Service
SY	Square Foot
STL. W.G.	U.S. Steel Wire, Washburn and Moen, American Steel and Wire Cos., or Roebling Gage
SY	Square yard
TDH	Total Dynamic Head
USAS	Standards of the United States of America Standards Institute (formerly American Standards Association)
USS GAGE	United States Standard Gage

VC	Vitrified Clay
WSP	Working Steam Pressure
Fed. Spec.	Federal Specifications issued by the Federal Supply Service of the General Service Administration, Washington, D.C.

END OF SECTION

SECTION 01150MEASUREMENT AND PAYMENTPART 1 - GENERAL1.1 DESCRIPTION

- A. For lump sum items, payment shall be made to the contractor in accordance with an accepted progress schedule and schedule of values on the basis of actual work completed.
- B. For unit-price items, payment shall be based on the actual amount of work accepted and for the actual amount of materials in place, as shown by final measurements.
 - 1. All units of measurement shall be standard United States convention as applied to the specific items of work by tradition and as interpreted by the Engineer.
 - 2. At the end of each day's work, the Contractor's Superintendent or other authorized representative of the Contractor shall meet with the Resident Project Representative and determine the quantities of unit price work accomplished and/or completed during the workday.
 - 3. The Resident Project Representative will then prepare two "Daily Progress Reports" which shall be signed by both the Resident Project Representative and Contractor's Representative.
 - 4. Once each month the Resident Project Representative will prepare two "Monthly Progress Summation" forms from the month's accumulation of "Daily Progress Reports" which shall also be signed by both the Resident Project Representative and Contractor's Representative.
 - 5. These completed forms will provide the basis of the Engineer's monthly quantity estimate upon which payment will be made. Items not appearing on both the Daily Progress Reports and Monthly Progress Summation will not be included for payment. Items appearing on forms not properly signed by the Contractor will not be included for payment.
 - 6. After the work is completed and before final payment is made, the Engineer will make final measurements to determine the quantities of various items of work accepted as the basis for final settlement.

1.2 SCOPE OF PAYMENT

- A. Payments to the Contractor will be made for the actual quantities of the Contract items performed and accepted in accordance with the Contract Documents. Upon completion of construction, if these actual quantities show either an increase or decrease from the quantities given in the Proposal Form, the Contract Unit Prices will still prevail.
- B. The Contractor shall accept in compensation, as herein provided, in full payment for furnishing all materials, labor, tools, equipment, and incidentals necessary to the completed work and for performing all work contemplated and embraced by the Contract; also for all loss or damage arising from the nature of the Work, or from the action of the elements, or from any unforeseen difficulties which may be encountered

during the prosecution of the Work and until its final acceptance by the Engineer, and for all risks of every description connected with the prosecution of the work, except as provided herein, also for all expenses incurred in consequence of the suspension of the Work as herein authorized.

- C. The payment of any partial estimate or of any retained percentage except by and under the approved final invoice, in no way shall affect the obligation of the Contractor to repair or renew any defective parts of the construction or to be responsible for all damage due to such defects.

1.3 PAYMENT FOR INCREASED OR DECREASED QUANTITIES

- A. When alterations in the quantities of work not requiring supplemental agreements, as hereinbefore provided for, are ordered and performed, the Contractor shall accept payment in full at the Contract price for the actual quantities of work done. No allowance will be made for anticipated profits. Increased or decreased work involving supplemental agreements will be paid for as stipulated in such agreements.

1.4 OMITTED ITEMS

- A. Should any items contained in the bid form be found unnecessary for the proper completion of the work contracted, the Engineer may eliminate such items from the Contract, and such action shall in no way invalidate the Contract, and no allowance will be made for items so eliminated in making final payment to the Contractor.

1.5 PARTIAL PAYMENTS

- A. Partial payments shall be made monthly as the work progresses. Partial payments shall be made subject to the provisions of the Supplemental and General Conditions.

1.6 PAYMENT FOR MATERIAL DELIVERED

- A. When requested by the Contractor and at the discretion of the Owner, payment may be made for all or part of the value of acceptable, non-perishable materials and equipment which are to be incorporated into bid items, have not been used and have been delivered to the construction site, or placed in storage places acceptable to the Owner. Payment shall be subject to the provisions of the General and Supplemental Conditions.
- B. No payment shall be made upon fuels, supplies, lumber, false work, or other materials, or on temporary structures of any kind which are not a permanent part of the Contract.

1.7 FINAL PAYMENT

- A. After final measurements are made by the Engineer, the Contractor will prepare a final quantity invoice of the amount of the Work performed and the value of such Work. Owner shall make final payments of the sum found due less retainages subject to provisions of the General and Supplemental Conditions.

1.8 INCIDENTAL WORK

- A. Incidental work items for which separate payment will not be made includes, but is not limited to, the following items:
 - 1. Pre-Construction photographs or videos.

2. Pre-installation dive inspection and video recording of the pipeline route.
3. Post-installation dive inspection and video recording of the installed pipeline.
4. All dive operations required for the successful execution of the work.
5. Project Record Documents.
6. Traffic control plan and traffic regulation.
7. Signs including temporary trail relocation signage.
8. Certified flagger or uniformed officer to be utilized when trucks are entering or exiting temporary access drive in accordance with NHDOT Driveway permit.
9. Clean-up and restoration of property.
10. Restoration of fences and other structures.
11. Cooperation and coordination with other Contractors and utility companies including related inspection costs and other costs (Refer to Section 01050).
12. Utility crossings and relocations, unless otherwise paid for.
13. Temporary utility services to buildings, as required to maintain service during construction.
14. Minor Items--such as relocation of signposts, guard rails, rock wall, mailboxes, curbs, traffic loop detectors, pavement markings, etc., damaged as a result of construction activities.
15. Trench boxes, steel and/or wood sheeting as required, including that left in place.
16. Maintenance of all existing sewer flows and repair of existing sewer pipes.
17. Temporary Construction Dewatering as necessary.
18. Dust control.
19. Quality assurance testing.
20. Clearing, grubbing, and stripping.
21. Routine flagman services.
22. Construction schedules, bonds, insurance, shop drawings, warranties, guarantees, certifications, and other submittals required by the Contract Documents.
23. Repair and replacement of water lines under 2-inches in size, culverts, underdrains, rock lined drainage trenches in streets and other utilities damaged by construction activities and corresponding proper disposal of removed materials unless otherwise paid for.
24. Temporary construction necessary for construction sequencing and other facilities not permanently incorporated into the work.
25. Weather protection.
26. Permits not otherwise paid for or provided by the Owner.
27. Visits to the project site or elsewhere by personnel or agents of the Contractor, including manufacturer's representatives, as may be required.
28. All excavation except the test pits specifically shown or ordered by the Engineer to establish sewer line and water line locations, earth excavation below grade and rock excavation.
29. Contract administration and insurance.
30. Test pits to establish in place field soils density, groundwater conditions, or requirements for dewatering.
31. Pipe markings.

32. Replacement of unsuitable material above pipe bedding and backfill.
33. Temporary Field Office and Engineer's Field Office.
34. Earthwork (Except Ledge).
35. Test Pits for the Contractor's Benefit.
36. Disinfection, cleaning, and testing of installed water mains and blow offs where show on plans.
37. Temporary resetting or replacement of existing street and traffic signs and temporary traffic signals where necessary.
38. Temporary construction barrier chain link fencing for work zone delineation.
39. Raising and lowering of existing frames and covers of buried utilities to grade unless payment is otherwise provided for.
40. Protection of existing block and stone retaining walls unless otherwise identified to be removed, relocated or modified in the Drawings.
41. Cross-over channels and underdrains for sewer, storm drain and water excavation pits, and check dams for all excavated channels.
42. Locating and verifying the locations of water within the limits of work. Capping or plugging existing underground utilities as shown on the plans as required to determine bulkheading and reconnection requirements.
43. Removal and subsequent delivery of replaced or obsolete frames, covers, grates, hydrants curbstones and signs to a location within the City limits designated by the Owner.

1.9 DESCRIPTION OF PAY ITEMS

- A. The following sections describe the measurement of and payment for the work to be done under the respective items listed in the Bid Form.
- B. Each unit or lump-sum price stated in the Bid Form shall constitute full compensation, as herein specified, for each item of the work completed.

(1) – Mobilization/Demobilization

- A. Method of Measurement: Lump sum. Total of bid item shall not exceed 5% of Total Amount of the Bid.
- B. Basis of Payment: Mobilization/demobilization costs are those costs of initiating and ending the contract. Payment for mobilization/demobilization shall be a lump sum at the price as stated in the Bid Form. Seventy-Five percent (75%) of the lump sum will be payable when the Contractor is operational on the site and the remaining 25% of the lump sum will be payable when the Contractor leaves the site following the completion of all contract work. For purposes of payment on this item, "Operational" shall mean the Contractor has provided all required and properly executed bonds and insurance certificates and the owner has approved the following: Construction Schedule, Stormwater Pollution Prevention Plan, Traffic Control Plan, Project Sign (and installed), Temporary Facilities (including Engineer's Trailer), and Pre-Construction photographs/videos. "Operational" shall mean the temporary field office is fully functional and power, phone and internet are functioning. Only one lump sum payment divided into the two partial payments described herein shall be made to cover all mobilization/demobilization costs throughout the entire contract.

(2) – Development of Stormwater Pollution Prevention Plan

- A. Method of Measurement: Development of Stormwater Pollution Prevention Plan (SWPPP) shall be measured on a lump sum unit price as stated in the Bid Schedule. The SWPPP shall include all project related areas.
- B. Basis of Payment: Payment for activities required under this item to prepare, implement, and manage a Storm Water Pollution Prevention Plan will be lump sum. Said lump sum payment shall be full compensation for all labor, materials, tools and equipment necessary to complete this work including preparation of SWPPP document in accordance with EPA requirements, submit an NOI to obtain coverage under the EPA Construction General Permit (CGP), monitoring best management practices and site controls, appropriate documentation required for plan compliance documentation, coordination, permit fees, and for all other work and expenses incidental thereto. The lump sum shall be paid in partial payments over the course of the project, where the percentage paid is equal to the percentage of completion of the entire Contract.

(3) – Monitor SWPPP and Sediment Controls

- A. Method of Measurement: Monitoring of the Stormwater Pollution Prevention Plan shall be measured on hourly basis as stated in the Bid Schedule.
- B. Basis of Payment: The payment shall be full compensation for monitoring project erosion controls in accordance with the Stormwater Pollution Prevention Plan and Construction General Permit. The payment shall be on an hourly basis and payment shall be based on invoiced hours for this project. The hourly rate of payment shall be full compensation for all labor, materials, tools, and equipment necessary to complete this work including monitoring best management practices and site controls, reporting as detailed in the SWPPP and CGP, coordination, and for all other work and expenses incidental thereto.

(4) – Erosion Controls

- A. Method of Measurement: Erosion and Sedimentation controls shall be paid for on a lump sum basis. This item shall include all erosion and sedimentation controls required for the project unless otherwise paid for.
- B. Basis of Payment: The lump sum payment shall be full compensation for all labor, materials, tools, and equipment necessary to complete this work including installation and maintenance of erosion and sedimentation control measures, preparing the site for construction, handling stormwater flows during construction, and all else incidental thereto and in accordance with all applicable permit requirements, for which payment is not provided under other items. This item includes erosion and sediment control installation as directed by Engineer, as well as re-installation or repair of erosion control prior to or following a storm event. The lump sum shall be paid in partial payments over the course of the project, where the percentage paid is equal to the percentage of completion of the entire Contract.

(5) – Site Preparation

- A. Method of Measurement: Site Preparation shall be paid for on a lump sum basis. This item shall include all site preparation activities required for the project unless otherwise paid for.

- B. Basis of Payment: The lump sum payment shall be full compensation for all labor, materials, tools and equipment necessary to complete this work including careful removal of existing stone wall at access drive location, preservation of stones for reconstruction of the stone wall, tree clearing and trimming, grubbing and stock piling soil in construction staging areas as needed, and removing and preserving bushes and plantings for replanting as indicated on the drawings. The lump sum shall be paid in partial payments, where the percentage paid is equal to the percentage of completion of the work under this item.

(6) – Furnish and Install Geotextile for Temporary Access Road

- A. Method of Measurement: Geotextile accepted for payment shall be the actual square yard of geotextile installed on the temporary access road and accepted complete in place.
- B. Basis of Payment: The contract unit price per square yard for geotextile shall be full compensation for all labor, materials, tools, and equipment necessary to complete this work including installation, anchoring, splicing, and repairing geotextile for the temporary access road and all else incidental thereto for which payment is not provided under other items. Geotextile required for anything other than the temporary access road will be paid under the item for that detail.

(7) – Furnish and Install Gravel (NHDOT 304.3)

- A. Method of Measurement: Placement of gravel measured for payment shall be the number of cubic yards of gravel placed for the temporary access road measured and calculated within the limits indicated on the plans, complete and in place.
- B. Basis for Payment:
 - 1. The contract unit price per cubic yard for placement of gravel shall constitute full compensation for all materials, labor, and equipment necessary to complete this work on the temporary access road including furnishing and transporting gravel to the project site, placing, grading, compaction, dust control and all else incidental thereto for which payment is not provided under other items.

(8) – Furnish and Install Screened Stone

- A. Method of Measurement: The quantity of screened stone to be paid under Item No. 8 shall be the actual number of cubic yards of material placed as requested and/or authorized by the Engineer/Owner.
- B. Basis for Payment: Screened stone shall be paid at the unit price per cubic yard stated in the Bid Schedule.

(9) – Furnish and Install Timber Mats

- A. Method of Measurement: Timber mats accepted for payment shall be the actual square yard of timber mats installed and accepted complete in place.
- B. Basis of Payment: The contract unit price per square yard for timber mats shall be full compensation for all labor, materials, tools, and equipment necessary to complete this work including transporting mats to site, installation in areas shown on the Plans and as directed by the Engineer, and all else incidental thereto for which payment is not provided under other items.

(10) – Furnish and Install 12” HDPE Culvert

- A. Method of Measurement: Culvert pipe measured for payment under these items shall be the number of linear feet installed measured along the center line of the pipe as laid, regardless of materials of construction.
- B. Basis of Payment: The contract unit price per linear foot for culvert installed shall be full compensation for all labor, materials, and equipment necessary to complete this work including furnishing and installing pipe and fittings, and all else incidental thereto for which payment is not provided under other items.

(11) – Construction of the Little Bay Subaqueous Water Main

- A. Method of Measurement: Construction of the Little Bay Water Main shall be paid for at the Contract Lump Sum price stated in the Bid Schedule.
- B. Basis of Payment: Payment of the lump sum price for Item 6 shall be full compensation for furnishing all labor, materials, tools, and equipment required and for installing a drinking water transmission main across Little Bay, complete as indicated on the Drawings, and as specified and all its appurtenances in its entirety, and in accordance with the approved environmental permits, except that work included for payment under other items. Item shall include:
 - 1. Furnishing all pipes, pipe fittings, tracer wire, bronze wedges, polywrap, and other materials required for the installation of the pipelines; for clearing and grubbing; for dewatering; for installing the pipelines; for excavating, laying, setting, and jointing/welding all pipes and fittings; for furnishing and placing all bedding, haunching and initial backfill; for backfilling; for thrust blocks; for restraining joints; for disinfection and testing; for furnishing and placing all temporary sheeting, cofferdams, trestle, sheet piling and bracing; for furnishing and installing concrete anchors; for all labor, tools and construction equipment; for all connections to the existing water mains unless otherwise paid for; turbidity monitoring in accordance with approved monitoring plan; for all related marine work including provision of boats, barges, diver inspection and marine safety provisions, and for all other work and expenses incidental thereto.
 - 2. Furnishing and installing all materials, labor, equipment, and tools; for excavating, setting, jointing, and torquing; furnishing and installing PCCP temporary line stops, tapping sleeves and valves and valve boxes; and service taps necessary for line stop installation; for restraining joints; for testing all valves and valve boxes; for furnishing and placing all bedding, haunching and initial backfill; for placement of support concrete and thrust block concrete; for backfilling; for furnishing and placing all temporary and/or permanent sheeting and bracing; for all connections to the existing water mains unless otherwise paid for; and for all other work and expenses incidental thereto.
 - 3. Furnishing and installing all materials, labor, equipment, and tools; for removal and replacement of the existing line valves in the existing valve vaults; for cutting and removal of the old valves; installing new valves and appurtenances, backfill, manhole covers, and surface restoration.
 - 4. Payment for this work on interim requisitions shall be in accordance with approved Schedule of Values.

(12) – Marine Traffic Management

- A. Method of Measurement: This item shall be paid for on a lump sum basis.
- B. Basis of Payment: Payment of the Lump Sum price for this item shall be full compensation for furnishing all labor, materials, tools, and equipment required to comply with all U.S. Coast Guard, applicable Harbormasters and Owner requirements to protect the boating public and provide safe installation of the marine pipeline.

(13) – Submarine Rock Relocation

- A. Method of Measurement: The quantity of submarine rock relocation to be paid under Item No. 12 shall be the actual number of cubic yards removed from the pipeline route and relocated to a location as directed by the Engineer.
- B. Basis of Payment: Submarine rock relocation shall be paid for at the unit price per cubic yard as stated in the Bid Schedule. Said unit price shall be full compensation for furnishing all labor including dive operations, tools, and equipment; for removal of obstructions from the pipeline route to the limits as directed by the Engineer; for placement of said obstructions to a location to the side of the proposed route at a location for enough removed as to not affect the pipe installation, and for all other work and expenses incidental thereto.

(14) – 6-inch Water Service Tap for Wagon Hill

- A. Method of Measurement: The quantity of water service taps to be paid for under this item shall be the actual number of taps furnished and installed in the main for service connections.
- B. Basis of Payment: Payment for this Item shall be full compensation for all fittings, labor, equipment, and tools necessary for the installation of a 6-inch service tap into PCCP main; tapping sleeve, excavation; 6-inch tapping gate valve and valve box; mechanical joint cap; concrete thrust restraint and tapping sleeve support; bedding; backfill; reestablishing vegetation, and for all work and expenses incidental thereto for which payment is not provided under other items.

(15) – Salt Marsh Salvage & Restoration

- A. Method of Measurement: Salt Marsh Salvage & Restoration shall be paid for on a lump sum basis. This item shall include restoration of all salt marsh impacted by the project construction.
- B. Basis of Payment: The lump sum payment shall be full compensation for all labor, materials, tools, and equipment necessary to complete removal of salt marsh peat and storage of the peat where indicated on the Drawings. The item shall include materials and equipment to store and water the salvage peat. This item includes restoration of the salt marsh substrates, placement of the salvaged peat at an elevation equal to or up to 2-inches higher than pre-construction condition, rebar anchors, supplemental sand to cover exposed root, and furnishing and installing supplemental salt marsh cordgrass seedlings where gaps in the salvaged peat exceed 4 inches. This item shall include furnishing and installing coir logs to protect the salt marsh installation. The lump sum shall be paid at 75% upon complete restoration of the work area. The remaining 25% will be paid upon two successful growing seasons of the restored salt marsh.

(16) – Turf Establishment with Till, Harrow, Mulch & Tackifiers

- A. Method of Measurement: The quantity of turf establishment shall consist of the number of square yards of soil preparation and seeding installed at the direction of the Engineer within the limits of work shown on the drawings.
- B. Basis of Payment:
 - 1. The square yard unit price shall be full compensation for furnishing all labor, materials, and equipment required to till and harrow impacted areas, furnish and place seed, mulch, lime, fertilize and water, assure and maintain grass growth until final acceptance by the Engineer; Areas disturbed for the Contractor's convenience shall be restored at no additional cost to the Owner.
 - 2. 80% at the completion of the soil preparation and seeding, upon acceptance by the Engineer. 20% upon final contract completion and consistent coverage and growth of the new turf.

(17) – Site Restoration - Durham

- A. Method of Measurement: Site Restoration – Durham shall be paid for on a lump sum basis. This item shall include full restoration of all areas in Durham impacted by the project.
- B. Basis of Payment: The lump sum payment shall be full compensation for all labor, materials, tools and equipment necessary to complete this work including removal of equipment and materials, removal of access road, removal of timber mats and temporary culverts, removal of timber mats in staging areas, removal of erosion controls, transporting stockpiled stones and reconstruction of the stonewall to match the existing conditions; restoration of the Route 4 right of way after driveway removal to the satisfaction of the NHDOT District 6 office; furnishing and installing split rail fence barrier; replanting preserved plantings and bushes; furnishing and installing new plantings as shown on the plans; and other work necessary to restore the work area to existing conditions. The lump sum shall be paid in full upon complete restoration of the work area.

(18) – Site Restoration-Newington

- A. Method of Measurement: Site Restoration – Newington shall be paid for on a lump sum basis. This item shall include full restoration of all areas in Newington impacted by the project.
- B. Basis of Payment: The lump sum payment shall be full compensation for all labor, materials, tools and equipment necessary to complete this work including removal of equipment and materials; furnishing and installing materials for the reinforced toe; furnishing all labor, materials, and equipment required to plant shrubs and plants as indicated on the plans and as directed by the engineer; restoration of the walking trail; removal of erosion controls, and other work necessary to restore the work area to existing conditions. The lump sum shall be paid in full upon complete restoration of the work area.

(19) – Roadway Repair - Newington

- A. Method of Measurement: Allowance to be included in and carried in the bid schedule in the event repair of Town of Newington roadways is required as determined by the

Engineer and the Town of Newington. The allowance may be used to reimburse the Contractor for completing roadway repairs as directed by the Engineer and Owner. All charges will be subject to approval of the Owner and Engineer.

- B. Basis of Payment: The payment shall be full compensation for all labor, materials, tools, and equipment necessary to repair damage to roadways that occurred as a result of the project including furnishing and installing gravel and bituminous asphalt for roadway repairs. Payment for this item shall be on the basis of invoices presented for the work. There shall be no payment for roadway repairs required for damage caused by the Contractor's negligence or at their convenience.

END OF SECTION

SECTION 01200

PROJECT MEETINGS

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work Included: To enable orderly review during progress of the work, and to provide for systematic discussion of problems, the Engineer will conduct project meetings throughout the construction period.
- B. Related work described elsewhere: The Contractor's relations with their subcontractors and materials suppliers and discussions relative thereto, are the Contractor's responsibility and are not part of project meetings content.

1.2 QUALITY ASSURANCE

- A. Persons designated by the Contractor to attend and participate in the project meetings shall have all required authority to commit the Contractor to solutions agreed upon in the project meetings.

1.3 SUBMITTALS

- A. Agenda items: To the maximum extent practicable, advise the Engineer at least 24 hours in advance of project meetings regarding all items to be added to the agenda.
- B. Minutes: The Engineer will compile minutes of each project meeting and will furnish a copy to the Contractor. The Contractor may make and distribute such other copies as they wish.

PART 2 - PRODUCTS

(No products are required in this Section.)

PART 3 - EXECUTION

3.1 MEETING SCHEDULE

- A. Except as noted below for Preconstruction Meeting, project meetings will be held monthly. Coordinate as necessary to establish mutually acceptable schedule for meetings.

3.2 MEETING LOCATION

- A. Meetings will be held at the job site in the Engineers' field office, unless the Owner and/or Engineer determine that virtual meetings are applicable and appropriate for any reason (e.g., COVID, Safety and Health Plan, etc.).
 - 1. If meetings are required by Owner/Engineer to be held virtually, Engineer will host the meetings via Microsoft Teams. All required meeting attendees are responsible for providing hardware necessary to view, share, be heard and hear content of the meeting.

3.3 PRECONSTRUCTION MEETING

- A. Preconstruction meeting will be scheduled within twenty days after the Effective Date of the Agreement, but before the Contractor starts work at the site. Provide attendance by authorized representatives of the Contractor and all major subcontractors. The Engineer will advise other interested parties and request their attendance.
- B. Minimum agenda: Distribute data on, and discuss:
 - 1. Identification of key project personnel for Owner, Engineer, Contractor, funding/regulatory Agencies.
 - 2. Responsibilities of Owner, Engineer, Resident Project Representative, Contractor.
 - 3. Channels and procedures for communications.
 - 4. Construction schedule, including sequence of critical work.
 - 5. Easements, permits.
 - 6. Contract Documents, including distribution of required copies of original documents and revisions.
 - 7. Processing of Shop Drawings and other data submitted to the Engineer for review.
 - 8. Processing of field decisions and Change Orders.
 - 9. Rules and regulations governing performance of the Work, including funding/regulatory Agency requirements.
 - 10. Procedures for safety and first aid, security, quality control, housekeeping, and other related matters.

3.4 PROJECT MEETINGS

- A. Attendance: To the maximum extent practicable, assign the same person or persons to represent the Contractor at project meetings throughout progress of the Work. The Superintendent shall attend. Subcontractors, materials suppliers, and others may be invited to attend those project meetings in which their aspects of the Work are involved.
- B. Minimum agenda:
 - 1. Review, revise as necessary, and approved minutes of previous meeting.
 - 2. Review progress of the Work since last meeting, including status of submittals for approval.
 - 3. Review schedule of work to be accomplished prior to next meeting.
 - 4. Discuss monthly partial payment request.
 - 5. Review status of change order requests and Work Directive Changes.
 - 6. Identify problems which impede planned progress.
 - 7. Develop corrective measures and procedures to regain planned schedule.
 - 8. Complete other current business.

END OF SECTION

SECTION 01310CONSTRUCTION SCHEDULES – SHORT FORMPART 1 - GENERAL1.1 DESCRIPTION

- A. Work Included: Within ten (10) days after the effective date of the Agreement between Owner and Contractor submit to the Engineer an estimated progress schedule as specified herein.
- B. Form of Schedules:
 - 1. Narrative: Completely describe the construction methods to be employed.
 - 2. Network Analysis System:
 - a. Provide a separate horizontal schedule line for each trade or operation and show concurrent and preceding activities.
 - b. Present in chronological order the beginning of each trade or operation showing duration and float time.
 - c. Scale: Identify key dates and allow space for updating and revision.
 - 3. Mathematical Analysis:
 - a. A mathematical analysis shall accompany the network diagram. A computer printout will be acceptable.
 - b. Information shall be included on activity numbers, duration, early start, late start, etc. and float times.
- C. Content of Schedules:
 - 1. Provide complete sequence of construction by activity:
 - a. Shop Drawings, Project Data and Samples:
 - i. Submittal dates.
 - ii. Dates reviewed copies will be required.
 - b. Decision dates for:
 - i. Products specified by allowances.
 - ii. Selection of finishes.
 - c. Estimated product procurement and delivery dates.
 - d. Dates for beginning and completion of each element of construction.
 - 2. Identify work of separate phases and logically grouped activities.
 - 3. Show the projected percentage of completion for each item of work as of the first day of each month.
 - 4. Provide separate sub-schedules, if requested by the Engineer, showing submittals, review times, procurement schedules, and delivery dates.
 - 5. Schedule sheets shall be printed in color on 24"x36" paper, unless a smaller size paper is allowed by the Engineer.
- D. Updating:
 - 1. Show all work activities including those already complete.
 - 2. Show all changes occurring since previous submission.
 - 3. Indicate progress of each activity, show completion dates.
 - 4. Include:
 - a. Major changes in scope.

- b. Activities modified since previous updating.
 - c. Revised projections due to changes.
 - d. Other identifiable changes.
5. Provide narrative report, including:
- a. Discussion of problem areas, including current and anticipated delay factors.
 - b. Corrective action taken or proposed.
 - c. Description of revisions that may affect schedules.
 - d. Description of activities to be performed in the next 6-week period.
 - e. Updated list of key shop drawings, project data and samples to be submitted in the next 6-week period.

1.2 SUBMITTALS

- A. Submit updated schedules with each progress payment request.
- B. Submit 4 copies of initial and updated schedules to the Engineer.

END OF SECTION

SECTION 01320SAFETY AND HEALTH PLANPART 1 - GENERAL1.1 DESCRIPTIONA. Work Included:

1. The Contractor shall be solely responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the work, as outlined herein and in the General and Special Conditions of the Contract Documents. Within 10 days after the effective date of the Agreement between Owner and Contractor, submit to the Engineer a Safety and Health Plan as specified herein. Refer to submittals section below.
2. Contractor shall comply with all applicable Laws and Regulations related to the safety of persons or property, or for the protection of persons or property from damage, injury, illness, or loss; and shall erect and maintain all necessary safeguards for such safety and protection.
3. Contractor shall designate a qualified and experienced safety representative (OSHA defined "Competent Person") at the site whose duties and responsibilities shall be the prevention of accidents and maintaining and supervising of safety precautions and programs, including a "Job Hazards Analysis".
4. The Contractor shall be solely responsible to provide all labor, equipment, and utilities sufficient to ensure no construction noise, particulates, or odors, are allowed to accumulate to levels which adversely affect health or work in, or near the construction area.

B. Content of Safety and Health Plan:

1. Prepare complete safety and health plan in accordance with the requirements of CFR Title 29 Part 1926 - Safety and Health Regulations for Construction.
 - a. Provide documentation that Contractor's hazardous communication program is up to date.
 - b. Provide documentation that Contractor's safety training is up to date.
 - c. Prepare a project specific Safety and Health Plan addressing construction safety and protection, including but not limited to excavations, fall protection and egress.
 - d. The Safety and Health Plan shall address construction safety and protection for work over, in, and near the water, including but limited to personal protection equipment, fall protection, floatation devices, and lifesaving vessels.
2. Safety provisions for confined space entry shall follow the requirements of CFR Title 29 Part 1926, Subpart AA – Confined Spaces in Construction and will be incorporated into the Safety and Health Plan.
 - a. The Contractor is required to perform a site evaluation to identify all hazards and potential hazards in work areas.

- b. The Contractor shall be responsible for all aspects of construction site safety including development of appropriate confined space entry procedures. The plan shall include, but not necessarily be limited to, the following:
 - i. Definitions
 - ii. Confined Space Evaluations
 - iii. Equipment Selection
 - iv. Confined Space Entry Training Documentation
 - v. Permit Required Confined Space Entry Requirements
 - vi. Testing (Monitoring) and Ventilation
 - vii. Confined Space Entry Permit Form
 - viii. Rescue and Emergency Procedures
 - ix. Emergency Contact Information
 - c. The Contractor shall inform the Owner and Engineer's representative whenever work will be performed in a confined space and the permit space program that the Contractor will follow.
 - d. The Contractor shall inform the Owner and Engineer's representative of any hazards confronted or created during entry operations, either through a briefing or during the entry operation.
 - e. The Contractor will coordinate entry operations with the Owner when both Owner personnel and Contractor personnel will be working in or near permit spaces.
 - f. The Owner, Engineer, their representatives, independent testing laboratories and government agencies, when inspecting the site, shall be supplied by the Contractor proper safety equipment when entry into a confined space is required.
- C. Updating:
- 1. Contractor shall be responsible for updating the Safety and Health Plan as appropriate throughout the course of the construction period.

1.2 SUBMITTALS

- A. Submit the Contractor's site-specific Safety and Health Plan to the Engineer, in accordance with Section 01340. Submit hardcopy submittals, if required.
- B. Submit updated Safety and Health Plans as necessary during the course of the project.
- C. The Safety and Health Plan is provided "for information only" to inform the Owner, Engineer and Resident Project Representative of the project specific safety program requirements; however, if the Safety and Health Plan incomplete (e.g., missing elements relevant to the project work), inadequate (e.g., outdated qualifications) or not project-specific, it will be returned "revise and resubmit". Delays related to an incomplete Safety and Health Plan are the responsibility of the Contractor.
- D. The Contractor will overview the plan with the Owner (and staff), Engineer (and Resident Project Representative) prior to work beginning at the project site, and subsequently when/if the safety plan is updated. The Safety and Health Plan will be submitted to the Towns of Newington and Durham for review by the respective Public Safety services for impacts to rescue and safety needs.
- E. Contractor's most current Safety and Health Plan shall be available at the construction site throughout the construction project.

1.3 ON-SITE COORDINATION MEETINGS

- A. Contractor shall review key aspects of Safety and Health Plan at the Pre-Construction Meeting, and subsequent on-site safety informational meeting.
- B. Contractor shall report to Engineer and Owner at each progress meeting concerning compliance with the Safety and Health Plan for the most recent construction period and new considerations and requirements for the upcoming period.
- C. Contractor shall hold weekly on-site coordination meetings with Resident Project Representative and Owner to ensure that Owner's staff is aware of key Safety and Health Plan requirements of the current phase of construction.

END OF SECTION

SECTION 01340SUBMITTALSPART 1 - GENERAL1.1 DESCRIPTION

- A. Work Included:
 - 1. Submit all shop drawings, operations and maintenance manuals, Manufacturers' certificates, project data, and samples required by the Specifications.
- B. Related Work Specified Elsewhere:
 - 1. Construction Schedules: Section 01310
 - 2. Project Record Documents: Section 01720
 - 3. General Conditions: Section 00700.
- C. Submittals: This project shall utilize:
 - 1. Submittals – Electronic via Email/FTP with Hard Copy for Record
 - a. The Contractor shall submit to the Engineer an electronic submittal of shop drawings and O&M Manuals in portable document format (PDF) transmitted via email or file transfer protocol (FTP). The Engineer shall return an electronic PDF of the submittal review comments to the Contractor for distribution to subcontractors, suppliers, and manufacturers. The electronic submittals shall serve as the electronic record of the project.
 - b. In addition, completed shop drawings and completed operations and maintenance (O&M) manuals shall be provided in hard copy (paper) format, for the record, in accordance with the following requirements.
 - i. Shop drawings and O&M manuals shall be considered “completed” once an action code of “0” or “1” has been attained, as specified below, unless otherwise directed by the Engineer.
 - ii. Once completed, the Contractor shall provide three hard copy sets (for Owner, Engineer and Resident Project Representative, respectively).
 - iii. Hard copy submittals shall be updated on a monthly basis, for those submittals completed during the preceding month.

1.2 SHOP DRAWINGS

- A. Shop Drawings are required for each and every element of the work.
- B. Shop Drawings are generally defined as all fabrication and erection drawings, diagrams, brochures, schedules, bills of material, manufacturers data, spare parts lists, and other data prepared by the Contractor, their subcontractors, suppliers, or manufacturers which illustrate the manufacturer, fabrication, construction, and installation of the work, or a portion thereof.
- C. The Contractor shall provide a completed Contractor Submittal Certification Form (copy provided for Contractor's use at the end of this Specification Section) which shall be attached to every copy of every shop drawing and signed by the Contractor and Manufacturer (where applicable). Shop Drawings shall show the principal dimensions, weight, structural and operating features, space required, clearances, type and/or brand of finish or shop coat, grease fittings, etc., depending on the subject of the drawing. When it is customary to do so, when the dimensions are of particular importance, or when so specified, the drawings shall be certified by the manufacturer

or fabricator as correct for the work.

1. Each shop drawing submittal shall include a complete copy of the relevant specification section markup up to reflect "compliance" or "deviation" on an item-by-item basis.
- D. Shop Drawings shall be submitted as a complete package by specification section, unless otherwise reviewed and approved by the Engineer. It is the intent that all information, materials, and samples associated with each specification section be included as a single submittal for the Engineer's review. Any deviation from this requirement, shall be requested in writing with an anticipated shop drawing breakdown/schedule prior to any associated submittal. An exception to this requirement are shop drawings for reinforcing steel, miscellaneous metals and structural steel, which shall be submitted separately for each structure unless otherwise permitted by the Engineer.
- E. The Contractor shall be responsible for the prompt and timely submittal of all shop and working drawings so that there shall be no delay to the work due to the absence of such drawings.
- F. No material or equipment shall be purchased or fabricated especially for the Contract until the required shop and working drawings have been submitted as hereinabove provided and reviewed for conformance to the Contract requirements. All such materials and equipment and the work involved in their installation or incorporation into the Work shall then be as shown in and represented by said drawings.
- G. Until the necessary review has been made, the Contractor shall not proceed with any portion of the work (such as the construction of foundations), the design or details of which are dependent upon the design or details of work, materials, equipment or other features for which review is required.
- H. All shop and working drawings shall be submitted to the Engineer by and/or through the Contractor, who shall be responsible for obtaining shop and working drawings from their subcontractors and returning reviewed drawings to them. Shop drawings shall be formatted to standard paper sizes to enable the Owner to maintain a permanent record of the submissions. Approved standard sizes shall be: (a) 24 inches by 36 inches; (b) 11 inches by 17 inches, and (c) 11 inches by 8-1/2 inches. Provision shall be made in preparing the shop drawings to provide a binding margin on the left hand side of the sheet. Shop drawings submitted other than as specified herein may be returned for resubmittal without being reviewed.
- I. Only drawings which have been checked and corrected by the fabricator should be submitted to the Contractor by their subcontractors and vendors. Prior to submitting drawings to the Engineer, the Contractor shall check thoroughly all such drawings to confirm that the subject matter thereof conforms to the Drawings and Specifications in all respects. All drawings which are correct shall be marked with the date, checker's name, and indication of the Contractor's approval, and then shall be submitted to the Engineer.
- J. If a shop drawing shows any deviation from the Contract requirements, the Contractor shall make specific mention of the deviations in the transmittal. Shop Drawings that contain significant deviations that are not brought to the attention of the Engineer may be subject to rejection.
- K. Should the Contractor submit equipment that requires modifications to the structures, piping, electrical conduit, wires and appurtenances, layout, etc., detailed on the

Drawings, Contractor shall also submit details of the proposed modifications. If such equipment and modifications are accepted, the Contractor, at no additional cost to the Owner, shall do all work necessary to make such modifications.

- L. A maximum of two submissions of each Shop Drawing will be reviewed, checked, and commented upon without charge to the Contractor. Any additional submissions which are ordered by the Engineer to fulfill the stipulations of the Drawings and Specifications, and which are required by virtue of the Contractor's neglect or failure to comply with the requirements of the Drawings and Specifications, or to make those modifications and/or corrections ordered by the Engineer in the review of the first two submissions of each Shop Drawing, will be reviewed and checked as deemed necessary by the Engineer, and the cost of such review and checking, as determined by the Owner, and based upon Engineer's documentation of time and rates established for additional services in the Owner-Engineer Agreement for this Project, may be deducted from the Contractor to make all modifications and/or corrections as may be required by the Engineer in an accurate, complete, and timely fashion. Resubmittals for the sole purpose of providing written responses to review comments will not be considered a resubmittal counting towards the two submission limit.
- M. Shop Drawings that include drawings or other material that is illegible or too small may be returned without review.
- N. American, Buy American certifications must be submitted with the initial shop drawing.

1.3 SAMPLES

- A. The Contractor shall submit samples when requested by the Engineer to establish conformance with the specifications, and as necessary to define color selections available. Submittals of "samples" shall be documented through the electronic submittal process by including a photograph of the item(s) and indicating the date the sample was mailed and/or delivered.

1.4 MANUFACTURER'S CERTIFICATES

- A. Prior to accepting the installation, the Contractor shall submit manufacturer's certificates for each item specified.
- B. Such manufacturer's certificates shall state that the equipment has been installed under either the continuous or periodic supervision of the manufacturer's authorized representative, that it has been adjusted and initially operated in the presence of the manufacturer's authorized representative, and that it is operating in accordance with the specified requirements, to the manufacturer's satisfaction. All costs for meeting this requirement shall be included in the Contractor's bid price.

1.5 SUBMISSION REQUIREMENTS

- A. Accompany submittals with a transmittal cover sheet, containing:
 - 1. Date.
 - 2. Project title and number.
 - 3. Contractor's name and address.
 - 4. The sequential shop drawing number for each shop drawing, project data and sample submitted shall be:
 - a. Specification Section number followed by a dash and then a sequential number beginning with 01 (e.g., 16000-01).

- b. Under limited situations when additional different pieces of equipment are submitted under the same specification section, those submittals shall be numbered sequentially (e.g. 05500-01, 05500-02, 05500-03, etc.).
 - c. Resubmittals shall include an alphabetic suffix after the corresponding sequential number (e.g., 16000-01A).
 - d. O&M submittals shall be numbered with the Specification Section number followed by a dash, the letters "OM", another dash, and then a sequential number beginning with 01 (e.g. 16000-OM-01). Resubmittals of O&Ms shall include an alphabetic suffix after the corresponding sequential number (e.g. 16000-OM-01A).
- 5. Notification of deviations from Contract Documents.
- 6. Other pertinent data.
- B. A completed Contractor Submittal Certification Form shall be attached to each hardcopy and electronic PDF of each shop drawing and must include:
 - 1. Project name
 - 2. Specification Section and sequential number with alphabet suffix for resubmittal
 - 3. Description
 - 4. Identification of deviations from Contract Documents.
 - 5. Contractor's stamp, initialed or signed, certifying review of the submittal, verification of field measurements and compliance with Contract Documents.
 - 6. Where specified or when requested by the Engineer, manufacturer's certification that equipment, accessories and shop painting meet or exceed the Specification requirements.
 - 7. Where specified, manufacturer's guarantee.
- C. Additional Requirements for Electronic Submittals:
 - 1. Each individual shop drawing or O&M submittal shall be contained in one PDF.
 - 2. The first page of the PDF shall be the Contractor Submittal Certification Form as described above.
 - 3. The electronic PDF shall be **exactly** as submitted in the hardcopy.
 - 4. The electronic PDF shall include an electronic table of contents that is bookmarked for each section of the submittal.
 - 5. The electronic PDF shall be configured such that is fully searchable.
 - 6. PDF versions of 24x36 drawings shall be converted to 24 x 36 PDFs so as not to lose the clarity of the original drawing.
 - 7. Electronic PDF submittals that are not submitted in accordance with the requirements stated above will not be reviewed by the Engineer.
 - 8. Electronic submittals shall be transmitted via the protocol established in Part 1 above.

1.6 RESUBMISSION REQUIREMENTS

- A. Revise initial submittals as required and resubmit as specified for initial submittal.
- B. Indicate on submittals any changes which have been made other than those required by Engineer. All renumbering of shop drawings, relabeling of individual pieces or assemblies or relocating of pieces or assemblies to other Drawings within the submittal shall be clearly brought to the attention of the Engineer. If relabeling of individual pieces or assemblies has taken place, the labels from the previous submittal

- shall be indicated to assist in comparing the original and resubmitted shop drawing.
- C. All resubmittals shall include a summary of the previous submittal review comments with the vendors' written response as to how the previous comments were addressed.

1.7 ENGINEER'S REVIEW

- A. The review of shop and working drawings hereunder will be general only, and nothing contained in this specification shall relieve, diminish or alter in any respect the responsibilities of the Contractor under the Contract Documents and in particular, the specific responsibility of the Contractor for details of design and dimensions necessary for proper fitting and construction of the work as required by the Contract and for achieving the result and performance specified thereunder.
- B. The Engineer's review comments will be summarized on a Submittal Review Form, which includes an action code. A description of each action code is provided below.
1. No Exceptions Taken (Status 0 on shop drawing log). The shop drawing complies with the Contract Document requirements. No changes or further information are required. Where appropriate, the submittal review form will be used to alert the Contractor, Owner and Field personnel of remaining items within that specification section that still needs to be submitted.
 2. Make Corrections Indicated (Status 1 on shop drawing log). The shop drawing complies with the Contract Document requirements except for minor changes, as indicated. Engineer requires that all comments will be addressed by the Contractor, unless otherwise notified in writing prior to execution of the relevant work.
 3. Conditional to Remarks (Status 2 on shop drawing log). The shop drawing potentially complies with the Contract Document requirements, contingent upon satisfactory resolution of review comments. Remarks will explicitly list what information needs to be resubmitted. Resubmittal from the Contractor should include a cover letter or summary which indicates how each review comment has been addressed. **This action code will not be used, or will be sparingly used, for electronic submittals.**
 4. Revise and Resubmit (Status 3 on shop drawing log). The shop drawing does not comply with the Contract Document requirement as submitted but may with changes indicated and/or submission of additional information. The entire package must be resubmitted with the necessary information and a cover letter which indicates how each review comment has been addressed and where to find the information in the resubmittal.
 5. Rejected (Status 4 on shop drawing log). The shop drawing does not comply with the Contract Document requirements, for the reasons indicated in the remarks, and is unacceptable.
 6. For Information Only (Status 5 on shop drawing log). The shop drawing review was for information only.
 7. In Review (Status 6 on shop drawing log). The shop drawing is currently under review.

CONTRACTOR SUBMITTAL CERTIFICATION FORM

PROJECT: _____ CONTRACTOR'S PROJ. NO: _____

CONTRACTOR: _____ ENGINEER'S PROJ. NO: _____

ENGINEER: _____

SHOP
DRAWING
NUMBER:SPECIFICATION SECTION
OR DRAWING NO:SEQUENTIAL NUMBER
(& ALPHA SUFFIX FOR
RESUBMITTAL)

DESCRIPTION: _____

MANUFACTURER: _____

The above referenced submittal has been reviewed by the undersigned and I/we certify that the material and/or equipment meets or exceeds the project specification requirements with

☐ NO DEVIATIONS

or

☐ A COMPLETE LIST OF DEVIATIONS AS FOLLOWS^a:

By: _____ By: _____

Contractor^bManufacturer^c

Date: _____ Date: _____

a Any deviations not brought to the attention of the Engineer for review and concurrence shall be the responsibility of the Contractor to correct, if so directed.

b Required on all submittals

c When required by specifications Page ____ of ____

General Contractor's Stamp

OPERATIONS AND MAINTENANCE MANUAL CERTIFICATION FORM

PROJECT: _____ CONTRACTOR'S PROJ. NO: _____

CONTRACTOR: _____ ENGINEER'S PROJ. NO: _____

ENGINEER: _____

O&M NUMBER:	_____ - OM- _____	_____
	SPECIFICATION SECTION OR DRAWING NO:	SEQUENTIAL NUMBER (& ALPHA SUFFIX FOR RESUBMITTAL)

DESCRIPTION: _____

MANUFACTURER: _____

The above referenced operations and maintenance manual has been reviewed by the undersigned and I/we certify that the manual is customized as needed for this project, is suitable for mounting in a 3-ring binder, and contains the following items:

- | | |
|--|--|
| <input type="checkbox"/> Table of Contents | <input type="checkbox"/> Project-Related Design Data |
| <input type="checkbox"/> Contractor and Manufacturer Contact Information | <input type="checkbox"/> Serial Numbers |
| <input type="checkbox"/> Preventative Maintenance Schedule and Summary | <input type="checkbox"/> Maintenance and Repair Procedures |
| <input type="checkbox"/> Removal and Replacement Instructions | <input type="checkbox"/> Wiring and Control Diagrams |
| <input type="checkbox"/> Lubrication Schedule | <input type="checkbox"/> Equipment Drawings & Schematics |
| <input type="checkbox"/> Troubleshooting Information | <input type="checkbox"/> Equipment Performance Curves |
| <input type="checkbox"/> Warranty Information | <input type="checkbox"/> Parts and Service Contact Information |
| <input type="checkbox"/> Rebuild Information for All Components | <input type="checkbox"/> Manufacturer's Contact Information |
| <input type="checkbox"/> Startup, Operation and Shutdown Procedures | <input type="checkbox"/> Emergency Operations Plan |
| <input type="checkbox"/> Normal and Emergency Operations | <input type="checkbox"/> List of All Component Part Numbers |
| <input type="checkbox"/> Safety Procedures and Precautions | <input type="checkbox"/> List of Spare Parts Supplied |
| <input type="checkbox"/> Shop Drawings corrected to As-Built Conditions | <input type="checkbox"/> Testing Equipment & Special Tools |
| <input type="checkbox"/> Personnel Training Requirements | <input type="checkbox"/> Other System Specific Information |

By: _____ By: _____

Contractor^a

Manufacturer^b

Date: _____ Date: _____

^a Contact information shall include name, address and telephone number.

^b Required on all Operation and Maintenance Manuals.

^c When required by Specifications. Page ____ of ____

General Contractor's Stamp

END OF SECTION

SECTION 01370SCHEDULE OF VALUESPART 1 - GENERAL1.1 DESCRIPTION

A. Work Included:

1. Provide a detailed breakdown of the Contract Sum showing values allocated to each of the various parts of the Work, as specified herein and in other provisions of the Contract Documents.

B. Related Work Specified Elsewhere:

1. Section C – General Conditions and Supplemental Conditions
2. Section 01340 – Submittals

1.2 QUALITY ASSURANCE

A. Use required means to assure arithmetical accuracy of the sums described.

B. When so required by the Engineer, provide copies of the subcontracts or other data acceptable to the Engineer substantiating the sums described.

1.3 SUBMITTALS

A. The proposed schedule of values (hereinafter referred to as “SOV”), meeting the requirements outlined below, shall be submitted to the Engineer for review. The SOV shall be used as the basis for reviewing and approving payment requisitions along with determining percentages of work completed. No payment requisitions will be processed until the Engineer has taken no exceptions to the schedule of values.

B. The SOV shall consist of a detailed breakdown of all the work within the Contract Documents, as specified herein, and shall include a sufficient number of work items to serve as an accurate basis the General Contractor’s Application for Payment. Each work item shall include its prorated share of overhead and profit and subcontractor markup. The breakdown shall provide the level of detail outlined below.

1. General Conditions:

- a. Includes all work indicated in all specifications within Division 0 and 1.

2. Civil and Site Work:

- a. Includes all work indicated on the Civil (C) Drawings and all specifications within Division 2.

3. Line items shall be broken down into work performed by the General Contractor or a Subcontractor

4. Provide an aggregate percentage completed calculation for each major subcontractor (e.g., site, HVAC, ATC, systems integrator, plumber, electrician, etc.).

5. If a work item, or series of work items, are separated into construction phases which will require phased payments, the SOV shall have separate line-item values for each phase.

END OF SECTION

SECTION 01380CONSTRUCTION PHOTOGRAPHSPART 1 - GENERAL1.1 DESCRIPTION

A. Work Included:

1. Pre-Construction Record: Contractor shall take digital photographs and video to obtain a visual record of the project area prior to beginning any work at the project site.
 - a. Pre-construction record shall include a visual record of the physical condition of Fox Point Road and Nimble Hill Road from Shattuck Way to the project site. The Contractor shall participate in complete current conditions survey and pre-construction video of Fox Point Road and Nimble Hill Road in conjunction with the City of Portsmouth representative and the Town of Newington Engineer, Altus Engineering, to document the existing conditions.
2. Construction Record: Contractor shall take a minimum of 40 digital photographs to obtain a visual record of the project area at monthly intervals during the project.
3. Pre-Installation Underwater Video Inspection: The Contractor shall complete an underwater video inspection and recording of the proposed pipeline route to document potential obstructions and/or bottom grade issues that would affect the installation of the pipeline. The video shall emphasize any potential obstructions along the pipeline route.
4. Post-Installation Underwater Video Inspection: The Contractor shall complete an underwater video inspection and recording of the in-place crossing pipe to document as-built conditions. The video shall include the in water profile of the entire crossing pipeline.
5. Post-Construction Record: Contractor shall take a minimum of 6 aerial photographs of the project site after the work has been completed.
 - a. Post-construction record shall include a visual record of the physical condition of Fox Point Road and Nimble Hill Road from Shattuck Way to the project site. The Contractor shall participate in complete current conditions survey and pre-construction video of Fox Point Road and Nimble Hill Road in conjunction with the City of Portsmouth representative and the Town of Newington Engineer, Altus Engineering, to document the post-construction conditions.
6. Notify Engineer at least three (3) working days prior to photographing or videoing the project area so Engineer may, at their option, observe.

1.2 QUALITY

- A. Pre-Construction Record: Quality shall be such that the condition of existing pavement, curbing, driveway entrances, sidewalks, walls, doors, equipment, piping, etc. can be readily determined.

- B. Construction Record: Quality shall be such that the progress of the work is satisfactorily documented / Construction record photographs shall be taken by a professional photographer acceptable to the Engineer.
- C. Post-Construction Record: Aerial photographs shall be taken by a professional aerial photographer acceptable to the Engineer. Electronic files shall be high resolution digital images.

1.3 SUBMITTAL OF PRINTS

- A. Pre-Construction Record:
 - 1. Submit pre-construction photographs/videos in accordance with Section 01340 prior to initiating any work on-site.
- B. Construction Record:
 - 1. Submit construction record photographs/videos in accordance with Section 01340 concurrent with the monthly payment requisition.
- C. Post-Construction Record:
 - 1. Submit post-construction record aerial photographs in accordance with Section 01340 prior to final payment requisition.
 - 2. For subaqueous water main installation, a video recording performed by a diver or ROV of the post placement pipeline alignment shall be provided detailing the condition and location of the submerged pipeline.
- D. The quality of the photos and video are subject to approval by the Engineer.
- E. Photographs and videos taken for the project and submitted are released to the Owner and Engineer for reproduction and use for records retention, governmental and commercial purposes.

END OF SECTION

SECTION 01400
QUALITY CONTROL

PART 1 - GENERAL

1.1 REQUIREMENTS INCLUDED

- A. General Quality Control.
- B. Workmanship.
- C. Manufacturer's Instructions.
- D. Manufacturer's Certificates.
- E. Manufacturer's Field Services.
- F. Testing Laboratory Services.

1.2 RELATED REQUIREMENTS

- A. Section C - General Conditions: Inspection and testing required by governing authorities.
- B. Section 01340 - Submittals: Submittal of Manufacturer's Instructions
- C. Section 02200 - Earthwork
- D. Section 02210 – Vacuum Excavation/ Hydro-Vacuum Excavation
- E. Section 02300 - Foundation Piles
- F. Section 02513 – Bituminous Concrete Paving
- G. Section 03300 - Cast-in-Place Concrete
- H. Section 03305 - Concrete Testing
- I. Section 03930 – Concrete Coatings

1.3 QUALITY CONTROL

- A. Maintain quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce work of specified quality.

1.4 WORKMANSHIP

- A. Comply with industry standards except when more restrictive tolerances or specified requirements indicate more rigid standards or more precise workmanship.
- B. Perform work by persons qualified to produce workmanship of specified quality.
- C. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, and racking.

1.5 MANUFACTURERS' INSTRUCTIONS

- A. Comply with instructions in full detail, including each step in the sequence. Should instructions conflict with Contract Documents, request clarification from Engineer before proceeding.

1.6 MANUFACTURERS' CERTIFICATES

- A. When required by individual Specifications Section, submit manufacturer's certificate that products meet or exceed specified requirements.

1.7 MANUFACTURERS' FIELD SERVICES

- A. When specified in respective Specification Sections, require supplier and/or manufacturer to provide qualified personnel to observe field conditions, conditions of surfaces and installation, quality of workmanship, start-up of equipment, test, adjust and balance of equipment as applicable, and to make appropriate recommendations.
- B. Representative shall submit written report to Engineer listing observations and recommendations.

1.8 TESTING LABORATORY SERVICES

- A. Owner will employ and pay for services of an Independent Testing Laboratory to perform inspections, tests, and other services wherever an Independent Testing Laboratory is required by individual specification sections listed in paragraph 1.2 above, unless otherwise indicated.
- B. Services will be performed in accordance with requirements of governing authorities and with specified standards.
- C. Reports will present observations and test results and indicate compliance or non-compliance with specified standards and with Contract Documents. Independent Testing Laboratory will submit one copy of each report directly to each of the following: Engineer, Resident Project Representative, Contractor. Reports will be submitted within 5 days of obtaining test results. If test results indicate deficiencies, Independent Testing Laboratory shall telephone or email results to Engineer, Resident Project Representative and Contractor within 24 hours.
- D. Contractor shall cooperate with Independent Testing Laboratory personnel; furnish tools, samples of materials, design mix, equipment, storage, and assistance as requested.
- E. Contractor shall coordinate all testing work and shall notify Engineer and Independent Testing Laboratory at least 24 hours prior to performing work requiring testing services. If scheduled tests or sampling cannot be performed because the work is not ready as scheduled, testing costs associated with the delay will be determined by Engineer and invoiced by Owner to Contractor. If unpaid after 60 days, the invoice amount will be deducted from the Contract Price. If adequate notice is not provided, Contractor shall suspend work on that portion of the Project until testing can be performed. Such suspension will not be grounds for a claim against the Owner for delay, nor will it be an acceptable basis for an extension of time.
- F. Payment for Independent Testing Laboratory services shall be as follows:
 - 1. General: Where testing is the Owner's responsibility, payment will be made as stated below unless other requirements are given in Specification Sections. Testing which is the responsibility of the Contractor will be considered an incidental item unless otherwise indicated in Section 01150, Measurement and Payment.
 - 2. Initial Testing: Owner will pay for initial tests.
 - 3. Retesting: Costs of retesting due to non-compliance will be paid by Owner. The cost of retesting will be determined by Engineer and Owner will invoice Contractor for this cost. If unpaid after 60 days, the invoice amount will be deducted from the Contract Price.
 - 4. Contractor's Convenience Testing: Inspections and tests performed for Contractor's convenience will be paid for by Contractor.

PART 2 - PRODUCTS
Not Used

PART 3 - EXECUTION
Not Used

END OF SECTION

SECTION 01500TEMPORARY FACILITIES AND CONTROLSPART 1 - GENERAL1.1 DESCRIPTION

A. Work Included:

1. Provide and pay for all temporary applicable utilities required to properly perform the Work at no additional cost to the Owner including the placement and removal of the utilities.
2. Completely remove all temporary equipment and materials upon completion of the Work and repair all damage caused by the installation of temporary utilities.
3. Make all necessary applications and arrangements for electric power, light, water, and other utilities with the local utility companies. Notify the local electric power company if unusually heavy loads, such as welders, will be connected.
4. Provide temporary protection of existing concrete tanks and other unheated concrete structures taken out of service for the General Contractor to complete the Work as indicated on the Contract Documents in that area.
5. Contractor shall provide temporary ventilation during construction as required to ensure a safe working environment. The temporary ventilation systems shall address the following conditions, including but is not limited to: removal of hazardous fumes from explosion-proof rated spaces (Class 1, Division 1 rated spaces), removal of paint fumes and other potentially toxic conditions associated with the contractor's activities, and ventilation of confined spaces, in compliance with all OSHA and State safety requirements.

1.2 QUALITY ASSURANCE

A. Requirements of Regulatory Agencies:

1. Obtain permits as required by local governmental authorities.
2. Obtain easements, when required, across private property other than that of the Owner for temporary power service.
3. Comply with the latest National Electrical Code.
4. Comply with all local, State and Federal codes, laws, and regulations.

B. All temporary utilities are subject to the approval of the Engineer.

PART 2 - PRODUCTS2.1 MATERIALS

A. Electrical:

1. The General Contractor shall make necessary arrangements with the local power company for connection to the existing power supply and shall provide and pay for all temporary light and power requirements except as otherwise specified hereunder. In general, the temporary electrical service shall include all necessary switches, poles, wiring, cables, conduit, raceways, panelboards,

fixtures, lamps and receptacles to supply construction power of adequate capacity for the project. Temporary transformers and meters shall be furnished and installed by the appropriate power authority, but paid for by the General Contractor, who shall be responsible for making all arrangements for their installation prior to using any existing power for temporary purposes.

2. Use new or used materials adequate in capacity for the purposes intended.
 3. Materials must not create unsafe conditions or violate the requirements of applicable codes.
 4. Conductors:
 5. Wire, cable, or busses of appropriate type, sized in accordance with the latest National Electrical Code for the applied loads.
 6. Use only UL approved wire.
 7. Conduit:
 8. Rigid steel, galvanized: ANSI C80.1.
 9. Electrical metallic tubing: ANSI C80.3.
 10. Other material approved by NEC.
 11. Equipment: Provide appropriate enclosures for the environment in which used in compliance with NEMA Standards.
 12. Temporary power shall be based upon the following minimum requirements:
 13. Lighting - 300 watt per 1,000 square feet of floor area.
 14. Receptacles - One 15 ampere duplex for 1,000 square feet of floor space.
 15. Special Construction Equipment - Provide one 30-amp, 2-pole fused switch for equipment connection. The cost for cables and connection from switch to the special equipment will be borne by the Sub-Contractor requiring same.
 16. The General Contractor will pay for the cost of energy consumed by all trades, including cost of lamp replacement. The General Contractor and Subcontractors of all trades shall furnish their own extension cords and such additional lamps as may be required for their work, shall pay for the cost of temporary wiring of a special nature for light and power required, other than that above mentioned.
 17. All temporary work shall be furnished and installed in conformity with the National Electrical Code and in accordance with local ordinances and requirements of the municipal power authority. All temporary wiring and accessories shall be removed after it has served its purpose.
- B. Heating and Ventilation:
1. The General Contractor shall furnish, install, and maintain a complete temporary heating and ventilation systems, including fuel therefore, which will provide heat and ventilation as required by the trades and for the protection of personnel in the work spaces, and stored and installed materials from injury as can be caused by dampness and cold. The General Contractor shall employ, within the terms of the General Contract, a competent watchman who will maintain and operate the systems, as required. The General Contractor shall bear all costs incurred from the temporary heating and ventilation from the time the systems are first required until the date of Substantial Completion of the General Contract, as defined in the General Conditions and Supplementary Conditions.

2. Under no circumstance shall the permanent heating system be used for temporary heating purposes, until the building/buildings have been considered as satisfactorily enclosed by the Engineer, specified hereunder.
 3. Temporary heating equipment must be smokeless and fumeless type, Underwriters Laboratories, Factory Mutual, Fire Marshal and Engineer approved, and will fulfill the heating requirements specified hereunder.
 4. As soon as practicable, after the building/buildings have been considered satisfactorily enclosed by the Engineer, the General Contractor shall have the permanent heating and ventilation systems and apparatus put in operation. Electrical service, wiring, controls, and other essential parts of the permanent system must be installed prior to utilizing the heating system. The General Contractor shall pay for all power and fuel consumed in the temporary operation of the permanent systems until the time the building/buildings are partially or permanently occupied by the Owner, whichever comes first in accordance with the provisions specified herein for use and occupancy prior to acceptance by the Owner.
 - a. The General Contractor shall reimburse the Heating and Ventilating Sub-Contractor for labor required to be provided by the Sub-Contractor.
 - b. Any adjustments to the permanent system shall be performed under the work of the trade Sections installing same and costs for same shall be borne by the respective trades. The General Contractor shall reimburse the Heating and Ventilating Sub-Contractor for costs involved in completely cleaning the permanent system, replacing all temporary filters and other temporary items used in conjunction with the permanent heating system, and otherwise required to put the system into new condition, just prior to occupancy of the project by the Owner.
 5. After enclosure of the building/buildings and before installation of wet work such as interior masonry and tile, maintain temperatures of 50 degrees minimum, except for a period commencing 10 days prior to the installation of interior woodwork, interior flooring, or interior painting, whichever occurs first, after which time the temperature shall be maintained at a minimum of 65 degrees F., until the project is either partially or permanently occupied by the Owner.
- C. Water and Sanitary:
1. The General Contractor shall make necessary arrangements for connection to the municipal water supply and shall provide, at his own expense, any extensions as required for the operation of this project. The General Contractor shall bear all costs incurred for the temporary water services, including the costs of the water itself.
 2. All lines, temporary or permanent, shall be protected and maintained by the General Contractor. Temporary lines shall be removed by the General Contractor when the temporary service is no longer required.
 3. The General Contractor shall provide an adequate drinking water supply, satisfactorily cooled, for his employees.
 4. See Site Plan for nearest water hook-up.

5. The General Contractor shall furnish, install, maintain and pay for adequate temporary chemical type toilet accommodations, for all persons employed on the work and located where approved by the Engineer. The accommodations shall be in proper enclosures and in accordance with Municipal Ordinances and shall be maintained in proper, safe and sanitary conditions and suitably heated when requested.
6. Relocate temporary toilet facilities as required to facilitate the construction.
7. Remove all temporary facilities at completion of work when directed by the Engineer.

PART 3 - EXECUTION

3.1 PERFORMANCE

A. Electrical:

1. Provide electrical energy to:
 - a. All necessary points on the construction site so that power can be obtained at any desired point with extension cords no longer than 100 feet.
 - b. Construction site offices.
 - c. Lighting as required for safe working conditions at any location on the construction site.
 - d. Night security light.
 - e. When applicable, Owner's present facilities during the changeover of electrical equipment.
2. Maintain electrical energy throughout the entire construction period.
3. Capacity:
 - a. Provide and maintain adequate electrical service for construction use by all trades during the construction period at the locations necessary, as specified herein.
4. Installation:
 - a. Install all work with a neat and orderly appearance.
 - b. All installations performed by a qualified electrician.
 - c. Modify service as job progress requires.
 - d. Locate all installations to avoid interference with cranes and materials handling equipment, storage areas, traffic areas and other work.

B. Heating and Ventilation:

1. Maintain a heated and ventilated environment for the work at the temperature and for the length of time specified or as directed by the Engineer, and as needed to protect all individuals on the construction site.
2. Precaution:
 - a. Operate temporary heating apparatus in such a manner that finished work will not be damaged.
 - b. Repair all damage, caused by temporary heating operations, to the complete satisfaction of the Engineer.

C. Water:

1. Provide and maintain water for drinking and construction purposes as required for the proper execution of the Work.

D. Sanitary Accommodations:

- a. Provide and maintain sanitary accommodations for the use of the employees of the General Contractor, subcontractors, and Engineer.
- b. Sanitary accommodations shall meet the requirements of all local, State and Federal health codes, laws and regulations.

END OF SECTION

SECTION 01562DUST CONTROLPART 1 - GENERAL1.1 DESCRIPTIONS

A. Work Included:

1. Furnish and apply water or calcium chloride on the road surfaces within the construction site, when required to control dust and when directed by the Engineer.
2. When dust control is not included as a separate item in the Contract, the work shall be considered incidental to the appropriate items of the Contract.

PART 2 - PRODUCTS2.1 MATERIALS

A. Water for Sprinkling:

B. Clean, free of salt, oil, and other injurious matter.

C. Calcium Chloride:

1. Meet the requirements of AASHTO M144.

PART 3 - EXECUTION3.1 APPLICATION

A. Water:

1. Apply water by methods approved by the Engineer.
2. Use approved equipment including a tank with gauge equipped pump and spray bar.

B. Calcium Chloride:

1. Apply at a rate sufficient to maintain a damp surface but low enough to assure non-contamination of water courses.
2. Apply water prior to calcium chloride addition.

END OF SECTION

SECTION 01570TRAFFIC REGULATIONPART 1 - GENERAL1.1 DESCRIPTION

- A. Work Included:
 - 1. Provide all materials and perform all work necessary to completely regulate traffic in the area of Work.
 - 2. Perform all work in such a manner as to provide safe passage at all times for the public and with a minimum of obstruction to traffic.
 - 3. Do not close roads or streets to passage of the public without the permission of the proper authorities.
- B. The local police department and/or the local authorities will decide if safe passage is being maintained and shall have the authority to require the Contractor to take any additional steps necessary to maintain safe passage. If the Authority furnishes an inspector on the job as a result of poor traffic control by the Contractor, the Contractor shall be responsible for all costs assessed by the Authority (State Highways).
- C. Minimize the length of delays or traffic stoppage to the extent practicable. Maximum traffic stoppage time shall be 10 minutes.
- D. Develop a project specific traffic control plan that meets the requirements of Manual of Uniform Traffic Control Devices (MUTCD) and any local and state requirements. Proposed Traffic Control Plan shall indicate signs/locations to be used. Traffic Control Plan submittal to the Engineer will be for general information only.
- E. The Contractor's designated traffic control representative shall respond to all traffic safety complaints and be available to direct traffic control subcontractors the entire time work is occurring on site. If the designated representative is not on site for a period of time, another on site representative shall be designated by the Contractor for that period.

1.2 SCHEDULING WORK

- A. During the Project Pre-Construction Meeting one Contractor representative will be designated as the coordinator between the Police Department and subcontracted traffic control.
- B. Variable Message Signs notifying the public of pending road closure and/or construction must be in place seven days prior to road closure or as required by local authorities.
- C. Schedule all work so that two adjacent parallel streets are not closed to passage by the public at any one time, if at all possible.
- D. Revise the plan of work if it will create a traffic hazard or an unreasonably long detour.
- E. Do not start work in any new location without the permission of the Engineer.
- F. Notify all police and fire departments of all scheduled detours and when streets are reopened.

PART 2 - PRODUCTS

2.1 WARNING SIGNS AND BARRICADES

- A. Traffic control (plans, methods and devices) shall be as outlined in Manual on Uniform Traffic Control Devices for Streets and Highways (MUTCD) as published by U. S. Department of Transportation, and any local and state requirements.
- B. Provide adequate warning signs, barricades, signal lights, flaggers/uniformed police officers, and take other necessary precautions for the safety of the public.
- C. Provide and illuminate suitable warning signs to show where construction, barricades or detours exist.
- D. Provide digital message boards at appropriate locations as determined by the local police department and/or the [insert appropriate state transportation authority] to maintain safe passage of traffic and work zone.
- E. Provide barricades of substantial construction and painted with a finish that increases visibility at night, as outlined in the MUTCD.
- F. Keep signal lights illuminated at all barricades and obstructions from sunset to sunrise.
- G. Maintain all necessary signs, barricades, lights, watchmen and other safety precautions during authorized suspension of the Work, weekends, holidays or other times when the Work is not in progress.
- H. Contractor shall make periodic inspection throughout the day of the traffic control patterns, methods, signs and other devices to ensure that they are properly placed.

2.2 UNIFORMED POLICE OFFICER

- A. A uniformed police officer is a police officer (local, county or state) on regular or special duty dressed in uniform with the necessary high visibility vest and apparel needed for traffic control.
- B. Arrange the police detail with the local Chief of Police, County Sheriff, or State Police Captain depending on jurisdiction.

2.3 FLAG PERSON

- A. A flag person is a trained and certified individual assigned specifically to the task of directing traffic and is outfitted in the necessary high visibility vest and apparel needed for traffic control.
- B. Flag persons shall be provided by the Contractor.

PART 3 - EXECUTION

3.1 DETOURS

- A. Provide, identify and maintain suitable detours when the project, or any part thereof, is closed to public travel.
- B. When the closed part of the project is reopened, restore the detour area and any other disturbed areas to the original condition.

3.2 INCONVENIENCE TO RESIDENTS OF VICINITY

- A. Whenever a traveled way is closed, perform the Work in such a manner that local travel, residents and businesses in the vicinity of the Work will be inconvenienced as little as possible.
- B. Allow access to residents and abutting land owners along the project to driveways and other normal outlets from their property.

3.3 TRAFFIC CONTROL OFFICERS

- A. Where required by the local, county or state police departments and/or when specified, traffic control officer shall be Uniformed Police Officers.
- B. Where the local, county or state police departments do not wish to or are unable to furnish traffic control officers and/or when specified, the traffic control officers shall be flag person.

END OF SECTION

SECTION 01572

GENERAL PERMIT FOR STORMWATER DISCHARGES FROM CONSTRUCTION ACTIVITIES (NON-DELEGATED STATE)

Construction activities to be performed under of this Project have been determined to require coverage under the National Pollutant Discharge Elimination System (NPDES) stormwater Construction General Permit (CGP) program. The Environmental Protection Agency (EPA) is the NPDES permitting authority since it has not delegated its authority to administer the CGP program to the State of New Hampshire. The CGP authorizes the discharge of stormwater from construction sites that disturb one acre or more of land, and from smaller sites that are part of a larger, common plan of development. Coverage under the CGP requires Operators to comply with the requirements of the CGP including submitting a Notice of Intent (NOI), developing a Stormwater Pollution Prevention Plan and implementing stormwater controls. The EPA requires all Operators submit a NOI and a Notice of Termination (NOT). Refer to Appendix A of the CGP for the EPA's definition of an "Operator". The CGP, resources, tools and templates can be found here: <https://www.epa.gov/npdes/developing-stormwater-pollution-prevention-plan-swppp>

PART 1 - GENERAL

1.1 NOTIFICATION PHASE:

A. Submit a Notice of Intent (NOI)

1. The Notice of Intent (NOI) for the CGP is an on-line registration form filed with the EPA. A NOI must be filed by all Operators if a project results in a total land disturbance of equal to or greater than one acre, where those stormwater discharges enter waters of the State. Additionally, a NOI must also be filed when a construction activity designated by the EPA shows the potential for contribution to an exceedance of a water quality standard or for significant contribution of pollutants to waters of the State. The NOI must be filed and approved by EPA prior to any soil disturbance or construction. The NOI form provides information including, but not limited to, the Operator's name, address, and contact information. The NOI also includes the Project location, the size of the disturbed area and a brief description of the project. Other information required includes SWPPP, Endangered Species protection information, Historic Preservation information, and chemical treatment information if applicable. By signing the NOI, the Operator certifies that the information is true and agrees to meeting the requirements of the CGP, including standards for erosion and sedimentation control; inspections by a qualified person; compliance with effluent limitations; maintenance of any stormwater control practices; and "housekeeping" (ex. preventing fuel spills and controlling dust on the construction site). Specific standards for these activities are found in the CGP. In signing the NOI, the Operator certifies that the NOI has been prepared accurately and that stormwater from the project areas will be discharged in accordance with the CGP. The EPA requires electronic filing of a NOI using the NPDES eReporting Tool or "NeT" system. More information on e-filing can be found at the following website: <https://www.epa.gov/compliance/npdes-ereporting>

GENERAL PERMIT FOR STORMWATER DISCHARGES FROM CONSTRUCTION ACTIVITIES (NON-DELEGATED STATE)

2. The NOI certifies that a project specific Stormwater Pollution Prevention Plan (SWPPP) has been developed in accordance with the CPG. The SWPPP must be prepared in accordance with good engineering practices and must identify all potential sources of pollution which may reasonably be expected to affect the quality of stormwater discharges from the construction site. Additionally, the plan must describe practices to be used to reduce pollutants in stormwater discharges from the construction site and assure compliance with the terms and conditions of the permit.
3. The NOI is deemed approved 14 calendar days after EPA receives the NOI and the Operator can proceed unless notified by EPA to the contrary. The EPA will attempt to contact the Operators regarding any problems or delays, but it is the responsibility of the Operators to check the website or contact the EPA NOI Processing Center at 866-352-7755.

1.2 PERFORMANCE PHASE

- A. The Operators must continue to comply with all conditions and effluent limitations in the CGP until coverage is terminated. Coverage may be terminated if all construction activities have been completed and all disturbed soils have been finally stabilized, all construction material have been removed, and temporary erosion and sediment controls have been removed. All Operators need to submit a Notice of Termination (NOT) to inform the EPA that permanent erosion control measures have been installed and are functioning properly.

1.3 PERMANENT STABILIZATION AND TERMINATION PHASE

- A. Submit Notice of Termination (NOT) - The EPA requires that the Operators use the NPDES eReporting Tool, or "NeT" system to prepare and submit a NOT. The NOT form provides information including, but not limited to, the Operator's name, address, and contact information. The NOT also includes the project location and terminating coverage, photographs of the completed site, the EPA number, an indication of why coverage under the permit is being terminated; and a signed certification statement.
- B. The Operator's authorization to discharge under the CGP terminates at midnight on the day the NOT is signed.
- C. Retention of Records - Following the termination of construction activities the Operators must keep copies of the SWPPP and records of all data used to complete the Notice of Intent for a period of at least three years following final stabilization. The record retention period may be extended by EPA's request.

1.4 STORMWATER POLLUTION PREVENTION PLAN

- A. Contractor shall develop a construction site SWPPP following the EPA electronic SWPPP template. The template with EPA's guidance on *Developing Your Stormwater Pollution Prevention Plan* are available on EPA's website at: <https://www.epa.gov/npdes/construction-general-permit-resources-tools-and-templates#swppp>. Sample inspection and corrective action forms are included in the guide.

END OF SECTION

SECTION 01580PROJECT IDENTIFICATION AND SIGNSPART 1 - GENERAL1.1 DESCRIPTION

A. Work Included:

1. Provide and erect sign(s) at the project site to identify the project and to indicate the applicable Federal and State Government Agencies that are participating in the development of the project.
- B. Do not place, or allow the placement of, other advertising sign boards at the project site or along rights-of-way furnished for the project work.

PART 2 - PRODUCTS2.1 MATERIAL AND DESIGN

- A. Construct a sign of 3/4-inch exterior grade, high density overlaid plywood or other material, approved by the Engineer, suitable for signs.

PART 3 - EXECUTION3.1 INSTALLATION

- A. Erect the sign in a prominent location as approved by the Engineer.
- B. Construct the sign in accordance with the following sample Drawing.
- C. Remove the sign when the Work has been completed at no additional cost to the Owner.



WATER SUPPLY PROJECT

Light Blue
#508AC8

Black

LITTLE BAY SUBAQUEOUS WATER TRANSMISSION MAIN

Funds Provided by US Environmental Protection Agency

Black

4'-0" x 8'-0" x 3/4" HIGH DENSITY OVERLAY
PLYWOOD SIGNBOARD OR OTHER APPROVED
MATERIAL SUITABLE FOR SIGNS

PROVIDE 4" x 4" SIGN POSTS OR OTHER
ADEQUATE SUPPORTS TO MOUNT SIGN AT
APPROVED LOCATION

END OF SECTION

SECTION 01590TEMPORARY FIELD OFFICEPART 1 - GENERAL1.1 DESCRIPTION

- A. Work Included: Provide and maintain a temporary field office for the exclusive use of the Engineer during the duration of the Contract.
- B. Temporary Field Office must be set up prior to the first week of construction activities.

1.2 REQUIREMENTS SPECIFIED ELSEWHERE

- A. Additional Requirements are specified elsewhere including, but not necessarily limited to, General Conditions, Supplementary Conditions, and Division 1.

PART 2 - PRODUCTS2.1 PRODUCTS

- A. Provide a separate structure or mobile field office trailer, as specified below:
 - 1. Size: 10 feet by 30 feet. Windows arranged for cross ventilation with screens and adequate window coverings to minimize glare on computer screens.
 - 3. Door with closure and secure lock.
 - 4. Adequate lights over all work areas.
 - 5. Convenient and accessible electrical outlets on each wall.
 - 6. Adequate heating and air conditioning system with thermostat control.
 - 7. Sanitary conveniences meeting the requirements of all local and state health codes for temporary offices.
- B. Furnish the following furniture and supplies:
 - 1. One flat top desk, 30 inches by 52 inches, with drawers at each side. Two desk trays, one pencil sharpener and one office chair per desk.
 - 2. One plywood drawing table, 3 by 6 feet. One straight chair being suitable for use with drawing table.
 - 3. One folding conference table, 36 inches by 72 inches, and 8 folding chairs.
 - 4. Two 4-drawer steel filing cabinets with lock and key.
 - 5. Two large wastebaskets.
 - 6. One rack for drawings, including related appurtenances.
 - 7. Two wall mounted fire extinguishers.
 - 8. One bookcase, 48 inches long by 60 inches high by 10 inches deep.
 - 9. One electric wall clock.
 - 10. One inside/outside thermometer with maximum and minimum recordings, General Tools, Model DTR900, or equal.
 - 11. One first aid kit.
 - 12. One each, broom, dust pan, brush.
 - 13. One refrigerated, 5-gallon bottle water cooler with refills as needed.
- C. Furnish the following internet and office equipment for the duration of the project:

1. Unrestricted, secure, internet service. Engineer's service shall be separate from the Contractor's service. Verizon Wireless 5G Modem with unrestricted Internet service. If the construction site is not accessible by Verizon Wireless's network, some other form of unrestricted wired Internet service will be provided (i.e., secured, encrypted, HTTPS and VPN connections in addition to simple web browsing. One combination inkjet printer/copier/scanner, including maintenance and paper, Printer shall be capable of printing in black and white or color on 8.5x11 and 11x17 paper (e.g. HP OfficeJet Pro 7740 Wide Format All-in-One Printer or equivalent). Printer shall be wireless enabled and shall support IEEE 802.11 standard Wi-Fi protocol. Provide ink cartridges, paper, and maintenance for the duration of the project.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install in approved location and properly set up for all anticipated weather conditions.
- B. Provide electric power and heat for the duration of the work.
- C. All monthly telephone charges, internet charges, and installation fees shall be the Contractor's expense.

3.2 CLEANING

- A. Upon completion of the project, remove the temporary field office and thoroughly clean and restore the area to the Owner's satisfaction.
- B. The Field Office and furnishings shall remain the property of the Contractor.

END OF SECTION

SECTION 01600

DELIVERY, STORAGE AND HANDLING

PART 1 - GENERAL

1.1 DESCRIPTION

- A. This Section specifies the general requirements for the delivery, handling, storage, and protection for all items required in the construction of the work. An updated delivery and storage log is required with the monthly payment requisition prior to approval. An example log is included in this section.

1.2 TRANSPORTATION AND DELIVERY

- A. Transport and handle items in accordance with manufacturer's 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 120 days prior to installation without written authorization from the Engineer.
- C. Ship equipment, material and spare parts complete except where partial disassembly is required by transportation regulations or for the protection of components.
- D. Pack spare parts in containers bearing labels clearly designating contents and pieces of equipment for which intended, including cross reference of the applicable contract specification section.
- E. Deliver spare parts at the same time as pertaining equipment. Deliver spare parts to the Owner after completion of work.
- F. Deliver products to the site in manufacturer's original sealed containers or other packing system, complete with instructions for handling, storing, unpacking, protecting, and installing.
- G. Instructions for handling, storing, unpacking, protecting, and installing equipment shall be included in the Equipment O&M Manuals, which shall be submitted prior to the equipment being shipped to the site. This information shall be filed in a dedicated three ring binder(s) on-site, in the Contractor trailers, accessible to the Owner and Engineer. The binder(s) shall be clearly labeled and include dividers for each specification section. The manufacturer-provided instructions for each equipment item shall be labeled with the specification number, equipment name, and equipment number. The instructions shall also be submitted to the Engineer.
- H. Assume responsibility for equipment material and spare parts just before unloading from carrier at site.
- I. All items delivered to site shall be unloaded and placed in a manner which will not hamper the Contractors normal construction operation or those of subcontractors and other contractors and will not interfere with the flow of necessary traffic.
- J. Provide equipment and personnel to unload all items delivered to the site.
- K. 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 the Engineer in writing of any problems.
- L. Pay all demurrage charges if failed to promptly unload items.

1.3 STORAGE AND PROTECTION

- A. Store and protect products and equipment in accordance with the manufacturer's instructions, with seals and labels intact and legible. Storage instructions shall be studied by the Contractor and reviewed with the Engineer by them. Instructions shall be carefully followed and a written record of this kept by the Contractor for each product and pieces of equipment.
- B. Arrange storage of products and equipment to permit access for inspection. Periodically, inspect to make sure products and equipment are undamaged and are maintained under specified conditions.
- C. Provide protective maintenance during storage consisting of manually exercising equipment, inspecting mechanical surfaces for signs of corrosion or other damage, lubricating, applying any coatings as recommended by the equipment manufacturer necessary for its protection and all other precautions to assure proper protection of all equipment stored and for compliance with manufactures requirements related to warranties.
- D. Store loose granular materials on a solid flat surface in a well-drained area. Prevent mixing with foreign matter.
- E. 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 dirt, standing water, staining, chipping or cracking. Brick, block and similar masonry products shall be handled and stored in a manner to reduce breakage, cracking and spalling to a minimum.
- F. All mechanical and electrical equipment and instruments shall be covered with canvas and stored in a weather tight building to prevent injury. The building may be a temporary structure on the site or elsewhere, but it shall be satisfactory to the Engineer.
 - 1. All equipment shall be stored fully lubricated with oil, grease and other lubricants unless otherwise instructed by manufacturer.
 - 2. Moving parts shall be rotated at a minimum of once weekly to ensure proper lubrication and to avoid metal-to-metal "welding". Log all rotation maintenance for each piece of equipment in the written record noted above.
 - 3. Upon installation of the equipment, the Contractor shall start the equipment, at least half load, once weekly for an adequate period of time to ensure that the equipment does not deteriorate from lack of use. Log all startup for each piece of equipment in the written record noted above.
 - 4. Lubricants shall be changed upon completion of installation and as frequently as required thereafter during the period between installation and acceptance. New lubricants shall be put into the equipment at the time of acceptance.
 - 5. Prior to acceptance of the equipment, the Contractor shall have the manufacturer inspect the equipment and certify that its condition has not been detrimentally affected by the storage period. Such certifications by the manufacturer shall be deemed to mean that the equipment is judged by the manufacturer to be in condition equal to that of equipment that has been shipped, installed, tested and accepted in a minimum time period. As such, the manufacturer will guarantee the equipment equally in both instances. If such a

certification is not given, the equipment shall be judged to be defective. It shall be removed and replaced at the Contractor's expense.

- G. The weather tight building shall be provided with adequate heating/cooling and ventilation as required by the manufacturer to prevent condensation. Maintain temperature and humidity within range required by manufacturer and to prevent condensation on the equipment being stored.
- H. Temporary heating and cooling is acceptable. Equipment shall be protected from environmental effects as required by the manufacturer and dependent on the season. Equipment that arrives on site without coating shall be protected from environmental impacts through coating or protection at the Contractor's expense. Any equipment that displays defects or corrosion from environmental impacts will not be accepted for installation.
- I. The location of all stored material and equipment shall be reviewed with the Owner and Engineer. The Owner and Engineer may request that equipment and material be moved to an alternate location to accommodate plant maintenance and operation, or if the location is deemed unacceptable or unsuitable.

PART 2 - PRODUCTS - NOT APPLICABLE

PART 3 - EXECUTION

3.1 DELIVERY, STORAGE, AND HANDLING MONTHLY LOG

- A. An updated storage and delivery log is required with the monthly payment requisition prior to approval.
- B. The monthly log shall include the specification section, equipment description, equipment tagging, submittal approval date, date of equipment delivery, date of O&M submittal, contractor start-up sign-off, certified equipment testing date, operator training date, spare parts turnover date, required maintenance (activity and date), and equipment turnover (Owner's witness and date).

3.2 STORAGE AND PROTECTION

- A. Equipment requires acceptance and verification of the storage from the Owner, Engineer, Manufacturer and Contractor at the Engineer's discretion.
- B. Following delivery, the equipment warranty from the Manufacturer is the responsibility of the Contractor.
- C. All storage and maintenance will be the responsibility of the Contractor, conducted at the Contractor's expenses and verified by the Engineer.
- D. It is the Contractor's responsibility to coordinate all storage requirements on site as required by the Manufacturer to achieve acceptance.

Section 01600 Delivery, Storage and Handling

[illegible]

1. If equipment is delivered and placed in storage, all steps for Stored Equipment shall be followed and tracked separately
2. Log weekly start-ups of installed equipment, performed by Contractor, until Equipment Turnover

END OF SECTION

SECTION 01710

PROJECT CLEANING

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work Included:

1. Maintain premises and public properties free from accumulations of waste, debris, and rubbish, caused by operations.
2. At completion of work, remove waste materials, tools, equipment, machinery and surplus materials, and clean all sight-exposed surfaces. Leave project clean and ready for use.

1.2 QUALITY ASSURANCE

- ###### A. Requirements of Regulatory Agencies:
- Conduct cleaning and disposal operations in accordance with all applicable local and state laws, ordinances, and code requirements.

PART 2 - PRODUCTS

2.1 MATERIALS

- ###### A. Use only cleaning materials recommended by manufacturer of surfaces to be cleaned.
- ###### B. Use cleaning materials only on surfaces recommended by cleaning material manufacturers.

PART 3 - EXECUTION

3.1 PERFORMANCE

A. Cleaning During Construction:

1. Execute cleaning operations to ensure that buildings, grounds, and public properties are maintained free from accumulations of waste materials and rubbish.
2. Entirely remove and dispose of material or debris during the progress of the work that has washed into or has been placed in watercourses, ditches, gutters, drains, catch basins, or elsewhere as a result of the Contractor's operations.
3. Wet down dry materials and rubbish to lay dust and prevent blowing dust.
4. At reasonable intervals during the progress of work, clean the site and dispose of waste materials, debris, and rubbish.
5. Clean interiors of buildings, when applicable, prior to finish painting, and continue to clean on an as-needed basis until buildings are ready for occupancy.
6. Handle materials in a controlled manner with as few handlings as possible. Do not drop or throw material from heights.
7. When applicable, schedule cleaning operations so that dust and other contaminants resulting from the cleaning process will not fall on wet, newly painted surfaces.

- B. Control of Hazards:
 - 1. Store volatile wastes in covered metal containers, and remove from premises daily.
 - 2. Prevent accumulation of wastes which may create hazardous conditions.
 - 3. Provide adequate ventilation during use of volatile or noxious substances.
- C. Disposal:
 - 1. Do not burn or bury rubbish and waste materials on project site.
 - 2. Do not dispose of volatile wastes, such as mineral spirits, oil, or paint thinner, in storm or sanitary drains.
 - 3. Do not dispose of wastes into streams or waterways.
- D. Final Cleaning:
 - 1. Employ experienced workmen, or professional cleaners, for final cleaning.
 - 2. Remove grease, dust, dirt, stains, labels, fingerprints, and other foreign materials, from all sight-exposed interior and exterior finished surfaces.
 - 3. Repair, patch and touch up marred surfaces to specified finishes.
 - 4. Broom clean paved surfaces.
 - 5. Rake clean non-paved surfaces of the project site.
 - 6. Restore to their original condition those portions of the site not designated for alterations by the Contract Documents.

END OF SECTION

SECTION 01720PROJECT RECORD DOCUMENTSPART 1 - GENERAL1.1 DESCRIPTION

A. Work Included:

1. Keep accurate record documents for all additions, demolition, changes of material or equipment (from that shown on the Drawings), variations in work, and any other additions or revisions to the Contract (via Change Order, Work Change Directive, Field Order or Clarification).

B. Related Work Specified Elsewhere:

1. Shop Drawings, Project Data, and Samples are specified in "General Conditions" and Section 01340, Submittals.

1.2 MAINTENANCE OF DOCUMENTS

A. Maintain at job site, one copy of:

1. Contract Drawings
2. Specifications
3. Addenda
4. Reviewed Shop Drawings
5. Change Orders
6. Any other modifications to the Contract
7. Field Test Reports

B. Store documents in files and racks specifically identified for Record Drawing use, that are apart from documents used for construction.

C. File documents in a logical manner indexed for easy reference.

D. Maintain documents in clean, dry, legible condition.

E. Do not use record documents for construction purposes.

F. Make documents available at all times for inspection by the Engineer and Owner, and by the end of the project, transmit these documents to the Engineer.

G. Failure to maintain current records, as specified herein, shall be grounds for withholding additional retainage from monthly partial payment requests.1.3 RECORDING

A. Label each document "PROJECT RECORD" in large high printed letters.

B. Keep record documents current and do not permanently conceal any work until required information has been recorded.

C. General Field Recording Issues:

1. All swing ties shall be taken from existing, permanent features such as utility poles, corners of buildings and hydrants. Porches, sheds or other house additions shall be avoided as they could be torn down. A minimum of two swing ties shall be taken. Survey grade GPS coordinates are also acceptable.
2. Stations shall be recorded to the nearest foot.
3. Inverts shall be recorded to the nearest hundredth of a foot.

4. Elevations shall be recorded to the nearest hundredth of a foot.
 5. Building dimensions shall be recorded to the nearest 1/4".
 6. Equipment and Piping shall be recorded to the nearest tenth of a foot, and the overall dimensions and layout of the equipment shall be adjusted to reflect the equipment provided.
- D. Project Record Drawings - Legibly mark Contract Drawings to record existing utilities and actual construction of all work, including but not limited to the following (where applicable):
1. Existing Utilities
 - a. Water mains and services, water main gate valves, sewer mains and services, storm drains, culverts, steam lines, gas lines, tanks and other existing utilities encountered during construction must be accurately located and shown on the Drawings. In congested areas supplemental drawings or enlargements may be required.
 - b. Show any existing utilities encountered in plan and profile and properly labeled showing size, material, and type of utility. Ties shall be shown on plan. Utility shall be drawn to scale in section (horizontally and vertically) and an elevation shall be called out to the nearest hundredth of a foot.
 - c. When existing utility lines are broken and repaired, ties shall be taken to these locations.
 - d. If existing water lines are replaced or relocated, document the area involved and pipe materials, size, etc. in a note, and with ties.
 2. Manholes, Catch Basins, Valve Pits, and other structures.
 - a. Renumber structure stationing to reflect changes.
 - b. Show ties to center of structure covers or hatches.
 - c. In general, show inverts at center of structures. However, for manholes with drop structures, or steep channels (greater than 0.2' change on slope), show inverts at face of manhole.
 - d. Show inverts for other structures at the face of the structure.
 - e. Draw any new structures that are added on plan and profile.
 - f. Show any field or office redesigns.
 - g. Redraw plan if the structure's location is moved more than 5 feet in any direction. Note: It is important to show existing utilities, as outlined in Paragraph 1 above, especially if they were one reason for relocating the sewer, manholes and other structures.
 - h. Redraw profile if inverts changed by more than 6 inches.
 3. Gravity Sewer Line
 - a. Change sewer line slopes indicated on Drawings if inverts are changed.
 - b. Draw any new gravity lines that are added on plan and profile.
 - c. Show any field or office redesigns.
 - d. Redraw the sewer line profile if manhole inverts are redrawn.
 - e. Redraw the sewer line on plan corresponding to relocated manholes.
 4. Water Mains and Force Mains
 - a. Show ties to the location of all valves, bends (horizontal and vertical), tees and other fittings. The use of thrust blocks shall be recorded.
 - b. Revise elevations indicated on the Drawings to reflect actual construction.

5. House Services
 - a. Draw all house services (even to empty lots) on plan and show ties.
 - b. Show ties or distances to wyes from manhole.
 - c. Show chimneys heights in the profile.
 - d. The Wright-Pierce "Sanitary Sewer Service Location" forms and "Water Service Location" forms shall be used to record sewer and water service information. A copy of these forms shall be provided to the Owner, along with the Record Drawing Set.
6. Septic Tanks
 - a. Show ties to center of tank covers.
 - b. Label size of septic tanks that are other than standard 1,000-gallon capacity.
 - c. The Wright-Pierce "Sanitary Sewer Service Location" forms shall be used to record septic tank information. A copy of these forms shall be provided to the Owner, along with the Record Drawing Set.
7. Ledge
 - a. Ledge profiles shall be shown. Note whether the plotted ledge profile reflects undisturbed or expanded conditions.
8. Yard Piping and Buried Electrical Conduit
 - a. Site piping and utilities shall be drawn to reflect the installed locations, with ties and elevation of all bends (horizontal and vertical).
 - b. Show routing for electrical conduits and pull boxes, especially in close proximity to buildings and when the conduits change direction or cross process piping.
9. Roads
 - a. Show centerline road profile and level spot elevations.
 - b. Show pavement widths.
 - c. On road cross sections, show the pavement cross slope.
 - d. Show any deviations from the design plans.
10. Buildings
 - a. In general, small changes to structures shall not be redrawn. If any dimensional changes were made in the field, the numerical change shall be made on the Drawing and be properly labeled. Update dimensions and elevations on Drawings.
 - b. Show finished concrete elevations (top of slab, top of wall, top of footing, etc.). Redraw any foundation, frost wall, etc. that was modified, deepened, or altered during construction.
 - c. Adjust finished concrete horizontal dimensions that are shown on the Drawings.
 - d. Adjust structural steel elevations and horizontal dimensions that are shown on the Drawings.
 - e. Show location of anchors, construction and control joints, and waterstops, when they are different from those shown on Drawings.
 - f. Any additions or major changes shall be shown in both plan and elevation (i.e. relocated doors, opposite door swings, change in wall location, relocation of floor drains).

- g. Show approximate location and routing of electrical conduits in walls, slabs and ceilings. Most conduits are run in groups, therefore, use range of measurements to define location for entire section of conduits.
 - h. Special circuits for computers, alarms and instrumentation shall be shown.
 - i. Show any changes in location and elevation of ductwork and devices, fuel piping and equipment, and heat piping and equipment.
 - j. Location of gravity sewer system below slabs in buildings shall be shown, if changes are made in the configuration.
 - k. If wall mounted electrical switches, control boxes, thermostats, etc. have been relocated significantly, (other side of door, or to a wall other than indicated diagrammatically on electrical plans) make the revision accordingly.
11. Utilities
- a. When encountered, additional utilities (e.g., gas, cable, telephone, fiber optic, etc.) shall be indicated on the Record Drawings.
12. Equipment Systems and Piping
- a. Show any changes to equipment systems, whether interior or exterior, for process, HVAC, plumbing, instrumentation or electrical. If any dimensional changes were made in the field, the numerical change shall be made on the Drawing and be properly labeled. Update dimensions and elevations on Drawings. Record Drawings must reflect any equipment configuration and layout changes differing from that shown on the Drawings.
 - b. Show any changes to piping systems, whether interior or exterior, for process, HVAC, plumbing and instrumentation. If any dimensional changes were made in the field, the numerical change shall be made on the Drawing and be properly labeled. Update dimensions and elevations on Drawings.
- E. Specifications and Addenda - Legibly mark up each section to record:
- 1. Manufacturer, trade name, catalog number, and supplier of each product and item of equipment actually installed.
 - 2. Changes made by Change Order, Field Order, or other method.

1.4 SUBMITTALS

- A. At the completion of the project, and prior to the release of retainage, deliver record documents to the Engineer.
- 1. Record drawings shall be provided as a bound, red-line paper set.
 - 2. Record drawings shall be provided as a bound, red-line paper set and an electronic file (pdf format) consisting of a full scan of the bound paper set.
 - 3. Record drawings shall be provided as a bound paper set of computer generated drawings, an electronic file (pdf format) of the bound paper set, and electronic files in AutoCAD format. Ownership of the drawings and files shall pass to the Owner at the time of submittal.
 - 4. Record drawings shall be provided as electronic files in ESRI GIS format. Ownership of the drawings and files shall pass to the Owner at the time of submittal.

5. If the Contractor provides alternate or substitute equipment that requires revised arrangements from the Bidding Documents, the Contractor shall provide supplemental record drawings of these items in AutoCAD format.
- B. Accompany submittal with transmittal letter, in duplicate, containing:
 1. Date, project title and number.
 2. Contractor's name and address.
 3. Title and number of each record document with certification that each document is completed and accurate.
 4. Signature of Contractor, or their authorized representative.
- C. Failure to supply all information on the Project Record Drawings as specified in Part 1.3 may result in withholding final completion and in non-approval of final payments of the Contract. If Contract Time has elapsed, this shall be grounds for imposing liquidated damages.

1.5 QUALITY ASSURANCE

- A. All horizontal and vertical dimensions, swing-ties, and elevations shall be accurate to within one-tenth of a foot, unless greater accuracy is specified elsewhere in the Specifications (e.g., concrete elevations, weir elevations, etc.).

PART 2 - PRODUCTS – NOT APPLICABLE

PART 3 - EXECUTION

3.1 MAINTAINING AND PROVIDING RECORDS

- A. Records shall be kept current as the work progresses.
- B. Records shall be made available for review by the Owner, Engineer, Resident Project Representative and/or Funding Agency(s) upon request.
- C. Records shall be kept current as the work progresses. Failure to maintain current records, as specified herein, shall be grounds for withholding additional retainage from monthly partial payment requests. Failure to provide records shall also be grounds for withholding of final payment and, if beyond contract time, shall be grounds for imposing liquidated damages.

3.2 AS-BUILT SURVEY PERFORMANCE

- A. From established survey control, and construction baseline as shown on the drawings, conduct surveys of the project area during construction as needed to obtain information of buried and above ground items. Surveys shall include information outlined in Section 1.3.
- B. Actual road alignments; walls; fence and guardrail; existing, new and relocated utility poles; traffic and warning sign locations; crosswalks, parking space and stop bar locations; retaining walls and foundations drains; all underground and overhead utility poles and lines within the project limits, including those installed on private property; all other new features and appurtenances and those existing features and appurtenances changed as a result of this project shall be included in the survey.

3.3 FORMAT FOR ELECTRONIC DELIVERABLES

- A. AutoCAD digital survey data for the as-built survey shall include:

1. Copy of field notes and sketches of the survey.
 2. Paper copy of description of layers.
 3. Paper copy of base map.
 4. Provide digital information on compact disk with paper copy printout; information shall be provided in .DWG format (AutoCAD 2011 or earlier). Data shall be provided in 3D format (northing, easting, elevation, or Y, X, Z).
 5. Drawing scale: Minimum one inch = twenty feet.
 6. Layering:
 - a. Repetitive symbols made into blocks and defined on layer 0.
 - b. All entities shall be drawn "by layer" as opposed to individual properties.
 - c. Use one linetype and one color per layer as opposed to numerous colors/linetypes on a single layer.
 - d. Preface each layer with the initials of the Survey company or Contractor (example, Survey Company: SC "layername").
 - e. Database text annotation will be coordinated so the text will be right-reading.
 - f. Place text on separate layers.
- B. ESRI GIS digital survey data for the as-built survey shall include:
1. All lines and points shall be accompanied by the attributes listed in Tables 1, 2, and 3 with consistent formatting and punctuation (e.g. 6, 8, 12, not 6", 8, 10", 12), and shall be provided in an ESRI geodatabase that may be easily imported by the Owner into their GIS System.



SANITARY SEWER SERVICE LOCATION

Project:	_____	Date:	_____
Date Installed:	_____	Town, City of:	_____
Type, Size of Service Pipe	_____	Street	_____
Connection at Sewer Main	_____	Dwelling No.	_____
Depth, End of Service	_____	Occupant	_____
Length of Service Pipe	_____	Owner	_____
Laid	_____		_____
Measured, Located By	_____	House No.	_____
Project Contractor	_____	Complete	_____
		Incomplete	_____

N.T.S.

Comments: _____

Observed By:

_____	_____
Contractor	(Date)
_____	_____
Wright-Pierce	(Date)

WATER SERVICE LOCATION

Project: _____	Date: _____
Date Installed: _____	Town, City of: _____
Type, Size of Service Pipe _____	Street _____
Connection at Water Main (STA) _____	Occupant _____
Depth to Cap _____	Owner _____
Elevation of Cap _____	House No. _____
Length of Service Pipe Laid _____	Complete _____
Measured, Located By _____	Incomplete _____
Project Contractor _____	

N.T.S.

Comments: _____

Observed By:

_____	_____
Contractor	(Date)
_____	_____
Wright-Pierce	(Date)

Location of Stub
approved

_____ (Owner)

Table 1
Sewer - GIS Attribute Table

Field	Description
Casing	
INSTALLDATE	The date the asset was installed
DIAMETER	The diameter of the asset
MATERIAL	Material the casing is manufactured with
RECORDLENG	Recorded length of the casing
CASEINVUP	Invert elevation of the casing (upstream)
CASEINVDOWN	Invert elevation of the casing (downstream)
Clean - Out	
FACILITYID	Locally assigned Facility Identifier = "CO"
ACCESSMAT	Access material for lid or cover
CORIM	Rim elevation of the clean out
COINV	Invert elevation of the clean out
INTDEPTH	Interior Depth
INSTALLDATE	The date the asset was installed
DEVICETYPE	The type of cleanout
ACCESSDIAM	Access diameter for the clean out
Gravity Main	
FACILITYID	Locally assigned Facility Identifier - US/DS
INSTALLDATE	The date the asset was installed
MATERIAL	Material the asset is manufactured with
DIAMETER	The diameter of the asset
MAINSHAPE	The shape of the gravity main
FROMMH	From Manhole
TOMH	The downstream manhole
WATERTYPE	Indicates the type of water in the pipe = "Sewer"
DOWNELEV	The downstream pipe elevation
UPELEV	The upstream pipe elevation
SLOPE	The slope of the pipe from outside face of structure
CALCPIPELENGTH	The pipe length used to calculate slope
Lateral Lines (separated & combined)	
INSTALLDATE	The date the asset was installed
MATERIAL	Material the asset is manufactured with
DIAMETER	The diameter of the asset
WATERTYPE	Indicates the type of water in the pipe = "Sewer"

Table 1
Sewer - GIS Attribute Table

Field	Description
Lateral Line Points	
INSTALLDATE	The date the asset was installed
MATERIAL	Material the asset is manufactured with
DIAMETER	The diameter of the asset
WATERTYPE	Indicates the type of water in the pipe = "Sewer"
ELEV	Elevation at the top of the asset
Sewer Manholes	
FACILITYID	Locally assigned Facility Identifier
INSTALLDATE	The date the asset was installed
HIGHELEV	High pipe elevation inside manhole - for drop
DEPTH	The depth of the manhole
INVERTELEV1	Invert elevation 1
INVERTELEV2	Invert elevation 2
INVERTELEV3	Invert elevation 3
RIMELEV	The elevation of the manhole rim
CVTYPE	The type of sewer manhole cover
WALLMAT	The manhole wall material = Brick, Block, or Concrete
MHTYPE	The type of manhole - Size and Shape
CONDITION	The condition of the asset = Excellent
GPSDATE	Date the feature was located with GPS
WATERTYPE	Indicates the type of water in the pipe = "Sewer"

Table 2
Water - GIS Attribute Table

Field	Description
Abandoned Line	
LINETYPE	The type of abandoned line = Water
ABANDATE	The date the asset was abandoned
MATERIAL	Material the asset is manufactured with
DIAMETER	The diameter of the pipe
Water Casings	
INSTALLDATE	The date the asset was installed
DIAMETER	The diameter of the asset
MATERIAL	Material the casing is manufactured with
RECORDLENG	Recorded length of the casing
CASEINVUP	Invert elevation of the casing (upstream)
CASEINVDOWN	Invert elevation of the casing (downstream)
Control Valve (control mechanism such as blowoff or relief)	
INSTALLDATE	The date the asset was installed
DIAMETER	The diameter of the pipe the valve is attached to
VALVETYPE	Type of control valve
ELEV	Elevation at the top nut of valve
Curb Stop Valve (control flow to lateral or service connection)	
INSTALLDATE	The date the asset was installed
DIAMETER	The diameter of the pipe the valve is connected to
VALVETYPE	Type of curb stop valve
NORMALLYOPEN	Flag to indicate if the device is normally open = Open
TURNSTOCLOSE	TurnsToClose = Left and # of turns
OPERABLE	Indicates if the asset can be operated = Yes
CURROPEN	Flag to indicate if the device is currently open = Open
ELEV	Elevation of top of pipe at curb stop
Fitting (features that connect segments of pipes)	
FACILITYID	Locally assigned Facility Identifier
INSTALLDATE	The date the asset was installed
FITTINGTYPE	The type of fitting
OWNEDBY	Indicates which organization owns the asset = City
MAINTBY	Indicates which organization maintains the asset = City
LASTUPDATE	The date the feature was last updated in the maintenance database
MAINLATERAL	Indicates whether it is a main, lateral, or hydrant lateral fitting
ELEV	Elevation at the top of fitting

Table 2
Water - GIS Attribute Table

Field	Description
Hydrants	
INSTALLDATE	The date the asset was installed
MANUFACTURER	The manufacturer of the hydrant
OPERABLE	Indicates if the hydrant can be operated = Yes
ACTIVEFLAG	Indicates if the feature is in use/active = Active
OWNEDBY	Indicates which organization owns the asset = City
MAINTBY	Indicates which organization maintains the asset = City
ELEV	Elevation at the top of vertical bend of hydrant
Lateral Lines	
INSTALLDATE	The date the asset was installed
MATERIAL	Material the lateral is manufactured with
DIAMETER	The diameter of the lateral
WATERTYPE	Indicates the type of water in the pipe = Water
OWNEDBY	Indicates which organization owns the asset = City
MAINTBY	Indicates which organization maintains the asset = City
Lateral Line Points	
INSTALLDATE	The date the asset was installed
MATERIAL	Material the lateral is manufactured with
DIAMETER	The diameter of the lateral
WATERTYPE	Indicates the type of water in the pipe = Water
OWNEDBY	Indicates which organization owns the asset = City
MAINTBY	Indicates which organization maintains the asset = City
ELEV	Elevation at the top of the asset
Water Mains	
INSTALLDATE	The date the asset was installed
MATERIAL	Material the main is manufactured with
DIAMETER	The diameter of the main
WATERTYPE	Indicates the type of water in the pipe = Water
OWNEDBY	Indicates which organization owns the asset = City
MAINTBY	Indicates which organization maintains the asset = City
Water System Valves	
INSTALLDATE	The date the asset was installed
DIAMETER	The diameter of the asset
VALVETYPE	Type of system valve = Gate or Butterfly
VALVEMAN	Manufacturer of valve
BYPASSVALVE	Indicates if this is a bypass valve = Yes or No
CLOCKTOCLOSE	Indicates if the valve turn direction = Left to close

Table 2
Water - GIS Attribute Table

Field	Description
NORMALLYOPEN	Flag to indicate if the device is normally open = Open
TURNSTOCLOSE	Number of turns to close
OPERABLE	Indicates if the hydrant can be operated = Yes
HYDRFLAG	Indicates if this is a hydrant valve = Yes or No
CURROPEN	Flag to indicate if the device is currently open = Open
MAINLATERAL	Indicates whether the valve is on a main, lateral, or hydrant lateral
ELEV	Elevation at the top nut of valve

Table 3
Drainage - GIS Attribute Table

Field	Description
Casing	
INSTALLDATE	The date the asset was installed
DIAMETER	The diameter of the asset
MATERIAL	Material the casing is manufactured with
RECORDLENG	Recorded length of the casing
CASEINVUP	Invert elevation of the casing (upstream)
CASEINVDOWN	Invert elevation of the casing (downstream)
Culverts	
INSTALLDATE	The date the asset was installed
MATERIAL	Material the asset is manufactured with
DIAMETER	The diameter of the asset
MAINSHAPE	The shape of the culvert
OWNEDBY	Indicates which organization owns the asset = City
MAINTBY	Indicates which organization maintains the asset = City
DOWNELEV	Downstream invert elevation
UPELEV	Upstream invert elevation
SLOPE	Culvert slope
DischargePoint	
DISCHRGTYP	The type of stormwater discharge = Stormwater
PERMIT	Permit Name
PERMITID	Unique permit identifier
INSTALLDATE	The date the asset was installed
DIAMETER	The diameter of the asset
Stormwater Gravity Main	
INSTALLDATE	The date the asset was installed
MATERIAL	Material the asset is manufactured with
DIAMETER	The diameter of the asset
MAINSHAPE	The shape of the gravity main
FROMMH	The upstream structure
TOMH	The downstream structure
OWNEDBY	Indicates which organization owns the asset = City
MAINTBY	Indicates which organization maintains the asset = City
DOWNELEV	The downstream elevation where the pipe meets the structure
UPELEV	The upstream elevation where the pipe meets the structure
SLOPE	The slope of the main from outside face of structure
CALCPIPELENGTH	The pipe length used to calculate slope

Table 3
Drainage - GIS Attribute Table

Field	Description
Inlet (typically found along side of roads or in drainage swales)	
INSTALLDATE	The date the asset was installed
INLETTYPE	The type of stormwater inlet = Pipe, Beehive, or Headwall
ACCESSDIAM	Access diameter for the inlet
INVERTELEV	Invert elevation
ACCESSMAT	Access material for lid or cover
ACCESSTYPE	Method for accessing the opening = Remove Grate
Manhole and Catch Basin	
FACILITYID	Locally assigned Facility Identifier
INSTALLDATE	The date the asset was installed
HIGHELEV	High pipe elevation inside manhole - for drops
INVERTELEV1	Invert elevation 1
INVERTELEV2	Invert elevation 2
INVERTELEV3	Invert elevation 3
INVERT	The depth of the structure from rim to bottom
RIMELEV	The elevation of the structure rim
CVTYPE	The type of stormwater structure cover
WALLMAT	Wall Material = Brick, Block, or Precast Concrete
MHTYPE	The type of structure = Concentric, Eccentric, or Flat Slab
CONDITION	The condition of the asset = Excellent
GPSDATE	Date the feature was located with GPS
MAINTBY	Indicates which organization maintains the asset = City
Network Structure - (Pump Stations, etc)	
FACILITYID	Locally assigned Facility Identifier
INSTALLDATE	The date the asset was installed
OPDATE	Date when the facility was put into service
STRUCTTYPE	Type of Sewer Network structure
System Valves	
INSTALLDATE	The date the asset was installed
DIAMETER	The diameter of the asset
VALVETYPE	Type of control valve
ELEV	Elevation at the top nut of valve

END OF SECTION

SECTION 02050DEMOLITIONPART 1 - GENERAL1.1 DESCRIPTION

A. Work Included:

1. The Contractor shall furnish all labor, materials, tools, equipment and apparatus necessary and shall do all work required to complete the demolition, removal, and alterations of existing facilities as indicated on the Drawings, as herein specified, and/or as directed by the Engineer.
2. Demolition and alteration work within occupied areas shall be accomplished with minimum interference to the occupants and to the plant which shall be in continuous operation during construction.
3. All equipment, piping, and other materials that are not to be relocated or to be returned to the Owner shall become the property of the Contractor and shall be disposed of by him, away from the site of the work and at his own expense.
4. All demolition or removal of existing structures, utilities, equipment, and appurtenances shall be accomplished without damaging the integrity of existing structures, equipment, and appurtenances to remain, to be salvaged for relocation or stored for future use.
5. Such items that are damaged shall be either repaired or replaced at the Contractor's expense to a condition at least equal to that which existed prior to the start of his work.
6. Unless otherwise indicated, all items labeled to be "removed", "demolished" or "remove/demolish" shall be removed and disposed of off-site in accordance with all Local, State and Federal Regulations.
7. The Contractor shall not collect any samples of either Building Materials, Wastes, Soils, or any other site/project related materials, nor have the samples analyzed for any reason without prior written approval from the Owner or Engineer. Furthermore, the Contractor shall not hire or contract with another party or Consultant to conduct sampling of either Building Materials, Wastes, Soils, or any other site/project related materials or to conduct analytical analysis.
 - a. All sampling requests are to be directed in written format to the Owner and Engineer.
 - b. By collecting unauthorized samples, the Contractor shall assume any and all financial burden of the required corrective action.
 - c. If a sample is collected and analyzed without prior written approval from the Owner or Engineer, the Contractor shall be responsible for any and all remediation required by any applicable regulatory authority arising from or related to the samples collected and analyzed, as the validity of the materials sampled, sample locations and sampling protocols utilized cannot be confirmed by the Owner's or Engineer's independent Consultant.

- B. Related Work Specified Elsewhere: (When Applicable)
 - 1. Earthwork is specified in Section 02200.
 - 2. Use of Explosives is specified in Section 01546.
 - 3. See Summary of Work, Section 01010.

1.2 JOB CONDITIONS

- A. Condition of Structures:
 - 1. The Owner assumes no responsibility for the actual condition of structures to be demolished.
 - 2. Conditions existing at the time of inspection for bidding purposes will be maintained by the Owner as far as practicable. However, variations within the structures may occur due to Owner's removal and salvage operations prior to the start of demolition work (where applicable).

1.3 UTILITIES

- A. Utility Locations:
 - 1. Utility locations shown on the plans are approximate only, based on information supplied by the utility companies.
- B. Coordination with Utilities:
 - 1. The Contractor shall make all necessary arrangements and perform any necessary work to the satisfaction of affected utility companies and governmental divisions involved with the discontinuance or interruption of affected public utilities and services.

1.4 SUBMITTALS

- A. Schedule - Demolition:
 - 1. Submit two (2) copies of proposed methods and operations of demolition to the Engineer for review prior to the start of work. Include in the schedule the coordination for shut-off, capping and continuation of utility services as required.
 - 2. Provide a detailed sequence of demolition and removal work to ensure the uninterrupted progress of the Owner's operations.

1.5 PROTECTIONS

- A. Ensure the safe passage of persons around the area of demolition. Conduct operations to prevent injury to adjacent buildings, structures, other facilities and persons. Erect temporary, covered passageways as required by authorities having jurisdiction.
- B. Provide interior and exterior shoring, bracing, or support to prevent movement, settlement or collapse of structures to be demolished and adjacent facilities to remain.

1.6 DAMAGES

- A. The Contractor shall promptly repair damages caused by demolition operations to adjacent facilities at no cost to the Owner.

PART 2 - PRODUCTS – Not Applicable

PART 3 - PERFORMANCE

- A. Remove and dispose of non-salvageable material in accordance with all applicable local and state laws, ordinances, and code requirements.
- B. Dispose of material daily as it accumulates.
- C. Carefully remove, store, and protect from damage all materials to be salvaged.
- D. Buildings and Adjacent Property:
 - 1. Protect all buildings and property adjacent to equipment to be removed from damage by erecting suitable barriers or by other suitable means.
 - 2. Leave such buildings in a permanently safe and satisfactory condition.
- E. Maintaining Traffic:
 - 1. Ensure minimum interference with roads, streets, driveways, sidewalks, and adjacent facilities.
 - 2. Do not close or obstruct streets, sidewalks, alleys, or passageways without permission from authorities having jurisdiction.
- F. Architectural, structural, mechanical, process and electrical demolition, removal and alteration are indicated in the corresponding sections.
- G. Mechanical/Process Demolition:
 - 1. Mechanical/Process demolition in general shall consist of the dismantling and removal of existing piping, tanks, pumps, motors, equipment, and other appurtenances as specified, and indicated on the Drawings.
 - 2. It shall also include, where necessary, the cutting of existing piping for the purpose of making connections thereto.
 - 3. Piping not indicated to be removed but which may interfere with construction shall be removed to the nearest solid support, capped and left in place. Where piping that is to be removed passes through the wall of existing structures, it shall be cut off and properly capped on each side of the wall.
 - 4. When piping is to be altered or removed underground, the remaining piping shall be properly capped or plugged.
 - 5. Abandoned underground piping shall be left in place unless it interferes with new structures or unless otherwise noted on the Drawings.
- H. Salvage:
 - 1. Salvaged items shall be stored on site for the Owner in an acceptable location and manner.
- I. Tank Cleaning: (unless indicated otherwise on the Drawings):
 - 1. Contractor shall give Owner 14 days minimum notice prior to beginning work in tanks requiring draining and cleaning, which are to be renovated as part of this project. The Owner will be responsible for removal and disposal of the liquid contents of the existing tanks.
 - 2. When the existing tank(s) are empty of liquid (drained by the Owner), any solids and/or debris remaining that are not easily drained by the Owner as part of normal facility operations shall be the responsibility of the Contractor. Contractor shall remove and dispose of all solids and/or debris within the tanks at no additional cost to the owner. The Contractor shall then clean the tank walls, floor and ceiling using a high-pressure steam cleaning device.

3. If the demolition work does not commence within the Contractor's approved project schedule, the tank(s) may be placed back in operation by the Owner. It will then be the Contractor's responsibility to drain and clean the tanks.
- J. Maintain Treatment:
1. During demolition, maintain treatment and distribution as outlined in Section 01010, Summary of Work.
- K. Demolition Sequence:
1. The demolition sequence is to conform the reviewed and approved project schedule, and restrictions outlined in Section 01310, Construction Schedules.
- L. Pest Control:
1. Provide pest control when needed or when directed by the Engineer.
 2. Exterminate and prevent migration of rodents to adjoining buildings in accordance with the requirements of the state or local health department.

END OF SECTION

SECTION 02110CLEARING AND GRUBBINGPART 1 - GENERAL1.1 DESCRIPTION

A. Work Included:

1. Clearing and grubbing includes, but is not limited to, removal of trees, brush, stumps, wooded growth, grass, shrubs, poles, posts, signs, fences, culverts and other vegetation and minor structures; the protection of designated wooded growth; the storage and protection of minor structures and materials which are to be replaced; and the disposal of nonsalvageable structures and materials, and necessary preliminary grading.

B. Limits of Work:

1. Perform clearing and grubbing work within the areas required for construction, or as shown on the Drawings, to a depth of 12 inches below the existing grade.
2. Perform additional clearing and grubbing work within areas and to depths which, in the opinion of the Engineer, interfere with excavation and/or construction, or are otherwise objectionable.
3. Do perform grubbing in areas where reuse of the existing soil is specified.

C. Work Not Included:

1. Clearing and grubbing work performed for the convenience of the Contractor will not be considered for payment.

1.2 QUALITY ASSURANCE

A. Requirements of Regulatory Agencies:

1. Dispose of combustible material by burning only when permitted by and in accordance with all applicable local and state laws, ordinances and code requirements.

B. Remove and dispose of nonsalvageable structures and material in accordance with all applicable local and state laws, ordinances and code requirements.

PART 2 - PRODUCTS2.1 MATERIALS

A. Provide all materials required to complete the work.

B. All timber and wood shall become the property of the Contractor unless other agreements are made between the Owner and the Contractor.

C. Repair any damage to structures to the complete satisfaction of the Owner and Engineer.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Carefully preserve and protect from injury all trees and/or shrubs not to be removed.
- B. Right-of-way:
 - 1. Where excavation is required on public or private rights-of-way containing trees, shrubs, other growth, or any structure or construction, obtain the Engineer's direction concerning the extent to which such obstacles can be cleared or stripped prior to performing the Work.
 - 2. In all rights-of-way, remove only those particular growths or structures which are, in the opinion of the Engineer, essential for construction operations.
 - 3. All other removals or damage shall be replaced or restored at the Contractor's expense.

3.2 PERFORMANCE

- A. Clearing:
 - 1. Remove and dispose of all trees, brush, slash, stubs, bushes, shrubs, plants, debris and obstructions within the area to be cleared, except any areas that may be designated as "Selective Clearing", and except as otherwise shown on the Drawings or as directed by the Engineer.
 - 2. Remove all stumps unless otherwise directed by the Engineer.
 - 3. Dispose of material to be removed daily as it accumulates.
 - 4. Take special care to completely dispose of all elm trees and branches immediately after cutting either by burial in approved locations or, when permitted, by burning in areas well removed from standing elm growth.
- B. Protection of Wooded Growth:
 - 1. Fell trees toward the center of the area being cleared to protect trees and shrubs to be left standing.
 - 2. Cut up, remove and dispose of trees unavoidably falling outside the area to be cleared.
 - 3. Employ skilled workmen or tree surgeons to trim and repair all trees that are damaged but are to be left standing.
- C. Selective Clearing:
 - 1. When shown on the Drawings and when directed by the Engineer, perform selective clearing work to preserve natural tree cover.
 - 2. Perform selective clearing work only under the direction and supervision of the Engineer.
 - 3. Remove all dead and uprooted trees, brush, roots and other material which, in the opinion of the Engineer, are objectionable.
 - 4. Cut flush with the ground and remove only those trees indicated by the Engineer.
 - 5. Employ skilled workmen or tree surgeons to carefully trim all branches requiring cutting on trees to be left standing. Wood exposed as the result of removal of branches is to be left exposed to air and sunlight.
 - 6. Bituminous paint shall not be used on wood exposed as a result of branch removal, excavation around roots, or damage to tree bark.
- D. Grubbing:

1. Perform grubbing work beneath new roads, driveways, walks, seeded areas and other areas and as directed by the Engineer.
 2. Grub out all sod, vegetation and other objectionable material to a minimum depth of 12 inches below the existing grade.
 3. Completely remove all stumps, including major root systems.
- E. Disposal:
1. Remove from the site and dispose of material not being burned.
 2. Provide an approved disposal area unless otherwise specified.
- F. Burning:
1. Dispose of combustible materials by burning, only if approved by local and state officials.
 2. Employ competent workmen to perform burning work in such a manner and at such locations that adjacent properties, trees and growth to remain, overhead cables, wires and utilities will not be jeopardized.
 3. Do not leave fires unguarded.
 4. Do not burn poison oak, poison ivy or other plants of similar nature.
 5. Do not use tires or other combustible waste material to augment burning.
 6. Burn combustible materials daily as the work progresses.
 7. The Contractor shall be responsible for all damage caused by burning and shall be responsible for obtaining all necessary permits for burning.

3.3 REPLACEMENT OF MATERIALS

- A. Paving, Curbing and Miscellaneous Material:
1. Remove all paving, subpaving, curbing, gutters, brick, paving block, granite curbing, flagging and minor structures that are over the area to be filled or excavated.
 2. Remove and replace bituminous asphaltic and portland cement concrete in accordance with the appropriate sections of these Specifications.
 3. Properly store and preserve all material to be replaced in a location approved by the Engineer.
- B. Shrubs and Bushes:
1. Remove, store, and replace ornamental shrubs and bushes to be preserved in accordance with accepted horticultural practices.
- C. Topsoil:
1. When applicable, carefully remove, store, and protect topsoil in accordance with the appropriate section of this division.
- D. Responsibility:
1. Replace, at no additional cost to the Owner, materials lost or damaged because of careless removal or neglectful or wasteful storage, disposal or use of these materials.

END OF SECTION

SECTION 02115STRIPPING AND STOCKPILING TOPSOILPART 1 - GENERAL1.1 DESCRIPTION

- A. Work Included:
 - 1. Segregate topsoil approved by the Engineer prior to excavation, trenching and grading operations and stockpile it for use in the work.
- B. Related Work Specified Elsewhere (When Applicable):
 - 1. Demolition, clearing, grading, embankment, excavation and landscaping are specified in the appropriate sections in this division.

PART 2 - PRODUCTS2.1 MATERIALS

- A. Topsoil shall consist of friable loam of at least two percent decayed organic matter (humus), free of subsoil, and reasonably free of clay lumps, brush, roots, weeds, and other objectionable vegetation, stones and similar objects larger than one (1) inch in any dimension, litter and other materials unsuitable or harmful to plant growth. It shall contain no toxic materials.
- B. The quality of the topsoil material to be used shall be subject to approval by the Engineer.

PART 3 - EXECUTION3.1 PERFORMANCE

- A. Remove topsoil from the areas that are likely to be disturbed as a result of construction operations to a depth based on the soil profile, as approved by the Engineer.
- B. Remove topsoil from all designated areas prior to the performance of normal excavation.

3.2 STORAGE

- A. Transport topsoil and deposit in storage piles convenient to the areas which are subsequently to receive the application of topsoil.
- B. Stockpile topsoil separate from other excavated materials in areas approved by the Engineer.
- C. Take all necessary precautions to prevent other excavated material and objectionable material from becoming intermixed with the topsoil before, during and after stripping and stockpiling operations.
- D. Neatly trim and grade stockpiles to provide drainage from surfaces and to prevent depressions where water may become impounded.
- E. Construct temporary erosion control devices for all stockpiled material, subject to the Engineer's approval.
- F. All loam stripped and stockpiled shall be immediately seeded with 70%

Domestic/30% Perennial Rye Grass.

END OF SECTION

SECTION 02156TEMPORARY EXCAVATION SUPPORT SYSTEMPART 1 - GENERAL1.1 DESCRIPTION

- A. Work Included: Design, furnish, install, maintain, and remove temporary excavation support system as required to comply with all applicable State and Federal regulations including the Occupational Safety and Health Act. Excavation support system shall consist of steel sheeting, pile and lagging bracing, cofferdams, caissons, cribs, sheeting, embankments, channel diversion structures, pipes, and other similar work designed by the Contractor. Related Work Specified Elsewhere:
1. Section 01340 Submittals
 2. Section 02401 Dewatering
 3. Section 02200 Earthwork
 4. Geotechnical Data is provided in Appendix A.

1.2 DESIGN REQUIREMENTS

- A. The Contractor shall be responsible for the design and construction of the excavation support structures. The excavation support structures (sheeting systems or other special excavation techniques) shall be designed by a Professional Engineer registered in the State in which the project is located, who practices in a discipline applicable to excavation work and has more than 5 years of experience in the design of excavation support systems.
- B. The excavation support system shall be designed and installed to limit the upward hydraulic gradient into the bottom of the excavation and to sustain all existing and expected loads and utilities, to prevent migration of fine-grained materials into the excavation, to prevent all movement to earth which could in any way cause injury to workers, delay the work or endanger adjacent structures. If detrimental effects result from construction activities, the Contractor shall modify the design, revise construction procedures and/or take measures to mitigate and abate further movement at no cost to the Owner.
- C. The Contractor shall prepare an excavation support system monitoring plan intended to monitor the performance of the excavation support system, as well as the adjacent grade and adjacent structures, throughout construction. The excavation support system monitoring plan shall include vibration and deformation monitoring. Contractor shall retain the services of a qualified vibration monitoring consultant to perform vibration monitoring during installation and removal of the excavation support system. Refer to Paragraphs 1.3 and 3.4 for additional requirements.
- D. Any internal lateral bracing for excavation support shall be located so that the braces shall not pass through walls and/or slabs of existing or proposed structures.
- E. The excavation support system shall provide adequate room to properly perform the installation and to allow for inspection of the installation.
- F. Prior to the installation of any portion of the temporary excavation support system, the Contractor shall furnish to the Owner precondition surveys documenting the

existing conditions of the adjacent structures.

- G. The use of existing structures to support the sheeting bracing or structural framing shall be prohibited.

1.3 SUBMITTALS

- A. Provide submittals in accordance with Specification Section 01340.
- B. Submit qualifications of temporary excavation support system design engineer.
- C. Submit attached certificate of design and complete scaled and dimensioned layout drawings of the proposed excavation system, stamped and sealed by a Professional Engineer registered in the State in which the project is located. Drawings shall show plan, sections and elevations of the support system as well as the proposed structures, materials to be used, proposed method of construction, and other details left open to Contractor choice or not fully shown on the plans.
Submittal shall identify:
 - 1. Physical location on the site and identify any existing utilities or structures that must be protected or relocated prior to excavation support system installation and means for protection and relocation.
 - 2. Type and location of any surcharge loads adjacent to the excavation support system required by the Contractor to execute the work (e.g., excavators, trucks, cranes, soil piles, etc.).
 - 3. Design calculations, supporting documentation and materials cut sheets.
 - 4. Sample monitoring log and proposed monitoring equipment and or software.
 - 5. System removal requirements.
- D. Submit excavation support system monitoring plan, including qualifications of Contractor's vibration monitoring consultant and Contractor's surveyor. The excavation support system monitoring plan shall identify: the specific method, location and frequency of measurements (pre-, during and post-construction); individual(s) responsible for inspection/measurements; submittal and maintenance of on-site records; and threshold vibration values and excavation support system deformation values that, if exceeded, will require immediate stoppage of work and the performance of repairs necessary for reinstatement of a functional system. Provide justification for recommended vibration and deformation tolerances, on a structure-by-structure basis.
- E. The Contractor shall have sole responsibility for design, construction, monitoring and removal of the excavation support system as necessary to prevent damage to adjacent structures, utilities, streets adjacent to excavations and for safety of persons working within the excavated areas. The submittals will be reviewed for consistency with the design intent.
- F. Submittals under this Section shall be provided concurrently with and coordinated with the submittals under Section 02401 Dewatering. Dewatering systems shall be constructed in a way to minimize erosion and resulting water pollution. Appropriate measures of protection shall be incorporated into their construction.

PART 2 - PRODUCTS

2.1 MATERIAL

- A. All materials shall conform to all applicable State and Federal regulations including

- the Occupational Safety and Health Act.
- B. All materials to be used in the construction of this work shall be subject to inspection and approval prior to their incorporation in the structure.

PART 3 - EXECUTION

3.1 GENERAL REQUIREMENTS

- A. Perform preparatory work to discover, protect, maintain and restore utilities, foundations or other facilities located in close proximity of the proposed excavation lateral support system.
- B. Conduct pre-excavation inspection to remove obstructions along the alignment of the excavation lateral support system which will interfere with installation of the excavation lateral support system.
- C. Install the excavation support system, including the installed wall and bracing system, outside the limits of the permanent structure. Construction tolerances (e.g., wall verticality) and lateral wall deflections as a result of excavation and other activities shall be considered in determining the plan location.
- D. Excavation shall not proceed more than 2 ft. below the bracing level, anywhere within the excavation support limits, until the entire level of bracing is completely installed unless explicitly allowed by the design engineer of the excavation support.
- E. The first level of bracing shall be installed within 5 ft. of the ground surface prior to any excavation below this level unless explicitly allowed by the design engineer of the excavation support.

3.2 INSTALLATION

- A. Install excavation support system in accordance with all applicable State and Federal regulations including the Occupational Safety and Health Act. The excavation support system design engineer shall visit the site during excavation support system installation.

3.3 INTERNAL LATERAL WALL BRACING (RAKERS, WALES AND STRUTS)

- A. Rakers are only allowed for the temporary lateral brace that is installed within 5 ft. of the ground surface.
- B. Use wales, struts, corner braces to provide support of the excavation lateral support walls as required. Include web stiffeners, plates, brackets, or angles as required to prevent rotation, crippling or buckling of connections and points of bearing between structural steel members. Allow for eccentricities due to fabrication and assembly. Consider effects of temperature changes.
- C. Install and maintain all support members in continuous tight contact with each other and with the wall being supported.
- D. Preload all bracing members (including rakers, corner braces, and struts) in accordance with methods, procedures and sequence as described on the reviewed shop drawings. Coordinate excavation work with installation of bracing and preloading. Use steel shims and steel wedges, welded or bolted in place, to maintain the preloading force in the bracing after release of the jacking equipment pressure. Wood shims or wedges shall not be used. Braces shall be preloaded to 50 percent of

the maximum design load. Provide means to control the fluctuation of loading due to temperature variations.

- E. Accomplish preloading by jacking struts, rakers, etc. in place against the excavation lateral support system walls, or by other methods acceptable to the Owner or Owner's Representative.

3.4 MONITORING

- A. Contractor shall implement the excavation support system monitoring plan intended to monitor the performance of the excavation support system, as well as adjacent grade and adjacent structures, and water quality throughout construction. Monitoring shall include the following at a minimum:
 - 1. Pre-Installation Structure Elevation Survey. Survey prior to excavation support system installation.
 - 2. Vibration and Displacement Monitoring. Full-time vibration and displacement monitoring during excavation support system installation.
 - 3. Installation Structure and Support System Surveys.
 - a. After excavation support system installation but prior to first brace installation;
 - b. When at mid-point of excavation;
 - c. When at bottom of excavation;
 - d. At weekly intervals during structure construction.
 - e. Prior to excavation support system removal.
 - f. Each survey shall assess the support system deformation and key structures.
 - 4. Vibration monitoring. Full-time during excavation support system removal.
 - 5. Post-Installation Structure Survey. Survey after removal of excavation support system.
 - 6. No movement of or damage to key structures shall be allowed. The following key structures shall be monitored: 180 Piscataqua Road Durham, NH
 - b. 184 Piscataqua Road Durham, NH
 - c. 499 Fox Point Road Newington, NH
 - 7. Turbidity Monitoring. The project is subject to the turbidity monitoring requirements of the approved Water Quality Certificate.
- B. The excavation support system design engineer shall visit the site during the monitoring program at periodic intervals.
- C. Additionally, if the excavation support system monitoring criteria/requirements are not satisfied due to inadequacy or failure of the excavation support system (settlement of adjacent grade, settlement of structures, cracking of structures, etc.), immediately stop work and perform repairs necessary for reinstatement of a functional system, as well as restoration of foundation soil and damaged structure resulting from such inadequacy or failure by Contractor, at no additional cost to Owner.

3.5 REMOVAL OF SHEETING

- A. Remove all sheeting and bracing unless the removal may cause injury to adjacent structures and/or property.
- B. The General Contractor shall be responsible for repairing all damage to structures caused by the removal of sheeting. The excavation support system design engineer

shall visit the site during excavation support system removal.

- C. All backfill disturbed by the removal of the sheeting shall be re-compacted to its in-situ density.
- D. Proceed with backfilling as specified in these Specifications. When the level of compacted backfill reaches the location of bracing and wales, remove these items from the trench or other excavation. When the level of the backfill reaches a point three feet below the existing ground grade, remove the sheeting by approved methods and equipment.
- E. After removing the sheeting, complete backfilling in accordance with Section 02200 (Earthwork).
- F. If the Contractor elects to leave the sheeting or any component of the temporary support system in place, the Contractor shall cut the sheeting or such component at least 4 feet below the ground surface, or as directed by the Engineer.

CERTIFICATE OF DESIGN

RE: Contract between
OWNER: _____
(Name)
and
CONTRACTOR: _____
(Name)
on
CONTRACT: _____
(Title)

(Number) (Date)

The undersigned hereby certify that the engineer listed below:

1. Is licensed or registered to perform professional engineering work in the state of _____(location of Project);
2. Is qualified by education and training to design the _____
specified in Section _____ of subject contract;
3. Has previously designed comparable excavation support systems;
4. Has prepared the design in full compliance with the requirements of subject contract, including all applicable laws, regulations, rules, and codes – including review and coordination with the Dewatering System design; and
5. Will inspect and supervise installation of the excavation support system, will monitor the in-place system to confirm that the system is installed and functions in accordance with the design and will inspect and supervise the removal of the excavation support system.

CONTRACTOR

ENGINEER

By: _____
(Signature)

(Name)

(Title)

(Date)

By: _____
(Signature)

(Name)

(Engineering Discipline)

(Date)

END OF SECTION

SECTION 02200EARTHWORKPART 1 - GENERAL1.1 DESCRIPTION

- A. The Work described by this Section consists of all earthwork encountered and necessary for construction of the project as indicated in the Contract Documents, and includes but is not limited to the following:
 - 1. Excavation
 - 2. Backfilling and Filling
 - 3. Compaction
 - 4. Embankment Construction
 - 5. Grading
 - 6. Providing soil material as necessary
 - 7. Disposal of unsuitable materials
 - 8. Disposal of excess suitable material
- B. Related Work Specified Elsewhere: (When Applicable)
 - 1. Traffic Regulation and Quality Control is specified in Division 1.
 - 2. Clearing and Grubbing, Temporary Construction Dewatering System, Temporary Excavation Support System, Filter Fabric, Temporary Erosion Control, Stripping and Stockpiling of Topsoil, Sheeting, Landscaping, and Paving are specified in the appropriate sections of this Division.
 - 3. Pipe, fittings, and valves are specified in Division 2.

1.2 QUALITY ASSURANCE

- A. Requirements of Regulatory Agencies:
 - 1. All work shall be performed and completed in accordance with all local, state and federal regulations.
 - 2. The General Contractor shall secure all other necessary permits unless otherwise indicated from, and furnish proof of acceptance by, the municipal and state departments having jurisdiction and shall pay for all such permits, except as specifically stated elsewhere in the Contract Documents.
- B. Line and Grade:
 - 1. The Contractor shall establish the lines and grades in conformity with the Drawings and maintain same to properly perform the work.
- C. Testing Methods:
 - 1. Gradation Analysis: Where a gradation is specified the testing shall be in accordance with ASTM C117 and ASTM C136 (or latest revision).
 - 2. Compaction Control:
 - a. Unless otherwise indicated, wherever a percentage of compaction for backfill is indicated or specified, it shall be the in-place density divided by the maximum density and multiplied by 100. The maximum density

shall be the density at optimum moisture as determined by ASTM Standard Methods of Test for Moisture-Density Relations of Soil Using 10-lb. Hammer and 18-in. Drop, Designation D1557 (Modified Proctor), or latest revision, unless otherwise indicated.

- b. The in-place density shall be determined in accordance with ASTM Standard Method of Test for Density of Soil in Place by the Sand Cone method, Designation D1556, (or latest revision) or Nuclear method Designation D6938.
- c. Wherever specifically indicated, maximum density at optimum moisture may be determined by ASTM Standard Methods of Test for Moisture Density Relations of Soils, ASTM D6938 (Standard Proctor).
- d. An Independent Testing Laboratory will be retained by the Owner to conduct all laboratory and field soil sampling and testing, and to observe earth work and foundation construction activities. Laboratory testing will consist of sieve analyses, natural water content determinations, and compaction tests. Field testing will consist of in-place field density tests and determination of water contents.

1.3 SUBMITTALS

- A. Collection of samples and testing of all materials for submittals shall be performed by the Independent Testing Laboratory and paid for by the Contractor until the materials are approved by the Owner or Engineer.
- B. Submit test results in accordance with the procedure specified in the General and Supplementary Conditions.
- C. Submit test results (including gradation analysis) and source location for all borrow material to be used at least 10 working days prior to its use on the site. Contractor shall identify and provide access to borrow sites.
- D. Submit moisture density curve for each type of soil (on site or borrow material) to be used for embankment construction or fill beneath structures or pavement.

1.4 TESTS

- A. The Independent Testing Laboratory shall conform to the following procedures and standards:
- B. Submit test results in accordance with the procedure specified in the General and Supplementary Conditions.
- C. All testing shall be performed by a qualified Independent Testing Laboratory acceptable to the Engineer and Contractor at the Owner's expense unless otherwise indicated (see Section 01400 - Quality Control).
- D. Field density tests on embankment materials shall be as follows:
- E. Tests shall be taken on every 200 cubic yards of embankment material.
- F. Paved Areas and Building Slab Subgrade: Make at least one field density test of subgrade for every 2,000 sq. ft. of paved area or building slab, but in no case less than 3 tests. In each compacted fill layer, make one field density test for every 2,000 sq. ft. of overlaying building slab or paved area, but in no case less than 3 tests.
- G. Trenches: Field density test in trenches shall be taken at 75 linear foot intervals on every third lift.
- H. Foundation Wall Backfill: Take at least one (1) field density tests per lift per wall at

locations and elevations as designated by the Engineer.

- I. In addition to the above tests the Independent Testing Laboratory will perform additional density tests at locations and times requested by the Engineer.
- J. Additional density testing will be required by the Engineer if the Engineer is not satisfied with the apparent results of the Contractor's compaction operation.
 - 1. If the test results fail to meet the requirements of these specifications, the Contractor shall undertake whatever action is necessary, at no additional cost to the Owner, to obtain the required compaction. The cost of retesting will be paid by Owner. The cost of retesting will be determined by Engineer and Owner will invoice Contractor for this cost. If unpaid after 60 days, the invoice amount for retesting will be deducted from the Contract Price. No allowance will be considered for delays in the performance of the work.
 - 2. If the test results pass and meet the requirements of these Specifications, the cost of the testing service will be borne by the Owner, but no allowance will be considered for delays in the performance of the work.

1.5 JOB CONDITIONS

A. Site Information:

- 1. Data on indicated subsurface conditions are not intended as representations or warranties of accuracy or continuity between soil borings. It is expressly understood that Owner and Engineer will not be responsible for interpretations or conclusions drawn there from by the Contractor. Data are made available for the convenience of Contractor.
- 2. Additional test borings and other exploratory operations may be made by Contractor at no additional cost to Owner.

B. Existing Utilities and Structures:

- 1. The locations of utilities and structures shown on the Drawings are approximate as determined from physical evidence on or above the surface of the ground and from information supplied by the utilities. The Engineer in no way warrants that these locations are correct. It shall be the responsibility of the Contractor to determine the actual locations of any utilities or structures within the project area.

PART 2 - PRODUCTS

2.1 SOIL MATERIAL

- A. Aggregate Base: Shall be screened or crushed gravel of hard durable particles free from vegetable matter, lumps or balls of clay and other deleterious substances. Type B Aggregate for base shall not contain particles of rock that will not pass the 4-inch square mesh sieve. The gradation of the part that passes a 3-inch sieve shall meet the following grading requirements:

<u>Sieve Designation</u>	<u>Percent by Weight Passing Square Mesh Sieves</u>
	Type B <u>Aggregate</u>
1/2 inch	35-75
1/4 inch	25-60
No. 40	0-25
No. 200	0-5

- B. Aggregate Leveling Course and Untreated Surface Course: Shall be screened or crushed gravel consisting of hard durable particles which are free from vegetable matter, lumps or balls of clay and other deleterious substances. The gradation of the material shall meet the grading requirements of the following table:

<u>Sieve Designation</u>	<u>Percentage by Weight Passing Square Mesh Sieves</u>
1 inch	95-100
3/4 inch	90-100
No. 4	40-65
No. 10	10-45
No. 200	0-7

- C. Common Borrow: Shall consist of approved material required for the construction of the work where designated. Common borrow shall be free from frozen material, perishable rubbish, peat, organic, and other unsuitable material.

<u>Sieve Designation</u>	<u>Percentage by Weight Passing Square Mesh Sieves</u>
6-inch	100
No. 200	0-5

- D. Common borrow may be used for embankments unless otherwise indicated and provided that the material is at a moisture content suitable for compaction to the specified density. No rocks shall exceed 3/4 of the depth of the specified lift thickness.
- E. Crushed Stone: Shall be a uniform material consisting of clean, hard, and durable particles or fragments, free from vegetable or other objectionable matter, containing angular pieces, as are those which come from a mechanical crusher. Gradation requirements shall be as follows:

<u>Sieve Designation</u>	<u>Percent by Weight Passing Square Mesh Sieve</u>
1-1/2 inch	100
1 inch	95-100
1/2 inch	25-60
No. 4	0-10

- F. Screened Stone: Shall be a well graded stone consisting of clean, hard, and durable particles or fragments, free from vegetable or other objectionable matter, meeting the following gradation requirements:

<u>Sieve Designation</u>	<u>Percent by Weight Passing Square Mesh Sieve</u>
1 inch	100
3/4 inch	90-100
3/8 inch	20-55
No. 4	0-10
No. 8	0-5

- G. Select Fill (Structural Fill): Shall consist of well graded granular material free of organic material, loam, wood, trash, snow, ice, frozen soil and other objectionable material and having no rocks with a maximum dimension of over 4 inches and meeting the following gradation requirements, except where it is used for pipe bedding in which case the maximum size shall be 2 inches.

<u>Sieve Designation</u>	<u>Percent by Weight Passing Square Mesh Sieve</u>
4 inch	100
3 inch	90-100
1/4 inch	25-90
No. 40	0-30
No. 200	0-5

- H. Sand: Shall be well graded durable material free of organic matter and conform to the following gradation requirements:

<u>Sieve Designation</u>	<u>Percent by Weight Passing Square Mesh Sieve</u>
3/8 inch	100
No. 4	95-100
No. 16	50-85
No. 50	10-30
No.100	2-10
No.200	0-5

Sand conforming to the requirement for fine aggregate in ASTM Standard Specifications for Concrete Aggregate, Designation C-33, will meet the above requirement.

2.2 CONCRETE

- A. If concrete is required for excess excavation, provide 3,000 psi concrete complying with requirements of Section 03300.

2.3 FILTER FABRIC

- A. If filter fabric is required, refer to Section 02260.

PART 3 - EXECUTION

3.1 INSPECTION

- A. Examine the areas and conditions under which excavating, backfilling, filling, compaction and grading are to be performed and notify the Engineer in writing of conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected.

3.2 EXCAVATION

- A. General:
1. Excavation consists of removal and disposal of all material encountered when establishing line and grade elevations required for execution of the work.
 2. The Contractor shall make excavations in such manner and to such widths as will give suitable room for building the structures or laying and jointing the piping; shall furnish and place all sheeting, bracing, and supports; shall do all cofferdamming, pumping, and draining; and shall render the bottom of the excavations firm, dry and acceptable in all respects.
 3. All excavation shall be classified as either earth or ledge.
 - a. Earth Excavation shall consist of the removal, hauling and disposal of all earth materials encountered during excavation including but not limited to native soil or fill, pavement (bituminous or concrete), existing sewers and manholes, ashes, loam, clay, swamp muck, debris, soft or disintegrated rock or hard pan which can be removed with a backhoe, or

- a combination of such materials, and boulders that do not meet the definition of "Ledge" below.
- b. Ledge Excavation: Shall consist of the removal, hauling, and disposal of all ledge or rock encountered during excavation. "Ledge" and "rock" shall be defined as any natural compound, natural mixture that in the opinion of the Engineer can be removed from its existing position and state only by drilling and blasting, wedging, sledging, boring or breaking up with power operated tools. No boulder, ledge, slab, or other single piece of excavated material less than two cubic yards in total volume shall be considered to be rock unless, in the opinion of the Engineer it must be removed from its existing position by one of the methods mentioned above.
 4. The Contractor shall not have any right of property in any materials taken from any excavation. Do not remove any such materials from the construction site without the approval of the Engineer. This provision shall in no way relieve the Contractor of his obligations to remove and dispose of any material determined by the Engineer to be unsuitable for backfilling. The Contractor shall dispose of unsuitable and excess material in accordance with the applicable sections of the Contract Documents.
- B. Additional Excavation: When excavation has reached required subgrade elevations, notify the Engineer and Resident Project Representative who will observe the conditions.
1. If material unsuitable for the structure or paved area or pipeline (in the opinion of the Engineer) is found at or below the grade to which excavation would normally be carried in accordance with the Drawings and/or Specifications, the Contractor shall remove such material to the required width and depth and replace it with thoroughly compacted select fill, screened stone, crushed stone, or concrete as directed by the Engineer.
 2. All excavated materials designated by the Engineer as unsuitable shall become the property of the Contractor and disposed of at locations in accordance with all State and local laws and the provisions of the Contract Documents.
- C. Unauthorized Excavation: Shall consist of removal of materials beyond indicated subgrade elevations or dimensions without specific authorization of Engineer. Unauthorized excavation, as well as remedial work required by the Engineer shall be at the Contractor's expense. Remedial work required is as follows:
1. Under footings, foundation bases, or retaining walls, fill unauthorized excavation with select fill or screened stone compacted to 95%. Provide 12" minimum select fill or screened stone directly under footings. Concrete fill may be used to bring elevations to proper position, when acceptable to Engineer.
 2. If the bottom of a trench is excavated beyond the limits indicated, backfill the resulting void with thoroughly compacted screened stone, unless otherwise indicated.
 3. Elsewhere, backfill and compact unauthorized excavations as specified for authorized excavations of same classification, unless otherwise directed by Engineer.
- D. Structural Excavation:

1. Shall consist of the removal, hauling, disposal, of all material encountered in the excavation to permit proper installation of structures.
 2. Excavations for structures shall be carried to the lines and subgrades shown on the Drawings.
 3. Excavate areas large enough to provide suitable room for building the structures.
 4. The extent of open excavation shall be controlled by prevailing conditions subject to any limits designated by the Engineer.
 5. Provide, install, and maintain sheeting and bracing as necessary to support the sides of the excavation and to prevent any movement of earth which could diminish the width of the excavation or otherwise injure the work, adjacent structures, or persons and property in accordance with all state and OSHA safety standards.
 6. Erect suitable fences around structure excavation and other dangerous locations created by the work, at no additional cost to the Owner.
 7. Exposed subgrade surfaces shall remain undisturbed, protected, and maintained as uniform, plane areas and shape to receive the foundation components of the structure.
 - a. Conform to elevations and dimensions shown within a tolerance of plus or minus 0.10', and extending a sufficient distance from footings and foundations to permit placing and removal of concrete formwork, installation of services, other construction, and for inspection.
 - b. In excavating for footings and foundations, take care not to disturb bottom of excavation. Excavate by hand to final grade and trim bottoms to required lines and grades to leave solid base to receive the structure.
 - c. If a structure is to be constructed within the embankment, the fill shall first be brought to a minimum of 3 feet above the base of the footing. A suitable excavation shall then be made as though the fill were undisturbed earth.
- E. Trench Excavation: Shall consist of removal, hauling and disposal of all material encountered in the excavation to the widths and depths shown on the Drawings to permit proper installation of underground utilities.
1. Excavate trenches to the uniform width shown on the Drawings sufficiently wide to provide sufficient space for installation, backfilling, and compaction. Every effort should be made to keep the sides of the trenches firm and undisturbed until backfilling has been completed and consolidated.
 2. Trenches shall be excavated with approximately vertical sides between the elevation of the center of the pipe and an elevation one foot above the top of the pipe.
 3. Grade bottoms of trenches as indicated for pipe and bedding to establish the indicated slopes and invert elevations, notching under pipe joints to provide solid bearing for the entire body of the pipe, where applicable.
 4. If pipe is to be laid in embankments or other recently filled material, the material shall first be placed to the top of the fill or to a height of at least two feet above the top of the pipe, whichever is the lesser. Particular care shall be taken to

ensure maximum consolidation of material under the pipe location. The pipe trench shall be excavated as though in undisturbed material.

5. Unless otherwise specifically directed or permitted by the Engineer, begin excavation at the low end of sewer and storm lines and proceed upgrade.
 6. Perform excavation for force mains and water mains in a logical sequence.
 7. The extent of open excavation shall be controlled by prevailing conditions subject to any limits prescribed by the Engineer.
 8. As the excavation progresses, install such shoring and bracing necessary to prevent caving and sliding and to meet the requirements of the state and OSHA safety standards, as outlined in the appropriate section of this Specification.
- F. Protection of Persons, Property and Utilities:
1. Barricade open excavations occurring as part of this work and post with warning lights in compliance with local and State regulations.
 2. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout and other hazards created by earthwork operations. Exercise extreme caution and utilize sheeting, bracing, and whatever other precautionary measures that may be required.
 3. Rules and regulations governing the respective utilities shall be observed in execution of all work. Active utilities and structures shall be adequately protected from damage, and removed or relocated only as indicated or specified. Inactive and abandoned utilities encountered in excavation and grading operations shall be removed, plugged or capped only with written authorization of the utility owner. Report in writing to the Engineer, the locations of such abandoned utilities. Extreme care shall be taken when performing work in the vicinity of existing utility lines, utilizing hand excavation in such areas, as far as practicable.
 4. Repair, or have repaired, all damage to existing utilities, structures, lawns, other public and private property which results from construction operations, at no additional expense to the Owner, to the complete satisfaction of the Engineer, the utility, the property owner, and the Owner.
- G. Use of Explosives:
1. Do not bring explosives onto site or use in work without prior written permission from authorities having jurisdiction. Contractor is solely responsible for handling, storage, and use of explosive materials when their use is permitted.
 2. All blasting shall be performed in accordance with all pertinent provisions of the "Manual of Accident Prevention in Construction" of the Associated General Contractors of America, Inc.
- H. Stability of Excavations:
1. Slope sides of excavations to comply with all codes and ordinances having jurisdiction. Shore and brace where sloping is not possible because of space restrictions or stability of material excavated.
 2. Maintain sides and slopes of excavations in a safe condition until completion of backfilling.
- I. Shoring and Bracing:

1. Provide materials for shoring and bracing, such as sheet piling, uprights, stringers and cross-braces, in good serviceable condition.
 2. Provide trench shoring and bracing to comply with local codes and authorities having jurisdiction. Refer to Specification Section 02156.
 3. Maintain shoring and bracing in excavations regardless of time period excavations will be open. Install shoring and bracing as excavation progresses.
- J. Material Storage:
1. Stockpile excavated materials which are satisfactory for use on the work until required for backfill or fill. Place, grade and shape stockpiles for proper drainage and protect with temporary seeding or other acceptable methods to control erosion.
 2. Locate and retain soil materials away from edge of excavations.
 3. Dispose of excess soil material and waste materials as herein specified.
- K. Dewatering:
1. To ensure proper conditions at all times during construction, the Contractor shall provide and maintain ample means and devices (including spare units kept ready for immediate use in case of breakdowns) with which to intercept and/or remove promptly and dispose properly of all water entering trenches and other excavations (including surface and subsurface waters).
 2. Excavations shall be kept dry until the structures, pipes, and appurtenances to be built therein have been completed to such extent that they will not be floated or otherwise damaged. Refer to Specification Section 02401.
- L. Cold Weather Protection:
1. Protect excavation bottoms against freezing when atmospheric temperature is less than 35°F.
 2. No frozen material shall be used as backfill or fill and no backfill shall be placed on frozen material.
- M. Separation of Surface Material:
1. The Contractor shall remove only as much of any existing pavement as is necessary for the prosecution of the work.
 2. Prior to excavation, existing pavement shall be cut where in the opinion of the Engineer it is necessary to prevent damage to the remaining road surface.
 3. Where pavement is removed in large pieces, it shall be disposed of before proceeding with the excavation.
 4. From areas within which excavations are to be made, loam and topsoil shall be carefully removed and separately stored to be used again as directed; or, if the Contractor prefers not to separate surface materials, he shall furnish, as directed, loam and topsoil at least equal in quantity and quality to that excavated.
- N. Dust Control:
1. During the progress of the work, the Contractor shall conduct his operations and maintain the area of his activities, including sweeping and sprinkling of streets as necessary, so as to minimize the creation and dispersion of dust. Refer to Specification Section 01562.
 2. If the Engineer decides that it is necessary to use calcium chloride for more effective dust control, the contractor shall furnish and spread the material, as directed.

3.3 BACKFILL AND FILL

A. General:

1. Backfilling shall consist of replacing material removed to permit installation of structures or utilities, as indicated in the Contract Documents.
2. Filling shall consist of placing material in areas to bring them up to grades indicated on the Drawings.
3. The Contractor shall provide and place all necessary backfill and fill material, in layers to the required grade elevations.
4. Backfill excavations as promptly as work permits, but not until completion of the following:
 - a. Acceptance by Engineer of construction below finish grade including, where applicable, dampproofing, waterproofing, and perimeter insulation.
 - b. Inspection, approval, and recording locations of underground utilities.
 - c. Removal of concrete formwork.
 - d. Removal of shoring and bracing, and backfilling of voids with satisfactory materials. Temporary sheet piling driven below bottom of structures shall be removed in manner to prevent settlement of the structure or utilities or cut off and left in place if required.
 - e. Removal of trash and debris.
 - f. Permanent or temporary horizontal bracing is in place on horizontally supported walls.
 - g. Density testing having results meeting requirements specified herein.
5. In general, and unless otherwise indicated, material used for backfill of trenches and excavations around structures shall be suitable excavated material which was removed in the course of making the construction excavation. Unless otherwise specified or allowed by the Engineer the backfill and fill shall be placed in layers not to exceed 8 inches in thickness.
6. All fill and backfill under structures and pavement, and adjacent to structures, shall be compacted crushed stone or select fill as specified or as indicated on the Drawings. The fill and backfill materials shall be placed in layers not exceeding 8 inches in thickness.
7. All structures (including manholes) shall be placed on a 6-inch mat of screened stone unless otherwise indicated.
8. Suitable excavated material shall meet the following requirements:
 - a. Free from large clods, silt lumps or balls of clay.
 - b. Free from stones and rock fragments with larger than 12 inch max. dimension.
 - c. Free from organics, peat, etc.
 - d. Free from frozen material.
9. If sufficient suitable excavated material is not available from the excavations, and where indicated on the Drawings, the backfill material shall be select fill or common borrow, unless otherwise indicated, as required and as directed by the Engineer.
10. Do not backfill with, or on, frozen materials.

11. Remove, or otherwise treat as necessary, previously placed material that has frozen prior to placing backfill.
 12. Do not mechanically or hand compact material that is, in the opinion of the Engineer, too wet.
 13. Do not continue backfilling until the previously placed and new materials have dried sufficiently to permit proper compaction.
 14. The nature of the backfill materials will govern the methods best suited for their placement and compaction. Compaction methods and required percent compaction is covered in Compaction section.
 15. Before compaction, moisten or aerate each layer as necessary to provide a water content necessary to meet the required percentage of maximum dry density for each area classification specified.
 16. Do not allow large masses of backfill material to be dropped into the excavation in such a manner that may damage pipes and structures.
 17. Place material in a manner that will prevent stones and lumps from becoming nested.
 18. Completely fill all voids between stones with fine material.
 19. Do not place backfill on or against new concrete until it has attained sufficient strength to support loads without distortion, cracking, and other damage.
 20. Deposit backfill and fill material evenly on all sides of structures to avoid unequal soil pressures.
 21. Keep stones or rock fragments with a dimension greater than two inches at least one foot away from the pipe or structure during backfilling.
 22. Leave sheeting in place when damage is likely to result from its withdrawal.
 23. Completely fill voids left by the removal of sheeting with screened stone which is compacted thoroughly.
- B. Pipe Bedding, Initial Backfill and Trench Backfill:
1. Place bedding and backfill in layers of uniform thickness specified herein, and as shown on the Drawings.
 2. Thoroughly compact each layer by means of a suitable vibrator or mechanical tamper.
 3. Install pipe bedding and initial backfill in layers of uniform thickness not greater than eight (8) inches.
 4. Deposit the remainder of the backfill in uniform layers not greater than eight inches.
 5. Provide underground utility marking tape for new utility trenches as shown on the Drawings. Refer to Section 02650 – Buried Utility Markings.
 6. Where soft silt and clay soils are encountered the trench shall be excavated six inches below the normal bedding and backfilled with 6-inches of compacted sand.
 7. Backfill trenches with concrete where trench excavations pass within 18 inches of column or wall footings and which are carried below the bottom of such footings, or which pass under wall footings. Place concrete to the level of the bottom of adjacent footings.
 8. The following schedule lists the bedding materials for various types of pipe. Refer to the pipe trench detail for dimensional requirements.

BEDDING REQUIREMENTS

DI or Concrete Pipe	screened stone or sand
PVC or HDPE Pipe	sand

9. The following schedule lists the initial backfill requirements for various types of pipes. Refer to the pipe trench detail for dimensional requirements.

INITIAL BACKFILL REQUIREMENTS

DI or Concrete Pipe	screened stone or sand
PVC or HDPE Pipe	sand

10. Special bedding and backfill requirements shown on the Drawings supersede requirements of this section.
11. Where pipes or structures pass through or under the impervious core of the lagoon embankments, bedding and backfill material shall consist of the impervious embankment material. Extra care should be given to properly and thoroughly compact the bedding material around the pipe.
- C. Improper Backfill:
1. When excavation and trenches have been improperly backfilled, and when settlement occurs, reopen the excavation to the depth required, as directed by the Engineer.
 2. Refill and compact the excavation or trench with suitable material and restore the surface to the required grade and condition.
 3. Excavation, backfilling, and compacting work performed to correct improper backfilling shall be performed at no additional cost to the Owner.
- D. Ground Surface Preparation:
1. Remove vegetation, debris, unsatisfactory soil materials, obstructions, and deleterious materials from ground surface prior to placement of fills. Plow, strip, scarify or break-up sloped surface steeper than 1 vertical to 4 horizontal.
 2. When existing ground surface has a density less than that specified under "compaction" for the particular area classification, break up the ground surface, pulverize, moisture-condition to the optimum moisture content, and compact to required depth and percentage of maximum density.

3.4 COMPACTION

- A. General:
1. Control soil compaction during construction to provide not less than the minimum percentage of density specified for each area classification.
- B. Percentage of Maximum Density Requirements:
1. Compact soil to not less than the following percentages of maximum dry density determined in accordance with ASTM D1557 as indicated.

- a. Structures: Compact each layer of backfill or fill material below or adjacent to structures to at least 95% of maximum dry density (ASTM D1557).
 - b. Off Traveled Way Areas: Compact each layer of backfill or fill material to at least 90% of maximum dry density (ASTM D1557).
 - c. Walkways: Compact each layer of backfill or fill material to at least 93% of maximum dry density (ASTM D1557).
 - d. Roadways, Drives and Paved Areas: Compact each layer of fill, subbase material, and base material to at least 95% of maximum dry density (ASTM D1557).
 - e. Pipes: Compact bedding material and each layer of backfill to at least 90% maximum dry density (ASTM D1557). Where backfilling with excavated material, compact to native field density.
 - f. Embankments: Compact each layer of embankment material to at least 95% of maximum dry density (ASTM D1557).
- C. Moisture Control:
- 1. Where subgrade or a layer of soil material must be moisture conditioned before compaction, uniformly apply water to surface of subgrade, or layer of soil material, in quantities controlled to prevent free water appearing on surface during or subsequent to compaction operations.
 - 2. Remove and replace, or scarify and air dry, soil material that is too wet to permit compaction to specified density.
 - 3. Soil material that has been removed because it is too wet to permit compaction may be stockpiled or spread and allowed to dry. Assist drying by discing, harrowing or pulverizing until moisture content is reduced to a satisfactory level.
- D. Embankment Compaction:
- 1. After each embankment layer has been spread to the required maximum 8-inch thickness and its moisture content has been adjusted as necessary, it shall be rolled with a sufficient number of passes to obtain the required compaction. One pass is defined as the required number of successive trips which by means of sufficient overlap will ensure complete coverage and uniform compaction of an entire lift. Additional passes shall not be made until the previous pass has been completed.
 - 2. When any section of an embankment sinks or weaves excessively under the roller or under hauling units and other equipment, it will be evident that the required degree of compaction is not being obtained and that a reduction in the moisture content is required. If at any place or time such sinking and weaving produces surface cracks which, in the judgment of the Engineer are of such character, amount, or extent to indicate an unfavorable condition, he will recommend operations on that part of the embankment to be suspended until such time as it shall have become sufficiently stabilized. The ideal condition of the embankment is that attained when the entire embankment below the surface being rolled is so firm and hard as to show only the slightest weaving and deflection as the roller passes.

3. If the moisture content is insufficient to obtain the required compaction, the rolling shall not proceed except with the written approval of the Engineer, and in that event, additional rolling shall be done to obtain the required compaction. If the moisture content is greater than the limit specified, the material of such water content may be removed and stockpiled for later use or the rolling shall be delayed until such time as the material has dried sufficiently so that the moisture content is within the specified limits. No adjustment in price will be made on account of any operation of the Contractor in removing and stockpiling, or in drying the materials or on account of delays occasioned thereby.
 4. If because of insufficient overlap, too much or too little water, or other cause attributable to defective work, the compaction obtained over any area is less than that required, the condition shall be remedied, and if additional rollings are ordered, they will be done at no cost to the Owner. If the material itself is unsatisfactory or if additional rolling or other means fails to produce satisfactory results, the area in question shall be removed down to material of satisfactory density and the removal, replacement, and re-rolling shall be done by the Contractor, without additional compensation.
 5. Material compaction by hand-operated equipment or power-driven tampers shall be spread in layers not more than 6 inches thick. The degree of compaction obtained by these tamping operations shall be equal in every respect to that secured by the rolling operation.
- E. Compaction Methods: The Contractor may select any method of compaction that is suitable to compact the material to the required density.
1. General: Whatever method of compacting backfill is used, care shall be taken that stones and lumps shall not become nested and that all voids between stones shall be completely filled with fine material. All voids left by the removal of sheeting shall be completely backfilled with suitable materials and thoroughly compacted.
 2. Tamping or Rolling: If the material is to be compacted by tamping or rolling, the material shall be deposited and spread in uniform, parallel layers not exceeding the uncompacted thicknesses specified. Before the next layer is placed, each layer shall be tamped as required so as to obtain a thoroughly compacted mass. Care shall be taken that the material close to the excavation side slopes, as well as in all other portions of the fill area, is thoroughly compacted. When the excavation width and the depth to which backfill has been placed are sufficient to make it feasible, and it can be done effectively and without damage to the pipe or structure, backfill may, on approval, be compacted by the use of suitable rollers, tractors, or similar powered equipment instead of by tamping. For compaction by tamping or rolling, the rate at which backfilling material is deposited shall not exceed that permitted by the facilities for its spreading, leveling, and compacting as furnished by the Contractor.
- F. Reconditioning Compacted Areas: Where completed compacted areas are disturbed by subsequent construction operations or adverse weather, scarify surface, re-shape, and compact to required density prior to further construction.

3.5 GRADING:

- A. General:
 - 1. Grading shall consist of that work necessary to bring all areas to the final grades.
 - 2. Uniformly grade areas within limits of work requiring grading, including adjacent transition areas.
 - 3. Smooth finished surface within specified tolerances, compact with uniform levels or slopes between points where elevations are shown, or between such points and existing grades.
- B. Grading Outside Building Lines:
 - 1. Grade areas adjacent to building to drain away from structures and to prevent ponding.
 - 2. Grade surfaces to be free from irregular surface changes, and as follows:
 - a. Lawn or Unpaved Areas: Finish grade areas to receive topsoil to within not more than 1" above or below the required subgrade elevations.
 - b. Walks: Shape surface of areas under walks to line, grade and cross-section, with finish surface not more than 1/2" above or below the required subgrade elevation.
 - c. Pavements: Shape surface of areas under pavement to line, grade and cross-section, with finish surface not more than 3/8" above or below the required subgrade elevation.
- C. Grading Surface of Fill Under Building Slabs:
 - 1. Grade surface to be smooth and even, free of voids, and compacted as specified, to the required elevation.
 - 2. Provide final grades within a tolerance of 1/2" when tested with a 10' straight edge.
- D. Compaction:
 - 1. After grading, compact subgrade surfaces to the depth and percentage of maximum density for each area classification.
- E. Protection of Graded Areas:
 - 1. Protect newly graded areas from traffic and erosion. Keep free of trash and debris.
 - 2. Repair and re-establish grades in settled, eroded, and rutted areas to specified tolerances.

3.6 BASE COURSE AND LEVELING COURSE

- A. General:
 - 1. Base course consists of placing the specified materials in layers to support a leveling course or paved surface, as indicated in the Drawings.
- B. Grade Control:
 - 1. During construction, maintain lines and grades including crown and cross-slope of base course and leveling course.
- C. Placing:
 - 1. Place base course on prepared subbase conforming to indicated cross-section and thickness. Maintain optimum moisture content for compacting base materials.
 - 2. Place leveling course on prepared base course, conforming to indicated cross-section and thickness. Maintain optimum moisture content for compaction.

D. Shaping and Compacting:

1. All layers of aggregate base course and leveling course shall be compacted to the required density immediately after placing. As soon as the compaction of any layer has been completed, the next layer shall be placed.
2. The Contractor shall bear full responsibility for and make all necessary repairs to the base leveling courses and the subgrade until the full depth of the base leveling courses is placed and compacted. Repairs shall be made at no additional cost to the Owner.
3. If the top of any layer of the aggregate base or leveling course becomes contaminated by degradation of the aggregate or addition of foreign materials, the contaminated material shall be removed and replaced with the specified material at the Contractor's expense.

END OF SECTION

SECTION 02225FLOWABLE FILLPART 1 - GENERAL1.1 DESCRIPTION

- A. Work Included: Provide and install flowable fill material in authorized excavation(s) as shown on the Drawings and/or as specified herein.
- B. Related Work Specified Elsewhere:
 - 1. Earthwork, excavation, backfilling, compaction, piping, manholes, testing, and pavement are specified in the appropriate sections of this Division.

1.2 QUALITY ASSURANCE

- A. Perform work in accordance with ACI 229, Controlled Low-Strength Materials, or as specified here-in.

1.3 SUBMITTALS

- A. Submit Mix designs for each mixture to be provided at least 15 days prior to production.

PART 2 - PRODUCTS2.1 MATERIALS

- A. General: Materials shall meet the following requirements:
 - 1. Portland Cement, Type I or II - ASTM C150.
 - 2. Fly Ash (LOI limits do not apply) - ASTM C618.
 - 3. Fine Aggregate/Mineral Filler – ASTM C 33, ASTM or non-ASTM sands or mineral fillers with 100% passing the 1/2" sieve may be considered which produce an acceptable flow and desired performance characteristic. Soils with fine clays will not be considered. All other than ASTM C 33 materials must receive prior approval from the Engineer.
 - 4. Air Entraining Admixtures - As Per Manufacturer's Specifications.
 - 5. Light Weight Cellular Admixture - As Per Manufacturer's Specifications.
 - 6. Water – Potable or ASTM C 94.
 - 7. Preformed Foam – Procedures for evaluation ASTM C 796 and ASTM C 869.
- B. Standard Flowable Fill:
 - 1. Compressive strength at 28 days less than 1200 psi
- C. Excavatable Flowable Fill:
 - 1. Compressive strength at 28 days between 100-200 psi.
 - 2. Mix:
 - a. Portland Cement: 50-100 lb/yd³
 - b. Fly Ash: up to 350 lb/yd³, lime content not to exceed 10% by weight.
 - c. Fine Aggregate/Mineral Filler: 2000-3000 lb/yd³
 - d. Water: 325-600 lb/yd³, for Class F fly ash and cement-only mixtures up to 1000 lb/yd³ may be acceptable.
- D. Low Density Flowable Fill:

1. The preformed foam shall produce stable air cells capable of resisting the chemical and physical forces imposed during mixing, placing and setting.
2. Submit the foaming agent Manufacturer's recommended mixing procedures and approved mixing equipment to the Engineer.
3. Methods of placement must not cause a change in density due to loss of air content beyond predictable ranges.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Flowable fill shall be produced and delivered using standard concrete construction equipment and practices.
- B. Placing flowable fill shall be by chute, pumping, or other method approved by the Engineer.
- C. The flowable fill shall be discharged directly from the mixer truck into the space to be filled.
- D. No flowable fill shall be placed on frozen ground.
- E. At the time of placement, the flowable fill shall have a temperature of at least 40 degrees F.
- F. When flowable fill is placed in freezing temperatures, the material should be covered with blankets and protected from freezing until hardening.
- G. The Contractor shall provide all necessary means to confine the material within a designated space.
- H. Formed walls or other bulkheads shall be constructed to withstand hydrostatic pressure exerted by flowable fill where necessary and as determined by the Engineer.
- I. The Contractor is responsible to ensure underground utilities, including but not limited to pipes, tanks, structures, cables, etc. are secured to prevent floating.
- J. No compaction or vibration of the material is required.
- K. Where flowable fill is being used as pipe bedding it shall be placed in lifts to ensure lateral support of the pipe develops along the side of the pipe before continuing with the backfilling.
- L. When paving over flowable fill in cold weather, any frozen material on the surface shall be scraped off and removed prior to paving.
- M. The flowable fill shall be left undisturbed until the material obtains sufficient strength. Sufficient strength for paving is achieved when the flowable fill can support the weight of foot traffic without apparent deformation. Sufficient strength for supporting vehicular traffic is 2.5 tons per square foot as measured by a pocket penetrometer.
- N. Trenches shall be covered and barricaded until hardening occurs.

END OF SECTION

SECTION 02260FILTER FABRICPART 1 - GENERAL1.1 DESCRIPTION

- A. Work Included:
 - 1. Furnish all materials and install filter fabric of the types, dimensions and in the location(s) shown on the Drawings and specified herein.
- B. Related Work Specified Elsewhere:
 - 1. Temporary Erosion Control, Riprap and Stone Ditch Protection, and Gabions and Revet Mattresses are specified in the appropriate sections of this Division.

1.2 QUALITY ASSURANCE

- A. A competent laboratory must be maintained by the manufacturer of the fabric at the point of manufacture to ensure quality control.
- B. During all periods of shipment and storage, the fabric shall be wrapped in a heavy-duty protective covering to protect the fabric from direct sunlight, ultraviolet rays, temperatures greater than 140°F, mud, dirt, dust and debris.

1.3 SUBMITTALS

- A. Manufacturer shall furnish certified test reports with each shipment of material attesting that the fabric meets the requirements of this Specification

PART 2 - PRODUCTS2.1 MATERIALS

- A. Filter fabric for use in stabilization, drainage, underdrains, landscaping and beneath structures shall be formed in widths of not less than six (6) feet and shall meet the requirements of Table 1. Both woven and non-woven geotextiles are acceptable; however no "slit-tape" woven fabrics will be permitted for drainage, underdrain, and erosion control applications.

TABLE 1

<u>Geotextile Mechanical Property</u>	<u>Test Method</u>	<u>Minimum Permissible Value</u>
Grab Tensile Strength	ASTM D4632	120 pounds
Grab Elongation	ASTM D4632	50 percent
CBR Puncture Strength	ASTM D6241	310 pounds
Trapezoid Tear Strength	ASTM D4533	50 pounds
Water Flow Rate	ASTM D4491	120 gal/min/sf
Equivalent Opening Size (EOS)	ASTM D4751	U.S. Std. Sieve #80
Coefficient of Permeability	ASTM D4491	0.2 cm/sec

The geotextile shall have property values expressed in "typical" values that meet or exceed the values stated above as determined by the most recent test methods specified above.

- B. Filter fabric for use in reinforcement shall meet the requirements of Table 2. Woven and non-woven geotextiles are acceptable.

TABLE 2

<u>Geotextile Mechanical Property</u>	<u>Test Method</u>	<u>Minimum Permissible Value</u>
Wide Width Tensile Strength	ASTM 4595	195 pounds
Grab Tensile Strength	ASTM 4632	195 pounds
Grab Elongation	ASTM D4632	20 percent
CBR Puncture Strength	ASTM D6241	700 pounds
Trapezoid Tear Strength	ASTM D4533	85 pounds
Equivalent Opening Size (EOS)	ASTM D4751	U.S. Std. Sieve number(s) between #20 and #100

The geotextile shall meet or exceed the "typical" values stated above as determined by the most recent test methods specified above.

- C. Filter Fabric for use under riprap shall meet the requirements as specified in Section 02271 - Riprap and Stone Ditch Protection.
 D. For Silt Fence, refer to Section 02270 - Temporary Erosion Control Execution

PART 3 - EXECUTION

- 3.1 Install filter fabric as shown on the drawings or as directed in appropriate specifications in this division or in accordance with manufacturer's instructions or as directed by the engineer.

END OF SECTION

SECTION 02270TEMPORARY EROSION CONTROLPART 1 - GENERAL1.1 DESCRIPTIONA. Work Included:

1. The work under this section shall include provision of all labor, equipment, materials and maintenance of temporary erosion control devices as specified herein, and as directed by the Engineer.
2. Erosion control measures shall be provided as necessary to correct conditions that develop prior to the completion of permanent erosion control devices or as required to control erosion that occurs during normal construction operations.
3. Construction operations shall comply with all federal, state and local regulations pertaining to erosion control.
4. After awarded the Contract, prior to commencement of construction activities, meet with the Engineer to discuss erosion control requirements and develop a mutual understanding relative to details of erosion control.

B. Related Work Specified Elsewhere:

1. Site work is specified in appropriate sections of this Division.

C. Design Criteria:

1. Conduct all construction in a manner and sequence that causes the least practical disturbance of the physical environment.
2. Stabilize disturbed earth surfaces in the shortest time and employ such temporary erosion control devices as may be necessary until such time as adequate soil stabilization has been achieved.

1.2 SUBMITTALS

- A. The Contractor shall furnish the Engineer, in writing, his work plan giving proposed locations for storage of topsoil and excavated material before beginning construction. A schedule of work shall accompany the work plan. Acceptance of this plan will not relieve the Contractor of the responsibility of completion of the work as specified.

1.3 QUALITY ASSURANCE

- A. All materials and methods of erosion control shall meet the guidelines established by the "New Hampshire Stormwater Manual, Volume 3 Erosion and Sediment Controls During Construction" issued by the New Hampshire Department of Environmental Services, herein referred to as "NH Stormwater Manual" and "Best Management Practices Manual: Utility Maintenance in and Adjacent to Wetlands and Waterbodies in New Hampshire" issued by the New Hampshire Department of Natural and Cultural Resources, herein referred to as "Utility BMP Manual".

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Baled Hay:
 - 1. At least 14" by 18" by 30" securely tied to form a firm bale, staked as necessary to hold the bale in place.
 - 2. Hay shall be free of weeds and invasive species.
- B. Sand Bags:
 - 1. Heavy cloth bags of approximately one cubic foot capacity filled with sand or gravel.
- C. Mulches:
 - 1. Loose hay, straw, wood chips, bark mulch, crushed stone, wood excelsior, or wood fiber cellulose.
 - 2. Type and use shall be as specified in the NH Stormwater Manual.
- D. Erosion Control Blanket:
 - 1. Mats made of biodegradable mulch such as straw, excelsior wood fiber, coconut fiber evenly distributed on or between manufactured netting. Netting composed of biodegradable natural fiber.
 - 2. Type and use shall be as specified in the NH Stormwater Manual and as indicated on the Plans.
- E. Permanent Seed:
 - 1. Refer to Specification 02480.
- F. Temporary Seeding:
 - 1. Use species appropriate for soil conditions and season as specified in the NH Stormwater Manual and subject to approval by the Engineer.
- G. Water:
 - 1. The Contractor shall provide water and equipment to control dust, as directed by the Engineer.
- H. Silt Fence:
 - 1. Silt Fence shall be one of the commercially available brands, meeting the following requirements:

<u>Geotextile Mechanical Property</u>	<u>Test Method</u>	<u>Minimum Permissible Value</u>
Grab Tensile Strength (both directions)	ASTM D-4632	124 pounds
Puncture Strength	ASTM D-4833	60 pounds
Apparent Opening Size	ASTM D-4751	#30
Flow Rate	ASTM D-4491	8 gal/min/ft ²

- I. Erosion Control Mix Berm
 - 1. Must consist primarily of organic material, separated at the point of generation, and may include shredded bark, stump grindings, composted bark, or

acceptable manufactured products. Wood and bark chips, ground construction debris or reprocessed wood products will not be acceptable as the organic component of the mix.

2. Minimum 12" high and 24" wide berm, meeting the following requirements and as specified by the NH Stormwater Manual:
 - a. Erosion control mix should contain a well-graded mixture of particle sizes and may contain rocks less than 4" in diameter.
 - b. Erosion control mix must be free of refuse, physical contaminants, and material toxic to plant growth.
 - c. Mix composition should meet the following standards:
 - i. The organic matter content should be between 25 and 65%, dry weight basis.
 - ii. Particle size by weight should be 100% passing a 3" screen, 90% to 100% passing a 1-inch screen, 70% to 100% passing a 0.75-inch screen, and a maximum of 30% to 75%, passing a 0.25-inch screen.
 - iii. The organic portion needs to be fibrous and elongated.
 - iv. The mix should not contain silts, clays or fine sands. o Soluble salts content should be < 4.0 mmhos/cm.
 - v. The pH should be between 5.0 and 8.0.

J. Filter sock

1. Minimum diameter of 12" woven or non-woven geosynthetic fabric filled with erosion control mix meeting the following requirements and as specified by the NH Stormwater Manual:
 - i. Organic matter content is between 25 and 65%, dry weight basis.
 - ii. Particle size by weight should be 100% passing a 3" screen, 90% to 100% passing a 1-inch screen, 70% to 100% passing a 0.75-inch screen, and a maximum of 30% to 75%, passing a 0.25-inch screen.
 - iii. The organic portion needs to be fibrous and elongated.
 - iv. The mix should not contain silts, clays or fine sands. o Soluble salts content should be < 4.0 mmhos/cm.
 - v. The pH should be between 5.0 and 8.0.

K. Timber mats

1. Mats constructed of 12" by 12" by 16' long timbers.

2.2 CONSTRUCTION REQUIREMENTS

A. Temporary Erosion Checks:

1. Temporary erosion checks shall be constructed in ditches and other locations as necessary.
2. Baled hay, sand bags or siltation fence may be used in an arrangement to fit local conditions.

B. Temporary Berms:

1. Temporary barriers shall be constructed along the toe of embankments when necessary to prevent erosion and sedimentation.

C. Temporary Seeding:

1. Areas to remain exposed for a time exceeding 3 weeks shall receive temporary seeding as indicated below:

<u>Season</u>	<u>Seed</u>	<u>Rate</u>
Summer (5/15 - 8/15)	Sudangrass	40 lbs/acre
Late Summer/Early Fall (8/15 - 9/15)	Oats	80 lbs/acre
Fall (9/15 - 10/1)	Annual Ryegrass	40 lbs/acre
Winter (10/1 - 4/1)	Winter Rye	112 lbs/acre
Spring (4/1 - 7/1)	Mulch w/Dormant Seed	80 lbs/acre*
	Oats	80 lbs/acre
	Annual Ryegrass	40 lbs/acre

* seed rate only

- D. Silt Fence shall be supported by posts and installed per the manufacturer's recommendations.
- E. Mulch All Areas Receiving Seeding:
Use either wood cellulose fiber mulch (750 lbs/acre); or straw mulch with chemical tack (as per manufacturers specifications). Wetting for small areas may be permitted. Biodegradable netting is recommended in areas to be exposed to drainage flow.
- F. Timber Mats:
 1. Install timber mats where indicated on the plans and as necessary to support construction access.
 2. Minimize impacts to wetlands during installation, use and removal.
 3. Remove timber mats as soon as possible after completion of project.
 4. Do not reuse mats that have been placed in areas of invasive species unless they have been cleaned and inspected.
 5. Refer to Utility BMP Manual for best practices.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Temporary Erosion Checks:
 1. Temporary erosion checks shall be constructed in ditches and at other locations designated by the Engineer. The Engineer may modify the Contractor's arrangement of silt fences, bales and bags to fit local conditions.
 2. Baled hay, silt fences, or sandbags, or some combination, may be used in other areas as necessary to inhibit soil erosion.
 3. Siltation fence shall be located and installed as shown on plans or as required to comply with all Federal, State and Local Regulations.
- B. Timber Mats
 1. Place mats so timbers are perpendicular to direction of traffic.
 2. Place mats so they do restrict the natural flow of water. Install culverts where shown on the plan.
 3. Place mats so they are not overtopped with water and equipment can remain in the dry.

3.2 MAINTENANCE:

- A. Erosion control features shall be installed prior to excavation wherever appropriate. Temporary erosion control features shall remain in place and shall be maintained until a satisfactory growth of grass is established. The Contractor shall be responsible for maintaining erosion control features throughout the life of the construction contract. Maintenance will include periodic inspections by the Owner or Engineer for effectiveness of location, installation and condition with corrective action taken by the Contractor as appropriate.

3.3 REMOVING AND DISPOSING OF MATERIALS:

- A. When no longer needed, material and devices for temporary erosion control shall be removed and disposed of as approved by the Engineer.
 - 1. When removed, such devices may be reused in other locations provided they are in good condition and suitable to perform the erosion control for which they are intended.
 - 2. When dispersed over adjacent areas, the material shall be scattered to the extent that it causes no unsightly conditions nor creates future maintenance problems.

3.4 WATER QUALITY MONITORING

- A. Turbidity monitoring shall be required while work is being performed in tidal waters and if surface erosion controls are not performing adequately.
- B. The turbidity monitoring shall be performed in accordance with the conditions of approved environmental permits and as follows:
 - 1. On a daily basis, prior to starting in-water activities, measure turbidity at each of the designated monitoring locations to establish pre-construction turbidity levels.
 - 2. Measure upcurrent and downcurrent turbidity at four-hour intervals at each monitoring location during in-water work.
 - 3. Average the three turbidity measurements at each location.
 - 4. If the average turbidity readings during in-water work is greater than 10 NTUs higher than the average pre-construction turbidity at that location for that day, modify work procedures and inspect, repair, or implement best management practices (BMPs).
 - 5. If at the next 4-hour reading, average turbidity readings are greater than 10 NTUs higher than the pre-construction average level, stop all in-water work and repair or implement additional BMPs. Resume in-water only after the reading average at the monitoring locations are less the 5 NTU above the pre-construction average.
 - 6. If in-water activities are not occurring on one end of the project, monitoring will not be required at the monitoring locations on that end of the project.
- C. The Contractor shall submit daily turbidity monitoring reports to the Engineer with the following information:
 - 1. Date
 - 2. Time
 - 3. Water depth
 - 4. Tide stage
 - 5. Weather conditions

6. Pre-construction turbidity readings at each monitoring location
 7. Turbidity measurements taken at the monitoring locations during in-water activities
 8. If the average reading at a station exceeded 10 NTUs above the pre-construction reading at the station, the actions taken to investigate and remediate the reason for the turbidity exceedance.
- D. Frequent turbidity exceedances may require an assessment of construction and monitoring practices.

END OF SECTION

SECTION 02271RIPRAP AND STONE DITCH PROTECTIONPART 1 - GENERAL1.1 DESCRIPTION

- A. This work consists of furnishing all plant, labor, equipment, and materials and performing all work necessary to place a protective covering of erosion-resistant material on the slopes of embankments, spillways, streambanks, slopes of channels, or as directed by the Engineer. The work shall be done in accordance with these Specifications and in conformity with the lines and grades shown on the Drawings or established by the Engineer.
- B. Types of riprap included in this specification:
 - 1. Riprap - Riprap consists of stone dumped in place on a prepared slope of either a filter blanket or a filter fabric backing to form a well-graded mass with a minimum of voids.
 - 2. Filter Blanket - A filter blanket consists of one or more layers of graded material placed on the bank before placing the riprap in order to prevent the bank material from passing through the riprap protection. The thickness and gradation of filter blanket will be shown on the plans.
 - 3. Filter Fabric Backing - A filter fabric backing consists of a filter fabric overlain by a layer of coarse aggregate placed on the bank before placing the riprap to prevent the bank material from passing through the riprap protection. Filter fabric backing shall be used in lieu of a filter blanket where specifically called for on the plans or where approved by the Engineer.

1.2 SUBMITTALS

- A. Submittals shall be in accordance with 01340 – Submittals, and the General Conditions of the Construction Contract.
- B. Submit test results (including gradation analysis) and source location for all riprap material to be used at least 10 working days prior to its use on the site. Contractor shall identify and provide access to borrow sites.

PART 2 - PRODUCTS2.1 MATERIALS

- A. Definition of the materials:
 - 1. Riprap:
 - a. Stone used for riprap shall be hard, durable, angular in shape; resistant to weathering and to water action; free from overburden, spoil, shale, and organic material; and shall meet the gradation requirements for the class specified. Neither breadth nor thickness of a single stone should be less than one-third its length. Rounded stone or boulders shall not be accepted without written permission of the Engineer. Broken concrete may be substituted for stone with written authorization of the Engineer. Shale and

stone with shale seams are not acceptable. The minimum weight of the stone shall be 155 pounds per cubic foot as computed by multiplying the specific gravity (bulk-saturated-surface-dry basis, AASHTO Test T 85) times 62.3 pounds per cubic foot.

- b. Each load of riprap shall be reasonably well graded from the smallest to the maximum size specified. Stones smaller than the specified 10 percent size and spalls shall not be permitted in an amount exceeding 10 percent by weight of each load.
- 2. Filter Blanket - The filter blanket shall consist of one or more layers of screened gravel of the thickness as shown on the plans. The gradation of materials in the filter blanket shall be as shown on the Drawings. All material comprising the filter blanket shall be composed of tough, durable particles, reasonably free from thin, flat, and elongated pieces, and shall contain no organic matter nor soft, friable particles in quantities in excess of those approved by the Engineer.
- 3. Filter Fabric Backing:
 - a. Coarse Aggregate:
 - i. The coarse aggregate shall be composed of tough, durable particles, reasonably free from thin, flat, and elongated pieces, and shall contain no organic matter nor soft, friable particles in quantities in excess of those approved by the Engineer.
 - b. Filter Fabric:
 - i. The filter fabric shall be formed in widths of not less than six (6) feet.
 - ii. A competent laboratory must be maintained by the producer of the fabric at the point of manufacture to ensure quality control. During all periods of shipment and storage, the fabric shall be maintained, wrapped in a heavy-duty protective covering to protect the fabric from direct sunlight, ultraviolet rays, temperatures greater than 140°F, mud, dirt, dust, and debris.
 - iii. The vendor shall furnish certified test reports with each shipment of material attesting that the fabric meets the requirements of this Specification.

TABLE 1
REQUIREMENTS FOR FILTER FABRIC

<u>Test</u>	<u>Method</u>	<u>Requirements</u>
Breaking Load & Elongation	ASTM D5034, D5035, Grab Test Method, constant rate of travel 12" per minute.	Tensile Strength: 200 lbs. any direction.
Weight Change in Water	CRD-C 575 or 6631 in Fed. Std.	Less than 1%
Bursting Strength	ASTM D751, using Diaphragm Bursting Tester	400 lbs. per square inch
Puncture Strength	ASTM D751, modified	120 lbs.
Seam Breaking Strength	ASTM D 1683, 1" square jaws, constant rate of traverse 12" per min.	180 lbs.
Abrasion Resistance Strength:*	ASTM D1175, modified	Tensile 55 lbs.
Percent of Open Area		Not less than 5%
Equivalent Opening Size		U.S. Standard Sieve No. 70
Permeability		0.02 to 0.3 cm/sec.
Specific Gravity Weight		0.95 Approximately .05 lb/sq/ft.
Seam sewn with polypropylene thread at point of manufacture		
Packaged in burlap		

* Tensile strength determined by Breaking Load & Elongation by the method stated in the first listing of Table 1.

B. Gradation of Coarse Aggregate for Filter Fabric Backing:

<u>Sieve Size</u>	<u>% Passing By Weight</u>
2-1/2"	100
2"	85 - 100
1"	35 - 70
1/2"	10 - 30
No. 4	0 - 5

C. Gradation of Riprap Stone:

<u>Riprap Class and Size</u>		<u>Min. and Max. Allowable Particle Size (in)</u>		<u>Min. and Max. Allowable Particle Weight (lb)</u>	
		d ₅₀		W ₅₀	
Class	Nominal Size (in)	Min.	Max.	Min.	Max.
I	6	5.7	6.9	15	27
III	12	11.5	14.0	120	210
V	18	17	20.5	410	720

PART 3 - EXECUTION3.1 CONSTRUCTION DETAILS

A. Slopes to be protected by riprap shall be free of brush, trees, stumps, and other objectionable material and be dressed to a smooth surface. All soft or spongy material shall be removed to the depth shown on the Drawings or as directed by the Engineer and replaced with approved material. Filled areas will be compacted thoroughly. A toe trench as shown on the Drawings shall be dug and maintained until the riprap is placed.

1. Riprap

- a. Stone for riprap shall be placed on the prepared slope or area in a manner which will produce a reasonably well-graded mass of stone with the minimum practicable percentage of voids. The entire mass of stone shall be placed in conformance with the lines, grades, and thicknesses shown on the Drawings. Riprap shall be placed to its full course thickness in one operation and in such a manner as to avoid displacing the underlying material. Placing of riprap in layers, or by dumping into chutes, or by similar methods likely to cause segregation will not be permitted.
- b. The larger stones shall be well distributed, and the entire mass of stone shall conform to the gradation specified on the Drawings. All material going into riprap protection shall be so placed and distributed so that there will be no large accumulations of either the larger or smaller sizes of stone.
- c. It is the intent of these Specifications to produce a compact riprap protection in which all sizes of material are placed in their proper proportions. Hand placing or rearranging of individual stones by

- mechanical equipment may be required to the extent necessary to secure the results specified.
- d. Unless otherwise authorized by the Engineer, the riprap protection shall be placed in conjunction with the construction of the embankment with only sufficient lag in construction of the riprap protection as may be necessary to allow for proper construction of the portion of the embankment protected and to prevent mixture of embankment and riprap. The riprap protection shall be maintained until accepted, and any material displaced by any cause shall be replaced.
 - e. Riprap stone shall not be dropped from a height greater than one foot onto the filter blanket.
2. Filter Blanket:
- a. A filter blanket shall be placed on the prepared slope or area to the full specified thickness using methods which will not cause segregation of particle sizes within the bedding. The surface of the finished layer should be reasonably even and free from mounds or windrows.
3. Filter Fabric Backing:
- a. A filter fabric shall be placed in the manner and at the locations shown in the Drawings or as directed by the Engineer. At the time of installation, fabric shall be rejected if it has defects, rips, holes, flaws, deterioration, or damage incurred during manufacture, transportation or storage. The fabric shall be placed with the long dimension parallel to the centerline of the channel or shoreline unless otherwise directed by the Engineer, and shall be laid smooth and free of tension, stress, folds, wrinkles, or creases. The strips shall be placed to provide a minimum width of 36 inches of overlap for each joint. Overlap joints and seams shall be measured as a single layer of cloth. Securing pins with washers shall be inserted through both strips of overlapped cloth at not greater than the following intervals along a line through the midpoint of the overlap.

<u>Pin Spacing</u>	<u>Slope</u>
2 feet	Steeper than 3:1
3 feet	3:1 to 4:1
5 feet	Flatter than 4:1

- The fabric shall be turned down and buried two (2) feet at all exterior limits.
- b. Additional pins regardless of location shall be installed as necessary to prevent any slippage of the filter fabric. The fabric shall be placed so that the upstream strip of fabric will overlap the downstream strip. Should the Engineer direct that the fabric be placed with the long dimension perpendicular to the centerline of the channel or shoreline, the lower strip of fabric shall overlap the next higher strip. Each securing pin shall be pushed through the fabric until the washer bears against the fabric and secures it firmly to the foundation. The fabric shall be protected at all times during construction from contamination by surface runoff and any

fabric so contaminated shall be removed and replaced with uncontaminated fabric. Any damage to the fabric during its installation or during placement of riprap shall be replaced by the Contractor. The work shall be scheduled so that the filter blanket shall be covered with riprap as soon as possible following filter blanket placement. Any damage to the filter material during placement of riprap shall be corrected prior to proceeding with the work.

- c. Securing pins for anchoring filter fabric shall be 3/16-inch steel bars, pointed at one end and fabricated with a head to retain a steel washer having an outside diameter of not less than 1.5 inches. The length of the pin shall not be less than 18 inches.
- d. A layer of coarse aggregate shall be placed on the filter fabric to the full specified thickness using methods which will not cause segregation of particle sizes. The surface of the finished layer shall be reasonably even and free from mounds or windrows.

END OF SECTION

SECTION 02401DEWATERINGPART 1 - GENERAL1.1 DESCRIPTION

A. Work Included:

1. Furnish, operate, and maintain, as incidental to the project, dewatering equipment for the control, collection and disposal of ground and surface water where necessary to complete the work.

B. Related Work Specified Elsewhere:

1. Section 01340 Submittals
2. Section 02200 Earthwork

PART 2 - PRODUCTS

Not Applicable

PART 3 - EXECUTION3.1 PERFORMANCE

A. General:

1. Keep work areas dewatered until the structures, pipes, and appurtenances to be built there have been completed to such an extent that they will not be damaged by water.
2. Thoroughly brace or otherwise protect against flotation all pipelines and structures which are not stable.

B. Disposal of Water:

1. Dispose of water pumped or drained from the construction site in a suitable manner to avoid public nuisance, injury to public health, damage to public and private property, and damage to the work completed or in progress.
2. Provide suitable temporary channels for water that may flow along or across the construction site.
3. For dewatering of brackish water, all dewatering activities will be performed so as not to discharge brackish water to upland areas or adversely impact shore vegetation.

C. Damage:

1. Any damage resulting from the dewatering operations, or the failure of the Contractor to maintain the work in a suitably dry condition shall be repaired by the Contractor at no additional cost to the Owner.

D. Temporary Underdrains:

1. When necessary, temporary underdrains may be placed in excavations.
2. Underdrain pipe shall be perforated, concrete, corrugated metal or P.V.C. pipe.
3. Entirely surround the underdrain and fill the space between the underdrain and the pipe or structure with underdrain material.

- E. Excavation Sump Pumping:
 - 1. When necessary and where appropriate to the geotechnical conditions encountered, excavations may be over excavated 6 to 12 inches and filled with screened stone to allow sump pumping of groundwater.
 - 2. The system shall be installed with suitable screens and filters so that pumping of fines does not occur.
- F. Well and Wellpoint System:
 - 1. If necessary, dewater the excavations and trenches with an efficient well or wellpoint system to drain the soil and prevent saturated soil from flowing into the excavated wells and area.
 - 2. Wellpoint and well system shall be of the type designed for dewatering work and shall be installed with suitable screens and filters so that pumping of fines does not occur.
 - 3. Pumping units shall be capable of maintaining sufficient suction to handle large volumes of air and water at the same time.

END OF SECTION

SECTION 02441MULCHPART 1 - GENERAL1.1 DESCRIPTION

A. Work Included:

1. Furnish all labor, materials, equipment and transportation required to furnish and spread mulch of the types and in the quantities indicated on the plans and as specified under this item.

PART 2 - PRODUCTS2.1 MATERIALS

A. Hay or Straw Mulch:

1. Shall consist of long fibered hay or straw, reasonably free of noxious weeds and other desirable material.
2. No material shall be used which is so wet, decayed or compacted as to inhibit even and uniform spreading. No chopped hay, grass clippings or other short fibered material shall be used unless directed by the Engineer.

B. Cellulose Fiber Mulch:

1. Shall consist of elongated virgin wood fibers capable of producing a strong yellow-brown reaction with Graff C stain for the presence of lignin in accordance with Tappi test T401 OS-74. The ash content shall not exceed 2.0%.
2. The material shall be non-toxic to plants and animals on contact and shall contain a green color sufficient to provide a definite contrast with the ground surface.
3. It shall be supplied in uniform packages not exceeding 100 pounds each and marked to show the air-dried weight for tank mixing purposes.

C. Wood Chips:

1. Shall be obtained from green wood and shall average 1/8 inch in thickness with 50 percent having an area of not less than 1 square inch nor more than 8 square inches.
2. Not more than a total of 2 percent by volume shall consist of sawdust, shavings and leaves.
3. The mulch shall contain no foreign material injurious to plant growth.
4. Wood chips made from badly weather or decayed material will not be accepted.
5. Wood chips which have been stored long enough to become decayed will not be accepted unless approved by Engineer.

D. Bark Mulch:

1. Shall consist of soft wood bark fragments of such size and texture as to successfully resist washing or blowing under normal conditions, but capable of being easily and uniformly spread around the plants.
2. No large peel strips and decayed material will be permitted.

- E. Stone Mulch:
 - 1. Shall be clean native stone, except limestone, consisting of stone particles passing a 3/4 inch screen, but retained on a 1/4 inch screen.
 - 2. This material shall be free from dust, dirt or other foreign matter.
- F. Mulch Binder:
 - 1. Shall be emulsified asphalt of a type and trade acceptable to the Engineer.
 - 2. May be diluted with water to ensure even distribution.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Hay or Straw Mulch:
 - 1. Shall be spread evenly and uniformly over the designated areas.
 - 2. Unless otherwise directed by the Engineer, hay or straw mulch shall be applied at the rate of one to two tons per acre.
 - 3. Unless otherwise authorized, the mulch shall be anchored in place by uniformly applying an approved mulch binder.
- B. Cellulose Fiber Mulch:
 - 1. Shall be applied as a water-borne slurry.
 - 2. Shall be applied at a rate of not less than 60 pounds of mulch material per 1000 square foot unit of area.
- C. Wood Chip or Bark Mulch:
 - 1. Shall be placed to cover the slope with a three-inch-deep blanket unless otherwise directed.
- D. Stone Mulch:
 - 1. Shall be placed as shown on the Drawings or directed by the Engineer.

END OF SECTION

SECTION 02480LANDSCAPINGPART 1 - GENERAL1.1 DESCRIPTIONA. Work Included:

1. Perform the following items of work as required to complete the work of this section as shown on the Drawings and as specified hereunder:
 - a. Spread stockpiled topsoil and furnish and spread any additional topsoil, required to meet the requirements of this section.
 - b. Furnish and sow grass seed/or sod in all areas within the work area to the extent indicated on the Drawings, and in existing grass areas which have been damaged or disturbed by the work of this Contract.
 - c. Furnish and install plant materials in all areas within the work area as indicated on the Drawings.
 - d. Provide maintenance services as specified hereunder.
- B. Examine all other sections of the Specifications and all Drawings for the relationship of the work under this section and the work of other trades. Cooperate with all trades in performing the work under this section.

1.2 REQUIREMENTS SPECIFIED ELSEWHERE

- A. Additional Requirements are specified elsewhere including, but not necessarily limited to, General Conditions, Supplementary Conditions, and Division 1.

1.3 SUBMITTALS AND TESTINGA. Seed:

1. Furnish the Engineer with duplicate signed copies of a statement from the vendor, certifying that each container of seed delivered to the project site is fully labeled in accordance with the Federal Seed Act and is at least equal to the specification requirements.
2. This certification shall appear in, or with, all copies of invoices for the seed.
3. Each lot of seed shall be subject to sampling and testing, at the discretion of the Engineer, in accordance with the latest rules and regulations under the Federal Seed Act.

B. Topsoil:

1. Inform the Engineer, within 30 days after the award of the Contract, of the sources from which the topsoil is to be furnished. It is the intent of this section that all topsoil which can be recovered from the site shall be used. Furnish additional topsoil as required.
2. Obtain representative soil samples, taken from several locations in the area under consideration for topsoil removal, to the full stripping depth.
3. Have soil samples tested by an independent soils testing laboratory, approved by the Engineer, at the Contractor's expense.

4. Have soil samples tested for physical properties and pH (or lime requirement), for organic matter, available phosphoric acid, and available potash, in accordance with standard practices of soil testing for agricultural use.
 5. Approval, by the Engineer, to use topsoil for use in the work will be dependent upon the results of the soils tests.
- C. Lime and Fertilizer:
1. Furnish the Engineer with duplicate copies of invoices for all lime and fertilizer used on the project showing the total minimum carbonates and minimum percentages of the material furnished that pass the 90 and 20 mesh sieves and the grade furnished.
 2. Each lot of lime and fertilizer shall be subject to sampling and testing at the discretion of the Engineer.
 3. Sampling and testing shall be in accordance with the official methods of the Association of Official Agricultural Chemists.
 4. Upon completion of the project, a final check may be made comparing the total quantities of fertilizer and lime used to the total area seeded. If the minimum rates of application have not been met, the Engineer may require the Contractor to distribute additional quantities of these materials to meet the minimum rates.

1.4 DELIVERY, STORAGE AND HANDLING

- A. Seed:
1. Furnish all seed in sealed standard containers, unless exception is granted in writing by the Engineer.
 2. Containers shall be labeled in accordance with the United States Department of Agriculture's rules and regulations under the Federal Seed Act in effect at the time of purchase.
- B. Fertilizer:
1. Furnish all fertilizer in unopened original containers.
 2. Containers shall be labeled with the manufacturer's statement of analysis.

1.5 JOB CONDITIONS

- A. Topsoil:
1. Do not place or spread topsoil when the subgrade is frozen, excessively wet or dry, or in any condition otherwise detrimental, in the opinion of the Engineer, to the proposed planting or to proper grading.
- B. Seeding and Planting:
1. Work Seasons - Perform seeding and planting work only between the dates of 1 May to 20 June and 15 August to 1 October, except as otherwise directed in writing by the Engineer.
 2. Weather Conditions:
 - a. Do not perform seeding work when weather conditions are such that beneficial results are not likely to be obtained, such as drought, excessive moisture, or high winds.
 - b. Stop the seeding work when, in the opinion of the Engineer, weather conditions are not favorable.

- c. Resume the work only when, in the opinion of the Engineer, conditions become favorable, or when approved alternate or corrective measures and procedures are placed into effect.

PART 2 - PRODUCTS

2.1 MATERIALS FOR GRADING AND SEEDING

A. Topsoil:

1. Supplemental topsoil shall only be brought to the site with the express permission of the Owner. Prior approval is required.
2. Fertile, friable, natural topsoil typical of the locality, without admixture of subsoil, refuse or other foreign materials and obtained from a well-drained site. Mixture of sand, silt, and clay particles in equal proportions.
3. Free of stumps, roots, heavy or stiff clay, stones larger than 1-inch in diameter, lumps, coarse sand, weeds, sticks, brush or other deleterious matter.
4. Not less than 4 percent nor more than 20 percent organic matter.
5. Topsoil depth shall be 4-inches, unless otherwise indicated.

B. Fertilizer:

1. Fertilizer shall be used to counteract soil deficiencies as indicated by the soil analysis and as approved by the Engineer. It should be a complete fertilizer, a standard product complying with the state and federal fertilizer laws, part of the elements of which are derived from organic sources, containing the following percentages by weight:

Nitrogen	10N - Minimum 75 percent organic
Phosphorus	6 P -
Potash	4 K -

The fertilizer shall be delivered to the site in the original unopened containers bearing the manufacturer's guaranteed statement of analysis, or a manufacturer's certificate of compliance covering analysis shall be furnished to the Engineer. The fertilizer shall be spread at the rate of 17 to 20 lbs/1000 sq-ft.

C. Lime:

1. Provide lime which is ground limestone containing not less than 85 percent of total carbonate and of such fineness that 90 percent will pass a No. 20 sieve and 50 percent will pass a No. 100 sieve.
2. Coarser materials will be acceptable provided the specified rates of application are increased proportionately on the basis of quantities passing a No. 100 sieve. No additional payment will be made to the Contractor for the increased quantity.

D. Soil Enrichers:

1. They shall be one of the following materials:
 - a. Peat Moss - Finely shredded and consisting of not less than 90 percent organic matter.
 - b. Sawdust - rotten.
2. They shall be natural and suited to horticultural use. They shall not contain lumps, roots or other foreign matter over two inches in diameter. They shall be

free from noxious weeds, seeds and other elements harmful to lawns. They shall be subject to inspection approval by the Engineer at the source and upon delivery and shall contain not more than 35 percent moisture by weight at the time of incorporation into the soil.

E. Mulch for Hydro Seeding:

1. Mulch material shall meet the following requirements:

- a. Hay or straw - Hay or straw mulch shall consist of long fibered hay or straw, reasonably free from noxious weeds or other undesirable material. No material shall be used which is so wet, decayed, or compacted as to inhibit even and uniform spreading. No chopped hay, grass clippings or other short fibered material shall be used unless directed.
- b. Wood cellulose fiber - Wood cellulose fiber mulch shall consist of natural wood cellulose fiber containing no materials which will inhibit seed germination or plant growth. Sufficient non-toxic water soluble green dye shall be added to provide a definite color contrast to the ground surface to aid in even distribution. Wood fiber mulch shall be supplied in uniform packages not exceeding 100 pounds each. Each package shall be marked to show the air dry weight.

F. Mulch Binder for Hydroseeding:

1. Material for mulch binder shall be emulsified asphalt.

- a. Emulsified asphalt mulch binder shall be a type acceptable to the Engineer and may be diluted with water to assure even distribution.

G. Grass Seed Mixture

1. Fresh, clean, new crop seed. Seed may be mixed by an approved method on the site, or may be mixed by the dealer. If the seed is mixed on the site, each variety shall be delivered in the original containers which shall bear the dealer's guaranteed statement of the composition of the mixture and the percentage of purity of each variety. The Dealers Guarantee Statement shall be delivered to the Engineer.
2. Grass seed shall be composed of the following varieties which shall be mixed in the proportions and shall test to 80 percent minimum purity, and 80 percent germination.

Percent Proportion by Weight:

a. Lawn Areas

- i. Kentucky 31 Fescue 25 percent
- ii. Chewing Fescue 15 percent
- iii. Creeping Red Fescue 15 percent
- iv. Pennfine Perennial Rye 25 percent
- v. Lynn Perennial Rye 10 percent
- vi. Common Annual Rye 10 percent
- vii. No weed seeds allowed

b. Slope Restoration

- i. New England Coastal Salt Tolerant Grass Mix by New England Wetland Plants or approved equal.

c. Wagon Hill Farm

- i. Northeast Native Wildflower and Grass Mix by Ernst Seeds:

20 percent Virginia Wildrye, PA Ecotype
20 percent Little Bluestem, Fort Indiantown Gap, PA Ecotype
15.9 percent Sideoats Grama, Butte
10 percent Purple Coneflower
4 percent Partridge Pea, PA Ecotype
4 percent Lanceleaf Coreopsis
4 percent Blackeyed Susan
2.7 percent Butterfly Milkweed, PA Ecotype
2.7 percent Oxeye Sunflower, PA Ecotype
2.1 percent Golden Alexanders, PA Ecotype
1.9 percent Tall White Beardtongue, PA Ecotype
1.7 percent Marsh Blazing Star
1.3 percent Purple Lovegrass, RI Ecotype
1.3 percent Browneyed Susan, WV Ecotype
1.1 percent Roundhead Lespedeza, RI Ecotype
1.0 percent Blue False Indigo, Southern WV Ecotype
0.9 percent Narrowleaf Mountainmint
0.8 percent Slender Lespedeza, VA Ecotype
0.8 percent Wild Senna, VA & WV Ecotype
0.5 percent Smooth Blue Aster, NY Ecotype
0.5 percent New England Aster, PA Ecotype
0.5 percent Aromatic Aster, PA Ecotype
0.5 percent Wild Bergamot, Fort Indiantown Gap-PA Ecotype
0.3 percent Heath Aster, PA Ecotype
0.3 percent Maryland Senna
0.3 percent White Goldenrod, PA Ecotype
0.3 percent Gray Goldenrod, PA Ecotype
0.3 percent Ohio Spiderwort, PA Ecotype
0.1 percent Sundrops
0.1 percent Hairy Beardtongue
0.1 percent Licorice Scented Goldenrod, PA Ecotype

H. Sod:

1. Preferable two year growth, at least 85 percent weed-free, solid landscaping sod composed of perennial fescues, Kentucky bluegrass's. Submit one 12 by 12 inch piece of sod, with source location, for approval of the Engineer, before ordering sod for the work.

2.2 MATERIALS FOR PLANTING

A. Water:

1. The Contractor shall arrange and pay for water required for the planting. Water shall be clean and suitable for domestic consumption.

B. Manure:

1. Manure shall be well rotted, unleached, horse or cow manure or a combination of both. It shall be free from any chemicals used to hasten decomposition artificially, or any other injurious substance.

2. Manure shall be at least nine months old and not more than two years old, free from sawdust, hay, tanbark or wood shavings, or refuse of any kind. Manure shall consist of not more than 25 percent straw or other acceptable material.
- C. Stakes shall be white cedar or approved equal, of size and length as shown on the Drawings.
- D. Hose for guying shall be new black or green two-ply fiber garden hose, not less than 1/2 inch inside diameter. Seconds rejected by the factory are acceptable.
- E. Burlap for wrapping shall be first quality burlap at least eight ounces in weight and six inches in width.
- F. Wire for tree guys shall be galvanized annealed steel wire, No. 14 gauge, as detailed.
- G. Tree paint shall be waterproof, adhesive and elastic, free from kerosene, coal tar creosote or any other material injurious to the life of the trees. Tree paint shall contain an antiseptic.
- H. Pine bark mulch shall be clean, shredded, free of weeds, seeds, insects and extraneous materials.
- I. Plant Materials:
 1. Plant materials shall conform to American Standard for Nursery Stock (April 15, 1951), sponsored by the American Association of Nurserymen, Inc., Standard Plant Names (1942) shall be the authority for plant names. Plant materials shall be of standard quality true to name and type and first class representatives of their species or variety.
 2. All plants shall conform to the varieties specified in the Plant List. No substitutions will be permitted unless approved in writing by the Engineer. Each bundle of plants and all separate plants shall be properly identified by name on legible, waterproof labels, securely attached thereto before delivery to the site.
 3. Plant materials shall be free of damage as a result of handling and transportation.
 4. All plant material shall be certified by the supplier to be free of disease and infestation.
 5. All plants shall be subject to approval at their source prior to shipment. The Contractor shall accompany the Engineer to inspect the materials, and shall request such inspection at least one week in advance.
 6. All plants shall be typical of their species or variety and shall have a normal habit of growth. They shall be first quality, sound, healthy, vigorous, well branched and densely foliated. They shall be free of disease, insect pests, eggs or larvae, and shall have healthy, well furnished root systems. Plants lacking compactness or proper proportions, and plants injured by too close planting in nursery rows will not be accepted.
 7. All plants shall conform to the measurements specified in the Plant List. Measurements specified shall be the minimum acceptable for each variety. Plants that meet these requirements specified, but do not possess a normal balance between height and spread, will not be accepted. Plants shall not be pruned prior to delivery.
 8. All plants and all tree trunks shall be measured when the branches are in their normal position. Dimensions noted for height and spread refer to the main body

of the plant, and not from branch tip to branch tip. Height is defined as the approximate dimension from ground to top of last year's growth. Top spread is defined as the approximate spread to top or principal width. The height of tree trunks need not be specified if the required height can be obtained by pruning the lower branches without leaving unsightly scars or otherwise damaging the trunk. Shade trees shall be free of branches up to five feet, with a single leader, well branched and reasonably straight stems. No trees which have had their leaders cut, or are so damaged that cutting is necessary, will be accepted. Trees which had their tops cut off some years previous will only be acceptable if the scar has not decayed. No trees with cut off tops will be accepted unless corrective surgery has been performed so as to effect a complete healing of the stem.

9. Caliper of trees shall be measured one foot above ground.
10. Plants larger in size than those specified in the Plant List may be provided if approved by the Owner or the Engineer, but the use of larger plants shall not increase the cost of the Contract. If the use of larger plants is approved, the ball of earth or spread of roots shall be increased in proportion to the size of the plant. If plants required to be bare rooted are furnished in sizes greater than specified, they shall be balled and burlapped.
11. All trees shall have straight trunks with single leader intact. There shall be no abrasion of the bark and no fresh cuts of limbs over 1-1/4 inch which have not completely callused over.
12. All plants shall be grown in nurseries and cultivated, sprayed, pruned, and fertilized annually in accordance with good horticultural practice. All plants shall have been grown under climatic conditions similar to those in the locality of the project, or shall have been acclimated to the conditions of the locality for at least two years.
13. All plants shall be freshly dug; neither heeled in plants nor plants from cold storage will be accepted. All plants shall have been transplanted or root pruned at least once in the past three years. Balled and burlapped plants shall come from soil which will hold a firm ball.
14. Plants marked "B&B" in the Plant List shall be adequately balled and burlapped with firm natural balls of soil, of diameter of sufficient depth to include all the roots. No plant required to be balled and burlapped shall be accepted if the ball is cracked or broken either before or during the process of planting, or when burlap, stakes, ropes or platform required in this connection have been removed.
15. All plants shall be handled so that the roots are adequately protected at all times. During shipment all plants shall be properly protected by a tarpaulin or other suitable covering.
16. No plants shall be so bound with rope or wire at any time so as to damage the bark, break branches, or destroy its natural shape. All balled and burlapped plants which cannot be planted immediately on delivery shall be set on the ground and well protected with soil or other acceptable material including watering. Until planted, all material shall be properly maintained.

2.3 STORAGE OF MATERIAL

- A. Materials such as fertilizers, ground limestone, etc. shall be stored in weatherproof

storage areas and in such a manner that their effectiveness will not be impaired.

PART 3 - EXECUTION

3.1 PREPARATION

A. Equipment:

1. Provide all equipment necessary for the proper preparation of the ground surface and for the handling and placing of all required materials.
2. Demonstrate to the Engineer that the equipment will apply materials at the specified rates.

B. Subsoil Preparation:

1. Upon removal of the access road gravel, geotextiles, and materials from the construction staging areas, all impacted upland areas shall be tilled and harrowed prior to planting.
2. Trim and rake the topsoil to true grades free from unsightly variations, humps, ridges or depressions.
3. If imported topsoil is needed, the subgrade shall be raked by approved means. Remove all stones greater than four inches and all debris or rubbish to a depth of six inches. Such materials shall be removed from the site.

C. Screening:

1. All topsoil shall be screened clear of all stones greater than one inch, sticks, plants, and all other foreign materials before being spread.
2. During the screening of topsoil, commercial fertilizers and lime as required by the soil analysis shall be mixed with the topsoil so that they are evenly distributed throughout the screened topsoil.
3. At the completion of this operation, topsoil is referred to as improved topsoil for the purpose of this specification and the Drawings.

3.2 SEED AND SOD BED PREPARATION

- A. Spread improved topsoil uniformly over subgrade and all areas where the existing grade has been changed and areas disturbed by construction operations except for those areas indicated on the site plans to be paved. No subsoil, topsoil, or improved topsoil shall be handled in any way when in a wet or frozen condition.
- B. Fine rake surface to receive seed or sod.
- C. After natural settlement and a light rolling, the completed work shall conform to the lines, grades, pitches, and spot elevations shown on the plans.
- D. Seeding may be done immediately thereafter, provided the seed bed has remained in a good friable condition and has not become wet.

3.3 SEASON

- A. Do all seeding work within the dates herein specified.
- B. If special conditions exist which may warrant a variance in the above dates, submit a written request to the Engineer stating the conditions and proposed variance. Permission for the variance will be given if, in the opinion of the Engineer, the variance is warranted.
- C. If seeding is authorized between May 15 and August 15, annual rye shall be sown separately in addition to the specified seed mix. Sow at the rate of six to eight pounds

per 1000 square feet.

3.4 SEEDING AND SODDING

- A. Immediately before seeding and sodding, the ground shall be restored as necessary to a loose friable condition by discing or other approved method to a depth of not less than two inches. The surface shall be cleared of all debris and of all stones one inch or more in diameter.
- B. Seed all areas to be seeded with the specified grass seed, sowing evenly with an approved mechanical seeder at the rate specified in the seed mix schedule. Sow one half the seed in one direction and the other half at right angles to the first seeding. Cultipacker or approved similar equipment may be used to cover the seed and to firm the seed bed in one operation. In areas inaccessible to Cultipacker, the seeded ground shall be lightly raked and rolled in two directions with a water ballast roller. Extreme care shall be taken during seeding and raking to insure that no change shall occur in the finished grades and that the seed is not raked from one spot to another.
- C. The hydraulic spray method of sowing seed may be used where approved by the Engineer. This work shall be done with an approved machine operated by a competent crew. Seed and fertilizing materials shall be mixed with water in the tank of the machine and kept thoroughly agitated so the materials are uniformly mixed and suspended in the water at all times during operation. The spraying equipment must be designed and operated to distribute seed and fertilizing materials evenly and uniformly on the designated areas at the required rates. If the Engineer finds the application uneven or otherwise unsatisfactory, the Engineer may require the hydraulic spray method to be abandoned and the balance of the work done as specified herein. Seed must be lightly raked into the surface of the soil unless seeding is to be followed within 24 hours by mulching.
 - 1. Applying Mulch - At the option of the Contractor, any of the following types of mulch material may be applied.
 - a. Hay or straw mulch shall be spread evenly and uniformly over the designated areas. Unless other directed, mulch shall be applied to a thickness of 1". Too heavy application of mulch shall be avoided and lumps and thick spots shall be thinned. Unless otherwise authorized, the mulch shall be anchored in place by uniformly applying an asphalt mulch binder. Application of a concentrated stream of mulch binder will not be allowed. Asphalt mulch binder may be omitted when authorized by the Engineer and when there is a danger of the asphalt contaminating the surface of nearby structures, houses, vehicles, or other objects. Other methods of anchoring mulch may be used subject to the approval of the Engineer.
 - b. Wood fiber mulch shall be applied as a water-borne slurry. The wood fiber and water shall be thoroughly mixed and sprayed on the area to be covered so as to form a uniform mat of mulch at the rate of not less than 30 pounds per 1,000 square feet unit of area. Wood fiber mulch may be mixed with the proper quantities of seed, fertilizer and lime as required in this section, or may be applied separately after seeding has been carried out. In the latter case, it must be applied within 24 hours after seeding.

2. Maintenance - The Contractor shall maintain the mulch by repairing any damaged mulch and by correcting any shifting of the mulch due to wind, water or other causes, until an acceptable growth of grass has been achieved, regardless of the acceptance status of the seeding. The Contractor shall supply additional mulch necessary as a result of damage or seed failure. Repairs to mulched areas and furnishing of additional mulch shall be incidental to this item. If wood fiber is used, any reseeding will require additional wood fiber mulch.
- D. Do not perform broadcast seeding work during windy weather.
- E. Compacting:
 1. Compact the entire area immediately after the seeding operations have been completed.
 2. Compact by means of a cultipacker, roller, or other equipment approved by the Engineer weighing 60 to 90 pounds per linear foot of roller.
 3. If the soil is of such type that a smooth or corrugated roller cannot be operated satisfactorily, use a pneumatic roller (not wobbly wheel) that has tires of sufficient size to obtain complete coverage of the soil.
 4. When using a cultipacker or similar equipment, perform the final rolling at right angles to the prevailing slopes to prevent water erosion, or at right angles to the prevailing wind to prevent dust.
- F. Thoroughly wet soil surfaces before sodding. Place sod pieces tightly together, tamping gently into position as the work progresses. After each area of sodding is completed, roll the entire surface in two directions with a water ballast roller, and soak the newly sodded areas.
- G. After the grass has started, all of the areas greater than five square feet which fail to show a uniform stand of grass for any reason whatsoever shall be reseeded repeatedly until all areas are covered with a satisfactory growth of grass.
- H. At the time of the first cutting, set mower blades two inches high. All lawns shall receive at least two mowings before acceptance. Schedule for mowing shall be coordinated with the Engineer.
- I. Maintenance shall also include all temporary protection fences, barriers and signs and all other work incidental to proper maintenance.
- J. Maintain grass areas until a full stand of grass is indicated, which will be a minimum of 45 days after all seeding or sodding work is completed, and shall not necessarily relate to Substantial Completion of the General Contract.
- K. Protection and maintenance of grass areas shall consist of watering, weeding, cutting, repair of any erosion and reseeding as necessary to establish a uniform stand of the specified grasses, and shall continue until Acceptance by the Engineer of the work of this section. It shall also include the furnishing and applying of such pesticides as are necessary to keep grass areas free of insects and disease. All pesticides shall be approved by Engineer prior to use.

3.5 SEEDING AND SODDING INSPECTION FOR PROVISIONAL ACCEPTANCE

- A. The Engineer shall inspect all work for Provisional Acceptance upon written request of the Contractor. The request shall be received at least ten calendar days before the anticipated date of inspection.
- B. Upon completion and reinspection of all repairs or renewals necessary in the

judgment of the Engineer, the Engineer shall certify in writing to the Owner as to the Provisional Acceptance of the work of this section.

- C. Upon approval of the Provisional Acceptance by the Owner, the Owner will assume maintenance of the lawn areas.

3.6 GUARANTEE

- A. The Contractor shall submit a written guarantee to the Engineer, after Provisional Acceptance of grass, covering reseeding of grass areas which do not survive through one full growing season after the date of Provisional Acceptance, at no cost to the Owner.

3.7 CLEAN-UP

- A. Any soil or similar material which has been brought on to paved areas by hauling operations or otherwise shall be removed promptly, keeping these areas clean at all time.
- B. Upon completion of work under this section all excess stones, debris, and soil resulting from work under this section, which have not previously been cleaned up, shall be removed from the project site.

3.8 PLANTING METHOD

- A. The Contractor shall excavate plant pits, furnish and place all plants, and then maintain them in a satisfactory manner until final acceptance.
- B. All pits shall be of size and shape as shown on the Drawings.
- C. For tree and shrub planting, soil used for backfilling shall be improved topsoil as recommended by soil analysis, with the following additions:
 - 1. For deciduous plants use a mixture of four parts topsoil and one part of manure.
 - 2. For evergreen plants use a mixture of four parts topsoil and one part of peat moss as specified under Soil Enrichers.
- D. Plant pits within or near paved areas shall be prepared prior to the laying of the pavement. Where tree pits in paved areas are to be covered with mulch, trees shall be placed at sufficient depth below finished grade to allow for the depth of the mulch.
- E. Plants shall be set plumb and straight, and at such a level that after settlement, a normal or natural relationship of the crown of the plant with the ground surface is established. Each plant shall be planted in the center of the pit. When balled, burlapped and platformed plants are set, the platform shall first be removed from the pit and the soil shall be carefully tamped under and around the base of each ball to fill all voids. All burlap, ropes, and wires shall be removed from the sides and tops of balls, but no burlap shall be pulled out from under the balls, except for plastic burlap, which shall be completely removed from the pit.
- F. All seals shall remain unbroken and visible on plant material until final inspection by Engineer. The Contractor shall remove all seals immediately after final inspection.

3.9 PLANTING SEASON

- A. Do all planting work within the dates herein specified.

3.10 PRUNING, PAINTING, SPRAYING

- A. Pruning:

1. Each tree and shrub planted shall be pruned to preserve the natural character of the plant and in a manner appropriate to the particular requirements of the landscape design. In general, approximately one third of the wood shall be removed by thinning or shortening branches, but no leaders shall be cut.
 2. All pruning shall be done with sharp tools. All pruning cuts shall be made flush and clean, especially where lower branches have been removed from collected trees.
- B. Painting:
1. Pruning cuts over one-half inch in diameter shall be painted with tree paint specified under "Materials" on all exposed cambium as well as other exposed living tissues.

3.11 STAKING

- A. All staking shall be done immediately after wrapping. Stakes shall be driven perpendicular into the ground around the periphery of the ball of the tree. Plants shall stand plumb after staking.

3.12 WATERING

- A. Plantings shall be watered in a satisfactory manner during and immediately after planting, not less than twice per week, until provisional acceptance.
- B. Suitable water for maintaining plants shall be provided by the Owner. The Contractor shall furnish the hose and hose connections from the outlets where water is furnished. Contractor is responsible for all watering until provisional acceptance.

3.13 MAINTENANCE

- A. Maintenance shall begin immediately after each plant is planted. Plants shall be watered, mulched, weeded, fertilized, cultivated and otherwise maintained and protected until provisional acceptance.
- B. Guys shall be tightened and repaired. Defective work shall be corrected as soon as possible after defects become apparent, and weather and season permit.

3.14 TREE SURGERY

- A. Existing trees shall be trimmed of all dead and diseased limbs at the direction of the Engineer. All cuts shall be made close to the trunk and those over one inch in diameter shall be covered with an acceptable tree paint manufactured for this specific purpose. In the case of important large trees where a small amount of cavity work would prolong their lives, such work should be done. The services of a qualified tree surgeon are recommended.

3.15 INSPECTION AND PROVISIONAL ACCEPTANCE

- A. The Engineer will inspect all planting work for provisional acceptance upon request of the Contractor.
- B. The Contractor shall furnish full and complete written instructions for maintenance of the planting to the Owner at the time of provisional acceptance.
- C. After all necessary corrective work has been completed and maintenance instructions have been received by the Owner, the Engineer will certify in writing the provisional acceptance of the planting.

3.16 GUARANTEE PERIOD

- A. All plants shall be guaranteed by the Contractor for a period of not less than one full year from time of provisional acceptance.
- B. At the issuance of provisional acceptance, the Owner shall take over maintenance of the planting. Nevertheless, the guarantee of all plant material will remain with the Contractor. The Contractor shall ascertain that the Owner properly waters and maintains all planting during the one year guarantee period.
- C. At the end of the guarantee period, any plant that is missing, dead, not true to name or size as specified, or not in satisfactory growth, as determined by the Engineer, shall be replaced. In case of reasonable doubt or question regarding the condition and satisfactory establishment of a rejected plant, the Engineer may allow such a plant to remain through another complete growing season, at which time the rejected plant, if found to be dead, in an unhealthy or badly impaired condition, shall be replaced at once. The Contractor will not be required to replace an inspected and accepted plant more than once.
- D. Replacements shall be plants of the same kind and size as specified in the Plant List. They shall be furnished and planted as specified herein. The cost of replacement shall be borne by the Contractor, except where it can be definitely shown that loss resulted from Owner's failure to maintain planting as instructed.

3.17 FINAL INSPECTION AND FINAL ACCEPTANCE

- A. At the end of the guarantee period, inspection will be made by the Engineer, at the request of the Contractor.
- B. After all necessary corrective work has been completed, the Engineer will certify in writing the final acceptance of the planting.

3.18 CLEAN UP

- A. Upon completion of work under this section, all excess stones, debris and soil resulting from planting work shall be removed from project site. The site shall be restored to a better condition than was present prior to construction.

END OF SECTION

SECTION 02615DUCTILE IRON PIPE & FITTINGS
(BURIED APPLICATIONS)PART 1 - GENERAL1.1 DESCRIPTION

- A. Work Included: Provide and install ductile iron pipe and fittings of the type(s) and size(s) in the location(s) shown on the Drawings and as specified herein.
- B. Related Work Specified Elsewhere:
 - 1. Pipe and Pipe Fittings - General is specified in the appropriate Section in this Division.
 - 2. Excavation, Bedding and Backfill are specified in this Division.

1.2 SUBMITTALS

- A. Submit shop drawings in accordance with the applicable section of Division 1 and the General Conditions of the Construction Contract.
- B. Submit manufacturer's "Certification of Conformance" that pipe and fittings meet or exceed the requirements of these Specifications.
- C. Submit manufacturers installation instructions and specifications for all pipe and fittings.

1.3 QUALITY ASSURANCE

- A. Standards (As Applicable):
 - 1. Cement-mortar lining for water: ANSI A21.4 (AWWA C104).
 - 2. Rubber gasket joints: ANSI A21.11 (AWWA C111).
 - 3. Ductile iron pipe thickness: ANSI A21.50 (AWWA C150).
 - 4. Ductile iron pipe centrifugally cast in metal or sand lined molds: ANSI A21.51 (AWWA C151).
 - 5. Pipe flanges and fittings: ANSI B16.1 and ANSI A21.10 (AWWA C110).
 - 6. Threaded, flanged pipe: ANSI A21.15 (AWWA C115).
 - 7. Cast and ductile iron fittings: ANSI A21.10 (AWWA C110).
 - 8. Ductile Iron Compact Fittings: ANSI 21.53 (AWWA C153).
- B. Acceptable Manufacturers:
 - 1. American
 - 2. US Pipe
 - 3. McWane
 - 4. Or equivalent.

1.4 DELIVERY, STORAGE & HANDLING

- A. Exercise extra care when handling ductile iron pipe because it is comparatively brittle.
- B. Exercise extra care when handling cement lined pipe because damage to the lining will render it unfit for use.
- C. Protect the spherical spigot ends and the plain ends of all pipe during shipment by

wood lagging securely fastened in place.

PART 2 - PRODUCTS

2.1 PIPE MATERIALS

A. General:

1. All exterior (buried) ductile iron pipe shall have push-on or mechanical joints unless otherwise specified or shown on the Drawings. Pipe within valve pits and other structures is considered interior pipe and shall be flanged.
2. Unless otherwise shown on the Drawings or in the pipe schedule, the minimum thickness of ductile iron pipe shall be:
 - a. For pipe 4 inches in diameter and smaller: Class 51.
For pipe 6 inches in diameter and larger: Class 52.
Pipe with flanges: Class 53.
3. Pipe for use with sleeve type couplings shall have plain ends (without bells or beads) cast or machined at right angles to the axis.
4. Pipe shall be double thickness cement lined and seal coated unless noted otherwise on the Drawings, and except for air piping lines which shall be completely unlined.
5. Pipe for use with split type couplings shall have ends with cast or machined shoulders or grooves that meet the requirements of the manufacturer of the couplings.
6. Factory applied bituminous coatings (in accordance with AWWA C151) shall be furnished on the exterior of all underground piping unless specified otherwise.
7. The outside of pipe within structures and exposed shall not be coated with bituminous coating, but shall be thoroughly cleaned and given one shop coat of Intertol Rustinhibitive Primer 621 by Koppers Co.; Multiprime by PPG Industries; Chromox 13R50 Primer made by Mobil Chemical Co.; or equivalent.

B. Joints (as shown on Drawings or as specified):

1. Push-on and Mechanical Joint:
 - a. The plain ends of push-on pipes shall be factory machined to a true circle and chamfered to facilitate fitting the gasket.
 - b. Provide gaskets manufactured from a composition material suitable for exposure to the fluid to be contained within the pipe. On high temperature applications such as air lines, the gaskets shall be suitable for service from 40°F to 250°F.
 - c. Bolts and nuts for buried mechanical joints shall meet the AWWA C-111 requirements and be made of high strength, low alloy steel.
2. Boltless Restrained Joint:
 - a. HDSS, TR Flex, or Flex-Ring push on pipe with integral bell slots for locking segment retainers.
 - b. Working pressure equal to equivalent push-on pipe.
 - c. Joint assembly per manufacturer's recommendations.
3. Push-on pipe with Restrained Gaskets:

- a. Provide compatible manufacturer supplied rubber ring compression type gaskets with stainless steel wedge-shaped elements to firmly grip the spigot end of the pipe.
 - b. Restrained gaskets are only allowed for below grade buried applications.
4. Gaskets:
- i. Ring type of rubber with cloth insertion.
 - ii. Thickness of gaskets 12 inches in diameter and smaller: 1/16 inch.
 - iii. Thickness of gaskets larger than 12 inches in diameter: 3/32 inch.
 - iv. On high temperature applications such as air lines, the gaskets shall be suitable for service from 40°F to 200°F.
- b. Fasteners:
- i. Make joints with bolt, studs with a nut on each end, or one tapped flanged with a stud and nut.
 - ii. The number and size of bolts shall meet the requirements of the applicable ANSI standard.
 - iii. Nuts, bolts, and studs shall be Grade B meeting the requirements of ASTM A307.
 - iv. After jointing, coat entire joint with bituminous material compatible with pipe coating unless other coating required by Section 09900.
- c. When applicable, provide and install flange clamps as shown on the Drawings.
5. Joint Bracing:
- a. Provide joint bracing to prevent the piping from pulling apart under pressure as required and as shown on the Drawings.
 - b. Types of bracing:
 - i. Pipe and fittings furnished with approved lugs or hooks cast integrally for use with socket pipe clamps, tie rods, or bridles. Bridles and tie rods shall be a minimum of 3/4 inch diameter except where they replace flange bolts of a smaller size, in which case they shall be fitted with a nut on each side of the pair of flanges. The clamps, tie rods, and bridles shall be coated with bituminous paint in buried installations and shall be coated with the same coatings as the piping system in interior installations after assembly or, if necessary, prior to assembly.
 - ii. Mechanical joint follower gland pipe restrainers.
 - (1) Ductile iron gland and restraining ring.
 - (2) Gasket shall be standard MJ gasket -ANSI/AWWA-C111/A21.11.
 - (3) Working pressure 350 psi, up to 8 inches; 250 psi, 10 inches to 24 inches.
 - (4) Test pressure two times working pressure.
 - (5) Grip Rings™, Romac Industries, MegaLug by EBAA Iron, or other equivalent as approved by Engineer.
 - iii. Other types of bracing as shown on the Drawings.

2.2 FITTINGS

A. Standard Fittings:

1. Pressure rating of 350 psi for D.I. compact fittings and 250 psi for all others unless indicated otherwise on the Drawings or as specified.
2. Joints the same as the pipe with which they are used or as shown on the Drawings.
3. Cement lining and seal coat as specified for pipe.
4. Factory applied bituminous coatings shall be furnished for all underground fittings.

PART 3 - EXECUTION

3.1 INSPECTION

- A. Provide all labor necessary to assist the Engineer to inspect pipe, fittings, gaskets, and other materials.
- B. Carefully inspect all materials at the time of delivery and just prior to installation.
- C. Carefully inspect all pipe and fittings for:
 1. Defects, such as weak structural components, that adversely affect the execution and quality of work.
 2. Deviations beyond allowable tolerances for pipe clearances.
- D. Immediately remove all rejected materials from the project site.

3.2 INSTALLATION

A. General:

1. Install in strict accordance with the pipe and fitting manufacturer's instructions and recommendations and as specified or as shown on the Drawings.
2. Concrete thrust blocks or other acceptable thrust resistant system is required at all fittings on pressure pipe. Where thrust blocks are used, these shall be placed against undisturbed soil or screened gravel compacted to 95 percent and shall be placed so that the joints are accessible for repairs.

B. Assembling Joints:

1. Push-on Joints:

- a. Insert the gasket into the groove of the bell.
- b. Uniformly apply a thin film of special lubricant over the inner surface of the gasket that will contact the spigot end of the pipe.
- c. Insert the chamfered end of the plain pipe into the gasket and push until it seats against the bottom of the socket.

2. Bolted Joints:

- a. Remove rust preventive coatings from machined surfaces prior to assembly.
- b. Thoroughly clean and carefully smooth all burrs and other defects from pipe ends, sockets, sleeves, housings, and gaskets.
- c. After jointing coat all bolts with bituminous material compatible with the pipe coating required herein and/or in Section 09900.

3. Restrained Joints:

- a. Insert the gasket into the groove of the bell.

- b. Uniformly apply a thin film of special lubricant over the inner surface of the gasket that will contact the spigot end of the pipe.
 - c. Insert the chamfered end of the plain pipe into the gasket and push until it seats against the bottom of the socket.
 - d. Insert locking segments and rotate clockwise around the pipe.
 - e. Hold the segments apart and wedge the rubber retainer into the slot between the locking segments.
 - f. Extend the joint to remove the slack in the locking segment cavity.
 - g. Set the joint deflection as required. Joint deflection shall be kept below 75% of manufacturer's maximum published deflection.
 - 4. Flanged Joints:
 - a. Insert the nuts and bolts (or studs), finger tighten, and progressively tighten diametrically opposite bolts uniformly around the flange to the proper tension.
 - b. Execute care when tightening joints to prevent undue strain upon valves, pumps, and other equipment.
 - 5. Mechanical Joints:
 - a. Thoroughly clean, with a wire brush, surfaces that will be in contact with the gaskets.
 - b. Lubricate the gasket, bell, and spigot by washing with soapy water.
 - c. Slip the gland and gasket, in that order, over the spigot and insert the spigot into the bell until properly seated.
 - d. Evenly seat the gasket in the bell at all points, center the spigot, and firmly press the gland against the gasket.
 - e. Insert the bolts, install the nuts finger tight, and progressively tighten diametrically opposite nuts uniformly around the joint to the proper tension with a torque wrench.
 - f. The correct range of torque (as indicated by a torque wrench) and the length of wrench (if not a torque wrench) shall not exceed:
 - i. Range or Torque: 60-90 ft.-lbs.
 - ii. Length of Wrench: 10 inches.
 - g. If effective joint sealing is not attained at the maximum torque specified above, disassemble, thoroughly clean, and reassemble the joint. Do not overstress the bolts to tighten a leaking joint.
 - 6. Bell and Spigot Joints:
 - a. Thoroughly clean the bell and spigots and remove excess tar and other obstructions.
 - b. Insert the spigot firmly into place and hold securely until the joint has been properly completed.
- C. Fabrication:
 - 1. Tapped Connections:
 - a. Make all tapped connections as shown on the Drawings or as required by the Engineer.
 - b. Make all connections watertight and of adequate strength to prevent pullout.
 - c. Drill and tap normal to the longitudinal axis of the pipe.

- d. Taps in fittings shall be located where indicated by the manufacturer for that particular type of fitting.
 - e. The maximum sizes of taps in pipes and fittings without busses shall not exceed the sizes listed in the appendix of ANSI A21.51 based on 2 full threads for ductile iron and 3 full threads for cast iron.
 - 2. Cutting:
 - a. Perform all cutting as set forth in AWWA C600.
 - b. Carefully chamfer all cut ends to be used with push-on joints to prevent damage to gaskets when pipe is installed.
- D. Pipe Deflection:
 - 1. Push-on and Mechanical Joints:
 - a. The maximum permissible deflection of alignment at joints shall be limited to 75% of that given in AWWA C600.
 - 2. Flexible Joints:
 - a. The maximum deflection in any direction shall not exceed the manufacturer's instructions and recommendations.

END OF SECTION

SECTION 02616

DUCTILE IRON MAIN ANTI-CORROSION POLYETHYLENE ENCASEMENT (POLYWRAP)

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work Included: Furnish all materials and install polyethylene encasement (polywrap) of ductile iron water and sewer main for all ductile iron main, valves and fittings and as specified herein.
- B. Related Work Specified Elsewhere: Ductile Iron pipe and fittings, trench excavation, valves.

1.2 QUALITY ASSURANCE

- A. A competent laboratory must be maintained by the manufacturer of the polywrap at the point of manufacture to ensure quality control.
- B. During all periods of shipment and storage, the fabric shall be wrapped in a heavy-duty protective covering to protect the fabric from direct sunlight, ultraviolet rays, and temperatures greater than 140°F, mud, dirt, dust and debris.

1.3 SUBMITTALS

- A. Manufacturer shall furnish certified test reports with each shipment of material attesting that the polywrap meets the requirements of this Specification.
- B. Contractor shall submit product information they intend to use and the installation method they intend to employ.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. **Linear low density polyethylene (LLDPE)** Polyethylene encasement protection wrap for ductile iron pipe. Minimum 8 mil thickness. Tubes or sheets

TABLE 1

<u>Geotextile Mechanical Property</u>	<u>Test Method</u>	<u>Minimum Permissible Value</u>
Tensile Strength (both directions)	ASTM D882	3600 psi
Elongation	ASTM D882	800 percent
 <u>Geotextile Mechanical Property</u>	 <u>Test Method</u>	 <u>Minimum Permissible Value</u>
Dielectric Strength	ASTM D149	800 V/mil
Impact Resistance	ASTM D1709-B	600 g
Propagation Tear Resistance Strength	ASTM D1922	2550 gf

DUCTILE IRON MAIN ANTI-CORROSION
POLYETHYLENE ENCASEMENT (POLYWRAP)

- B. Polywrap shall meet all requirements of ANSI/AWWA C105/A21.5
- C. Polywrap shall consist of 3 layers of co-extruded linear low-density polyethylene fused into a single layer, minimum 8 Mil thickness.
- D. Inside surface of Polywrap shall be infused with an antimicrobial compound to mitigate microbiologically induced corrosion (MIC) and a volatile corrosion inhibitor to control galvanic corrosion.
- E. The polywrap shall meet or exceed the minimum values stated above as determined by the most recent test methods specified above. The product must be marked with the specification conformance, applicable pipe sizes and the words “corrosion protection”.

PART 3 - EXECUTION

3.1 GENERAL

- A. Quality of installation is more important than the actual sequence followed.
- B. Polyethylene shall not be stored in the sun.
- C. When lifting polyethylene-encased pipe with a crane, use a synthetic sewn “sling” or padded wire rope sling to protect the polyethylene.
- D. Remove all lumps of clay, mud, cinders, etc., on the pipe surface before encasing the pipe.
- E. Prevent soil or bedding material from becoming trapped between the pipe and the polyethylene.
- F. When installing polyethylene encasement below the water table or in areas subject to tidal action, seal as thoroughly as possible both ends of each polyethylene tube with polyethylene adhesive tape or plastic tie straps at the joint overlap. Additionally, place circumferential wraps of tape or plastic tie straps at two-foot intervals along the barrel of the pipe to help minimize the space between the polyethylene and the pipe.

3.2 DUCTILE IRON PIPE AND FITTINGS

Installation of the polywrap shall be done in accordance with one of the three recommended methods as outlined in ANSI/AWWA C105/A21.5. Methods A and B use polyethylene tubes, and method C uses polyethylene sheets.

- A. Method A uses one length of polyethylene tube, overlapped at the joints, for each length of pipe. A minimum of 2' overlap shall be used. The polyethylene wrap shall be cut approximately 2 feet longer than that of the pipe section. After assembling the pipe joint, the polyethylene shall be overlapped approximately one (1) ft. and at all joints sealed with approved adhesive tape. Additional taping shall be used at 3 foot (3') intervals along the pipe. Any rips, punctures or other damage to the polyethylene shall be repaired immediately with adhesive tape. All copper service connections shall be wrapped for a distance of 3 feet from the centerline of the main. Before installing the polyethylene wrap, the exterior of the pipe shall be free of foreign material.
- B. Method B uses a length of polyethylene tube for the barrel of the pipe and a separate length of polyethylene tube or sheet for the joints. The national standard does not recommend Method B for bolted-type joints unless an additional layer of polyethylene is provided over the joint area as in Methods A and C. If this method is chosen an additional layer of polyethylene will be provided over the joint area.

DUCTILE IRON MAIN ANTI-CORROSION
POLYETHYLENE ENCASEMENT (POLYWRAP)

- C. In Method C, each section of pipe is completely wrapped with a flat polyethylene sheet.

3.3 JOINTS, VALVES, APPURTENANCES AND TAPS

- A. All ductile iron pipe, fitting and valves will be wrapped in accordance with C105/A21.5.
- B. Pipe-shaped appurtenances: bends, reducers, offsets, and other pipe-shaped appurtenances in shall be covered in the same manner as the pipe.
- C. Odd-shaped appurtenances: Wrap odd-shaped appurtenances such as valves, tees, and crosses with a flat sheet or split length of polyethylene tube by passing the sheet under and then over the appurtenance and bringing it together around the body of the appurtenance. Make seams by bringing the edges of the polyethylene together, folding over twice, and taping them down.
- D. Joints: Overlap joints as in normal installation; then tape the polyethylene securely in place at valve stems and other penetrations. When bolted-type joints are used, care should always be taken to prevent bolts or other sharp edges of the joint configuration from penetrating the wrap.
- E. Branches, blow offs, air valves: To provide openings for branches, blow-offs, air valves, and similar appurtenances, make an X-shaped cut in the polyethylene and temporarily fold back the film. After installing the appurtenance, tape the slack securely to the appurtenance and repair the cut and any other damaged areas in the polyethylene with tape.
- F. Service taps: Wrap a minimum of two layers of polyethylene adhesive tape completely around the pipe to cover the area where the tapping machine and chain will be mounted. Then install the corporation stop directly through the tape and polyethylene. After the tap is made, inspect the entire circumferential area for damage and make any necessary repairs.
- G. Hydrants: Do not wrap hydrants that do not have drain port plugs installed. Tape the polyethylene securely in place on the hydrant branch after the valve, before reaching the hydrant.

END OF SECTION

SECTION 02628

HIGH DENSITY POLYETHYLENE PIPE AND FITTINGS

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work Included: Furnish, install, and test all polyethylene pipe, pipe fittings and appurtenances of the type(s) and size(s) and in the location(s) as shown on the Drawings and as herein specified.
- B. Related Work Specified Elsewhere:
 - 1. "Earthwork" is specified in Section 02200.
 - 2. "Pipe and Pipe Fittings - General" is specified in Section 15050.

1.2 QUALITY ASSURANCE

- A. Pressure rating or pressure class of pipe as shown on the Drawings or specified herein.
- B. Standards:
 - 1. ANSI/AWWA C901-02: Standard for Polyethylene (PE) Pressure Pipe and Tubing, ½" (13 mm) through 3" (76 mm) for Water Service.
 - 2. AWWA C 906-99: Standard for Polyethylene (PE) Pressure Pipe and Fittings, 4" (100 mm) through 63" (1,575 mm) for Water Distribution and Transmission.
 - 3. ASTM D 2657-07: Standard Practice for Heat Joining Polyolefin Pipe and Fittings.
 - 4. ASTM D 2683-14: Standard Specification for Socket-Type Polyethylene Fittings for Outside Diameter-Controlled Polyethylene Pipe and Tubing.
 - 5. ASTM D 2837-13e1: Standard Test Method for Obtaining Hydrostatic Design Basis for Thermoplastic Pipe Materials or Pressure Design Basis for Thermoplastic Pipe Products.
 - 6. ASTM D 3261-15: Standard Specification for Butt Heat Fusion Polyethylene (PE) Plastic Fittings for Polyethylene (PE) Plastic Pipe and Tubing.
 - 7. ASTM D 3350-14: Standard Specification for Polyethylene Plastic Pipe and Fittings Materials.
 - 8. ASTM F 1055-16: Standard Specification for Electrofusion type Polyethylene Fittings for Outside Diameter Controlled Polyethylene Pipe and tubing.
 - 9. NSF/ANSI-61-2003e: Standard for Drinking Water Systems Components - Health Effects, NSF International, Ann Arbor, MI.
 - 10. CSA B 137.1-2002: Polyethylene Pipe, Tubing, and Fittings for Cold-Water Pressure Services.
 - 11. ASTM F2164, Standard Practice for Field Leak Testing of Polyethylene (PE) Piping Systems Using Hydrostatic Pressure.
 - 12. Manufacturers of high density polyethylene pipe, fittings, adapters, and couplings must be certified under ISO 9000, Quality Management Systems - Fundamentals and Vocabulary, International Organization for Standardization (ISO), Geneva, Switzerland.
 - 13. 49 CFR 192 subpart F, 192.281, selected requirements for plastic joints; 192.282, requirements for qualifying joining procedures; 192.285, specifies qualifying persons to make joints; and 192.287, specifies inspection of joints.

14. Fusion Operators: Operators shall meet the minimum qualification requirements outlined in 49 CFR 192 subpart F, 192.285 and shall have documented experience with successful butt fusion of pipe larger than 24-inch diameter.
 15. Joint Fusion Data: Fusion plate temperature (°F), interfacial fusion pressure (psi), interfacial contact fusion time (sec.), and cooling time (min.) shall be recorded by data logger for computer download or recorded by the operator(s) in a field book for each joint fusion completed.
 16. Pipe deemed damaged or unacceptable to the Engineer shall be replaced at no additional cost to the Owner. Pipe shall be adequately protected during storage to prevent external damage to the pipe side wall or ends. Pipe with gouged side walls will be rejected by the Engineer.
 17. Exterior pipe markings shall include the nominal pipe diameter, SDR, and rated working pressure.
- C. Acceptable Pipe and Fitting Supplier/Manufacturers:
1. Vari-Tech "Performance Pipe"
 2. PolyPipe, Inc. "PW Pipe"
 3. KWH Pipe, "Sclairpipe"
 4. "Isco-Pipe"
 5. "Poly-Cam"
 6. "Friatec"
 7. Independent Pipe Products, Inc.
 8. Or approved equal.

1.3 SUBMITTALS

- A. Submit shop drawings in accordance with the applicable section of Division 1 and the General Conditions of the Construction Contract.
- B. Submit manufacturer's "Certification of Conformance" that pipe and fittings and other piping appurtenances meet or exceed the requirements of these Specifications.
- C. Submit experience statement for operator(s) to complete the pipe fusion to demonstrate the minimum experience and qualification requirements described in paragraph 1.2.B.14.
- D. Following pipe construction, submit joint fusion data in an electronic spreadsheet format as a record to document joint fusion quality control.
- E. Submit manufacturers installation instructions and specifications for all fittings, couplings, adapters, saddles, etc.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Pipes shall be either Iron Pipe Size (IPS) or Ductile Iron Pipe Size (DIPS) with SDR ratings as indicated in the pipe schedule.
- B. Polyethylene compounds utilized in the manufacture of products furnished under this specification shall be listed in PPI TR-4, with a minimum cell classification of PE 445574C for PE 4710 materials, as defined in ASTM D3350. Pipe shall be in conformance with AWWA C901, AWWA C906, or CSA B137.1. They shall have a PPI recommended Hydrostatic Design Basis (HDB) of 1600 psi (PE4710) at a temperature of 73.4°F (23°C).
- C. All materials which come in contact with water, including lubricants, shall be

evaluated, tested and certified for conformance with NSF/ANSI Standard 61. Polyethylene pipe shall be manufactured in compliance with NSF/ANSI Standard 14 certified for potable water contact.

- D. Clean re-work material of the same type, grade, and cell classification generated from the manufacturer's own pipe and fitting production may be used by the same manufacturer as long as the pipe, tubing and fittings produced meet all the requirements of AWWA C901, AWWA C906, or CSA B137.1.
- E. Pipe and tubing furnished under this specification shall be manufactured using compounds complying with the requirements above. Dimensional and performance characteristics shall conform to the requirements of AWWA C901, AWWA C906, or CSA B137.1.
- F. The polyethylene compound shall be suitably protected against degradation by ultraviolet light by means of carbon black, well dispersed in a concentration of not less than 2%.
- G. The polyethylene resin compound shall have a resistance to environmental stress cracking as determined by procedure detailed in ASTM D 1693 with sample preparation by procedure C of ASTM D 4703 of not less than 40 hours.
- H. Pipe shall be homogeneous throughout and free of visible cracks, holes, foreign material, blisters, or other deleterious faults.
- I. Polyethylene fittings shall have the same pressure rating as the pipe itself for all pressurized pipeline applications.
- J. Polyethylene fittings shall be molded style for diameters up to 12 inches and fabricated style for diameters larger than 12 inches.

2.2 PIPE SCHEDULE

PIPE IDENTIFICATION	DIA. (inches)	SDR	IPS/DIPS	WORKING PRESSURE RATING (PSI)	DE-BEAD REQUIRED INSIDE PIPE
24" SUBAQUEOUS PIPE	24	11	DIPS	200	No

2.3 ADAPTERS AND COUPLINGS (AS APPLICABLE)

- A. Polyethylene Mechanical Joint Adapter
 - 1. For joining IPS or DIPS size polyethylene pipe to any ANSI\AWWA C153 ductile iron fitting and valve.
 - 2. Molded from NSF listed PE 4710 resin.
 - 3. Adaptor shall meet requirements of AWWA C901, 906.
 - 4. Adaptor kit to include anchor fitting, 316 stainless steel retainer gland ring, gasket, and long 316 stainless steel tee-bolts, and rubber gasket.
 - 5. Provide stainless steel stiffeners as necessary.
- B. Polyethylene Flanged Adapter
 - 1. For joining IPS or DIPS size polyethylene pipe to ANSI B16.1, ANSI B16.5, or ANSI A21.10 (AWWA C110) flange as required.
 - 2. Molded from NSF listed PE 4710 resin.
 - 3. Adaptor kit to include 316 stainless steel backing ring, gasket, and long 316 stainless steel tee-bolts, and rubber gasket

4. Adaptor shall meet requirements of AWWA C901, 906.
- C. Polyethylene Wall Anchor
 1. For restraining polyethylene pipe in cast-in-place concrete headwall.
 2. Molded from NSF listed PE 4710 resin.
 3. Pressure rating and size shall be the same as the required pipe and fitting SDR.
 4. IPS or DIPS to match required pipe size.
- D. Polyethylene Electrofusion Coupling
 1. For joining plain ends of polyethylene pipe where butt fusion is not practical as approved by the Engineer.
 2. Molded from NSF listed PE 4710 resin or fabricated from pipe meeting NSF requirements with an integral heating element and electrical leads to connect the heating element power supply.
 3. Pressure rating and size shall be the same as the required pipe and fitting SDR.
- E. Polyethylene Electrofusion Saddle
 1. For installation corporation stops in HDPE pipe for water service connection or manual air release valve.
 2. Molded from NSF listed PE 4710 resin with an integral heating element and electrical leads to connect the heating element power supply.
 3. Pressure rating and size shall be the same as the required pipe and fitting SDR.
- F. Threaded HDPE Transition Adapter, Unions, and Threaded Adapters
 1. For joining polyethylene pipe to threaded fittings and valve ends (NPT).
 2. HDPE end of transition adapters be SDR rated to match required pipe SDR.
 3. HDPE end of transition adapters shall be molded from NSF listed PE 4710 resin.
 4. All metallic materials shall be constructed of Hastelloy C-276
 5. Coupling transition end shall be Male NPT.
 6. IPS or DIPS to match required pipe size.
- G. Blind Flanges
 1. Molded from NSF listed PE 4710 resin.
 2. Pressure rating and size shall be the same as the required pipe and fitting SDR.

2.4 FABRICATION

- A. Thermal Butt-Fusion:
 1. Join the pipe to itself, or to the polyethylene fittings or to the flange connections by means of thermal butt-fusion.
 2. Have all fusion performed by personnel trained by the pipe supplier or other qualified persons, using tools approved by the pipe supplier.
 3. The polyethylene fittings and flanged connections to be joined by thermal butt-fusion shall be from the same type, grade and class of polyethylene compound as the polyethylene pipe unless otherwise approved.
 4. Joint strength must be equal to that of the adjacent pipe.
- B. Socket Fusion (When Applicable)
 1. Join the pipe to socket type fittings by means of socket fusion
 2. Have all fusion performed by personnel trained by the pipe supplier or other qualified persons, using tools approved by the pipe supplier.
 3. The polyethylene fittings to be joined by thermal socket-fusion shall be from the same type, grade and class of polyethylene compound as the polyethylene pipe unless otherwise approved.

- C. Electrofusion (When Applicable)
 - 1. Applies to the installation of electrofusion couplings and saddles.
 - 2. Have all fusion performed by personnel trained by the pipe supplier or other qualified persons, using tools approved by the pipe supplier.
 - 3. The coupling or saddle shall be joined using heat created by electric current from a control box.
 - 4. Install clamps to hold the fitting in place during the fusion process.
- D. Flanged Joints
 - 1. Flange joining of sections of pipe is allowed to facilitate the pipe installation process as approved by the Engineer.
 - 2. Joints shall include full face gaskets.
 - 3. Flange bolts shall be tightened to the same torque value and tightening pattern recommended by the manufacturer.
 - 4. Flange bolts and nuts shall be Type 316 stainless steel and have tensile strength equivalent to SEA Grade 3.
 - 5. Use flat Type 316 stainless steel washers between the nut and backup ring.
 - 6. Retighten bolts to the manufacturer recommended torque value after an hour to offset the effects of compression set.
- E. Mechanical Connections: The mechanical connections of the polyethylene pipe to auxiliary equipment shall be in accordance with the pipe suppliers written instructions.

PART 3 - EXECUTION

3.1 INSTALLATION OF PIPES AND FITTINGS

- A. Install joint and transition adapters in accordance with the manufactures recommendations.
- B. Refer to the drawings and Section 02200 for additional bedding and backfill requirements.
- C. Joining surfaces must be clean and dry.
- D. Pipe must not be dumped, dropped, pushed or rolled into the trench. Provide appropriate equipment to lift move and lower the pipe into the trench as necessary.
- E. Install pipe and fittings in accordance with the Marine Installations Chapter of PPI Handbook of Polyethylene Piping and C906 (4 in. to 63 in. diameter).
- F. Upon completion of subaqueous HDPE water main installation, a complete dive inspection shall be performed to verify pipeline location and condition prior to flushing and testing. For any areas that are not installed at the correct alignment and placement, Contractor shall utilize dive and surface equipment to correctly align the pipeline.

3.2 TESTING

- A. Joint Quality
 - 1. 12" diameter and smaller - On each day butt fusions are to be made, the first fusion of the day shall be a trial fusion. The trial fusion shall be allowed to cool completely, then fusion test straps shall be cut out. The test strap shall be 12" or 30 times the wall thickness in length (minimum) and 1" or 1.5 times the wall thickness in width (minimum). Bend the test strap until the ends of the strap touch. If the fusion fails at the joint, a new trial fusion shall be made, cooled

completely and tested. Butt fusion of pipe to be installed shall not commence until a trial fusion has passed the bent strap test.

2. Pipes larger than 12" diameter - Visual inspection of the joint shall be the primary indicator of joint quality. Specific visual inspection criteria shall be provided by the pipe and fitting manufacturer. The v-groove between the bends shall be uniform around the circumference of the pipe and the both sides of the bead shall have uniform thickness and height indicating proper pipe alignment during the fusion process.
3. All fused joints shall be visually inspected by qualified fusion operators and the Engineer during construction to assure uniform alignment and beading.

B. Leak Test

1. Refer to Section 02675 for water main flushing and disinfection requirements.

END OF SECTION

SECTION 02641

GATE VALVES

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work Included: Furnish, install, and test gate valves of the type(s) and size(s) and in the location(s) shown on the Drawings and as specified.
- B. Related Work Specified Elsewhere:
 - 1. "Valve Box" and "Ductile Iron Pipe & Fittings for Buried Applications" are specified in this Division.
 - 2. "Valves and Specialties - General" is specified in Division 15.
 - 3. "Gate Valves for Interior Applications" are specified in Division 15.

1.2 QUALITY ASSURANCE

- A. All gate valves of same type and style shall be manufactured by one manufacturer.
- B. Acceptable Manufacturers:
 - 1. American Flow Control
 - 2. Kennedy/McWane
 - 3. Clow/McWane
 - 4. Mueller
 - 5. Or approved equal.
- C. All valves shall be compliant with NSF 61 and NSF 372.

1.3 SUBMITTALS

- A. Submit shop drawings in accordance with the applicable section of Division 1 and the General Conditions of the Construction Contract.
- B. Submit manufacturer's "Certification of Conformance" that valves meet or exceed the requirements of these Specifications.
- C. Submit manufacturers installation instructions and specifications for all valves.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Waterworks type NRS valves (AWWA):
 - 1. Valve Body, bonnet and stuffing box - Cast iron (ASTM A126 C1B), or Ductile iron (ASTM A536), coated inside and out with fusion bonded epoxy meeting AWWA C550. Face-to-face dimensions shall comply with ANSI B16.10 and flanges to comply with ANSI B16.1.
 - 2. Resilient Wedge - Ductile iron wedge with bonded EPDM or Nitrile (Buna-N/NBR) rubber covering.
 - 3. Stem - Manganese bronze, ASTM B584
 - 4. Stuffing box O-rings
 - a. Two O-rings, each nitrile rubber.
 - b. Capable of changing under pressure.
 - 5. Wedgenut - Bronze, ASTM B62 or Manganese bronze, ASTM B584

6. Bolting - Stainless steel Type 316, ASTM F593, GP2.
7. End Connections
 - a. Buried valves – gasketed and bolted mechanical joints in conformance with AWWA standards for appropriate pipe material.
 - b. Exposed valves in buried structures – flanged and bolted joints in conformance with ANSI/ASME B16.1 and AWWA standards for appropriate pipe material. Bolts and associated hardware shall be 316 stainless steel.
 - c. Tapping valves - mechanical joints for valves 16-inch and smaller, flanged joints by mechanical joints for larger valves.
8. Operation
 - a. Buried valves – 2-inch square nut, cast iron, ASTM A126, C1B or ductile iron, ASTM A536. Provide operator extensions where required for standard tee-handle valve wrench operation.
 - b. Opening Direction – counterclockwise (open left)
9. Water working pressure: 250 psi
10. Standards - valves shall meet or exceed AWWA C509 or AWWA C515, latest edition.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install valves with stem position vertical or horizontal as indicated on the plans.
- B. Valve box vertical and centered over operating nut or bevel gear nut.
- C. Valve box supported during backfilling and maintained vertical.
- D. Install and test in accordance with AWWA C500 and AWWA C509 or AWWA C515, latest revision.
- E. For PVC or PE main, install anchor rods around the valve body or through the mounting lugs and embed the rods in concrete beneath the valve.

END OF SECTION

SECTION 02642CORPORATION STOPSPART 1 - GENERAL1.1 DESCRIPTION

- A. Work Included: Furnish and install corporation stops of the type(s) and size(s) and in the location(s) shown on the Drawings and as specified herein.

1.2 QUALITY ASSURANCE

- A. All corporation stops shall be manufactured by one manufacturer.
- B. Qualifications of Manufacturer: Products have proven reliable in similar installations over a reasonable number of years.

PART 2 - PRODUCTS2.1 MATERIALS

- A. Ball style corporation valve conforming to AWWA C 800. Valve shall have solid one-piece tee head and stem, dual o-rings in the stem, coated brass ball with no metal-to-metal contact, and integral or secured ends to prevent unintentional disassembly.
- B. Constructed of "Lead free" brass in compliance with NSF 61 Annex G and Safe Drinking Water Act Section 1417. Lead free fittings shall contain less than 0.25% lead on a weighted average and installed using flux and solder containing not more than 0.2% lead.
- C. Outlet shall be copper pipe packed joint (CPPJ) or approved restrained grip joint.
- D. Inlet shall have AWWA (CC) standard thread.
- E. Acceptable Manufacturers:
 - 1. Ford (FB1000)
 - 2. A. Y. MacDonald (74701)
 - 3. Mueller
 - 4. Or equivalent

PART 3 - EXECUTION3.1 INSTALLATION

- A. Install at locations shown on the Drawings and as specified in accordance with manufacturer's instructions.
- B. Check and adjust all corporation stops for smooth operation.

END OF SECTION

SECTION 02643CURB STOPSPART 1 - GENERAL1.1 DESCRIPTION

- A. Work Included: Furnish and install curb stops of the type(s) and size(s) and in the location(s) shown on the Drawings and as specified herein.

1.2 QUALITY ASSURANCE

- A. All curb stops shall be manufactured by one manufacturer.
- B. Qualifications of Manufacturer: Products shall have proven reliable in similar installations over a reasonable number of years.
- C. Acceptable Manufacturers:
 - 1. Ford (B44)
 - 2. A.Y. MacDonald
 - 3. Or equivalent

PART 2 - PRODUCTS2.1 PRODUCT CONSTRUCTION

- A. Ball style valve conforming to AWWA C 800. Valve shall have solid one-piece tee head and stem, dual o-rings in the stem, coated brass ball with no metal-to-metal contact, ring lock to lock stem solidly into the body and non-directional seats to support the valve and assure watertight.
- B. Constructed of "Lead free" brass in compliance with NSF 61 Annex G and Safe Drinking Water Act Section 1417. Lead free fittings shall contain less than 0.25% lead on a weighted average and installed using flux and solder containing not more than 0.2% lead.
- C. Inlet and outlet shall be copper packed pipe joint (CPPJ) type or approved restrained grip joint.
- D. Working pressure of 300 psi shall be required.

PART 3 - EXECUTION3.1 INSTALLATION

- A. Install at locations shown on the Drawings and in accordance with manufacturer's instructions.

3.2 ADJUSTMENTS

- A. Check and adjust all curb stops for smooth operation.

END OF SECTION

SECTION 02646VALVE BOXESPART 1 - GENERAL1.1 DESCRIPTION

- A. Work Included: Furnish and install valve boxes of type(s) and size(s) and in the locations shown on the Drawings and as specified herein.

1.2 QUALITY ASSURANCE

- A. All valve boxes shall be manufactured by one manufacturer.
- B. Qualifications of Manufacturer: Products to have been proven reliable in similar installations over a reasonable number of years.
- C. Acceptable Manufacturers:
 - 1. Tyler
 - 2. Quality Water Products
 - 3. Bibby-Ste-Croix
 - 4. McWane
 - 5. Bingham and Taylor
 - 6. Or Equivalent

1.3 SUBMITTALS

- A. Submit shop drawings in accordance with the applicable section of Division 1 and the General Conditions of the Construction Contract.
- B. Submit manufacturer's "Certification of Conformance" that all valve boxes meet or exceed the requirements of these Specifications.
- C. Submit manufacturers installation instructions and specifications for all valve boxes.

PART 2 - PRODUCTS2.1 MATERIALS

- A. The valve box shall be ductile iron or cast iron, slip type two-piece integral base, 5-1/4 inch shaft. Top section with flanges.
- B. The cover shall be ductile iron or cast iron, with the word "Water" cast in cover.
- C. Belled Base Section.
- D. For valve boxes installed in non-paved areas, Encase valve cover in a 2-foot square concrete housekeeping pad. Pad shall be sloped to drain, broom finish with chamfered edges. Pad shall be minimum 6-inch thick with w6x6 wire mesh reinforcing.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Installation as shown on the Drawings and/or as specified herein.
 - 1. When installation is complete, no pressure shall be exerted by valve box on the water main or on the valve.
 - 2. Be of such length as required without full extension. Minimum lap 6 inches.

END OF SECTION

SECTION 02647

TEMPORARY LINE STOPS FOR PCCP PIPE

PART 1 - GENERAL

1.1 SCOPE

- A. Under this item Contractor shall furnish all materials, labor, and equipment to properly install a temporary line-stop into the existing Prestressed Concrete Steel Cylinder water main at the locations shown on the plans.

1.2 DESCRIPTION OF PROCEDURE

- A. The line-stopping procedure is a means of temporarily plugging a pressurized pipe without disrupting pressure or service upstream of the line-stop. A pressure tap is first made into the main, allowing insertion of the line-Stop plugging fitting, the tapping valve can be later recovered after the plugging head has been removed from the main. The sequence consists of sixteen steps, two of which must be accomplished prior to placing orders for Line-Stop materials.
 - 1. For Concrete pipe - determine from engineering, and/or manufacturers' records:
 - a. (a) make, (b) specification, (c) age, (d) cross sectional dimensions (cylinder reinforcing/prestressing, core and coating)
- B. Prior to ordering material: Excavate, dewater, expose, and clean the exterior of the main at location of Tap(s). If main is heavily corroded; or if utilities will interfere with fittings, support/reaction blocking, or equipment; move location up or downstream to structurally sound pipe.
 - 1. Caliper O.D. of all mains to determine ovality.
 - 2. Verify wall thickness and interior condition.
 - 3. Remove outer coating and prepare a template of cylinder contours. This must be accomplished at the point where Pressure Tap(s) is to be installed.
 - 4. Backfill, restore as necessary.
- C. Upon fitting delivery, re-excavate; dewater. Assemble split tapping fitting(s) to the main.
- D. Pressure test per Engineer's specs.
- E. Pour concrete support and reaction blocking. Allow to cure per Engineer's instructions.
- F. Mount temporary tapping valve(s) to tapping fitting(s).
- G. Mount tapping machine; open valve; pressure tap; retract cutter; close temporary valve, remove tapping machine.
- H. Mount line-stop machine, open temporary valve; insert plugging head into main.
 - 1. If two or more line-stops; insert downstream plugging head first.
 - 2. NOTE: No flow in main greater than 0.5 fps at time plugging head is inserted into main.
- I. Test for shutdown at drain nozzle.
- J. Cut downstream main. Install required fittings.
- K. Retract line-stop plugging head(s), close temporary valve. Remove tapping machine.
- L. Install completion machine; open valve.

- M. Insert completion plug into nozzle of line-stop fitting.
- N. Remove completion machine and temporary valve.
- O. Repeat Par. 1.1.12 thru 1.1.14 at other line-stop fittings(s).
- P. Install blind flange(s) into nozzle of line-stop fitting(s) and into drain fitting(s).

1.3 INTERRUPTION OF FLOW

- A. The existing mains cannot be shut down or taken out of service. To ensure that the entire operations shall be accomplished without interruption of water service or flow, the installation shall be accomplished by Contractor personnel skilled and experienced in the procedures specific to line-stops of this size on PCCP.

1.4 REDUCTION OF PRESSURE

- A. The entire operation of making the Tap(s) shall be accomplished with the line pressure operating at no more than the safety limit established by mathematical calculation of the hoop stress of the unsupported cylinder with the reinforcing (pre-stressing) wires removed. A safety factor of 80% of yield is normally used. This calculation will determine the maximum operating pressure at the time of the material installation and the Tap.

1.5 PRELIMINARY FIELD INSPECTION OF MAINS

- A. Dimensional, specification, and other data regarding the existing mains have been taken from records, many of which are old and/or inadequate. These data have not been verified by field inspections. Many of these mains consist of very old concrete pipe which may contain dimensional and structural flaws. In addition, it is anticipated that exterior main conditions, service connections, or presence of adjoining utilities may require relocation of proposed Taps.
 - 1. It is necessary to know the exact main O.D., ovality, and cylinder diameter before line-stopping fittings can be manufactured.
 - 2. Prior to ordering material, Contractor shall excavate at each proposed location and caliper the header O.D. along at least four (4) diameters to determine ovality.
 - 3. If applicable, Contractor shall determine main wall thickness, uniformity, and structural integrity by means of ultrasonic testing. Data shall be submitted to Engineer.
 - 4. Contractor shall expose a section of the internal steel cylinder at the Pressure Tap location and prepare a template showing the actual contour of that cylinder. Contractor shall apply Portland cement mortar to the exposed cylinder, filling the recess flush with the O.D. of the main. Mortar will be allowed to harden before backfilling.
 - 5. If, in Engineer's opinion, the proposed location is unsatisfactory he will direct excavation at another site. Excavating, dewater, inspections, backfill and restoration will be separate pay items.

1.6 LINE-STOP FITTING AND ACCESSORIES, CONCRETE PIPE

- A. Fitting shall be full encirclement type, split tee. It shall consist of three steel weldments; (1) an upper flange saddle plate and (2) a lower saddle plate/or straps and (3) tapping flange and nozzle with gland sealing against internal cylinder in concrete

main.

1. Material Drawings: Contractor shall submit to Engineer a digital set of drawings, furnished by manufacturers, fully and distinctly illustrated, and describing the tapping fittings proposed to be furnished.
2. General: Manufacturer will exercise extreme care to ensure that weldments are of adequate strength, properly shaped, securely reinforced, and free from distortion that could stress the concrete main or its internal steel cylinder during pressure tapping.
3. Steel Weldments: All steel shall meet the requirements of ASTM A36, as a minimum. All weldments shall be braced and stress relieved.
4. Gaskets: Shall be molded from elastomer compounds that resist compression setting and are compatible with drinking water in the 32 to 140 deg. F temperature range.
5. Coating: Unless otherwise noted, all exposed steel surfaces shall be given one coat of shop prime paint.
6. Upper Flange Saddle Plate Assembly: Shall consist of a saddle plate, an anchor flange, and a cylindrical anchor neck (or nozzle).
 - a. Saddle plate shall be of 0.375" minimum thickness and shaped to concentric to the outside of the concrete main. Grout hoppers shall be provided, equally spaced across the saddle plate.
 - b. A cylindrical anchor neck of 0.375" min. wall thickness shall be securely welded to the saddle plate.
 - c. A 1.25" thick anchor flange shall be drilled and tapped to allow attachment of the gland assembly. The anchor flange shall be securely welded to the anchor neck.
 - d. Two sets of gaskets shall be provided to retain the grout between the saddle plate and the outer coating of the concrete main. One gasket will be placed second will lie immediately outside the neck.
7. Lower Saddle Plate: The lower saddle plate/straps opposite the tapping nozzle) shall be shaped to fit the contours of the outer coating of the concrete pipe.
8. Line-Stop Flange And Nozzle Assembly: This weldment shall consist of the Line-Stop flange and nozzle welded to a gland which shall seal against the internal cylinder in the concrete pipe.
 - a. The flange shall be drilled to match the anchor flange and Class 125 (ASA B 16.1-1960) Flange shall also have locking pins built into retain the completion plug.
 - b. Minimum wall thickness of nozzle shall be 0.375".
 - c. The gland shall seal to the exterior of the cylinder by means of an elastomer gasket confined in a steel retainer ring. This retainer shall be shaped by manufacturer to conform to the contour of the steel cylinder in the main. Contractor shall provide manufacturer with a template prepared from a section of the main at the locations where the Tap is to be installed (See Section 1.4.4, above).
 - d. Unmachined interior surfaces of assembly shall be sandblasted and coated with a fusion bonded epoxy to a final cured thickness of 0.015"

9. Completion Plug: The completion plug shall be machined from a stress relieved carbon steel weldment. It shall contain two (2) circumferential grooves: one to receive the locking devices from the Line-Stop flange, and the second to contain a compressible "O" ring to seal pressure tight against the bore of the flange.
10. Blind Flange: The Line-Stop fitting shall be closed with a blind flange. Facing and drilling of the blind flange shall be compatible with that of the flange. Minimum blind flange thickness shall be that of AWWA Spec. 207, Class D.
11. Gaskets: Shall be molded from elastomer compounds that resist compression setting and are compatible with water in the 32 to 140 deg. F temperature range.

1.7 INSTALLATION OF LINE-STOP FITTING, CONCRETE CYLINDER PIPE

- A. Note: Cylinder shall have been exposed and inspected by Contractor, per Section 1.4, prior to ordering tapping fitting. Contractor shall power wire brush and grind the exterior of the main to remove any debris, corrosion deposits, or other surface irregularities that might interfere with proper seating and sealing of each tapping fitting against each main. Any structural defects in main, service connections appurtenances, adjacent utilities, etc. that could interfere with Tapping installation shall be immediately reported to Engineer.
 1. Inspection: Contractor shall fit upper and lower saddle assemblies to main, thoroughly checking for proper fit to main.
 2. Assembly to Main: Under no circumstances shall Contractor attempt to force, reshape or bend saddle plates by excessive tightening of saddle studs while Line-Stop fitting is assembled around the main.
 - a. Any retrofitting shall be accomplished with the fitting removed from the main.
 - b. Any damage to fitting, accessories, or main shall be repaired at Contractor's expense to the satisfaction of Engineer.
 3. Assemble of Saddle: Upper and lower saddle assembly shall be drawn up against the main to compress gaskets (1.5.6 c).
 - a. The exterior surface of the nozzle half of the main be wetted thoroughly by pouring water into the grout hoppers.
 4. Grouting: Grouting material shall be a rich, high early strength, non-shrink, Portland cement mixture. Its' consistency shall be fluid enough to allow it to flow between the saddle plate and the surface of the main.
 - a. Upper saddle plate shall be grouted by pouring mixture into grout hoppers and vibrating saddle plate to eliminate air pockets.
 - b. After grout has taken initial set, draw studs shall be tightened as necessary.
- B. Exposure of Cylinder: Contractor shall chip exterior concrete coating from main to expose reinforcing cages or prestressing wires. Any cages not touching cylinder may be cut by torch or cold chisel. Contractor shall exercise extreme caution to avoid damage to cylinder. NOTE: Pressure in line may have to be reduced during installation of Line-Stop Fitting.
 1. Core Retention: Contractor shall anchor the inner concrete core (liner) to the cylinder with a minimum of four toggle bolts. Two stiffening ribs shall be attached to the cylinder to prevent buckling or springing after the Tap has been

completed. Placement of toggles and ribs shall not interfere with cutting equipment.

2. Line-Stop Flange/Nozzle Gland Assembly: Contractor shall thoroughly clean and prepare the surface of the cylinder to insure a pressure-tight seal to the gland gasket. Surface imperfections such as weld seams shall be carefully filled. Voids shall be filled with chemical-cure compound such as epoxies.
3. Pressure Test: Using a tapped blind flange, Contractor shall pressure test the Line-Stop fitting to verify satisfactory gland/cylinder seal. Test pressure shall not exceed line pressure in the main to avoid collapsing the cylinder and liner.
4. Nozzle Grouting: The entire volume between the Line-Stop nozzle and the anchor neck shall be filled with grouting material per Section 1.6.4 Contractor shall vibrate the nozzle to eliminate air pockets.
 - a. Nozzle grout must thoroughly set before mounting tapping valve.

1.8 THRUST AND SUPPORT BLOCKING

- A. Prior to mounting tapping valve and pressure tapping machinery, Contractor shall install concrete thrust and support blocking as shown on the plans. Blocking shall reach a minimum cure strength specified by Engineer before any valves or machinery shall be mounted onto the Line-Stop fitting.

1.9 CUTTING OPERATION

- A. Drilling equipment shall be in good condition and equipped with power drive to insure smooth cutting and to minimize shock and vibration. Cutting equipment shall be carbide tipped and capable of being renewed without removal from jobsite.
 1. Tapping Equipment: Shall be mounted and blocked to tapping valve and the entire assembly pressure tested.
 - a. Upon acceptance from Engineer the Pressure Tap may be performed.
 - b. Upon completion of Tap, machine shall be retracted, with coupon, into its' housing, tapping valve closed and equipment removed.

1.10 LINE-STOP MACHINERY

- A. The equipment shall consist of a folding plugging head that contains an elastomer sealing element. The plugging head is advanced into and from the main by means of a linear actuator. When retracted, the plugging head and carrier are housed in an adapter, bolted pressure tight between the tapping valve and the actuator.
 1. Plugging Head: The diameter of the plugging head shall be (1) pipe size (minimum) smaller than the bore of the main. plugging head shall open mechanically and sealing element be in full contact with the bore of the main when fully seated.
 2. Sealing Element: The element shall be monolithically molded from a suitable polyurethane compound. The element shall be flat in a plane perpendicular to the flow in the main and seal against the I.D. of the main when plugging head is in the fully open position.

1.11 COMPLETION

- A. The completion of the Line-Stopping shall include the installation of the Completion Plug (1.5.9) and a Blind Flange (1.5.10).

TEMPORARY LINE STOPS FOR PCCP PIPE

1. Completion Plug: Test of completion plug (1.5.9) sealing shall be accomplished through bleed-off in machinery housing.
2. Removal: Temporary valve shall be removed, and installation of blind flange shall be completed.
3. Coating of the entire remaining fitting shall be epoxy to a final minimum cured thickness of 0.020".

END OF SECTION

SECTION 02648TAPPING SLEEVES & VALVES FOR
PRESTRESSED CONCRETE CYLINDER PIPEPART 1 - GENERAL1.1 DESCRIPTION

- A. Work Included: Install tapping sleeves and valves of the type(s) and size(s) and in the location(s) shown on the Drawings and as specified herein.
- B. Related Work Specified Elsewhere:
 - 1. Section 02641 "Gate Valves".
 - 2. Section 02675 "Cleaning Testing, and Disinfection of Water Mains".

1.2 QUALITY ASSURANCE

- A. Tapping Valves: Shall meet the requirements of Section 02641. Valves shall be flanged inlet and mechanical joint outlet.
- B. Tapping Sleeves: Shall be designed for pressurized PCCP pipe. Tapping sleeves shall be fabricated steel with epoxy coating designed to reinforce the pipe and provide easy installation with maximum safety factor. All hardware shall be 316 stainless steel bolts and straps.
- C. Manufacturers of tapping sleeves shall have a minimum of 10 years of experience manufacturing similar products.
- D. Acceptable Manufacturers:
 - 1. JCM Model 415.
 - 2. Or approved equivalent.

PART 2 - PRODUCTS2.1 MATERIALS

- A. Valves: Shall be resilient wedge gate valve with flanged joint inlet by mechanical joint outlet with non-rising stem as specified in Section 02641.
- B. Tapping Sleeves:
 - 1. Shall be suitable for use on precast concrete cylinder pipe as applicable.
 - 2. NSF-61 certified fusion bonded epoxy on entire sleeve.
 - 3. Tapping sleeve shall have a separate body and tapping gland to reinforce the pipe prior to removal of prestress wire.
 - 4. Outlet gasket shall be a broad cross section gasket with hydrodynamic lip to provide initial seal that increases with increased line pressure.
 - 5. Tapping sleeve shall be equipped with load bearing set screws on the gland flange to transfer any load on the outlet from the steel cylinder and onto the sleeve.
 - 6. Grout Seal Assembly – provide grout seal assembly under the sleeve to facilitate fitting oversize, undersize, or out-of-round pipe.
 - 7. Nuts and Bolts – Type 316 stainless steel, coated to prevent galling.
- C. Gasket: Virgin Neoprene (SBR) or Buna-N (NBR) type full circumferential gasket

suitable for potable water.

- D. Valve Boxes: As specified in Section 02646.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Tapping Sleeve and Valve:
1. Confirm the outside diameter of the pipe matches the range specified for the tapping sleeve. Contractor shall create a template of the outside of outside diameter of the pipe surface per manufacturer's recommendations.
 2. Thoroughly clean and disinfect the exterior pipe surface. A suitable NSF approved lubricant should be used on rough surface pipe to assure proper seal.
 3. Outlet shall be set horizontally, and sleeve shall be squarely centered on the main to be tapped. Make sure the valve is in proper alignment by checking to see that the distance between flange faces on all sides is equal.
 4. Concrete shall be poured under the sleeve and valve to provide support during the tapping operation.
 5. Pressure test the tapping sleeve before installing the tap.
 6. Poured concrete thrust blocks shall be provided under and behind all tapping sleeves. Allow to cure per Engineer's instructions.
 7. After completing the tap, the valve shall be flushed to ensure the valve seat is clean.
 8. Boxes shall be set vertically and adequately supported squarely over the operating nut.
- B. Installation shall be made under pressure and tapping machine shall be furnished by a Specialty Contractor with a minimum of 10-years of experience installing similar sized pressurized taps on PCCP pipe.
- C. Installation shall be in accordance with AWWA Manual M-9.

3.2 ADJUSTING

- A. Valve Boxes: Top of valve box shall be adjusted to be flush with final grade.

END OF SECTION

SECTION 02649TRACER WIREPART 1 - GENERAL1.1 DESCRIPTION

- A. Install electrically continuous tracer wire with access points as described herein to be used for locating non-metallic pipe with an electronic pipe locator after installation.

1.2 SUBMITTALS

- A. Manufacturer's materials specifications

1.3 QUALITY ASSURANCE

- A. All system components specified herein shall be furnished by a single Manufacturer who regularly engages in the production of this type of equipment. The Manufacturer shall be responsible for the performance and warranty of the entire system provided under this section.
- B. Qualifications of Manufacturers: The Manufacturer shall have a minimum of 10 years of experience in the design and manufacture of the specified systems.
- C. Acceptable Manufacturers:
 - 1. Copperhead Industries
 - 2. Seton
 - 3. Or equivalent
- D. Project Design: Attention is directed to the fact that the Drawings are based on Copperhead Industries as listed in this Section.

1.4 PROJECT CONDITIONS

- A. Service Laterals on public property - Trace wire must terminate at an approved grade level/in-ground trace wire access box, located at the edge of the road right-of-way, and out of the roadway.
- B. Service Laterals on private property - Trace wire must terminate at an approved above-ground trace wire access box, affixed to the building exterior directly above where the utility enters the building, at an elevation not greater than 5 vertical feet above finished grade, or terminate at an approved grade level/in-ground trace wire access box, located within 2 linear feet of the building being served by the utility.
- C. Hydrants – Trace wire must terminate at an approved above-ground trace wire access box, properly affixed to the hydrant grade flange. (affixing with tape or plastic ties shall not be acceptable)
- D. Long-runs, in excess of 500 linear feet without service laterals or hydrants - Trace wire access must be provided utilizing an approved grade level/in-ground trace wire access box, located at the edge of the road right-of-way, and out of the roadway. The grade level/in-ground trace wire access box shall be delineated using a minimum 48" polyethylene marker post, color coded per APWA standard for the specific utility being marked.

PART 2 - PRODUCTS

2.1 MATERIAL

- A. Tracer wire for open trench installations shall be 10-gauge minimum copper clad steel wire (CCS) with thermoplastic insulation recommended for direct burial (Copperhead #1030-HS or equal).
- B. Tracer wire for horizontal directional drill installations shall be 8-gauge minimum extra-high strength (1,700 lb. yield strength) CCS with 45 mil HDPE insulating jacket and 30 Volt maximum rating (Copperhead SoloShot 845-EHS or equal).
- C. Tracer wire for pipe bursting/slip lining installation shall be 7 x 7 Stranded Copper Clad Steel, Extreme Strength with 4,700 lb. break load and minimum 50 mil HDPE insulating jacket (Copperhead #PBX-50 or equal).
- D. All mainline trace wires must be interconnected in intersections, at mainline tees and mainline crosses. At tees, the three wires shall be joined using a single 3-way lockable connector (Copperhead #LCS1030 or equal). At Crosses, the four wires shall be joined using a 4-way connector. Use of two 3-way connectors with a short jumper wire between them is an acceptable alternative. Wire connectors shall be watertight and provide electrical continuity.
- E. Direct bury wire connectors shall include 3-way lockable connectors and mainline to lateral lug connectors specifically manufactured for use in underground trace wire installation. Connectors shall be dielectric silicon filled to seal out moisture and corrosion, and shall be installed in a manner so as to prevent any uninsulated wire exposure (Copperhead #3WB-01 or equal).
- F. Tracer wire color shall be blue for all water construction.
- G. Tracer wire access boxes or test stations shall be heavy duty in-ground boxes with cast iron lids color coded to identify use. Non-Roadway access boxes shall be light-duty grade level boxes (Copperhead # LD14*TP or equal). Concrete/Driveway boxes shall be standard grade level boxes (Copperhead #CD14*TP 14" or equal). Fire hydrant access boxes shall be above ground two terminal boxes with 1" conduit (Copperhead Cobra #T3-75-F or equal).
- H. Trace wire must be properly grounded at all dead ends/stubs. Grounding of trace wire shall be achieved by use of a drive-in magnesium grounding anode rod with a minimum of 20-feet of #14 red HDPE insulated copper clad steel wire connected to anode (minimum 0.5 lb.) specifically manufactured for this purpose, and buried at the same elevation as the utility (Copperhead #ANO-14 or equal).

PART 3 - EXECUTION

3.1 GENERAL REQUIREMENTS

- A. Tracer wire shall be installed on PVC and HDPE mains, laterals and services. The wire shall be installed in such a manner as to be able to properly trace all water mains without loss or deterioration of signal or without the transmitted signal migrating off the tracer wire.
- B. Trace wire shall be installed in the same trench for open trench installation, inside bored holes if horizontal directional drilling and inside casing if cased pipe installation for all non-metallic pipelines. It shall be secured to the pipe as required to ensure that the wire remains adjacent to the pipe. The trace wire shall be securely

bonded together at all wire joints with an approved watertight connector to provide electrical continuity, and it shall be accessible at all new water valve boxes.

- C. At all hydrant connections, tracer wire shall be installed inside a magnetized tracer box directly adjacent to the hydrant. Tracer boxes shall be heavy duty cast lid boxes with 5-inch top flange and color-coded lid to match utility located. Lids shall be directly connected to tracer wire and not require removal of the lid for connection of locator device. Tracer boxes shall be Copperhead SnakePit Roadway Boxes or approved equal.
- D. At the point of connection between cast or ductile iron water mains, with any non-iron water main, the tracer wire shall be properly connected to the iron pipe with a cad weld or approved equivalent. Tracer wire welds shall be completely sealed with the use of an approved mastic type sealer specifically manufactured for underground use. Mastic shall be applied in a thick coat a minimum of 1/2-inches thick and shall be protected from contamination by the backfill material with the use of a plastic membrane.
- E. Tracer wire shall be laid flat and securely affixed to the pipe at 10 foot intervals. The wire shall be protected from damage during the execution of the works. No breaks or cuts in the tracer wire or tracer wire insulation shall be permitted. At water service saddles, the tracer wire shall not be allowed to be placed between the saddle and the water main. Except for approved spliced-in connections, tracer wire shall be continuous and without splices from valve box to valve box.
- F. At all non-metallic pipe ends, a minimum, of 6 feet of tracer wire shall be extended beyond the end of the pipe, coiled and secured for future connections. The end of the tracer wire shall be spliced to the wire of a six-pound magnesium or zinc anode and is to be buried at the same elevations as the water main.
- G. For horizontal directional drilling, auguring or boring installations, two tracer wires shall be installed with the pipe and connected to the tracer wire at both ends, or cad welded to the existing iron pipe at both ends.
- H. Spliced connections between the main line tracer wire and branch connection tracer wire shall only be allowed at water main tees, crosses or at iron or copper water services where a portion of the branch connection water main or water service is replaced with a non-iron or non-copper material. The branch connection tracer wire shall be a single tracer wire properly spliced to the main line tracer wire. Where the existing branch connection is neither iron nor copper, then the new branch connection tracer wire shall be properly spliced to the existing tracer wire on the branch connection.
- I. At all repair locations where there is existing tracer wire, the tracer wire shall be properly reconnected and spliced as outlined above.

3.2 TERMINATION/ACCESS

- A. All tracer wire termination points shall utilize an approved tracer wire access box specifically manufactured for this purpose.
- B. All grade-level/in-ground boxes shall be properly identified with “sewer” or “water” cast into the cap and color coded.
- C. A minimum of 2 feet of excess/slack wire is required at all tracer wire access boxes after meeting final elevation.
- D. All tracer wire access boxes must include a manually interruptible

conductive/connective link between the terminals for the tracer wire connection and the terminal for the grounding anode wire connection.

- E. A drive-in grounding anode rod is required at each termination/access point installed at pipe elevation. Anode rod shall have factory applied grounding anode wire for connection to access box. Grounding anode wire shall be connected to the identified terminal on all access boxes.

3.3 TESTING REQUIREMENTS

- A. Contractor shall perform a continuity test on all trace wire in the presence of the Engineer or the Engineers' representative. If the trace wire is found to be not continuous after testing, Contractor shall repair or replace the failed segment of the wire.

3.4 MEASUREMENT

- A. There is no separate payment for the supply and installation of tracer wire on any construction or installation of non-ductile iron water main by the Contractor. The Contractor shall consider the supply and installation of the tracer wire incidental to all construction of non-ductile mains.

END OF SECTION

SECTION 02650

BURIED UTILITY MARKINGS

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work Included:
 - 1. This work shall consist of providing and installing utility line markings above all buried lines installed as part of this contract and replacing existing markings disturbed as part of this contract. Buried utilities are indicated on the Civil and Electrical Drawings.
- B. Related Work Specified Elsewhere:
 - 1. Pipe, excavation, backfill, and insulation are specified in the appropriate Sections in this Division.

1.2 SUBMITTALS

- A. Submit shop drawings in accordance with the applicable section of Division 1 and the General Conditions of the Construction Contract.
- B. Submit manufacturer's "Certification of Conformance" that utility markings meet or exceed the requirements of these Specifications.
- C. Submit manufacturers specifications for utility markings.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Materials and color shall be in accordance with latest AASHTO specifications for pipe and utility marking.
- B. Marking tape color shall be in accordance with latest American Public Works Association (APWA) Uniform Color Code and American National Standards Institute ANSI Standard Z535.1, Safety Color Code specifications for buried utility marking as noted in the Schedule below.
 - 1. Schedule

Marker Color	Buried Utility
Blue	Potable Water & Associated lines
Green	Sanitary Sewers, Storm Drain and other Drain lines
Orange	Telecommunication, signal, alarm
Purple	Reclaimed, Recycled, Irrigation Water and Slurry Lines
Red	Electric Power lines cables conduits and lighting cables
Yellow	Gas, Oil, Steam, Petroleum or Gaseous Material Lines

- 2. Warning Information shall be in Black Letters with typical wording of:
 - a. "CAUTION: BURIED (NAME OF UTILITY LINE) BELOW"
- C. For ferrous pipe material use 0.004" minimum polyethylene film; 6" wide clearly marking type of buried utility.

- D. For non-ferrous pipe material (e.g. Concrete, PVC, PE, etc.) use detection tape composite of polyethylene and metallic core 6" wide clearly marking type of buried utility.
- E. Seton Identification Products, New Haven, CT, Utility Safeguard LLC or equal.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Marking tape shall be installed over utility lines centerline and buried 24" below grade.
- B. Markings damaged during opening of trench shall be reinstalled with 2' overlap at broken sections.

END OF SECTION

SECTION 02655COUPLINGS & CONNECTORSPART 1 - GENERAL1.1 DESCRIPTION

- A. Furnish and install couplings and connectors of the type and size in the location shown on the Drawings and as specified herein.

1.2 QUALITY ASSURANCE

- A. Minimum pressure rating equal to that of the pipeline in which they are to be installed.
- B. Couplings and connectors, other than those specified herein, are subject to the Engineer's approval. Acceptable Manufacturers:
 - 1. Romac Industries
 - 2. Krausz
 - 3. Smith Blair
 - 4. For Meter Box Company
 - 5. Or Equal
- C. Reference Standards:
 - 1. AWWA C104 – Cement-Mortar Lining for Ductile-Iron Pipe and Fittings
 - 2. AWWA C111 – Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings
 - 3. AWWA C116 – Protective Fusion-Bonded Coatings for the Interior and Exterior Surfaces of Ductile-Iron and Gray-Iron Fittings
 - 4. AWWA C153 – Ductile-Iron Compact Fittings
 - 5. AWWA C213 – Fusion-Bonded Epoxy Coatings and Linings for Steel Water Pipe and Fittings
 - 6. AWWA C219 – Bolted, Sleeve-Type Couplings for Plain-End Pipe

1.3 SUBMITTALS

- A. Submit shop drawings in accordance with the applicable section of Division 1 and the General Conditions of the Construction Contract.
- B. Submit manufacturers product data and installation instructions.

PART 2 - PRODUCTS2.1 MATERIALS

- A. All Couplings and Connectors:
 - 1. Gasket Materials: Composition suitable for exposure to the liquids to be contained within the pipes.
 - 2. Diameters to properly fit the specific types of pipes on which couplings and connectors are to be installed.
- B. Sleeve Type Transition Couplings (for 4 – 12" pipe size)
 - 1. Buried Non-Restrained Couplings:
 - a. Two top facing bolt design

- b. Fusion bonded epoxy ductile iron center sleeve, end rings and bolt guides. Ductile iron meeting or exceeding ASTM A536, Grade 65-45-12.
 - c. Two wedge-section EPDM or NBR rubber gaskets compounded for water service. NSF-61 certified for potable water service.
 - d. Ductile iron heat treated grippers, 304 stainless steel draw hooks, and reinforced nylon ramp runners.
 - e. Nuts and bolts shall be 304 Stainless Steel with rolled thread and anti-galling compound.
 - f. Couplings shall be long barrel type.
 - g. Coupling shall be fusion bonded epoxy coated meeting AWWA C213 and NSF-61 standards for potable water applications.
 - h. Acceptable Manufacturers:
 - i. Romac Industries – Macro HP™
 - ii. Krausz – Hymax® 2
 - iii. Smith Blair – Model 421
 - iv. Or Equal
2. Buried Restrained Couplings:
- a. Two top facing bolt design
 - b. Fusion bonded epoxy steel or ductile iron center sleeve and end rings.
 - c. Two wedge-section EPDM or NBR rubber gaskets compounded for water service and NSF-61 certified.
 - d. 304 Stainless Steel bridge or Armor over gasket in expansion zone.
 - e. Nuts and bolts shall be 304 Stainless Steel with rolled thread and anti-galling compound.
 - f. Couplings shall be long barrel type.
 - g. Coupling shall be fusion bonded epoxy coated meeting AWWA C213 and NSF-61 standards for potable water applications.
 - h. Acceptable Manufacturers:
 - i. Romac Industries – Alpha™
 - ii. Krausz – Hymax Grip
 - iii. Smith Blair – Pipe Lock Coupling
 - iv. Or Equal
- C. Solid Sleeve Couplings
- 1. Solid sleeves shall be ductile iron with mechanical joint ends.
 - 2. Couplings shall meet AWWA/ANSI C-153/A21.53 and C-111/A21.11 for joints, and C-104/A21.4 for cement lining in sizes 3"-24".
 - 3. Nuts and bolts shall be ductile iron low alloy steel per ANSI/AWWA A21.11/C-111.
 - 4. Acceptable Manufacturers:
 - a. Romac – Model 501.
 - b. Smith Blair – Model 441.
 - c. Ford – Model FC1 or FC2A.
 - d. Or Equal.
- D. Flexible Couplings for drain connections (Fernco or equal)
- 1. Rubber material with stainless steel clamps.
 - 2. Must provide a positive seal against infiltration and exfiltration.

3. Coupling materials must conform to applicable portions of ASTM C443 (Concrete), C564 (Cast Iron), D1869 (A.C.), D5926 (PVC), C1173 (transition) and CSA B602.
- E. Mechanical Joint Adaptors (Foster Adaptor® – Infact Corporation)
 1. Required to connect fittings and valves with mechanical joints.
 2. Ductile iron construction mechanical joint bolt pattern.
 3. Bolts and nuts shall meet AWWA C-111.
- F. Restrained Flange Adapters
 1. All flange adapters shall be fully restrained type adapters, suitable for connection to existing cast iron pipe.
 2. All adapter hardware shall be 316 stainless steel.
 3. Acceptable Manufacturers:
 - a. EBAA Iron Series 2100 MegaFlange
 - b. Romac – Model RFCA

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Sleeve Type Couplings:
 1. Thoroughly clean pipe ends a minimum of 12-inches from the ends prior to installing couplings and use soapy water as a gasket lubricant.
 2. Slip an end ring and gasket over each pipe and place the center sleeve centered over the joint.
 3. Insert the other pipe length into the center sleeve the proper distance.
 4. Press the gaskets and end rings evenly and firmly into the center sleeve flares.
 5. For two-bolt systems, insert or tighten the bolts, finger tighten and progressively tighten nuts on the top of the coupling with a torque wrench applying the torque recommended by the manufacturer. For multiple bolt systems, insert or tighten the bolts, finger tighten and progressively tighten diametrically opposite nuts around the coupling with a torque wrench applying the torque recommended by the manufacturer.
 6. Insert and tighten the tapered threaded lock pins as needed.
- B. Install thrust rods, supports, and other provisions to properly support pipe weight and axial equipment loads.

END OF SECTION

SECTION 02675CLEANING, TESTING AND DISINFECTION OF WATER MAINSPART 1 - GENERAL1.1 DESCRIPTION

- A. The work of this section includes the furnishing of all labor, tools, equipment and materials and performing all operations necessary for the flushing, pressure testing, leakage testing and chlorination of water mains as specified herein and as required to complete the work.

1.2 REQUIREMENTS SPECIFIED ELSEWHERE

- A. Additional Requirements are specified elsewhere including, but not necessarily limited to, General Conditions, Supplementary Conditions, and Division 1.

1.3 QUALITY ASSURANCE

- A. Standards (as applicable):
 - 1. All work shall be in accordance with this specification and AWWA C651. Where conflicts appear between these specifications and AWWA C651 the more stringent requirement shall apply.
 - 2. Chlorine solution for disinfecting water mains and appurtenances shall be made from either liquid sodium hypochlorite, or solid calcium hypochlorite, which shall conform to the latest AWWA B300 Standard for Hypochlorite.
 - 3. Chlorine test kits shall be as described in the current edition of AWWA M12 - Simplified Procedures for Water Examination.
 - 4. Disposal of chlorinated water as per AWWA C651, Appendix B.

1.4 COORDINATION

- A. Use of water will only be as approved and coordinated by the Owner.
- B. All flushing, pressure and leakage testing and chlorinating shall be done by the Contractor in the presence of the Engineer and in the presence of the Owner or Owner's Representative in accordance with the requirements of the local and state plumbing codes and the appropriate Sections of these Specifications, at no additional cost to the Owner.

PART 2 - PRODUCTS2.1 MATERIALS

- A. Each temporary blow-off shall consist of a corporation cock, type K copper tubing and a curb stop, each of not less than 1-inch diameter.
- B. A pumping unit or proportionate feeder suitable for delivering a hypochlorite solution to the isolated main shall be provided. The unit used shall prevent chlorine solution from flowing back into the existing system.

PART 3 - EXECUTION

3.1 GENERAL

- A. Thoroughly clean all piping prior to testing. Remove all dirt, dust, oil, grease and other foreign material. Exercise care while cleaning to avoid damage to linings and coatings.
- B. Supply all labor, equipment, materials, gages, and pumps required to conduct the tests. The drawings do not detail taps, gages, plugs and other related materials required to perform testing. These materials are the responsibility of the Contractor.
- C. Flushing, testing and chlorinating of the mainline shall closely follow main laying work. As the mainline is installed, it shall be tested approximately every 1,000 feet, or between line valves, whichever is less. Should the mainlines fail to be flushed, tested, and chlorinated as specified, the main laying work shall be suspended until the flushing, testing and chlorinating is done.
- D. Final acceptance of the water main shall be based on successful (negative) results of bacteriological tests, which shall be done on samples taken from the main following chlorination and final flushing. Locations of samples shall be determined by the Engineer.
- E. The testing and related procedures described herein, shall be performed in the order listed.
- F. The Contractor, with the assistance of the Owner, shall fill mains as slowly as practicable so as not to cause dirty water and serious pressure drops within the existing system.
- G. Temporary disinfection taps used for chlorination shall be capped at the corporation and removed once the main passes bacteriological testing after final chlorination.

3.2 AIR REMOVAL

- A. After filling the line and letting it sit for 24-hrs the line shall be burped to purge the air in the line. Air shall be completely expelled from the mains, valves, and hydrants before flushing or applying the specified test pressure. After all air has been expelled, the air blowoffs can be closed, and the test pressure applied.

3.3 FLUSHING

- A. All new water mains, and existing water mains that have been drained and cut-into for making connections, shall be filled and allowed to sit for 24 hours and burped to purge air prior to thoroughly flushing, leakage testing or final chlorination. Flushing shall be accomplished by partially opening and closing valves, hydrants, and blowoffs, several times, under expected line pressure, with flow velocities of not less than 3 feet per second, in the main. The size and number of hydrant outlets and/or main taps to provide the required flow (at 40 psi residual pressure) is as follows:

Minimum Required Flow and Openings Required to Flush Water Mains
(Assuming 40 psi Residual Pressure in Water Mains)

Main Diameter (in.)	Flow Required to Produce 3 fps in Main (gpm)	Minimum Size of Taps (in.)	Hydrant Outlets Number	Size (in.)
4	120	15/16	1	2-1/2
6	265	1-3/8	1	2-1/2
8	470	1-7/8	1	2-1/2
10	735	2-5/16	1	2-1/2
12	1,055	2-13/16	1	2-1/2
16	1,880	3-5/8	2	2-1/2

1. If less than a 40-psi residual is available in the main, with the size tap shown above then a larger, or more tap(s) or hydrant outlets will be required, as determined by the Engineer.
2. The length of time for flushing, at or above the minimum allowable velocity, shall be computed to allow a minimum of 3 times the total volume of water in the main to be flushed to waste. Flushing shall be done in the presence of the Engineer.

3.4 PRESSURE TEST

- A. All new water mains, or any sections thereof, shall be subjected to a hydrostatic pressure of at least 1.5 times the working pressure that will exist at the point of testing, or 150 psi, whichever is greater. Test pressures shall meet the following requirements:
 1. Fill line and let sit for 24 hours, flush and then pressure test.
 2. Be of at least 2-hour duration.
 3. Be not less than 1.25 times the expected system working pressure at the highest point along the test section.
 4. Not exceed main or thrust-restraint design pressures.
 5. Not vary by more than + 5 psi for the duration of the test.
 6. Not exceed 2-times the rated pressure of the valves or hydrants when the pressure boundary includes closed valves or hydrants. Valves shall not be operated in either direction at differential pressure greater than the rated pressure.
 7. Not exceed 1.5-times the rated pressure of the valves when the pressure boundary of the test section includes closed butterfly valves or resilient seated gate valves.
- B. Each section of main shall be slowly raised to the specified test pressure for two separate periods. The first period shall be for 15-minutes, after which the pressure shall be allowed to drop slowly back to system pressure. The pressure shall then be slowly raised again to the specified test pressure and maintained for 2-hours. The test pressure shall be based on the elevation of the lowest point of the main, in the test section and shall be corrected to the elevation of the test gauge, as directed by the Engineer. The test pressure shall be applied by means of a pump connected to

CLEANING, TESTING AND DISINFECTION OF WATER MAINS

the main, in an approved manner, and which will prevent any backflow into the existing system. Valves shall not be operated in either the closing or opening direction, at differential pressure greater than the rated pressure.

- C. Any exposed main, fittings, valves, hydrants and joints shall be carefully examined during the test. Any damaged or defective main, fittings, hydrants, or valves discovered following, or as a result of the pressure test shall be repaired or replaced with sound material. If faulty materials are removed and replaced, the pressure testing procedure shall be repeated.

3.5 LEAKAGE TEST - DUCTILE IRON AND PVC PIPES

- A. Leakage testing shall be conducted concurrently with the pressure test.
- B. Leakage is defined as the quantity of water that must be pumped into the new main during the test, or any section thereof, required to maintain pressure within 5 psi of the starting test pressure. Leakage shall be recorded to the nearest one-tenth of a gallon. The Contractor shall employ qualified personnel throughout the testing. Leakage shall not be measured by a drop in pressure over a period of time.
- C. Leakage in the test section must be less than an amount determined as follows:

$$L = \frac{SD(P^{0.5})}{148,000}, \text{ where}$$

L = allowable gallons of leakage per hour

S = the length of main tested, in feet

D = the nominal main diameter in inches

P = the average test pressure during the test, in psi

- D. The leakage formula is based allowable leakage of 11.65 gallons per day, per mile of main, per inch (nominal) of main diameter, at a pressure of 150 psi. Allowable leakage under various conditions is shown below.

Allowable Leakage (gph) per 1,000 Feet of Mainline

Average Test Pressure(psi)	Nominal Diameter (inches)						
	6	8	10	12	16	20	24
250	0.64	0.85	1.07	1.28	1.71	2.14	2.56
225	0.61	0.81	1.01	1.22	1.62	2.03	2.43
200	0.57	0.76	0.96	1.15	1.53	1.91	2.29
175	0.54	0.72	0.89	1.07	1.43	1.79	2.15
150	0.50	0.66	0.83	0.99	1.32	1.66	1.99
125	0.45	0.60	0.76	0.91	1.21	1.51	1.81
100	0.41	0.54	0.68	0.81	1.08	1.35	1.62

1. If the mainline under test contains sections of various diameters, the allowable leakage will be the sum of the computed leakage for each size.

2. When testing against closed metal seated valves, an additional leakage shall be allowed per closed valve of 0.0078 gallons per hour, per inch of nominal valve diameter.
 3. When hydrants are in the test section, the test shall be made against the closed hydrant(s).
- E. Acceptance shall be determined on the basis of allowable leakage. If leakage in any test is greater than that specified, the Contractor shall locate and make repairs as necessary until the leakage is within the specified allowance.
1. All visible leaks are to be repaired regardless of the amount of leakage.
 2. All water mains shall be pressure and leakage tested in the presence of the Engineer, in order to qualify for acceptance.

3.6 LEAKAGE TEST - HIGH DENSITY POLYETHYLENE (HDPE) PIPES

- A. Hydrostatic leak testing shall be performed in accordance with procedures specified in Chapter 2, Inspections, Tests and Safety Considerations of Plastic Pipe Institute's (PPI) "Handbook of Polyethylene Pipe" 1st edition, 2006.
- B. Two types of leak test procedures are acceptable: 1) Monitored Make-up Water Test, and 2) Non-Monitored Make-Up Water Test
- C. Monitored Make-Up Water Test procedures are as follows:
 1. Clean water shall be used as the pipe testing fluid. The test section of pipe shall be completely filled with water taking care to bleed off any trapped air. Venting at high points may be required to purge air pockets while the test section is filling.
 2. The maximum allowable test pressure is 1.5 times the system design pressure at the lowest elevation in the section under test.
 3. The test procedure consists of 2 phases, an initial expansion phase and a testing phase. During the expansion phase, the test section is pressurized to test pressure and a sufficient quantity of make-up water is added each hour for 3 hours to maintain test pressure.
 4. After the initial expansion phase, about 4 hours after pressurization, the test phase begins. The test phase begins with the water pressure in the pipe at the test pressure. The test phase may be 1, 2 or 3 hours long, after which time a measured amount of water is added in order for the water pressure in the pipe to return to the test pressure. If the quantity of make-up water does not exceed the values in the table below, the test section of pipe passes the leak test.

HDPE LEAK TEST MAKE-UP WATER ALLOWANCE

Nominal Pipe Size (inches)	Make-up Water Allowance (U.S. Gallons per 100 feet of pipe)		
	1 Hour Test	2 Hour Test	3 Hour Test
1 ¼	0.06	0.10	0.16
1 ½	0.07	0.10	0.17
2	0.07	0.11	0.19
3	0.10	0.15	0.25
4	0.13	0.25	0.40
5	0.19	0.38	0.58
5.375	0.21	0.41	0.62
6	0.3	0.6	0.9
7 .125	0.4	0.7	1.0
8	0.5	1.0	1.5
10	0.8	1.3	2.1
12	1.1	2.3	3.4
13.375	1.2	2.5	3.7
14	1.4	2.8	4.2
16	1.7	3.3	5.0
18	2.0	4.3	6.5
20	2.8	5.5	8.0
22	3.5	7.0	10.5
24	4.5	8.9	13.3
26	5.0	10.0	15.0
28	5.5	11.1	16.8
30	6.3	12.7	19.2
32	7.0	14.3	21.5
34	8.0	16.2	24.3
36	9.0	18.0	27.0
42	12.0	23.1	35.3
48	15.0	27.0	43.0
54	18.5	31.4	51.7
63	-	-	-

5. Non-Monitored Make-Up Water Test procedures are as follows:
 - a. The test procedure consists of 2 phases, an initial expansion phase and a testing phase. For the initial expansion phase, make-up water is added as required to maintain the test pressure in the test section of pipe for 4 hours.
 - b. After the expansion phase is complete, the test phase begins with the pressure in the pipe at test pressure. The test pressure is then reduced by 10 psi. If the pressure remains steady (within 5% of target value) after one hour, then the pipe has passed the leakage test.
6. All water mains shall be pressure and leakage tested in the presence of the Engineer, in order to qualify for acceptance.

3.7 CHLORINATION

- A. The method of chlorination shall be the Continuous Feed Method as described hereinafter. Chlorination procedures will not be allowed until acceptable flushing and pressure testing has been performed and accepted. The continuous feed method consists of the following steps:
1. Prior to the application of chlorine, confirm that valves are closed to prevent back-feeding chlorine solution into the existing system.
 2. At a point not more than 10 feet downstream from the beginning of the new main, fill the main with chlorinated potable water, having an initial concentration of 25 mg/l free chlorine residual.
 - a. Water from the existing distribution system or other approved source of supply shall flow at a constant measured rate, into the new main. In the absence of a meter, the rate may be approximated by measuring the discharge rate at the end of the test section with a pito-gauge or by measuring the time to fill a container of known volume.
 3. The application of chlorine solution shall continue until the entire main is filled with water having 25 mg/l of free available chlorine. To assure that 10 mg/l free chlorine residual concentration is achieved throughout the test section, the Contractor shall measure chlorine concentration at regular intervals.
- B. The amount of chlorine required to obtain a concentration of 25 mg/l per 100 feet of various diameter mains is as follows.

Chlorine Required to Obtain 25 mg/l per 100 feet of Various Diameters

Main Diameter (inches)	Sodium Hypochlorite (gallons)				Calcium Hypochlorite (ounces)
	5% Available Chlorine	10% Available Chlorine	12.5% Available Chlorine	15% Available Chlorine	65% Available Chlorine
4	0.03	0.02	0.02	0.01	0.02
6	0.08	0.04	0.03	0.03	0.75
8	0.13	0.07	0.06	0.06	1.30
10	0.20	0.10	0.09	0.07	2.10
12	0.28	0.15	0.12	0.10	2.90
16	0.50	0.25	0.22	0.17	5.30
20	0.80	0.40	0.34	0.28	8.40
24	1.30	0.60	0.50	0.40	12.00

1. The above quantities are to be added to a sufficient quantity of water, dissolved, and mixed. The solution shall be injected into the main as specified.
 2. The quantities shown are based on concentrations of available chlorine by volume. Extended or improper storage may have caused a loss of available chlorine.
- C. The chlorinated water shall be retained in the main for a minimum of 24-hours. At

the end of this 24-hour period, retest portions of the main to confirm that a minimum of 10 mg/l free available chlorine residual exists in the main. If the residual chlorine is less than 10 mg/L, acceptable bacteria results may not be obtained.

- D. All water main disinfection shall be performed in the presence of the Engineer and potentially the regulatory agency, in order to qualify for acceptance.

3.8 FINAL FLUSHING OF CHLORINATED WATER

- A. After the initial 24-hour period, the heavily chlorinated water shall be flushed from the main until chlorine measurements show the concentration in water leaving the main is no higher than that generally prevailing in the system.
- B. The Contractor shall obtain approval of location(s) for discharging the heavily chlorinated water, which will result from the chlorination procedures. Great care shall be exercised in the selection of the rate of flow and the discharge points, in order to minimize complaints, and damage to public or private property.
- C. The heavily chlorinated water shall be suitably and thoroughly neutralized prior to disposal into the environment. In no case shall chlorinated or neutralized water be discharged directly into a water body. If necessary, state, federal, and local regulatory agencies should be contacted to determine special provisions for the disposal of heavily chlorinated water.

3.9 BACTERIOLOGICAL TESTS

- A. After final flushing and before the water main is placed in service, water samples shall be collected twice (at least 16-hours apart) by the Engineer or Owner and tested for bacteriological quality in accordance with standard methods. Water samples shall show the absence of coliform organisms and background bacteria.
- B. If, during construction, trench water has entered the main, or if in the opinion of the Engineer excessive quantities of dirt or debris have entered the main, bacteriological samples shall be taken at intervals of approximately 200 feet and shall be identified as to location. Samples shall be taken of water that has stood in the main for at least 24-hours after final flushing has been completed.
- C. Samples shall be obtained through a corporation cock and copper tubing installed by the Contractor.
- D. The Engineer or Owner shall deliver samples to a laboratory approved by the Department of Health Services for bacterial analysis. The Owner shall pay for the cost of analysis. Only after each consecutive sample is approved shall the mains be incorporated into the water system. In the event that positive reports of contamination are received, the mains shall be flushed and chlorinated as many times as may be necessary to obtain approved (negative) results.

3.10 RE-CHLORINATION

- A. If the initial chlorination fails to produce satisfactory bacteriological samples, the main shall be re-flushed and re-sampled. If re-sampling fails to produce acceptable results, the main shall be re-chlorinated until satisfactory results are obtained.

3.11 CHLORINATION PROCEDURES WHEN CUTTING INTO OR REPAIRING EXISTING MAINS

- A. Trench Treatment. If during excavation the trench is either wet or filled with water, it is recommended that liberal quantities of hypochlorite tablets be applied to open trench areas to lessen the danger from pollution.
- B. The interior of all main and fittings used in making a repair shall be swabbed or sprayed with a 1 percent hypochlorite solution before they are installed.
- C. If valve and hydrant locations permit thorough flushing toward the work location from both directions, it shall be done. Flushing shall be started as soon as the repairs are completed and shall be continued until discolored water is eliminated.
- D. Slug Chlorination. Where practical and in addition to the procedures above, a section of main in which the break is located shall be isolated. All service connections shall be shut off, and the section flushed and chlorinated by the Slug Chlorination method. This method allows the chlorine dose to be increased to as much as 300 mg/l, and the contact time reduced to as little as 1-hour. After chlorination, the section shall be properly flushed until discolored water is eliminated and the water is free of noticeable chlorine odor.
- E. Bacteriological samples shall be taken after repairs. If the direction of flow is unknown, samples shall be taken on each side of the main break. If positive samples are recorded, daily sampling shall be continued until two consecutive negative samples are recorded.

END OF SECTION

SECTION 03300CAST-IN-PLACE CONCRETE (SHORT FORM)PART 1 - GENERAL1.1 SECTION INCLUDES

- A. Cast-In-Place Concrete indicated on the Contract Drawings
- B. Formwork
- C. Concrete and CMU deformed reinforcement bars and accessories
- D. Epoxy and expansion anchors
- E. Concrete finishing, curing, modifications and repairs
- F. Concrete testing
- G. Non-Shrink Grout

1.2 PRODUCTS INSTALLED BUT FURNISHED UNDER OTHER SECTIONS

- A. Anchor Rods: Section 05500 - Metal Fabrications
- B. Embedded Angles: Section 05500 - Metal Fabrications
- C. Embedded Plates: Section 05500 - Metal Fabrications

1.3 RELATED SECTIONS

- A. Section 01340 - Submittals
- B. Section 01400 - Quality Control
- C. Section 05500 - Metal Fabrications

1.4 REFERENCES

- A. This section contains references that are applicable to this Specification Section. The applicable edition of the indicated references shall be the version that was the most current at the time of the Advertisement of Bids. If referenced documents have been discontinued by the issuing organization, references to those documents shall mean the replacement documents issued or otherwise identified by that organization or, if there are no replacement documents, the last version of the document before it was discontinued. Where document dates are given in the following listing, references to those documents shall mean the specific document version associated with that date, whether or not the document has been superseded by a version with a later date, discontinued, or replaced.
- B. ACI 117/117M – Specifications for Tolerances for Concrete Construction and Materials and Commentary
- C. ACI 301/301M - Specifications for Structural Concrete
- D. ACI 302.1R - Guide to Concrete Floor and Slab Construction
- E. ACI 304.2R - Guide to Placing Concrete by Pumping Methods
- F. ACI 306.1 - Standard Specification for Cold Weather Concreting
- G. ACI 306R – Guide to Cold Weather Concreting
- H. ACI 308.1/308.1M - Specification for Curing Concrete
- I. ACI 318/318M - Building Code Requirements for Structural Concrete and Commentary

- J. ACI 347R - Guide to Formwork for Concrete
- K. ACI 350/350M - Code Requirements for Environmental Engineering Concrete Structures
- L. ACI 355.2 – Qualification of Post-Installed Mechanical Anchors in Concrete & Commentary
- M. ACI 355.4/355.4M – Qualification of Post-Installed Adhesive Anchors in Concrete and Commentary
- N. ACI SP-066 – ACI Detailing Manual
- O. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement
- P. ASTM A675/A675M - Standard Specification for Steel Bars, Carbon, Hot-Wrought, Special Quality, Mechanical Properties
- Q. ASTM A706/A706M – Standard Specification for Deformed and Plain Low-Alloy Steel Bars for Concrete Reinforcement
- R. ASTM A1064/A1064M – Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete
- S. ASTM C31/C31M - Standard Practice for Making and Curing Concrete Test Specimens in the Field
- T. ASTM C33/C33M - Standard Specification for Concrete Aggregates
- U. ASTM C39/C39M - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens
- V. ASTM C40 – Standard Test Method for Organic Impurities in Fine Aggregates for Concrete
- W. ASTM C42/C42M - Standard Test Method of Obtaining and Testing Drilled Cores and Sawed Beams of Concrete
- X. ASTM C88 – Standard Test Method for Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate
- Y. ASTM C94/C94M - Standard Specification for Ready-Mixed Concrete
- Z. ASTM C131/C131M – Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine
- AA. ASTM C150/C150M - Standard Specification for Portland Cement
- BB. ASTM C171 - Standard Specification for Sheet Materials for Curing Concrete
- CC. ASTM C172 - Practice for Sampling Freshly Mixed Concrete
- DD. ASTM C231 - Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method
- EE. ASTM C260/C260M - Standard Specification for Air-Entraining Admixtures for Concrete
- FF. ASTM C309 - Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete
- GG. ASTM C494/C494M - Standard Specification for Chemical Admixtures for Concrete
- HH. ASTM C535 – Standard Test Method for Resistance to Degradation of Large-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine
- II. ASTM C595/C595M - Standard Specification for Blended Hydraulic Cements
- JJ. ASTM C618 - Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete

- KK. ASTM C881/C881M - Standard Specification for Epoxy-Resin-Base Bonding Systems for Concrete
- LL. ASTM C989/C989M - Standard Specification for Slag Cement for Use in Concrete and Mortars
- MM. ASTM C1059/C1059M - Standard Specification for Latex Agents for Bonding Fresh to Hardened Concrete
- NN. ASTM C1077 - Standard Practice for Agencies Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Testing Agency Evaluation
- OO. ASTM C1157/C1157M - Standard Performance Specification for Hydraulic Cement
- PP. ASTM C1240 - Standard Specification for Silica Fume Used in Cementitious Mixtures
- QQ. ASTM C1260 – Standard Test Method for Potential Alkali Reactivity of Aggregates (Mortar-Bar Method)
- RR. ASTM C1293 – Standard Test Method for Determination of Length Change of Concrete Due to Alkali-Silica Reaction
- SS. ASTM C1315 - Standard Specification for Liquid Membrane-Forming Compounds Having Special Properties for Curing and Sealing Concrete
- TT. ASTM C1567 – Standard Test Method for Potential Alkali-Silica Reactivity of Combinations of Cementitious Materials and Aggregate (Accelerated Mortar-Bar Method)
- UU. ASTM C1602/C1602M - Standard Specification for Mixing Water Used in the Production of Hydraulic Cement Concrete
- VV. ASTM D412 - Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers - Tension
- WW. ASTM E329 – Standard Specification for Agencies Engaged in Construction Inspection, Testing, or Special Inspection
- XX. ASTM E1155 - Standard Test Method for Determining FF Floor Flatness and FL Floor Levelness Numbers
- YY. AWS D1.4/D1.4M – Structural Welding Code – Reinforcing Steel
- ZZ. Concrete Reinforcing Steel Institute -10-MSP Manual of Standard Practice
- AAA. Concrete Reinforcing Steel Institute - Placing Reinforcing Bars
- BBB. ICC-ES AC58 - Acceptance Criteria for Adhesive Anchors in Masonry Elements
- CCC. ICC-ES AC308 - Acceptance Criteria for Post-Installed Adhesive Anchors in Concrete Elements

1.5 QUALITY ASSURANCE

- A. Perform work in accordance with ACI 301/301M, ACI 117/117M ACI 306.1 and ACI 308.1/308.1M, except as modified here-in.
- B. All curing, finishing and repair materials shall meet all Federal and State regulations pertaining to Volatile Organic Compounds (VOC) Compliance.
- C. Contractor performing flatwork finishing of concrete slabs shall provide at least one (1) flatwork finisher certified as an ACI Concrete Flatwork finisher.
- D. Expansion and epoxy anchors shall meet the following requirements:
 - 1. Expansion anchors shall be qualified for earthquake loading (use in cracked concrete) in accordance with ACI 355.2.

2. Epoxy anchors shall be qualified for earthquake loading (use is cracked concrete) in accordance with ACI 355.4.
3. Epoxy anchors installed shall be qualified in accordance with ACI 355.4 requirements for sensitivity to installation direction.
4. Epoxy anchors shall be installed by personnel certified by an applicable certification program that includes written and performance tests in accordance with ACI/CRSI Adhesive Anchor Installation Certification program.

1.6 QUALIFICATIONS OF INDEPENDENT TESTING LABORATORY

- A. Independent Testing Laboratory shall conform to concrete testing requirements of ASTM C1077 and ASTM E329.
- B. Key personnel must be qualified and experienced in concrete quality assurance.
- C. Perform concrete field quality control testing with personnel certified as an ACI Concrete Field-Testing Technician, Grade 1 according to the American Concrete Institute (ACI).

1.7 SUBMITTALS

- A. Submit shop drawings for concrete and masonry reinforcement prior to fabrication, showing bar bends, details and placement and certified copies of Mill Test Reports for the reinforcing steel materials analysis. Conform to ACI SP-066. Details shall include:
 1. Sizes, dimensions, and locations for reinforcement and supports.
 2. Bending diagrams and schedules.
 3. Splices.
 4. Cover and clearances.
 5. Class designation and details for bar supports.
 6. Pertinent reinforced concrete details with dimensions and elevations.
 7. Embedded items furnished by other trades and/or under other sections of the specification that are to be cast in concrete where interference with reinforcing steel bars may occur.
 8. Show reinforcement on plan views of slabs, wall elevations and sections, beam elevations and details. Provide plan details at wall intersections and openings.
- B. Submit Concrete Mix designs including field performance test results which meet the criteria specified in ACI 301, Section 4. Mix design shall include:
 1. Proportions for all ingredients, 28-day design compressive strength, water to cementitious materials ratio, admixture dosages, slump, and air content.
 2. Cement Manufacturer's Certificates of conformance with ASTM C150 taken during the last 90 days.
 3. Supplementary Cementitious Materials: Source and test reports with certificates of conformance with ASTM C618 for fly ash and ASTM C989/C989M for slag cement for actual material to be used in the Work taken during the last 90 days.
 4. Aggregate: data not older than 90 days, except test data for soundness, abrasion, alkali reactivity – not older than 12 months. Fine and coarse aggregate data shall include:
 - a. Sources.

- b. Specific Gravity.
- c. Sieve analyses per ASTM C33/C33M, including fineness modulus of fine aggregate.
- d. Organic impurities for fine aggregate per ASTM C40.
- e. Potential alkali reactivity (except not required if a cement containing less than 0.60% alkalis is used, per ASTM C33/C33M), per ASTM C1260, ASTM C1293, or ASTM C1567.
- f. Soundness per ASTM C88.
- g. Abrasion for coarse aggregate per ASTM C131/C131M and ASTM C535.
- 5. Product data and material safety data sheets for concrete admixtures.
- 6. Test reports by testing agencies meeting ASTM E329:
 - a. Field test data used to determine the standard deviation used for establishing the required average design strength, and field test data documenting that the proposed concrete proportions will produce an average compressive strength equal or greater than the required average compressive strength, shall be from within the previous 12 months.
 - b. Laboratory trial batch data shall be from within the previous 24 months.
- C. Submit product data and material safety data sheets for concrete accessories.
- D. Submit sample concrete mix delivery slip that shall include the following information:
 - 1. Serial number of ticket
 - 2. Date and project location
 - 3. Name and location of ready mixed concrete plant
 - 4. Truck number, time loaded, cubic yards delivered
 - 5. Mixture design
 - 6. Quantities of admixtures, with brand names
 - 7. Quantities and types of cement, fly ash and/or slag
 - 8. Quantity of water including quantity of water withheld
 - 9. Quantities of fine and coarse aggregate including moisture content, nominal maximum aggregate size
 - 10. Quantity of water added subsequent to plant batching
 - 11. Unloading time and location
- E. Submit product data and material safety data sheets for form release agent.
- F. Submit product data for epoxy adhesive anchors. Data shall include:
 - 1. Material properties of anchors and epoxy adhesive
 - 2. ICC-ES AC58 (creep test) report
 - 3. ICC-ES AC308 report
 - 4. Allowable and ultimate loads of the anchor system
 - 5. Storage requirements
 - 6. Installation requirements including:
 - a. Drilling method (diamond drill bit shall be prohibited)
 - b. Drill bit diameter and depth of hole for each size anchor
 - c. Hole cleaning procedure and required condition of hole
 - d. Requirements for discarding initial discharge to ensure proper mixing
 - e. Hole filling procedure

- f. Time period when anchor cannot be contacted or otherwise disturbed
 - g. Gel and cure times as a function of temperature
 - h. Installation temperature requirements for cartridges and base material
- G. Submit product data and sample for form ties.
- H. Submit methods to be used to protect the concrete during cold weather placements. The Engineer's review shall be for information only as the Contractor is responsible for the means and methods of protection of concrete placed during cold weather.
- I. Submit methods to be used to protect the concrete during hot weather placements. The Engineer's review shall be for information only as the Contractor is responsible for the means and methods of protection of concrete placed during hot weather.
- J. Submit product data and material safety data sheets for curing compounds, floor sealers and floor hardeners. Indicate the intended use and location for all products.
- K. Submit product data and material safety data sheets for repair materials. Indicate the intended use and location for all products.
- L. Submit curing methods.
- M. Independent Testing Laboratory will submit one copy each of all test reports to each of the following: Engineer, Resident Project Representative, Contractor and concrete supplier. Reports shall indicate the following information:

Project Name	Air content
Placement Location	Cure box min/max temps
General Contractor	Cylinder Nos
Concrete supplier	Cylinder weights
Technician	Date of breaks
Date cast	Break type
Date picked up	Break load
Design strength	Break strength
Air temp	Truck Arrival Time
Concrete temp	Truck Unload Time
Lab/Field cured	Cylinder size
Final slump	
- N. Independent Testing Laboratory will submit reports within 5 days of testing or inspection.
- O. Independent Testing Laboratory will telephone the Engineer within 24 hours if tests indicate deficiencies.

PART 2 - PRODUCTS

2.1 FORM MATERIALS

- A. Undamaged smooth form facing materials such as plywood, hardboard, metal, and plastic that will produce a smooth form finish with fins and offsets not exceeding 1/8 inch. Surfaces shall be clean, free of scratches, mars, and discolorations.
- B. Steel: Minimum 16 ga. sheet, well matched, tight fitting, stiffened to resist loads without excess deflection.
- C. Aluminum: Forms with unoxidized surfaces shall be pretreated with a calcium hydroxide and water paste followed by repeated water rinsing until hydrogen bubbles

- no longer form.
- D. Chamfer Corners: Chamfer, Wood Strip Type; $\frac{3}{4}$ " x $\frac{3}{4}$ " minimum, maximum possible length.
 - E. Form Ties:
 - 1. Exterior backfilled walls of below grade spaces: Factory fabricated adjustable length assembly providing a minimum 1.5 inch break back dimension with a minimum 1-inch diameter tapered wood or plastic cones to leave a uniform hole for patching on both sides of the wall. All ties require a tightly fitted waterstop washer at the midpoint. Tie systems that use plug style waterstops inserted into tie holes after removal of forms are not permitted.
 - 2. Non-liquid retaining structures: Snap-off type, galvanized metal, adjustable lengths designed to break back at least 1 inch from finished surface or ties as indicated above.
 - F. Form release agent: Non-staining colorless, compatible with finishes.
 - 1. Bio Strip WB, SpecChem by HD Supply White Cap
 - 2. StarSeal EF Bio-Release by Vexcon
 - 3. Q-2 Form Release by Dayton Superior
 - 4. Farm Fresh XL by Dayton Superior
 - 5. Clean Strip by Dayton Superior
 - 6. or equivalent

2.2 REINFORCING STEEL

- A. "Reinforcing Steel" shall include all bars, anchorages, stirrups, dowels, ties, tie-wire, chairs and other steel supports, and spacers, as noted on the Contract Drawings, specified herein, and as required for the proper completion of the Work.
- B. Bars: ASTM A615 Grade 60; deformed new materials. Cold-bent in accordance with CRSI 10-MSP
- C. Welded wire fabric: ASTM A1064/A1064M. Flat sheets are required, rolls are not permitted.
- D. Tie wire: ASTM A1064/A1064M, annealed. Provide epoxy coated for epoxy-coated reinforcing and galvanized for architectural concrete.
- E. Bolsters, chairs, spacers and other supports to properly position reinforcement shall conform to the "Bar Support" recommendations of CRSI 10-MSP and shall be of adequate strength and design to prevent displacement of reinforcement and discoloration of concrete. Where concrete surfaces are exposed to view, weather and/or moisture supports shall be Class 1 Plastic, Plastic Protected, or epoxy coated. Supports for bottom reinforcement for slabs placed on soil or on a mud mat with no more than 3 inches of cover shall be Class 3 chairs with integral plates or precast concrete blocks not less than 4 inches square.

2.3 FABRICATION OF REINFORCING STEEL

- A. Conform to CRSI Code of Standard Practice-Fabrication.
- B. Cold bend bars.
- C. Bend bars around revolving collar of recommended size.

2.4 EXPANSION ANCHORS

- A. Approved for use in cracked concrete in accordance with ACI 355.2.
- B. Stainless steel AISI Type 316 for galvanized and aluminum fabrications; cadmium plated for painted steel fabrications.
 - 1. Hilti Kwik-Bolt TZ or Hilti HSL, by Hilti Fastening Systems
 - 2. Tru Bolt Stud Anchor by Ramset Fastening System
 - 3. Power-Stud by Powers Fasteners
 - 4. Or equivalent

2.5 EPOXY ADHESIVE ANCHORS

- A. Includes epoxy anchor systems and epoxy adhesive for threaded rods and reinforcing steel bars.
- B. Approved for use in cracked concrete in accordance with ACI 355.4/355.4M.
- C. Materials:
 - 1. Anchor: AISC Type 316 Stainless Steel threaded rod with washer and nut.
 - 2. Adhesive:
 - a. Epoxy adhesive for anchoring reinforcement to concrete shall be a two-component solid epoxy-based system supplied in manufacturer's standard side-by-side cartridge and dispensed through manufacturer's standard static-mixing nozzle. Except for gel times, epoxy adhesive shall conform to ASTM C881. The Grade, Class and Type of epoxy shall be that which is appropriate for the intended use.
 - b. Epoxy adhesive shall pass the creep test requirements of ICC-ES AC58.
 - c. Acceptable manufacturers:
 - i. SET-XP or ET-HP by Simpson Strong Tie Co., Inc.
 - ii. HIT-RE 500-SD by Hilti, Inc.
 - iii. or equal.
- D. Embedment depth for reinforcing bars: Unless otherwise indicated on the Drawings, the embedment depth shall be per the manufacturer's requirements such that:
 - 1. The ultimate strength exceeds the tensile strength of the bar.
 - 2. The ultimate strength divided by a minimum safety factor of 3.75 is at least 40 percent of the yield strength of the bar.

2.6 CAST-IN-PLACE CONCRETE

- A. Concrete Materials:
 - 1. Portland cement: ASTM C150/C150M; Type II. Cement shall be furnished from one source during the project.
 - 2. Blended cements: ASTM C595/595M. Do not use blended cements conforming to ASTM C595/595M if they contain cements conforming to ASTM C1157/C1157M.
 - 3. Supplementary Cementitious Materials:
 - a. Ground Granulated Blast Furnace Slag: ASTM C989 - Grade 100 or 120.
 - b. Silica Fume: ASTM C1240
 - c. Fly Ash: ASTM C618 - Type F

4. Aggregates:

- a. Prohibited: crushed hydraulic cement concrete for aggregate.
- b. Fine aggregate shall consist of washed inert natural sand, free from mineral or other coatings, soft particles, clay, loam, organic or other deleterious materials conforming to the requirements of ASTM C33/C33M and the following requirements:

SIEVE NO.	PERCENT PASSING
4	95 to 100
8	80 to 100
16	50 to 85
30	25 to 60
50	5 to 30
100	0 to 10

The Fineness Modulus shall be between 2.3 to 3.1. The percentage retained between any two consecutive sieves shall not exceed 45%. Color of supernatant liquid above test sample tested in accordance with ASTM C40 shall not be darker than organic plate No. 3.

- c. Coarse aggregate shall consist of a well graded crushed stone or a washed gravel conforming to the requirements of ASTM C33/C33M and the following requirements:

SIEVE	PERCENT PASSING			
	NO. 8 (3/8")	NO. 67 (3/4")	NO. 57 (1")	NO. 467 (1 1/2")
1-1/2 inch	-	-	100	95-100
1 inch	-	100	95-100	-
3/4 inch	-	90-100	-	35-70
1/2 inch	100	-	25-60	-
3/8 inch	85-100	20-55	-	10-30
No. 4	10-30	0-10	0-10	0-5
No. 8	0-10	0-5	0-5	-
No. 16	0-5	-	-	-
No. 50	-	-	-	-

The limits of deleterious substances and physical property requirements shall be listed in ASTM C33/C33M, Table 4, for severe weathering regions.

- d. Aggregate reactivity testing:
 - i. Perform testing on the aggregate in accordance with ASTM C1260 (Rapid Mortar-Bar Test).
- e. Do not use aggregate having a 14-day expansion greater than 0.10% (considered potentially reactive), except if additional testing is performed as follows:

- i. ASTM C1567 (Accelerated Mortar-Bar Test): The 14 day expansion is not greater than 0.10%, or if tested per
 - ii. ASTM C1293 (Concrete Prism Test): The 2-year expansion of concrete prisms is not greater than 0.04%,
 - iii. Cement containing less than 0.60% alkalis is used per ASTM C33/C33M
 - f. Evidence of a satisfactory service record in lieu of testing for alkali reactivity is not permitted.
- 5. Water: Potable from municipal water supply or shall meet the requirements of ASTM C1602. Admixtures:
 - 1. Low Range Water Reducer: MasterPozzolith 210 by BASF; WRDA with HYCOL by W.R. Grace & Company; or equivalent meeting ASTM C494 Type A.
 - 2. High Range Water Reducer (superplasticiser): MasterRheobuild 1000 or MasterGlenium 3030 by BASF; Daracem 100 or ADVA 140M by W.R. Grace & Company; or equivalent meeting ASTM C494 Type F.
 - 3. Water reducing-retarding agents: for use when ambient temperature is above 70°F, replace water reducing agent in whole or in part with water reducing-retarding agent meeting ASTM C494 Type D. Use amounts to produce concrete with a set time equal to that at 70°F without the retarder.
 - 4. Air entraining agent: MasterAir AE 200 by BASF, DAREX II AEA by W.R. Grace & Company; or equivalent meeting ASTM C260.
 - 5. Non-corrosive non-chloride accelerator: MasterSet FP 20 by BASF; PolarSet by W. R. Grace; or equivalent meeting ASTM C494 Type C or E.
 - 6. Not permitted: Calcium chloride, thiocyanates or admixtures containing chloride ions.
 - 7. All admixtures used for each mix design shall be from one common manufacturer.
- C. Concrete Mix Design
 - 1. Concrete Class:
 - a. Class A: Reinforced concrete structures
 - b. Class B: Concrete Fill, Conduit and Pipe Encasements and topping for prestressed precast concrete plank
 - 2. Mix Design:
 - a. Class A: $f'_c = 4,500$ psi, max w/cm = 0.42
 - b. Class B: $f'_c = 3,000$ psi, max w/cm = 0.50
 - 3. Maximum nominal aggregate size:
 - a. Coarse aggregate shall conform to the grading given in Table 2 of ASTM C33/C33M for sizes (i.e., nominal maximum aggregate sizes) No. 67 (3/4") and No. 8 (3/8").
 - b. Class A: No. 67 (3/4")
 - c. Class B: No. 8 (3/8")
 - d. Concrete Fill:
 - i. 1/2": minimum thickness less than 2 1/4 inches and fills screeded into place by process equipment,

- ii. $\frac{3}{4}$ " : minimum thickness from 2 $\frac{1}{4}$ inches to less than 6 inches,
 - iii. 1 $\frac{1}{2}$ " : minimum thickness of 6 inches or greater
- e. Electrical Ductbanks: 3/8"
- f. Topping of prestressed precast concrete plank: $\frac{1}{2}$ "
- 4. Air entrainment:
 - a. All concrete, except as noted below, shall be air entrained in accordance with the nominal maximum aggregate size, with a tolerance of plus or minus 1.5%:
 - b. No. 8 (3/8") – 7.5%
 - c. No. 67 ($\frac{3}{4}$ ") – 6.0%
 - d. Interior concrete slabs to be hard troweled shall have a maximum air content of 3.0%. After the curing period (at which time they are protected), such slabs shall be protected from freezing temperatures for a minimum of 8 weeks. Thereafter, and for the duration of the Contract if such slabs might be subject to freezing temperatures, they shall be fully sheltered from rain, snow and all other water sources.
- 5. Cement: The proposed mix design shall contain cementitious materials in the following proportions:
 - a. Portland Cement - No less than 75% of the total by weight.
 - b. Ground Granulated Blast Furnace Slag - No greater than 25% of the total by weight.
 - c. Fly Ash - No greater than 15% of the total by weight.
- 6. The slump shall be 3" with a 1" plus or minus tolerance at the point of delivery, without use of a high range water reducer. When a high range water reducer is used, the slump shall be as stated above before it is added, and a maximum of 8" at the point of delivery after it is added.
- 7. Water:
 - a. The amount of water carried on the aggregate and the effect of admixtures is included in the water content. Provide that water carried on the aggregate is determined periodically by test and the amount of free water on the aggregate is subtracted from water added to the mixture.
 - b. Maximum amount of water: that required to produce a plastic mixture of the strength and water to cementitious materials ratio specified and the required density, uniformity, and workability. Consistency of the mixture: that required for the specific placing conditions and methods.
- 8. High Range Water Reducing admixtures shall be used for all concrete to be pumped or with a specified water/cement ratio below 0.50. High range water reducer shall be added either at the concrete batch plant or on site to obtain the slumps as indicated above.
- 9. Concrete shall be furnished from one supplier and batch plant during the project.
- 10. The Concrete producer shall select the concrete mix proportions on the basis of past field performance or the use of trial mixes, both in accordance with ACI 301, Section 4, "Concrete Mixtures".

2.7 ACCESSORIES

- A. Expansion Joint Fillers (Expansion joints and slab perimeter joints):
 - 1. For joints less than ½" thick: J-Joint polyethylene foam with tear off strip for sealant or equivalent; joint filler to be slab thickness in depth less 0.5 inch for sealant. Deck-o-Foam by W.R. Meadows, Polyfoam by Superior Profiles, or equivalent
 - 2. For joints ½" thick or greater: Self-expanding cork by W.R. Meadows or BoMetals Inc. or equivalent, size as indicated on the Drawings.
- B. PVC Waterstops:
 - 1. PVC waterstops shall meet COE CRD-C 572 except:
 - a. Tensile strength shall exceed 2,000 psi;
 - b. Minimum ultimate elongation shall be 300 percent; and
 - c. Shall be extruded virgin polyvinylchloride with no scrap, reclaimed material, or pigment, and
 - d. Shall be either the flat ribbed type or wire reinforced flat ribbed type
 - 2. Flat Ribbed Type Waterstop:
 - a. Construction and Control Joints: 3/8-inch-thick by 6 inches wide. Type R638 by Vinylex Corporation, Style 679 by Sika Greenstreak, Type FR-6380 by Paul Murphy Plastics Company or equivalent.
 - b. Containment Curbs: 3/16 inch by 4 inches wide. Type R4-316T by Vinylex Corporation, Style 781 by Sika Greenstreak, Type FR-4316 by Paul Murphy Plastics Company, or equivalent.
- C. Surface applied waterstops (hydrophilic rubber type):
 - 1. Hydrotite CJ-1020-2K by Sika Greenstreak
 - 2. Swellseal Joint by de neef Construction Chemicals, Inc.
 - 3. ConSeal CS-231 by Concrete Sealants, Inc.
 - 4. Or equivalent
- D. Surface applied waterstops (elastomeric adhered type):
 - 1. System shall consist of Polyolefin (FPO) sheeting strips adhered to the concrete with an epoxy resin. The hypalon strips shall be minimum 8 inches wide and minimum 2 mm thick. The hypalon rubber shall exhibit a minimum tensile strength of 1,000 psi in accordance with ASTM D412.
 - 2. Sikadur Combiflex SG Type 20-P
 - 3. Sikadur Combiflex SG Type 20-M approved for drinking water contact
 - 4. Or equivalent
- E. Epoxy bonding adhesive: Epoxy resin/portland cement moisture resistant bonding agent: Armathec 110 EpoCem by Sika Corporation, Corr-Bond by Euclid Chemical Company, Epobond by L&M Construction Chemicals, Inc. or equivalent.
- F. Structural inserts: of type and size shown on the drawings; Richmond Screw Anchor, Heckman Building Products, Hohman and Barnard, Dayton Superior or equivalent.
- G. Bond Breaker: Thompson's Water Seal or equivalent, or form oil.

2.8 CURING MATERIALS

- A. Curing and Sealing Compound:
 - 1. Conform to ASTM C309 Type 1 Class B.

2. Acceptable products:
 - a. Harris Emulsion Kurseal 309 by A.H. Harris & Sons, Inc.
 - b. Aqua-Cure VOX by Euclid Chemical Company
 - c. Starseal EF Cure by Vexcon Chemicals
 - d. Or equivalent.
- B. Curing/Hardening Compound:
 1. Sodium Silicate Type
 2. Acceptable products:
 - a. Eucosil by Euclid Chemical Company
 - b. Harris AsSuper KurHard by A.H. Harris & Sons, Inc.
 - c. Or equivalent.
- C. Curing, Sealing and Hardening Compound:
 1. Acrylic water based compound
 2. Acceptable products:
 - a. Ashford Formula by Curecrete
 - b. Starseal EF Medium Gloss by Vexcon Chemicals
 - c. Harris Super Kurseal 800 Emulsion by A.H. Harris
 - d. Or equivalent.
- D. Curing Water: Water shall be potable from a municipal water supply or shall meet the requirements of ASTM C1602, and shall be free of materials that have the potential to stain concrete. The temperature of the curing water shall not be lower than 20°F cooler than the surface temperature of the concrete at the time the water and concrete come in contact.
- E. Curing Blanket: ASTM C171. Cellulose fabric sheets with an impervious layer on one side. Konkure by Raven Industries, UltraCure by Sika Industries or equivalent.
- F. Curing Paper: ASTM C171, regular or white waterproof paper.

2.9 FINISHING MATERIALS

- A. Slab Sealer:
 1. Silane or Siloxane based 96% chloride ion screen.
 2. Do not apply to surfaces cured with curing compounds.
 3. Acceptable products:
 - a. Euco-Guard-100 by Euclid Chemical
 - b. SikaGard 701W by Sika Corporation
 - c. Starseal EF Weather Seal Plus by Vexcon Chemicals
 - d. Or equivalent
- B. Slab Hardener:
 1. Fluorosilicate water based.
 2. Acceptable products:
 - a. Ultrasil 7 by Euclid Chemical??
 - b. Lapidolith by Sonneborn
 - c. Fluohard by L&M Construction Chemicals, Inc.
 - d. Or equivalent
- C. Evaporation Retardant:
 1. Water based polymer liquid evaporation retardant.

2. Acceptable products:
 - a. E-CON as manufactured by L&M Construction Chemicals, Inc.
 - b. SikaFilm by Sika Corporation
 - c. MasterKure ER 50 by Master Builders (Caribbean??)
 - d. Or equivalent.

2.10 REPAIR MATERIALS FOR STRUCTURAL DEFECTS

- A. Patching Mortar: 1 part of a mixture of white and grey portland cement to 2.5 parts of damp loose sand. Cement type to match substrate.
- B. Epoxy Adhesive:
 1. Two- or three-part water based epoxy bonding agent with cementitious components
 2. Acceptable products:
 - a. Armatec 110 Epocem by Sika Corporation
 - b. Corr-Bond by Euclid Chemical Co.
 - c. Epobond by L&M Construction Chemicals
 - d. MasterEmaco P 124 by Master Builders
 - e. Or equivalent
- C. Repair of random cracks (dry – free of liquid or moisture):
 1. 2-component, 100% solids, moisture-tolerant, low-viscosity, high-strength, multipurpose, epoxy resin adhesive.
 2. Acceptable products:
 - a. Sikadur 35 Hi-Mod LV by Sika Corporation
 - b. Eucopoxy Injection Resin by Euclid Chemical Co.
 - c. MasterInject 1500 by Master Builders
 - d. Or equivalent
- D. Repair of random cracks (wet - presence of liquid or moisture):
 1. Low viscosity polyurethane resin that expands and forms a closed cell foam when it comes in contact with water.
 2. All cracks that are wet (either damp or leaking) at the time of repair shall be repaired with a material that is specifically intended for wet repair as recommended by the manufacturer.
 3. Acceptable products:
 - a. SikaFix HH LV by Sika Corporation
 - b. Dural Aqua-Fil by Euclid Chemical Co.
 - c. MasterInject 1210 IUG by Master Builders
 - d. Or equivalent
- E. Repair of excessive cracking:
 1. Two component, 100% solids, moisture-tolerant, epoxy or urethane crack sealer / penetrating sealer
 2. Acceptable products:
 - a. Sikadur 55 SLV by Sika Corporation
 - b. Euco Qwikstitch by Euclid Chemical Co.
 - c. Or equivalent
- F. Repair of spalls, honeycombs areas and air voids and cementitious overlays:

1. Polymer modified, non-sag cementitious repair mortar with corrosion inhibitor.
2. Repair material shall include peastone for repairs of greater depth as required by the manufacturer. For repair areas involving depths generally in excess of three (3) inches, utilize a repair material suitable for the depth of repair.
3. Acceptable products:
 - a. SikaTop 122 Plus or 123 Plus by Sika Corporation
 - b. Tamms Structural Mortar by Euclid Chemical Co.
 - c. MasterEmaco N 400
 - d. Or equivalent
- G. All repair materials shall be installed in accordance with the manufacturer's recommendations.
- H. All repair materials in contact with potable water shall be NSF Standard 61 approved.

2.11 STORAGE OF MATERIALS

- A. Protect materials from ground and the elements.
- B. Maintain cement in dry condition.
- C. Store reinforcement and all other embedded items on skids.
- D. Keep surface applied waterstops dry.
- E. Remove defective materials from site. Do not store on site.

PART 3 - EXECUTION

3.1 FORMWORK

- A. Conform to ACI 301.
- B. Verify lines, levels, and measurements before proceeding.
- C. Erect plumb and straight. Maintain rigid. Brace sufficiently.
- D. Allow no concrete leakage. Provide continuous, straight, smooth exposed surfaces.
- E. Treat forms with form release agent prior to erecting forms. Do not apply form release agent at formed surfaces of construction joints designed with continuous reinforcement or remove all traces from formed joint prior to subsequent concrete placement. Protect reinforcing from contact with form release agent. Any and all form release agent that contacts reinforcing shall be thoroughly removed.
- F. Earth forms not permitted for below grade walls, slabs, and footings.
- G. Camber formwork as necessary.
- H. Chamfer all exposed outside corners and edges 0.75 inch unless otherwise noted.
- I. Clean out inside of forms of all foreign materials prior to concrete placement.
- J. Install reinforcing steel spacers as required.
- K. Maintain specified tolerances.
- L. Maintain vertical forms and shores supporting the cast concrete for the time periods indicated below:
 1. Walls and Vertical Surfaces: 36 hours
 2. Forms may be unlocked after 24 hours but shall remain in place for the indicated time periods.

3. Time period listed above represents cumulative number of hours during which the temperature of the air surrounding the concrete is above 50°F and the concrete has been damp and no loss of moisture has occurred.
- M. Reshore as required.
- N. Form pressures increase with the use of concrete with High Range Water Reducers. Design forms accordingly.
- O. Clean and repair surfaces of forms to be re-used in work. Split, frayed, delaminated, or otherwise damaged form facing material will not be acceptable for exposed surfaces. Apply new form release agent as specified for new formwork.

3.2 REINFORCING STEEL

- A. Conform to the CRSI Code of Standard Practice.
- B. Do not weld reinforcement unless the Engineer takes no exceptions - in writing. When permitted, welding shall be in accordance with AWS D1.4/D1.4M.
- C. Splicing reinforcing steel:
 1. Welded wire fabric: Install in longest sheets practical. Welded wire fabric shall be lapped 1½ wire spacings or 12 inches and securely tied at maximum 24 inches on center. Offset end laps in adjacent sheets.
 2. Reinforcing bars: Splices shall be located as shown on the Contract Drawings. Where not shown, splices shall be located away from areas of maximum stress, and shall be reviewed, with no exceptions taken, by the Engineer. Minimum splice lengths shall be as indicated on the Contract Drawings.
- D. Provide bar supports: on grade use concrete brick; elsewhere use manufactured wire supports.
- E. Reinforcement shall be securely tied at intersections with tie wire or clips in a manner that will keep all metal away from exposed concrete surfaces.
- F. Cutting, heating and bending of reinforcement embedded in the concrete will not be allowed
- G. All reinforcement within an area of a continuous concrete placement shall be installed, supported, and secured before beginning concrete placement.

3.3 EMBEDDED ITEMS

- A. Contractor shall coordinate the installation and securing of all embedded items.
- B. Contractor shall coordinate number and layout of masonry dowels with the mason prior to installation.
- C. Pipes or conduits for embedment within a slab, wall or beam, other than those merely passing through, shall satisfy the following:
 1. Shall not be larger in outside diameter than one-third (1/3) the thickness of the slab or wall.
 2. Shall not be spaced closer than 3 diameters on center.
 3. Shall not significantly impair the strength of the concrete.
 4. Only two conduits or pipes shall cross at any point. The sum of the outside diameter of the crossing pipes or conduits shall not exceed one-third (1/3) of the thickness of the concrete thickness.

5. Conduit shall not be located between the bottom of reinforcing steel and bottom of concrete slab.
6. Aluminum conduit shall not be embedded in concrete.
7. Conduit shall be installed such that there will be NO cutting, bending, and/or displacement of reinforcing from its proper location.
8. Conduit shall not be installed prior to review of conduit layout plan with no exceptions taken by the Engineer.
9. Bondouts in concrete slabs or walls for pipes or conduit shall not be installed unless reviewed with no exceptions taken by the Engineer.

3.4 WATERSTOPS

- A. Waterstops shall be continuous throughout and around all corners and intersections. For PVC waterstops, use factory fabricated intersections such as corners, tees and crosses. Bending waterstop around corners will not be acceptable.
- B. PVC waterstop splices in the field shall be straight butt type. Splices shall be heat fused welded using a Teflon coated thermostatically controlled waterstop splicing iron at 380 °F in accordance with the manufacturer's recommendations. Unacceptable field splices include the following:
 1. Tensile strength less than 80% of the parent section.
 2. Misalignment of centerbulbs and ribs more than 1/16 inch, or that reduces cross section by more than 15%.
 3. Visible porosity, bubbles, or inadequate bonding. If while prodding the joint with a penknife the knife breaks through the outer portion of the weld into a bubble.
 4. Visible signs of splice separation when cooled splice is bent by hand at a sharp angle, including bond failure greater than 1/16 inch depth.
 5. Combined misalignment and bond failure with net cross section reduction of more than 15%.
 6. Charred or burnt material.
 7. Edge welded tee intersections.
- C. All waterstops shall have 2 inches of concrete cover where designated to terminate.
- D. Center waterstop in joint and secure in correct position with hog rings or grommets spaced 12 inches apart along both edges of waterstop and wired to adjacent reinforcement prior to concrete placement.
- E. Pressure wash or otherwise clean waterstop of any and all dried concrete splatter from previous concrete placements.
- F. Hold PVC waterstop rigid with split bulkhead forms at all joints.
- G. Surfaces to receive surface-applied waterstop shall be cleaned of all debris. Apply primer in accordance with manufacturer's recommendations and install surface-applied waterstop. Protect from contact with water.
- H. Place concrete uniformly to avoid displacing waterstop.
- I. Thoroughly vibrate concrete around waterstop to avoid honeycombing and voids in concrete and to ensure complete contact between waterstop and concrete.
- J. Notify Engineer 24 hours prior to installing waterstops.

3.5 EXPANSION ANCHORS AND EPOXY ADHESIVE ANCHORS

- A. Anchors shall be installed by qualified personnel trained to install adhesive anchors.
- B. Anchors shall be installed in strict accordance with the Manufacturer's Printed Installation Instructions (MPII).
- C. Each installer shall at all times have in their possession the MPII.
- D. Adhesive anchors shall be installed in concrete having a minimum age of 21 days at time of installation.
- E. All adhesive anchor cartridges shall have the expiration date clearly visible. Material past its expiration date shall not be used and shall be immediately removed from the site.
- F. Embedded reinforcement shall be located with proper equipment prior to drilling to ensure that each drilling location does not coincide with existing reinforcement. Drilling through reinforcement shall be prohibited.
- G. If existing reinforcing steel is encountered while drilling, offset the drill hole by a maximum of 2-inches. The new relocated hole shall be in the same line as the line of drilled holes. All offset holes shall be a minimum of 4-inches from a free concrete edge. Maintain the original spacing locations of the remaining dowels as indicated on the Contract Drawings.
- H. Diamond drill bits shall not be permitted. Hammer drills shall be used.
- I. The initial material extruded from each adhesive anchor cartridge shall be discarded in accordance with the manufacturer's instructions to ensure that all material is properly mixed.
- J. Depth stop shall be used to ensure correct drilling depth. Drilled holes shall be blown out with air, thoroughly wire-brushed with a repeated back and forth movement, blown out, thoroughly wire-brushed, and blown out again. Adhesive shall be injected starting from the bottom of the hole, and slowly withdrawn as filling progresses to prevent air pockets.
- K. Anchored reinforcement shall remain completely undisturbed between manufacturer's specified gel time and the full cure time. Zero load shall be applied during this time.

3.6 PLACING CONCRETE

- A. Notify Engineer and Independent Testing Laboratory 24 hours' minimum prior to each placement.
- B. All reinforcement within the area of one day's concrete placement shall be tied in place, and observed by the Engineer, prior to commencing concrete placement.
- C. All concrete delivery trucks at each placement shall be tested for slump and air content.
- D. Assure placement and proper location of all embedded items.
- E. Provide concrete Delivery Slip prepared at batch plant with each truck load of concrete showing the information listed under Submittals in this Section.
- F. Water: additional water added to the mix shall be carefully monitored as follows:
 - 1. Residual, wash, and/or other water in drums: completely discharged prior to concrete batching (drums backed out).

2. Slump adjustment: additional water shall not be added from the time of batching to the point of delivery at the Project site.
 3. Water added after arrival at Project site: accurately metered and recorded on the delivery ticket. The amount of water withheld from batching shall be clearly indicated on the delivery slip. The total water added at the site shall include water added for the truck and water added to the drum from any initial washdown.
- G. Place concrete from mixing truck to final location quickly and without segregation.
- H. Place all concrete from the delivery truck within 90 minutes of addition of water to cement, or cement to aggregate, whichever occurs first. When air temperature is 90°F and above, this time shall be reduced to 60 minutes. These times may be exceeded only upon review with no exceptions taken by the Engineer, and only if all tests for air content, slump and temperature are also within specified limits.
- I. Standing water shall be removed from all forms (except as permitted during hot weather placements) and excavations and the Work shall be kept dry during concrete placement. No water shall be thrown on, allowed to flow over, or rise upon the concrete until it is thoroughly set.
- J. Runways shall be provided for wheeled concrete handling equipment. Runways shall not be supported upon placed reinforcement.
- K. Concrete truck chute shall conform to the following:
1. Minimum slope: 3 horizontal to 1 vertical. Maximum slope: 2 horizontal to 1 vertical. Between these limits the chute slope shall be such to ensure continuous flow without segregation.
 2. Provide baffle at end of chute to prevent segregation. If the end of the chute is more than 3 feet above the surface of deposit, a spout is to be used. The spout is to be kept full of concrete with the end kept as near as practical to the surface of the deposit.
 3. The chute shall be steel or steel-lined. Aluminum chutes are not permitted. Sections of the chute shall have the same slope throughout.
 4. The chute is to be thoroughly flushed with water before and after each use with the water discharged outside the forms.
- L. Freefall from concrete truck discharge chute, pump hose and hopper hose: 4 feet maximum.
- M. The accumulation of concrete on the forms and/or reinforcement above the level of placement shall be avoided. The splashing of concrete upon formwork that is set for a subsequent concrete placement shall be prevented due to the resulting marks on the finished concrete.
- N. Concrete placements shall be carried out in a continuous operation until the placement of the entire section between construction joints is complete. Place against plastic concrete only.
- O. Do not place partially hardened concrete. Re-tempering is not permitted.
- P. Compacting and vibrating concrete:
1. Concrete may be deposited in one or multiple layers. Consolidate each layer by mechanical internal vibrating equipment supplemented by hand spading, rodding, and tamping as required. The depth of each layer shall not exceed the

smaller of 20 inches and the depth that can be properly vibrated with the equipment used. When deposited in multiple layers, the vibrator shall penetrate the preceding layer approximately 6 inches to blend layers. Ensure that initial setting of the previous layer doesn't occur prior to placement of subsequent layer.

2. Do not use vibrator to move fresh concrete within the forms. Insert vibrator at approximately 18-inch intervals, and over-vibration resulting in segregation shall be prevented.
3. Concrete shall be thoroughly consolidated around reinforcement, embedded items and into corners of forms.
4. Vibratory screeds are acceptable for slabs up to 8 inches thick, however internal vibration is required in areas of load-transfer dowels and electrical conduit. Internal vibration is required for slabs thicker than 8 inches.

Q. Placing concrete in cold weather:

1. Conform to ACI 306.1 for concrete placements in cold weather as defined below. When freezing temperatures may occur during periods not defined as cold weather, concrete surfaces shall be protected against freezing for at least the first 24 hours after placement.
2. Cold Weather:
 - a. Cold weather is defined as any and all periods when for more than three consecutive days the average daily outdoor temperature drops below 40°F. (The average daily temperature is the average of the highest and lowest temperature during the period from midnight to midnight.) When temperatures higher than 50°F occur during more than half of any 24-hour duration, the period shall not be regarded as cold weather.
 - b. When freezing temperatures may occur during periods not defined as cold weather, concrete surfaces shall be protected against freezing for at least the first 24 hours after placing.
3. Concrete shall conform to the following temperature limitations when delivered to the project site:

		Concrete Thickness			
Item	Air Temperature	Less than 12 in	12-36 in	36-72 in	Greater than 72 in
Minimum concrete temperature as placed and maintained					
1	--	55°F	50°F	45°F	40°F
Minimum concrete temperature as mixed for indicated air temperature					
2	Above 30°F	60°F	55°F	50°F	45°F
3	0 to 30°F	65°F	60°F	55°F	50°F
4	Below 0°F	70°F	65°F	60°F	55°F

4. The concrete mixing temperature shall not be higher than the minimum concrete placement temperature (Items 2-4 in the table above) by more than 15°F.
5. An Accelerator may be used in the mix design when placing concrete in air temperatures below 50°F.

6. All material and equipment required for cold weather placement, protection and curing shall be available at the project site before commencing concrete placement.
 7. Any enclosure for weather and climate protection shall be in place before depositing any concrete. Heating within the enclosure shall maintain the temperature specified with a reasonable degree of uniformity in all parts of the enclosure. All exposed concrete surfaces within the enclosure shall be kept sufficiently moist to prevent drying. Heating appliances shall not be placed in a manner so as to damage the enclosure, forms, supports, or expose any area of concrete to drying out or to excessive temperatures.
 8. All snow, ice and frost shall be removed from the surfaces against which the concrete is to be placed including subgrade and reinforcement.
 9. Do not place concrete on frozen ground. Insulate or heat subgrade to ensure temperature of subgrade material is above 32°F when concrete is placed.
 10. All embedded items having a cross sectional area of 1.00 square inches or greater, including #9 and larger reinforcing steel bars shall be at a temperature not less than 10°F at time of concrete placement.
 11. Cover, insulate and/or heat as required to protect concrete and provide frost protection beneath structure. Thermal protection shall be provided immediately after concrete placement. Except when supplemental heat is provided, the R-value of the insulation shall be per the recommendations of Chapter 9 of ACI 306R.
- R. Placing concrete in hot weather:
1. Hot Weather: Job-site conditions that accelerate the rate of moisture loss or rate of cement hydration of freshly mixed concrete, including an ambient temperature of 80°F or higher, and an evaporation rate that exceeds 1 kg/m²/h.
 2. Temperature of concrete when placed shall not exceed 90°F. When the air temperature is 90°F and above, procedures to cool mixture ingredients shall be employed. These include:
 - a. Providing shaded storage for aggregate,
 - b. Frequent sprinkling or fog spraying of coarse aggregate,
 - c. Using chilled batch water and/or ice.
 3. Forms and reinforcement shall be sprinkled with cold water just prior to concrete placement. When possible, placement of slabs should be scheduled accordingly in order to minimize problems associated with direct sunlight and/or drying winds.
- S. Pumping: The inside diameter of pipes and hoses used to convey the concrete shall be a minimum of three times the maximum size aggregate of the mixture. In order to minimize altering the concrete properties, long vertical sections at the end of the pump line is prohibited. A horizontal hose run, a hose loop, or a slide gate at the end of the hose is to be used to reduce loss of entrained air.
- T. Thoroughly moisten subgrade materials prior to placing slabs on grade.
- U. When placing new concrete directly against existing concrete, clean the surface of all contamination and debris, and roughen by steel shot-blasting, abrasive (sand) blasting, or water-jetting (hydrodemolition). Use of scabblers, scarifiers, bush

hammers, or pneumatic hammers is not permitted. The prepared surface shall be water-saturated for a minimum of six hours, and the excess water shall be removed immediately prior to placement of concrete. Apply epoxy bonding agent to the prepared surface to bond to new concrete.

- V. Provide concrete pads and foundations for all equipment as shown on Drawings or as required by the equipment manufacturer. Set anchor bolts for equipment with templates at correct elevations using manufacturer's shop drawings reviewed by the Engineer with no exceptions taken unless otherwise indicated. All equipment pads shall be sized by the Contractor and equipment supplier.
- W. Contractor shall coordinate concrete truck wash-out area with Owner.

3.7 TESTING CAST-IN-PLACE CONCRETE

- A. An Independent Testing Laboratory, selected and paid for by the Owner and directed by the Engineer and/or Resident Project Representative, shall test and sample Class A concrete for strength, slump and air content as indicated herein.
- B. The General Contractor shall notify the Independent Testing Laboratory of proposed upcoming concrete placements as follows.
 - 1. The General Contractor shall notify the Testing Laboratory of proposed concrete placements on a weekly basis.
 - 2. The General Contractor shall notify the Testing Laboratory of specific placements a minimum of 24 hours in advance.
- C. Obtain 5 standard test cylinder samples measuring 6"Ø x 12" or 8 test cylinders measuring 4"Ø x 8" for each class of concrete placed in any one day at the following frequency:
 - 1. For each 100 cubic yards of placed concrete, or
 - 2. For each placement less than 100 cubic yards
- D. Concrete cylinders shall be tested as follows:
 - 1. 6"Ø x 12" cylinders:
 - a. Test 2 cylinder at 7 days; two cylinders at 28 days
 - b. Hold one cylinder for later testing (if required)
 - 2. 4" Ø x 8" cylinders:
 - a. Test 3 cylinders at 7 days; three cylinders at 28 days.
 - b. Hold two cylinders for later testing (if required)
- E. Perform slump tests and air entrainment tests at the project site on each truck and at each sampling. Perform slump and air entrainment tests for each condition if applicable:
 - 1. Before addition of high range water reducer (when the high range water reducer is added on site instead of the batch plant)
 - 2. After addition of additional mix water withheld at the batch plant (when the high range water reducer is added on site)
 - 3. After addition of high range water reducer (all concrete).
- F. Sample concrete for testing of air and slump at the discharge end of the truck. When concrete is pumped, concrete taken for test cylinders shall be at the discharge end of the pump hose. All concrete sampled for testing shall be taken from the beginning of the concrete truck discharge. No concrete shall be placed until the testing is complete.

All concrete sampled for casting of cylinders shall be taken from the middle third of the concrete truck discharge.

- G. Perform strength, slump and air entrainment tests at other times when directed by the Resident Project Representative.
- H. Additional testing and sampling required as a result of deficient results or improper curing shall be paid for by Owner. The cost of resampling and retesting will be determined by Engineer, and Owner will invoice Contractor for this cost. If unpaid after 60 days, this invoice amount will be deducted from the Contract Price.
- I. Contractor shall provide and maintain an insulated, heated concrete cylinder curing box, 4-foot square minimum, with a min.-max. thermometer and maintain the temperature between 60°F and 80°F. Contractor to coordinate the location and specific details of the curing box with the Resident Project Representative and Independent Testing Laboratory.
- J. Contractor shall provide access to the site at all times for the Independent Testing Laboratory Personnel.
- K. Additional concrete tests:
 - 1. Independent Testing Laboratory shall provide additional testing of in-place concrete that does not comply with the requirements of the Contract Documents or is considered substandard as directed by Engineer. Additional tests may consist of non-destructive testing, cores drilled from the area in question or load tests. Costs of additional testing will be paid by Owner. The cost of the additional testing will be determined by Engineer and Owner will invoice Contractor for that cost. If unpaid after 60 days, the invoice amount will be deducted from the Contract Price.
 - 2. When the concrete strength is substandard as defined in this Section, concrete core specimens shall be obtained and tested from the affected area. A minimum of three (3) cores shall be taken for each sample in which the strength requirements were not met. The drilled cores shall be obtained and tested in conformance with ASTM C42. Engineer will determine the size and location of the required core samples.

3.8 FINISHES

- A. Repair all defects and allow repair material to properly cure prior to finishing concrete.
- B. Clean all exposed concrete surfaces and adjoining work stained by leakage of concrete.
- C. Finish concrete surfaces as scheduled.

3.9 FINISHING SLABS AND FLATWORK

- A. Screed to bring concrete surface to proper contour and elevation.
- B. Highway straightedge, bull float or darby float the concrete surface immediately after screeding.
- C. Allow bleeding process to complete and for all bleed water to evaporate. Slabs shall not be finished while bleed water is on the surface. Means to accelerate drying such as applying dry cement, sand, and other materials shall be prohibited.

- D. After completion of the above listed procedures, provide one of the concrete finishes listed below as indicated in the Schedule of Finishes:
1. (FF) Float Finish: Float the surface with magnesium or cast aluminum float or with a power finishing machine. Floating shall begin when the water sheen has evaporated and when the slab has stiffened sufficiently to allow proper operation of a power-driven float. Hand floating with wood, aluminum or magnesium floats shall be used at locations inaccessible to a power float.
 2. (LTF) Light Trowel Finish: Provide Float Finish. Apply trowel with a minimum number of passes to provide a sealed surface free of trowel marks. Do not apply an excessive number of trowel passes.
 3. (HTF) Hard Trowel Finish: Provide Float Finish. Steel trowel surface immediately after floating to produce smooth surface. Steel trowel again after concrete has hardened enough so that mortar does not adhere to trowel edge. Ringing sound should be apparent when performing second troweling due to tilted, compacting motion. The finished surface shall be free of trowel marks and uniform in texture and appearance.
 4. (WFF) Wood Float Finish: Allow concrete to stiffen. Use wood float to provide even surface with open pores.
 5. (LBF) Light Broom Finish: Provide FF or WFF as indicated above. While plastic draw a soft-bristled broom, over the concrete in long even strokes with downward pressure. Broom transverse to traffic or at right angles to the slope of the slab.
 6. (SF) Scratch Finish: Roughen the surface with stiff brushes or rakes before final setting. Remove laitance and loose aggregate.
- E. Flatness and Levelness: All concrete slabs with a HTF shall be finished to achieve the following "Face Floor Profile Numbers" for composite flatness (FF) and composite levelness (FL) in accordance with Section 10.15 of ACI 302.1:
1. Specified Overall Value: FF 20/FL 15.
 2. Minimum Local Value: FF 15/FL 10.
- F. Schedule of Finishes:
1. Interior slabs:
 - a. Finish: HTF [or LTF]
 - b. Curing:
 - i. Apply two coats of curing, sealing and hardening compound, or
 - ii. Moist cure and apply two coats of curing, sealing and hardening compound.
 2. Exterior slabs
 - a. Finish: LBF
 - b. Curing:
 - i. Apply two coats of curing, sealing and hardening compound
 - ii. Moist cure and apply two coats of curing, sealing and hardening compound.

3.10 VERTICAL FORMED SURFACE FINISHES

- A. Concrete surfaces "exposed to view" shall be defined as those exposed to view upon

completion of the Work, whether or not a painted finish is specified. Surfaces which will be covered by fill, such as exterior faces of walls, shall not be considered exposed to view.

- B. Surface tolerance classes indicated herein are specified in ACI 117, and include abrupt surface irregularities that are measured within 1-inch of the irregularity, and gradual surface irregularities measured as the maximum gap between the concrete and the near surface of a 5-foot straight-edge, measured between contact points.
- C. Environmental Surface Finish-2.0 (ESF-2.0):
 - 1. Patch voids larger than $\frac{3}{4}$ inch wide or $\frac{1}{4}$ inch deep.
 - 2. Projections exceeding $\frac{1}{4}$ inch in height to be removed.
 - 3. Patch form tie holes.
 - 4. Repair surface and structural defects as indicated in this Section.
 - 5. Surface tolerance Class B with formed surface irregularities not more than $\frac{1}{4}$ inch.
 - 6. Unless otherwise indicated, ESF-2.0 shall be provided for formed surfaces not exposed to view.
- D. Environmental Surface Finish-3.0 (ESF-3.0):
 - 1. The concrete surface shall be of uniform color, texture and free of all irregularities.
 - 2. The arrangement of the facing material shall be orderly and symmetrical, with the number of seams kept to the minimum.
 - 3. Patch voids larger than $\frac{3}{4}$ inch wide or $\frac{1}{4}$ inch deep.
 - 4. Projections exceeding $\frac{1}{8}$ inch in height to be removed.
 - 5. Patch form tie holes.
 - 6. Repair surface and structural defects as indicated in this Section.
 - 7. Additional finishing and surface preparation will be required for surfaces to receive concrete coatings or waterproofing. Refer to Section 03930 (Coatings) or 07120 (Waterproofing).
 - 8. Surface tolerance Class A in accordance with ACI 117 with formed surface irregularities not more than $\frac{1}{8}$ inch.
 - 9. Unless otherwise indicated, ESF-3.0 shall be provided for formed surfaces exposed to view.
- E. Schedule of Finishes:
 - 1. Interior wall surfaces exposed to view
 - a. Finish: ESF-3.0
 - b. Curing:
 - i. Apply two coats of curing and sealing compound, or
 - ii. Moist cure
 - 2. Exterior wall surfaces exposed to view from top of walls to 6" below grade
 - a. Finish: ESF-3.0
 - b. Curing:
 - i. Apply two coats of curing and sealing compound, or
 - ii. Moist cure
 - 3. Exterior below grade wall surfaces not exposed to view
 - a. Finish: ESF-2.0

- b. Curing:
 - i. Apply two coats of curing and sealing compound, or
 - ii. Moist cure

3.11 FINISHING OTHER MISCELLANEOUS CONCRETE SURFACES

- A. Curbs: Provide steel trowel finish to top surface. Strip forms immediately after 24 hours and apply an ESF-3.0 finish to vertical surfaces.
- B. Top of walls:
 - 1. Exposed to view - Strike off smooth and hand steel trowel to produce a smooth hard level surface. Line and elevation shall be pre-established by means of preset wood screeds which shall be removed during the troweling operation.
 - 2. Not exposed to view – Strike off smooth.

3.12 CURING

- A. Curing: Curing shall begin immediately following the initial set of concrete or after slab surface finishing has been completed when it will not mar, erode or stain the concrete surface and shall continue after form removal. All concrete shall be cured to attain strength and durability by one of the following methods for a minimum of seven consecutive days immediately after placement:
 - 1. Moist Cure
 - a. Ponding or continuous sprinkling. Intermittent wetting and drying is not an acceptable curing method.
 - b. Application of curing blankets kept continuously wet.
 - c. Application of curing paper kept continuously wet. Use wet methods for the first 24 to 30 hours. Lap side joints 4 inches, and end joints 6 inches. Tape joints or weigh down paper to prevent displacement. Repair any and all tears during the curing period. Apply paper no earlier than 24 hours, and no later than 30 hours, after finishing. The slab surface shall be maintained in a wet condition beneath the paper at all times.
 - d. Contractor shall provide additional heat as required to maintain moist curing.
 - 2. Application of concrete curing compounds.
 - a. For slabs, apply immediately following the disappearance of the surface water sheen after the final finishing pass. For formed concrete, apply immediately after form removal.
- B. Moisture loss from surfaces placed against wooden or metal forms exposed to heating by the sun shall be minimized by keeping the forms wet until they can be safely removed.
- C. After form removal of vertical elements, the concrete shall be cured as indicated for the balance of time remaining as specified above. All exposed concrete (tops of walls) within vertical forms shall begin moist curing within 24 hours of placement, regardless of the duration that the forms will remain in place.
- D. Cold Weather:

1. Unless otherwise superseded by more stringent requirements within this Specification, conform to ACI 306.1 for placement of concrete in cold weather as defined in Part 3.6.
 2. Thermal protection must be provided immediately after concrete placement. Procedures for covering, insulating, housing and/or heating concrete shall be prearranged. Except when supplemental heat is provided, the R-value of the insulation shall be in accordance with the recommendations of Chapter 9 of ACI 306R.
 3. Concrete structures shall be covered, insulated and heated as required to prevent frost penetration beneath the structures.
 4. Maintain concrete at the following minimum temperature (measured at concrete surface) for a minimum protection period of 7 days:
 - a. Sections of less than 12 inch minimum dimension: 55°F
 - b. Sections of 12 to 36 inch minimum dimension: 50°F
 - c. Sections of 36 to 72 inch minimum dimension: 45°F
 - d. Sections greater than 72 in minimum dimension: 40°F
 5. Protect concrete from damage due to concentrated heat sources to minimize local carbonation of the concrete surfaces. Combustion heaters shall be located so they do not apply heat directly to the concrete surfaces.
 6. For those surfaces requiring curing compounds, reapply curing compounds every two days during heating period or at greater frequencies as required by the manufacturer.
 7. The temperature shall be monitored at the surface of the concrete, including corners and edges, which are more vulnerable to low temperature. The concrete surface temperature shall be recorded a minimum of twice per each 24 hour period.
 8. Slabs, regardless of air content, shall not be exposed to freezing temperatures when exposed to rain, snow or other water sources, prior to reaching a compressive strength of 3500 psi.
 9. Concrete shall be cooled gradually at the end of the protection period. The maximum allowable temperature drop at the concrete surfaces during the first 24 hours after the end of the curing period shall not exceed 5°F in any 1 hour and shall not exceed the following total gradual temperature drop in the first 24 hours:
 - a. Sections of less than 12 inch minimum dimension: 50°F
 - b. Sections of 12 to 36 inch minimum dimension: 40°F
 - c. Sections of 36 to 72 inch minimum dimension: 30°F
 - d. Sections greater than 72 in minimum dimension: 20°F
- E. Hot Weather:
1. Unless otherwise superseded by the requirements within this Specification, conform to ACI 308.1 for curing of concrete in hot weather as defined in Part 3.6.
 2. Protect concrete from plastic shrinkage cracking and rapid evaporation of water.
 3. Shade concrete from direct sun and protect from wind.

3.13 JOINTS

A. Saw cut joints:

1. Early-entry dry-cut saws shall be used unless otherwise permitted in writing by the Engineer. Sawing shall be performed as soon as the concrete has hardened sufficiently to prevent dislodgment of aggregates and edge raveling – normally between 1 and 4 hours after finishing. When use of wet cut saws is permitted, sawing shall be completed within 8 hours of concrete placement. Preformed embedded control joint strips may be used in lieu of saw cutting.
2. The depth of saw cut joints shall be as indicated on the Contract Drawings.
3. Except as noted otherwise, sawed joints made with early-entry dry-cut saws shall be 1" deep for slabs up to 8 inches thick, and 1/6 of the slab thickness for thicker slabs. Sawed joints made with wet-cut saws, when permitted by the Engineer, shall extend into the slab 1/4 of the slab thickness.
4. If a crack forms in the slab, propagating from the end of the partially completed sawed joint, the Contractor shall stop sawing the joint. The Contractor shall route out the crack in a concave configuration, and fill the routed crack with the specified joint filler. Routing need not occur immediately.
5. Concrete sawing machines shall be adequate in number and power, and with sufficient replacement blades to complete the sawing at the required rate. Joints shall be cut to true alignment and shall be cut in sequence of concrete placement. Sludge and cutting debris shall be removed.
6. Temporary plastic joint inserts shall be provided in order to prevent spalling where joints intersect.
7. Prior to completion of joint filler installation, sawed joints shall be protected against edge spalling due to any and all traffic and/or work occurring on the slab.
8. Plastic joint inserts may be used at joint locations in lieu of saw cutting.
9. Provide joints only where shown on the drawings or as otherwise approved after written request.

B. Install surface applied waterstops in all joints at containment curbs unless otherwise shown on the Drawings.

C. Apply bondbreaker to surface of control joints.

D. Prepare joints as follows:

1. Horizontal joints: remove laitance immediately after initial set and roughen surface in an acceptable manner that exposed the aggregate uniformly and doesn't leave laitance or loose aggregate. After the concrete has set to a stiffness that precludes laitance removal by shovels or scrapers, the Contractor shall remove it and create a roughened surface by water-jetting or other effective method. The use of pneumatic hammers is not permitted.
2. Vertical joints: the surface shall be thoroughly cleaned of laitance by water-jetting or wire-brushing followed by air blasting.
3. Add bond breaker to the surface of control joints.
4. Before concrete is placed against set concrete, the surface shall be thoroughly wetted with standing water removed. Horizontal construction joints shall be in

a saturated surface dry condition: saturated for a minimum of 6 hours, with standing water removed.

3.14 REPAIRS TO CONCRETE (GENERAL)

A. Definitions:

1. Honeycombed areas: Areas where voids are left in the concrete due to inadequate vibration and consolidation resulting in a failure of the mortar to effectively fill the spaces among coarse aggregate particles.
2. Spalls: Concrete that has chipped, flaked, scaled or broken off from the surface of the concrete.
3. Surface Defects: Those defects that affect the appearance of the finished concrete but do not affect the structural integrity.
4. Structural Defects: Those defects that affect the appearance of the finished concrete and the structural integrity.

B. Surface Defects:

1. Form tie holes
2. Air voids (bug holes) larger than those specified for the required surface finish
3. Honeycomb areas with a depth less than 1 inch
4. Blisters
5. Delaminations
6. Crusting
7. Visible construction joints, fins and burs
8. Non-uniform concrete color and appearance
9. Floors that are not level

C. Structural Defects:

1. Random cracks
2. Excessive cracking (crazing)
3. Spalls
4. Air voids (bug holes) and honeycombed areas with a depth greater than or equal to 1 inch
5. All repairs to newly placed concrete shall be at no additional cost to the Owner.

3.15 REPAIRS OF SURFACE DEFECTS

- A. As soon as the forms have been stripped and the vertical concrete surfaces exposed or concrete slabs have been finished and cured, repair all surface defects. All concrete repair work shall result in a concrete surface of uniform color and texture, and shall be free of all irregularities.
- B. Form Tie Holes: After cleaned and thoroughly dampened, apply grout paint and fill holes solid with patching mortar.
- C. Air voids (bug holes): After cleaned and thoroughly dampened, apply grout paint and fill holes solid with patching mortar.
- D. Honeycomb areas:
 1. All honeycombed areas shall be removed to sound concrete by means of hand chisels or pneumatic chipping hammers or hydrodemolition.

2. Saw cut a 1 inch minimum square groove around the edges of the defective area perpendicular to the surfaces to serve as the boundary for concrete removal. Saw cut the edges perpendicular to the surface. No feather-edges shall be allowed.
 3. Remove all loose aggregate paste and debris and scrub clean. Thoroughly wet area to be repaired. Brush and scrub grout paint into the substrate of the area to be repaired.
 4. Mix patching mortar using as little water as possible. Allow to stand with frequent manipulation of trowel to achieve stiffest consistency. Blend white and gray Portland cement to achieve color match with surrounding concrete.
 5. Prior to the set of grout paint (but after it has cast its water sheen), apply a stiff consistency of patching mortar to the area with a trowel. Leave patched surface slightly higher than surrounding surface. Do not finish for 1 hour minimum. Cure in same manner as adjacent concrete.
- E. Blisters, delaminations, and crusting: Repairs shall be similar to those for honeycomb areas. Depth of saw cut shall match the depth of the defective concrete.
- F. Visible construction joints, fins, and burrs: Remove by grinding until a smooth uniform surface is attained.
- G. Concrete with an overall non-uniform color or appearance as determined by the Engineer shall be repaired with a complete cementitious overlay. Application of the overlay shall be in strict accordance with the manufacturer's written instructions and recommendations.
- H. Finished Flatwork exceeding specified tolerances:
1. High areas shall be repaired by grinding after the concrete has cured 14 days.
 2. Low areas shall be repaired by adding appropriate overlay material. Grind concrete if required to provide minimum overlay thickness as required by the manufacturer. Finish repair area to match adjacent concrete.

3.16 REPAIRS OF STRUCTURAL DEFECTS

- A. Remove and replace or repair all structural defects in newly placed concrete.
- B. Repair all structural defects in existing concrete that are identified by the Engineer during construction. These repairs are identified either on the Structural Drawings or in the Bid Form.
- C. Unless otherwise indicated, all concrete defects shall be repaired in accordance with the specific repair material manufacturer's recommendations.
- D. Random cracks:
1. Cleaning of cracks:
 - a. Dry cracks: Crack or void must be dry at time of application. Remove all dust, debris or disintegrated material from cracks or voids by the use of oil-free compressed air or vacuuming. Cracks saturated with oil or grease must be chipped out to unsaturated concrete. "Vee" out cracks in horizontal surfaces slightly.
 - b. Wet cracks: Clean the crack surface so that the crack can be located. If the crack is wide or high water flows are encountered, seal the surface of the

- crack with a surface sealing material as recommended by the manufacturer.
2. Where cracks extend through members and are accessible, seal bottom of crack which is to receive the repair material.
 3. Patching of vertical wall or overhead cracks shall be accomplished in the same manner using a similar epoxy material of higher viscosity as recommended by the manufacturer.
 4. Apply repair material in strict accordance with manufacturer's recommendations.
- E. Excessive cracking (Crazing):
1. Floor slabs containing an excessive amount of cracks as defined herein, and which will remain exposed, shall receive topping after sealing of cracks in accordance with the above paragraph.
 2. Excessive cracking shall be defined as areas containing cracks averaging 1/64th-inch wide or greater, and in excess of 15 linear feet of cracks per 100 square feet of slab. In the event that excessive cracking occurs in isolated areas of a given floor, topping shall only be applied in the area of the cracks bounded by construction, expansion, or control joints.
 3. Apply repair material in strict accordance with manufacturer's recommendations.
- F. Spalls, honeycomb areas and holes:
1. All weakened, damaged or disintegrated concrete shall be removed to sound concrete by means of hand chisels or pneumatic chipping hammers or hydrodemolition.
 2. Saw cut a 1 inch minimum square groove around the edges of the defective area perpendicular to the surfaces to serve as the boundary for concrete removal. Saw cut the edges perpendicular to the surface. No feather-edges shall be allowed.
 3. Remove defective concrete. If defective areas extend around reinforcing steel, chip to provide a clear space of at least 1 inch all around the bar. When pneumatic chipping hammers are used for removal of concrete around reinforcement, they shall not exceed 15 pounds.
 4. Apply repair material in strict accordance with manufacturer's recommendations.

3.17 MODIFICATIONS TO EXISTING CONCRETE

- A. When removing materials or portions of existing structures and when making openings in existing structures, all precautions shall be taken and all necessary barriers, temporary bracing and shoring and other protective devices shall be erected to prevent damage to the structures beyond the limits necessary for the new work and to prevent damage to the structures or contents by falling or flying debris.
- B. Remove concrete to the depths shown or required. Surfaces must be clean and sound. Remove dust, laitance, grease, curing compounds, impregnations, waxes, foreign particles, and disintegrated materials. Clean surface of all contamination and debris, and roughen by steel shot-blasting, abrasive (sand) blasting, or water-jetting

(hydrodemolition). Use of scabblers, scarifiers, bush hammers, or pneumatic hammers is not permitted. The prepared surface shall be water-saturated for a minimum of six hours, and the excess water shall be removed immediately prior to placement of repair material.

- C. Exposed reinforcement shall be cleaned by wire brushing, steel shot blasting or abrasive sand blasting. Reinforcement shall be cut or bent as shown on the Drawings. Additional reinforcement shall be provided as shown on the Drawings.

3.18 CORING OF HOLES

- A. Core drill holes where shown. Prior to coring holes in existing concrete, Contractor shall coordinate with the Owner and Engineer to determine the location of existing utilities in the concrete.
- B. Coring shall be performed with a non-impact rotary tool with diamond core drills, size shall be suitable for pipe conduit, sleeves or mechanical seals to be installed. Protect all existing equipment, utilities and critical areas against water or other damage caused by the drilling operation.
- C. No additional structural members shall be cut without review by the Engineer with no exceptions taken.
- D. Apply epoxy paint (5 mils DFT minimum) to exposed reinforcing cut during coring that will not be covered with new concrete or repair material.

3.19 CUTTING OF HOLES

- A. Prior to cutting holes in existing concrete, Contractor shall coordinate with the Owner and Engineer to determine the location of existing utilities in the concrete.
- B. Cutting shall be done with a concrete wall saw and diamond saw blades of proper size.
- C. Provide for control of slurry generated by sawing operation on both sides of wall.
- D. When cutting a reinforced concrete wall, the cutting shall be done so as not to damage the bond between the concrete and reinforcing steel left in structure.
- E. New openings in existing concrete shall be overcut and formed as follows:
 - 1. The opening size removed shall be a minimum 4" greater on each side, unless otherwise indicated on the Drawings.
 - 2. The concrete shall be saw cut to the limits indicated.
 - 3. While removing the concrete, either:
 - a. Maintain the existing reinforcing steel such that it extends 2" beyond the cut.
 - b. Cut the existing reinforcing steel flush with the cut concrete. Prior to placing the new concrete to form the new openings, drill and adhere reinforcing steel dowels into the existing concrete with high strength epoxy as indicated on the drawings.
 - 4. Apply an epoxy bonding adhesive to the cut concrete surface. Apply surface applied waterstop if indicated on the Contract Drawings
 - 5. Add additional reinforcing steel and place new concrete to form the new opening as indicated.

3.20 TOLERANCES

- A. Maximum allowable deviations from dimensions, elevations, slopes and position shall conform to ACI 117. Tolerances apply to concrete dimensions only, not to positioning of vertical reinforcing steel, dowels, or embedded items.

3.21 FAILURE TO MEET STRENGTH REQUIREMENTS

- A. The strength of the concrete in place will be considered substandard if any one of the following results occur: (Note: A strength test is defined as the average of two 6"Ø x 12" cylinders or three 4"Ø x 8" cylinders)
 - 1. The average any three (3) consecutive strength tests at 28 days is less than the specified strength (f'_c).
 - 2. More than 10 percent of the strength tests have strengths less than the specified strength (f'_c).
 - 3. A compressive strength test result falls below the specified strength (f'_c) by more than 500 psi.
- B. Concrete which fails to meet the strength requirements as outlined above will be reviewed by the Engineer. The Engineer will determine whether the substandard concrete will be accepted, rejected or additional tests performed.
- C. When substandard concrete occurs as defined in Part A, the Engineer will require corrective measures to be taken immediately in order to increase the average of subsequent strength tests. In addition, the Engineer may require cores drilled in the area of question in accordance with this Section. If the core tests are inconclusive or impractical to obtain, load tests may be required, and their results evaluated in accordance with ACI 318 Chapter 27. If the average of the three cores is less than 85% of the specified strength or if one core is less than 75% of the specified 28-day strength, then that portion of the structure shall be strengthened by a method proposed by the Contractor and no exceptions taken by the Engineer or replaced by the Contractor at no additional cost to the Owner.

3.22 DEFECTIVE CONCRETE

- A. Concrete work will be considered deficient if it does not conform to strength and material durability requirements (including water-to-cementitious materials ratio), location, elevation, dimension, shape, alignments, and/or appearance as required in the Contract Documents. Specific examples of deficient concrete include (but are not limited to):
 - 1. Concrete containing reinforcement that does not meet the requirements of the Contract Documents for size, quantity, strength, position, or arrangement.
 - 2. Concrete which differs from the required dimensions or locations in such a manner as to reduce the strength.
 - 3. Concrete surfaces not finished or cured in accordance with this Section.
 - 4. Concrete work in hot or cold weather that doesn't meet the requirements of the Contract Documents.
 - 5. Formed surfaces larger or smaller than specified dimensional tolerances. If the Engineer permits the Contractor to correct the error, such correction shall be as

directed and in such a manner as to maintain the strength, function and appearance of the structure.

6. Concrete members cast in the wrong location may be rejected and shall be removed at no additional cost to the Owner if the strength, appearance or function of the structure is adversely affected.
 7. Concrete exposed to view with defects which adversely affect the appearance of the specified finish shall be repaired. If, in the opinion of the Engineer, the defects cannot be repaired, the concrete may be accepted or rejected in accordance with the decision of the Engineer.
 8. Concrete work damaged from accidents, poor construction practices or fire.
- B. Any deficient concrete may be subject to rejection and replacement at no additional cost to the Owner if the Engineer deems necessary.

3.23 PROTECTION

- A. In addition to providing protection against hot and cold weather, provide the following additional protective measures for freshly placed concrete:
1. Protect concrete against vibration until concrete has attained 33% of its 28-day strength. Do not compact soil [drive piles or blast ledge] within 100 feet of freshly placed concrete until concrete has attained 33% of its 28-day strength.
 2. Protect concrete against premature loads until the concrete has been in place for 28 days and the design strength has been attained (unless otherwise indicated). Premature loads include but are not limited to:
 - a. Backfilling
 - b. Loading slabs
 - c. Building CMU walls atop slabs
 - d. Installing equipment on slabs
 - e. Installing equipment atop slabs prior to completion of backfilling

END OF SECTION

SECTION 03319PRE-CAST CONCRETE THRUST BLOCKS AND ANCHOR BLOCKSPART 1 - GENERAL1.1 DESCRIPTION

- A. Work Included: Furnish and install pre-cast concrete thrust blocks for pipes in the location(s) and of the dimension(s) and shapes shown on the Drawings, as directed by the Engineer and as required to rigidly support pipes. Furnish and install precast split concrete anchor blocks for HDPE pipe.
- B. The Contractor shall provide pre-cast concrete thrust blocks, if cast-in-place thrust blocks are not used as indicated on the drawings.

1.2 SUBMITTALS

- A. Submit dimensioned drawings for each type of block required, as indicated on the drawings.

PART 2 - PRODUCTS2.1 MATERIALS

- A. Thrust blocks shall be manufactured of 3,000 psi concrete or greater.
- B. Anchor blocks shall be manufactured of minimum 4,500 psi concrete for durability in saltwater conditions. Reinforcing steel for anchor blocks shall be epoxy coated or 316 stainless steel as indicated on the drawings.

PART 3 - EXECUTION3.1 INSTALLATION

- A. Thrust blocks shall be installed as shown on the Drawings, to secure pipe and fittings and properly compacted as specified.
- B. Secure pipe to prevent movement and floatation during the placement of the concrete.
- C. Pipe anchors shall be installed as detailed on the drawings.

END OF SECTION

APPENDIX A
Geotechnical



B-5

JOB NO. 14202

DATE STARTED: 05/05/2020

DATE FINISHED: 05/05/2020

ELEVATION: N/A

ELEVATION (PVC): N/A

GROUNDWATER (ft bgs): N/A

DRILLER: Sam Cooley

INSPECTOR: W. Edgar

Located on Durham side of the
Piscataqua River, approx 280' south
east of the Mackie Property valve
vaults

DEPTH (ft)	WELL CONSTRUCTION	FORMATION CLASSIFICATION	SAMPLE				Notes	
			NO.	INTER. (ft)	REC. (in.)	BLOWS/6"		
0	N/A	Gray/Brn CLAY	N/A	0-2	18	0-0-0-0	Firm	
2		Gray/Brn Silt and Clay		2-4	24	0-0-0-0		
4		Gray CLAY		4-6	24	0-0-0-0		
6				6-8	24	0-0-1-2	Loose	
8				8-10	24	0-0-1-2		
10		N/A			10-16	N/A	N/A	Roller cone to 16' below mudline
12								
14	End of Exploration @ 16' below mudline							
16								
18								
20								



B-6

PROJECT: Subaqueous Water Transmission Main					JOB NO. 14202			Located on Durham side of the Piscataqua River, approx 350' south east of the Mackie Property valve vaults
CLIENT: City of Portsmouth					DATE STARTED: 05/05/2020			
CONTRACTOR: New England Boring Contractors, Inc					DATE FINISHED: 05/05/2020			
					ELEVATION: N/A			
					ELEVATION (PVC): N/A			
	CAS.	SAMP.	CORE	TUBE	GROUNDWATER (ft bgs): N/A			
TYPE	Steel	Wash	-	-	DRILLER: Sam Cooley			
DIAMETER	2.25-inch	-	-	-	INSPECTOR: W. Edgar			
WEIGHT	140 lb	-	-	-				
FALL	36"	-	-	-				
DEPTH (ft)	WELL CONSTRUCTION		FORMATION CLASSIFICATION	SAMPLE				Notes
				NO.	INTER. (ft)	REC. (in.)	BLOWS/6"	
0	N/A		Gray CLAY	N/A	0-2	24	0-0-0-0	Firm
2					2-4	24	0-0-0-0	
4					4-6	24	0-0-0-1	
6					6-8	24	0-0-0-0	Loose
8					8-10	24	0-0-1-2	
10					N/A		N/A	10-15
12								
14								
16	End of Exploration @ 15' below mudline							
18								
20								



B-7

PROJECT: Subaqueous Water Transmission Main					JOB NO. 14202		Located on Durham side of the Piscataqua River, approx 575' south east of the Mackie Property valve vaults
CLIENT: City of Portsmouth					DATE STARTED: 05/06/2020		
CONTRACTOR: New England Boring Contractors, Inc					DATE FINISHED: 05/06/2020		
					ELEVATION: N/A		
					ELEVATION (PVC): N/A		
					GROUNDWATER (ft bgs): N/A		
	CAS.	SAMP.	CORE	TUBE	DRILLER: Sam Cooley		
					INSPECTOR: W. Edgar		
TYPE	Steel	Wash	-	-			
DIAMETER	2.25-inch	-	-	-			
WEIGHT	140 lb	-	-	-			
FALL	36"	-	-	-			
DEPTH (ft)	WELL CONSTRUCTION	FORMATION CLASSIFICATION	SAMPLE				Notes
			NO.	INTER. (ft)	REC. (in.)	BLOWS/6"	
0	N/A	Gray Fine Sand, Trace Med Sand and Clay	N/A	0-2	24	0-0-0-0	
2-4				24	0-0-0-0		
4		Gray CLAY		4-6	24	0-0-0-0	Firm
6				6-8	24	0-0-0-0	
8				8-10	24	0-0-0-0	
10				N/A	10-17	N/A	
12							
14							
16							
End of Exploration @ 17' below mudline							
18							
20							

PROJECT: Subaqueous Water Transmission Main					JOB NO. 14202		Located on Durham side of the Piscataqua River, approx 725' south east of the Mackie Property valve vaults
CLIENT: City of Portsmouth					DATE STARTED: 05/06/2020		
CONTRACTOR: New England Boring Contractors, Inc					DATE FINISHED: 05/06/2020		
					ELEVATION: N/A		
					ELEVATION (PVC): N/A		
TYPE	CAS. Steel	SAMP. Wash	CORE -	TUBE -	GROUNDWATER (ft bgs): N/A		
DIAMETER	2.25-inch	-	-	-	DRILLER: Sam Cooley		
WEIGHT	140 lb	-	-	-	INSPECTOR: W. Edgar		
FALL	36"	-	-	-			

DEPTH (ft)	WELL CONSTRUCTION	FORMATION CLASSIFICATION	SAMPLE				Notes
			NO.	INTER. (ft)	REC. (in.)	BLOWS/6"	
0							
-							
-							
-							
-2							
-	N/A	Brn/Gray Fine-Med Sand, Gravel and Clay	N/A	0-2	6	3-4-5-5	
-		Refusal Encountered @ approx. 2.5' below mudline					
-4							
-							
-							
-							
-6							
-							
-							
-8							
-							
-10							
-							
-12							
-							
-14							
-							
-16							
-							
-18							
-							
-20							
-							
-							



B-9

PROJECT: Subaqueous Water Transmission Main					JOB NO. 14202		Located on Newington side of the Piscataqua River, approx 630' north west of the Fox Point Property valve vaults		
CLIENT: City of Portsmouth					DATE STARTED: 05/06/2020				
CONTRACTOR: New England Boring Contractors, Inc					DATE FINISHED: 05/06/2020				
					ELEVATION: N/A				
					ELEVATION (PVC): N/A				
					GROUNDWATER (ft bgs): N/A				
					DRILLER: Sam Cooley				
					INSPECTOR: W. Edgar				
DEPTH (ft)	WELL CONSTRUCTION		FORMATION CLASSIFICATION		SAMPLE			Notes	
					NO.	INTER. (ft)	REC. (in.)		BLOWS/6"
0									Roller cone to approx. 7' below mudline
-									
-									
-2									
-									
-									
-4	N/A		Bm/Gray Fine-Crs Sand & Gravel, Silt and Cobbles		N/A	0-7'	N/A	N/A	
-									
-									
-6									
-									
-									
-8	Probable Bedrock Refusal Encountered @ approx. 7' below mudline								
-									
-									
-10									
-									
-									
-12									
-									
-									
-14									
-									
-									
-16									
-									
-									
-18									
-									
-									
-20									
-									
-									



Located on Newington side of the
Piscataqua River, approx. 450' north
west of the Fox Point Property valve
vaults

PROJECT: Subaqueous Water Transmission Main					JOB NO. 14202		Located on Newington side of the Piscataqua River, approx. 450' north west of the Fox Point Property valve vaults
CLIENT: City of Portsmouth					DATE STARTED: 05/05/2020		
CONTRACTOR: New England Boring Contractors, Inc					DATE FINISHED: 05/05/2020		
					ELEVATION: N/A		
					ELEVATION (PVC): N/A		
	CAS.	SAMP.	CORE	TUBE	GROUNDWATER (ft bgs): N/A		
TYPE	Steel	Wash	-	-	DRILLER: Sam Cooley		
DIAMETER	2.25-inch	-	-	-	INSPECTOR: W. Edgar		
WEIGHT	140 lb	-	-	-			
FALL	36"	-	-	-			
DEPTH (ft)	WELL CONSTRUCTION	FORMATION CLASSIFICATION	SAMPLE				Notes
			NO.	INTER. (ft)	REC. (in.)	BLOWS/6"	
0	N/A	Gray Fine-Med Sand and Silt	N/A	0-2	12	2-3-2-6	
2		Gray/Brn Fine Sand, Silt and Clay		2-4	24	1-0-0-1	
4		Reddish Brn Fine Sand and Silt		4-6	10	2-1 for 18"	
6		Gray/Brn Fine Sand and Silt		6-8	24	6-1-1-1	
8		Brn Fine-Med Sand, Some Gray Clay		8-10	24	1-3-4-7	
10		N/A		10-15	N/A	N/A	Roller cone to 15' below mudline
12		End of Exploration @ 15' below mudline					
14							
16							
18							
20							



B-11

PROJECT: Subaqueous Water Transmission Main					JOB NO. 14202			Located on Newington side of the Piscataqua River, approx 375' north west of the Fox Point Property valve vaults		
CLIENT: City of Portsmouth					DATE STARTED: 05/05/2020					
CONTRACTOR: New England Boring Contractors, Inc					DATE FINISHED: 05/05/2020					
	CAS.	SAMP.	CORE	TUBE	ELEVATION: N/A					
TYPE	Steel	Wash	-	-	ELEVATION (PVC): N/A					
DIAMETER	2.25-inch	-	-	-	GROUNDWATER (ft bgs): N/A					
WEIGHT	140 lb	-	-	-	DRILLER: Sam Cooley					
FALL	36"	-	-	-	INSPECTOR: W. Edgar					
DEPTH (ft)	WELL CONSTRUCTION		FORMATION CLASSIFICATION		SAMPLE				Notes	
					NO.	INTER. (ft)	REC. (in.)	BLOWS/6"		
0	N/A		Gray Fine Sand, Silt and Clay		N/A		0-2	12	2-3-2-6	
2			Gray Clay				2-4	24	13-14-17-21	Stiff
4			Gray Clay, Trace Fine-Med Sand and Gravel				4-6	12	1-4-5-5	
6			Gray/Brn Clay and Silt				6-8	24	5-4-3-3	Dry, Stiff
8			Gray CLAY				8-9.5	24	4-5-5-5	
10			Brn Fine-Med Sand and Silt				9.5-10			
12			N/A				10-15	N/A	N/A	Roller cone to 15' below mudline
14						End of Exploration @ 15' below mudline				
16										
18										
20										



Located on Newington side of the
Piscataqua River, approx 215' north
west of the Fox Point Property valve
vaults

PROJECT: Subaqueous Water Transmission Main					JOB NO. 14202			Located on Newington side of the Piscataqua River, approx 215' north west of the Fox Point Property valve vaults		
CLIENT: City of Portsmouth					DATE STARTED: 05/05/2020					
CONTRACTOR: New England Boring Contractors, Inc					DATE FINISHED: 05/05/2020					
	CAS.	SAMP.	CORE	TUBE	ELEVATION: N/A					
TYPE	Steel	Wash	-	-	ELEVATION (PVC): N/A					
DIAMETER	2.25-inch	-	-	-	GROUNDWATER (ft bgs): N/A					
WEIGHT	140 lb	-	-	-	DRILLER: Sam Cooley					
FALL	36"	-	-	-	INSPECTOR: W. Edgar					
DEPTH (ft)	WELL CONSTRUCTION		FORMATION CLASSIFICATION		SAMPLE				Notes	
					NO.	INTER. (ft)	REC. (in.)	BLOWS/6"		
0			Gray Fine Sand, Silt and Some Clay			0-2	4	0-0-0-0		
2			Gray Fine Sand, Silt, Trace Med Sand and Clay			2-4	24	0-0-0-0		
4			Gray Clay, Some Fine-Med Sand	N/A		4-6	24	1 for 12"-2-2	Firm	
6			Gray Clay, Some Fine-Med Sand and Gravel			6-8	24	1-1-5-10		
8			Gray Clay, Fine Sand, Silt, and Some Med Gravel			8-10	24	0-0-1-2		
10			End of Exploration @ 10' below mudline							
12										
14										
16										
18										
20										
22										
24										
26										
28										
30										

TO:	Brian Goetz, City of Portsmouth	DATE:	3/17/2020
FROM:	Britt Eckstrom, Darrin Lary, William Edgar	PROJECT NO.:	14202A
SUBJECT:	Subaqueous Water Main -Durham/Newington Land-Based Test Drilling		

Land-based test drilling activities were conducted on March 11 and 12, 2020 in order to assess the subsurface conditions at both the Durham and Newington sites. Six borings were completed to a depth of approximately 15 feet below ground surface (bgs); and, one boring was advanced down to approximately 25 feet bgs. One boring (B-13) on the Newington site was omitted due to access limitations. Boring locations are shown on Figure 1 and 2 (Attachment A). Subsurface materials were observed and noted as the auger was advanced. Boring logs are included in Attachment B.

Durham Site

Borings were completed at the Mackie property located at 180 Piscataqua Road in Durham, New Hampshire between March 11 and March 12. Extra precautions were taken to protect the property in consideration of the fact that the existing water main easement is located on private property. A total of four borings were completed in accordance with the New Hampshire Department of Environmental Services (NHDES) Wetland and Non-Site Specific Permit #2019-03224.

In general, subsurface materials at the Durham site consisted of fine to medium sand, silt and clay. Refusal was not encountered at any of the boring locations.

Newington Site

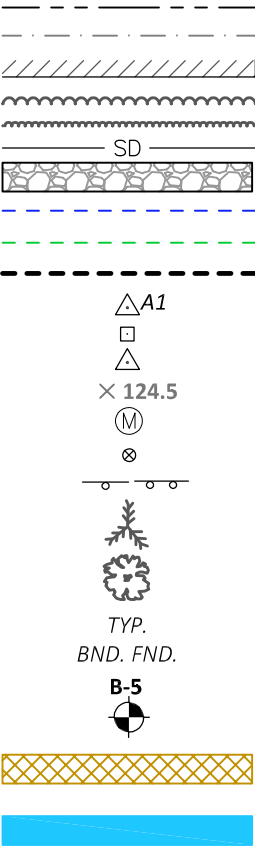
Borings were completed at the Fox Point park property located in Newington, New Hampshire on March 12. Three out of four borings were completed in accordance with the NHDES Wetlands and Non-Site Specific Permit 2019-03224. Boring B-13 was omitted because access to the shoreline was limited and the drill rig was unable to descend/ascend the embankment without significant tree clearing. As a result of the omission, boring B-14 was advanced to a depth of 25 feet bgs.

In general, subsurface materials at the Newington site consisted of fine to medium sand, silt and clay. Refusal was not encountered at any of the boring locations.

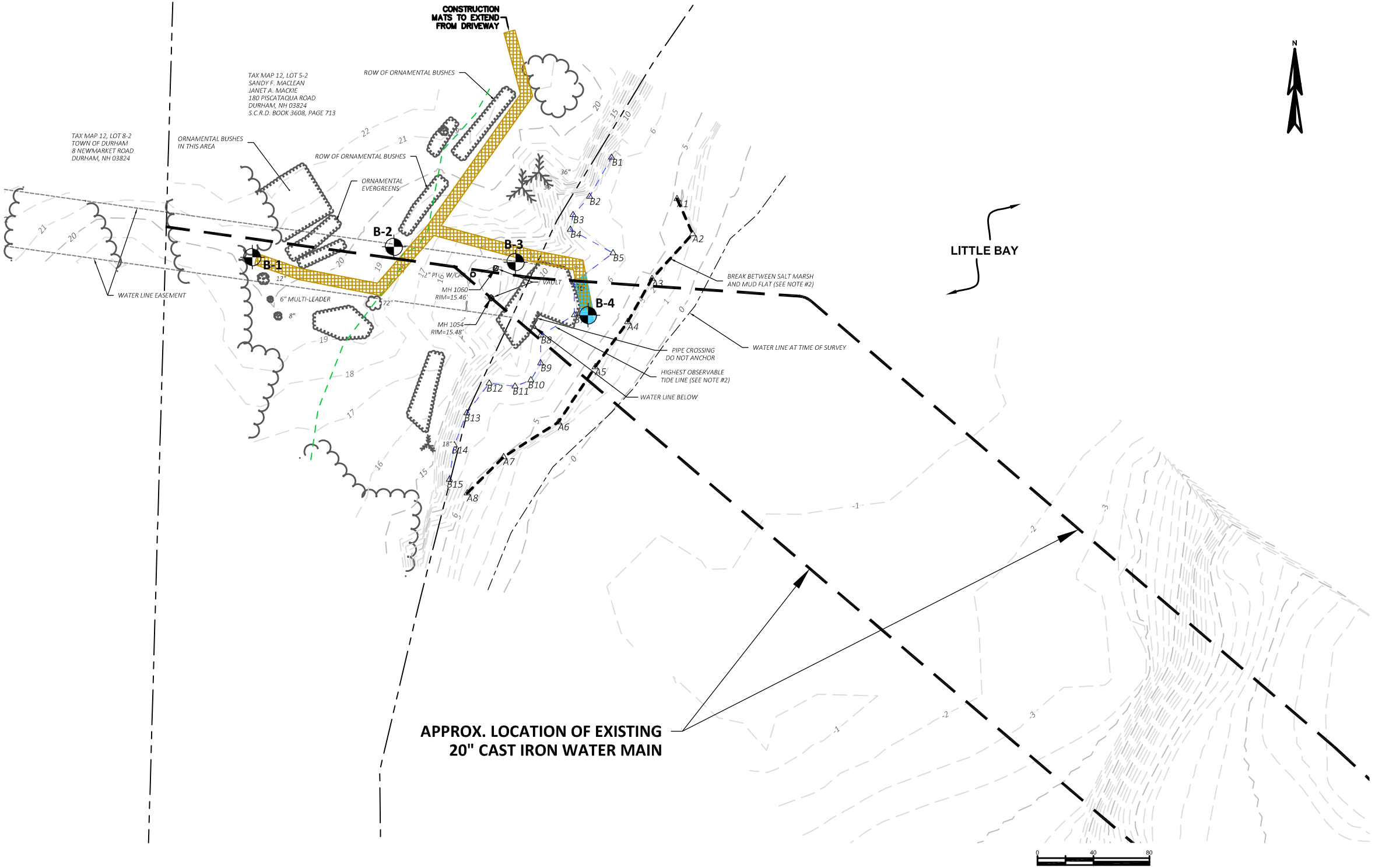
ATTACHMENT A
Figures

J:\ENG\NH\PORTSMOUTH\14202-SUBAQUEOUSWATERMAIN\DRAWINGS\CIV\FIGURES\14202A-CS-BORINGLOCATIONPLANS.DWG

LEGEND



APPROX. ABUTTER LOT LINE
EXISTING EASEMENT LINE
BUILDING
TREE LINE
SHRUB LINE
STORM DRAIN
RIP RAP
HIGHEST OBSERVABLE TIDE LINE
TIDAL BUFFER ZONE
WETLAND
WETLAND FLAG
BOUND
SURVEY CONTROL POINT
SPOT ELEVATION
MANHOLE
VENT PIPE
SIGN
CONIFEROUS TREE
DECIDUOUS TREE
TYP.
BND. FND.
BORING
PROPOSED TEMPORARY
CONSTRUCTION MAT
PROPOSED TEMPORARY
TIDAL WETLAND IMPACT



NOTES

1. FIELD SURVEY PERFORMED BY DOUCET SURVEY, INC., DURING MAY & JUNE 2019 USING A TRIMBLE S7 TOTAL STATION AND A TRIMBLE R10 SURVEY GRADE GPS WITH A TRIMBLE TSC3 DATA COLLECTOR AND A SOKKIA B21 AUTO LEVEL. TRAVERSE ADJUSTMENT BASED ON LEAST SQUARE ANALYSIS.
2. JURISDICTIONAL RESOURCES INCLUDING HIGHEST OBSERVABLE TIDE LINE WERE DELINEATED ON MAY 29, 2019 BY MARC JACOBS, CERTIFIED WETLAND SCIENTIST NUMBER 090, ACCORDING TO THE STANDARDS OF THE US ARMY CORPS OF ENGINEERS – WETLANDS DELINEATION MANUAL; THE 2012 REGIONAL SUPPLEMENT TO THE CORPS OF ENGINEERS WETLAND DELINEATION MANUAL: NORTHCENTRAL AND NORTHEAST REGION; AND THE CODE OF ADMINISTRATIVE RULES, NH DEPARTMENT OF ENVIRONMENTAL SERVICES – WETLANDS BUREAU – ENV WT 100–900. SOILS WERE EVALUATED UTILIZING THE FIELD INDICATORS FOR IDENTIFYING HYDRIC SOILS IN NEW ENGLAND, VERSION 4, APRIL 2019 AND THE FIELD INDICATORS OF HYDRIC SOILS IN THE UNITED STATES, VERSION 8, 2016. THE INDICATOR STATUS OF VEGETATION AS HYDROPHYTIC WAS DETERMINED ACCORDING TO THE U.S. ARMY CORPS OF ENGINEERS – NORTHCENTRAL AND NORTHEAST 2016 REGIONAL WETLAND PLANT LIST. COPIES OF SITE PLANS WHICH HAVE BEEN REVIEWED BY THE WETLAND SCIENTIST ARE INDIVIDUALLY STAMPED, SIGNED AND DATED. THIS NOTE HAS BEEN CUSTOMIZED FOR THIS PROJECT.

CITY OF PORTSMOUTH, NH
SUBAQUEOUS WATER MAIN
LITTLE BAY, DURHAM-NEWINGTON
NEW HAMPSHIRE

BORING LOCATIONS - DURHAM SITE

PROJ NO:	14202A	DATE:	MARCH 2020	FIGURE:
WRIGHT-PIERCE Engineering a Better Environment				1

APPROX. ABUTTER LOT LINE
 EXISTING EASEMENT LINE
 BUILDING
 TREE LINE
 SHRUB LINE
 STORM DRAIN
 RIP RAP
 HIGHEST OBSERVABLE TIDE LINE
 TIDAL BUFFER ZONE
 WETLAND
 WETLAND FLAG
 BOUND
 SURVEY CONTROL POINT
 SPOT ELEVATION
 MANHOLE
 VENT PIPE
 SIGN
 CONIFEROUS TREE
 DECIDUOUS TREE
 TYPICAL
 BOUND FOUND
 BORING
 PROPOSED TEMPORARY
 CONSTRUCTION MAT
 PROPOSED TEMPORARY
 TIDAL WETLAND IMPACT

1. FIELD SURVEY PERFORMED BY DOUCET SURVEY, INC., DURING MAY & JUNE 2019 USING A TRIMBLE S7 TOTAL STATION AND A TRIMBLE R10 SURVEY GRADE GPS WITH A TRIMBLE TSC3 DATA COLLECTOR AND A SOKKIA B21 AUTO LEVEL. TRAVERSE ADJUSTMENT BASED ON LEAST SQUARE ANALYSIS.
2. JURISDICTIONAL RESOURCES INCLUDING HIGHEST OBSERVABLE TIDE LINE WERE DELINEATED ON MAY 29, 2019 BY MARC JACOBS, CERTIFIED WETLAND SCIENTIST NUMBER 090, ACCORDING TO THE STANDARDS OF THE US ARMY CORPS OF ENGINEERS – WETLANDS DELINEATION MANUAL; THE 2012 REGIONAL SUPPLEMENT TO THE CORPS OF ENGINEERS WETLAND DELINEATION MANUAL: NORTHCENTRAL AND NORTHEAST REGION; AND THE CODE OF ADMINISTRATIVE RULES, NH DEPARTMENT OF ENVIRONMENTAL SERVICES – WETLANDS BUREAU – ENV WT 100-900. SOILS WERE EVALUATED UTILIZING THE FIELD INDICATORS FOR IDENTIFYING HYDRIC SOILS IN NEW ENGLAND, VERSION 4, APRIL 2019 AND THE FIELD INDICATORS OF HYDRIC SOILS IN THE UNITED STATES, VERSION 8, 2016. THE INDICATOR STATUS OF VEGETATION AS HYDROPHYTIC WAS DETERMINED ACCORDING TO THE U.S. ARMY CORPS OF ENGINEERS – NORTHCENTRAL AND NORTHEAST 2016 REGIONAL WETLAND PLANT LIST. COPIES OF SITE PLANS WHICH HAVE BEEN REVIEWED BY THE WETLAND SCIENTIST ARE INDIVIDUALLY STAMPED, SIGNED AND DATED. THIS NOTE HAS BEEN CUSTOMIZED FOR THIS PROJECT.



**CITY OF PORTSMOUTH, NH
SUBAQUEOUS WATER MAIN
LITTLE BAY, DURHAM-NEWINGTON
NEW HAMPSHIRE**

BORING LOCATIONS - NEWINGTON SITE

PROJ NO:	14202A	DATE:	MARCH 2020
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WRIGHT-PIERCE 
Engineering a Better Environment

FIGURE:

2

APPENDIX B
Boring Logs

PROJECT: Subaqueous Water Transmission Main					JOB NO. 14202
CLIENT: City of Portsmouth					DATE STARTED: 03/11/2020
CONTRACTOR: New England Boring Contractors, Inc.					DATE FINISHED: 03/11/2020
	CAS.	SAMP.	CORE	TUBE	ELEVATION: N/A
TYPE	-	-	-	-	ELEVATION (PVC): N/A
DIAMETER	-	-	-	-	GROUNDWATER (ft bgs): N/A
WEIGHT	-	-	-	-	DRILLER: Mike Smith
FALL	-	-	-	-	INSPECTOR: W. Edgar

Durham Site - Located approx. 75' northwest of existing manhole #1060

DEPTH (ft)	WELL CONSTRUCTION	FORMATION CLASSIFICATION	SAMPLE				Notes
			NO.	INTER. (ft)	REC. (ft)	BLOWS/6"	
0		Dark Brn Fine Sand and Organics		0-1			
2		Brn Fine Silty Sand and Brn/Gray Clay		1-5			
4							
6							
8	N/A		N/A		N/A	N/A	
10		Gray Clay		5-10			
12							
14							
16	End of Exploration @ 15' bgs						
18							
20							



PROJECT: Subaqueous Water Transmission Main					JOB NO. 14202			Durham Site - Located approx. 90' northwest of existing manhole #1060	
CLIENT: City of Portsmouth					DATE STARTED: 03/11/2020				
CONTRACTOR: New England Boring Contractors, Inc.					DATE FINISHED: 03/11/2020				
	CAS.	SAMP.	CORE	TUBE	ELEVATION: N/A				
TYPE	-	-	-	-	ELEVATION (PVC): N/A				
DIAMETER	-	-	-	-	GROUNDWATER (ft bgs): N/A				
WEIGHT	-	-	-	-	DRILLER: Mike Smith				
FALL	-	-	-	-	INSPECTOR: W. Edgar				
DEPTH (ft)	WELL CONSTRUCTION		FORMATION CLASSIFICATION		SAMPLE				Notes
					NO.	INTER. (ft)	REC. (ft)	BLOWS/6"	
0	N/A		Dark Brn Fine Sand and Organics		N/A	0-1	N/A	N/A	
2			Brn Fine-Med Sand, Silt and Brn/Gray Clay			1-5			
4			Brn Fine Sand, Silt, Clay			5-10			
6			Gray Clay			10-14.5			
8			Brn Fine-Med Sand and Gravel			14.5-15			
10	End of Exploration @ 15' bgs								
12									
14									
16									
18									
20									

PROJECT: Subaqueous Water Transmission Main					JOB NO. 14202
CLIENT: City of Portsmouth					DATE STARTED: 03/11/2020
CONTRACTOR: New England Boring Contractors, Inc.					DATE FINISHED: 03/11/2020
	CAS.	SAMP.	CORE	TUBE	ELEVATION: N/A
TYPE	-	-	-	-	ELEVATION (PVC): N/A
DIAMETER	-	-	-	-	GROUNDWATER (ft bgs): N/A
WEIGHT	-	-	-	-	DRILLER: Mike Smith
FALL	-	-	-	-	INSPECTOR: W. Edgar

Durham Site - Located approx. 10' northeast of existing manhole #1060

DEPTH (ft)	WELL CONSTRUCTION	FORMATION CLASSIFICATION	SAMPLE				Notes
			NO.	INTER. (ft)	REC. (ft)	BLOWS/6"	
-0		Dark Brn Fine Sand and Organics		0-1			
-2		Brn Fine-Med Sand, Silt and Brn/Gray Clay		1-5			
-4							
-6							
-8	N/A	Brn/Gray Clay	N/A	5-10	N/A	N/A	
-10							
-12		Gray Clay		10-15			
-14							
-16	End of Exploration @ 15' bgs						
-18							
-20							



PROJECT: Subaqueous Water Transmission Main					JOB NO. 14202			Durham Site - Located approx. 35' east of existing manhole #1060	
CLIENT: City of Portsmouth					DATE STARTED: 03/12/2020				
CONTRACTOR: New England Boring Contractors, Inc.					DATE FINISHED: 03/12/2020				
	CAS.	SAMP.	CORE	TUBE	ELEVATION: N/A				
TYPE	-	-	-	-	ELEVATION (PVC): N/A				
DIAMETER	-	-	-	-	GROUNDWATER (ft bgs): N/A				
WEIGHT	-	-	-	-	DRILLER: Mike Smith				
FALL	-	-	-	-	INSPECTOR: W. Edgar				
DEPTH (ft)	WELL CONSTRUCTION		FORMATION CLASSIFICATION		SAMPLE				Notes
					NO.	INTER. (ft)	REC. (ft)	BLOWS/6"	
0			Gray Fine Sand, Silt, and Organics			0-1			
-2									
-4									
-6									
-8	N/A		Gray Clay, Silt and Some Med-Crs Gravel		N/A	1-15	N/A	N/A	
-10									
-12									
-14									
-16	End of Exploration @ 15' bgs								
-18									
-20									
-22									
-24									
-26									
-28									
-30									

PROJECT: Subaqueous Water Transmission Main					JOB NO. 14202		Newington Site - Located approx. 15' east of existing manhole #1877	
CLIENT: City of Portsmouth					DATE STARTED: 03/12/2020			
CONTRACTOR: New England Boring Contractors, Inc.					DATE FINISHED: 03/12/2020			
					ELEVATION: N/A			
					ELEVATION (PVC): N/A			
CAS.	SAMP.	CORE	TUBE	GROUNDWATER (ft bgs): N/A				
TYPE	-	-	-	DRILLER: Mike Smith				
DIAMETER	-	-	-	INSPECTOR: W. Edgar				
WEIGHT	-	-	-					
FALL	-	-	-					
DEPTH (ft)				SAMPLE			Notes	
				NO.	INTER. (ft)	REC. (ft)		BLOWS/6"
0	Dark Brn Fine Sand and Organics			N/A	0-1.5	N/A	N/A	
2	Dark Brn Fine-Med Sand, Silt and Clay				1.5-5			
4								
6	Brn/Gray Clay				5-10			
8								
10	Gray Clay				10-11			
12	N/A	Brn Fine-Med Sand and Gravel, Some Crs Gravel and Cobbles			11-15			
14								
16	Brn Fine Sand, Silt and Gravel			15-20				
18								
20								
22	Lt Brn Fine-Med Sand			20-25				
24								
26								
End of Exploration @ 25' bgs								

Newington Site - Located approx. 15'
east of existing manhole #1877



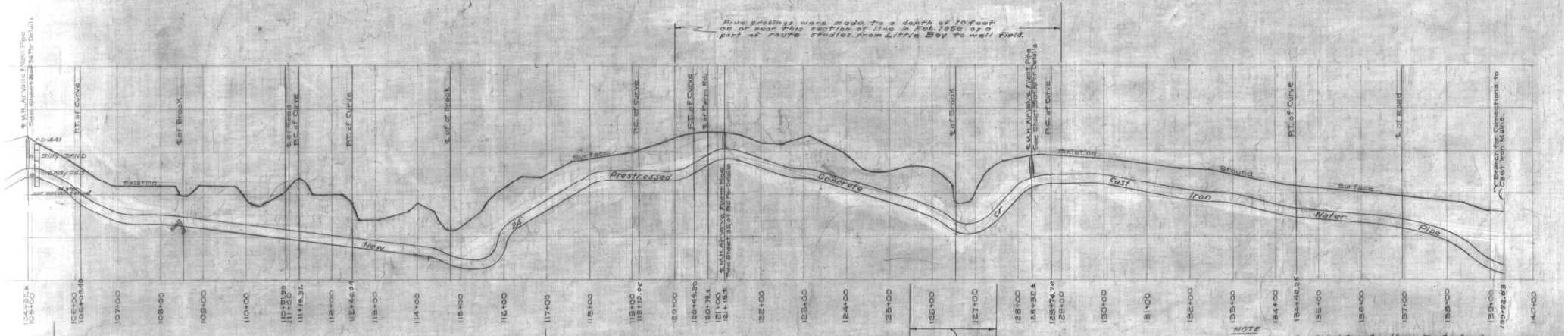
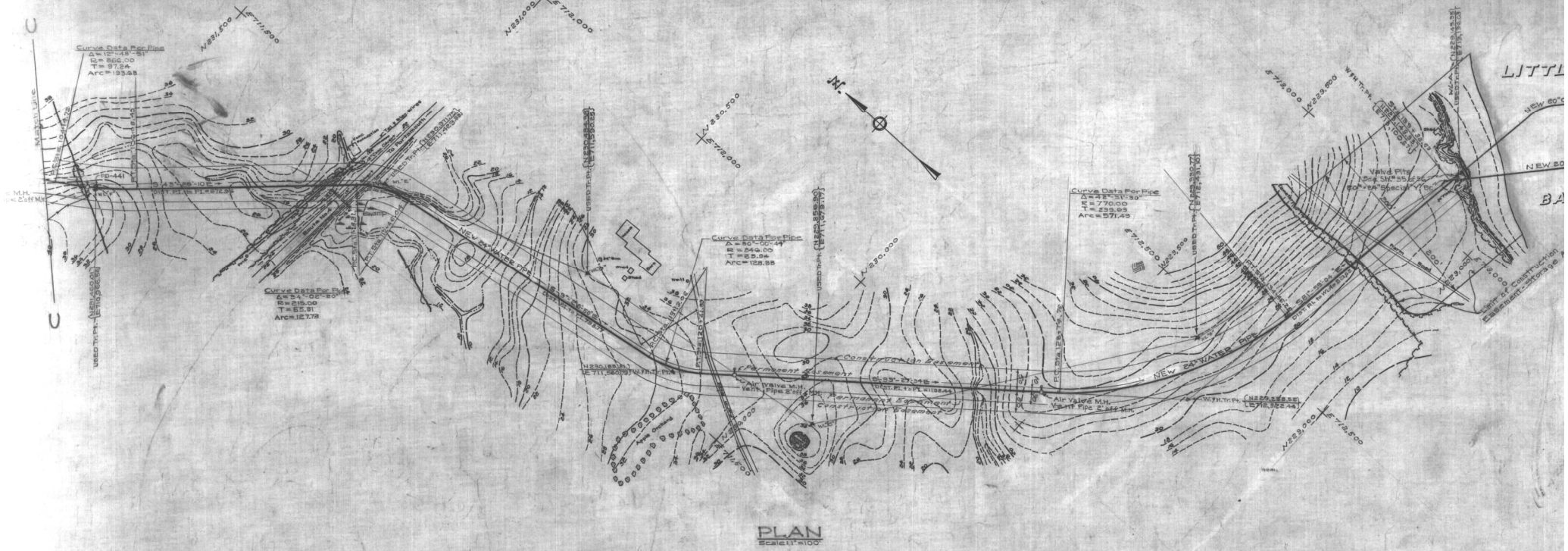
B-15
Pg. 1 of 1

PROJECT: Subaqueous Water Transmission Main					JOB NO. 14202			Newington Site - Located approx. 60' east of existing manhole #1877	
CLIENT: City of Portsmouth					DATE STARTED: 03/12/2020				
CONTRACTOR: New England Boring Contractors, Inc.					DATE FINISHED: 03/12/2020				
	CAS.	SAMP.	CORE	TUBE	ELEVATION: N/A				
TYPE	-	-	-	-	ELEVATION (PVC): N/A				
DIAMETER	-	-	-	-	GROUNDWATER (ft bgs): N/A				
WEIGHT	-	-	-	-	DRILLER: Mike Smith				
FALL	-	-	-	-	INSPECTOR: W. Edgar				
DEPTH (ft)	WELL CONSTRUCTION		FORMATION CLASSIFICATION		SAMPLE				Notes
					NO.	INTER. (ft)	REC. (ft)	BLOWS/6"	
0	N/A		Dark Brn Fine Sand and Organics		N/A	0-1	N/A	N/A	
2			Brn Fine Sand and Silt transitioning to Brn/Gray Clay			1-5			
6			Gray Clay Transitioning to Lt Brn Fine-Med Sand			5-10			
10			Lt Brn Fine Sand			10-15			
End of Exploration @ 15' bgs									



PROJECT: Subaqueous Water Transmission Main					JOB NO. 14202			Newington Site - Located approx. 95' southeast of existing manhole #1877	
CLIENT: City of Portsmouth					DATE STARTED: 03/12/2020				
CONTRACTOR: New England Boring Contractors, Inc.					DATE FINISHED: 03/12/2020				
	CAS.	SAMP.	CORE	TUBE	ELEVATION: N/A				
TYPE	-	-	-	-	ELEVATION (PVC): N/A				
DIAMETER	-	-	-	-	GROUNDWATER (ft bgs): N/A				
WEIGHT	-	-	-	-	DRILLER: Mike Smith				
FALL	-	-	-	-	INSPECTOR: W. Edgar				
DEPTH (ft)	WELL CONSTRUCTION		FORMATION CLASSIFICATION		SAMPLE				Notes
					NO.	INTER. (ft)	REC. (ft)	BLOWS/6"	
0	N/A		Med Brn Fine Sand and Organics	N/A	0-1	N/A	N/A		
-2			Lt Brn Fine Sand and Silt transitioning to Gray Clay						1-5
-4									
-6									
-8			Brn/Gray Clay, Trace Fine Sand		5-10	N/A	N/A		
-10									
-12			Brn Clay Transitioning to Lt Brn Fine-Med Sand		10-15				
-14									
-16	End of Exploration @ 15' bgs								
-18									
-20									

APPENDIX B
Existing Piping Plans



GENERAL NOTES

1. Datum plane refers to Mean Sea Level.
2. For any crossing valve, pit details see sheet 35 of 35.
3. For details of Air Valve and Vent Pipe see sheet 35 of 35.
4. Overflow Elevation - Portsmouth Tanks 175.45.
5. For Legend for Bedding see sheet 35 of 35.
6. For Hydrostatic Thrust Block details see sheet 35 of 35.
7. If Cast iron pipe is used, use AWWA fittings in place of prestressed concrete fittings.
8. Min. Cover over pipe shall be 4 ft. except as shown on plan.
9. Limit of Construction Easement is Limit of Work.
10. Clear as necessary for construction.

Final Field Corrections 25 Mar. 57

REVISION	DATE	DESCRIPTION

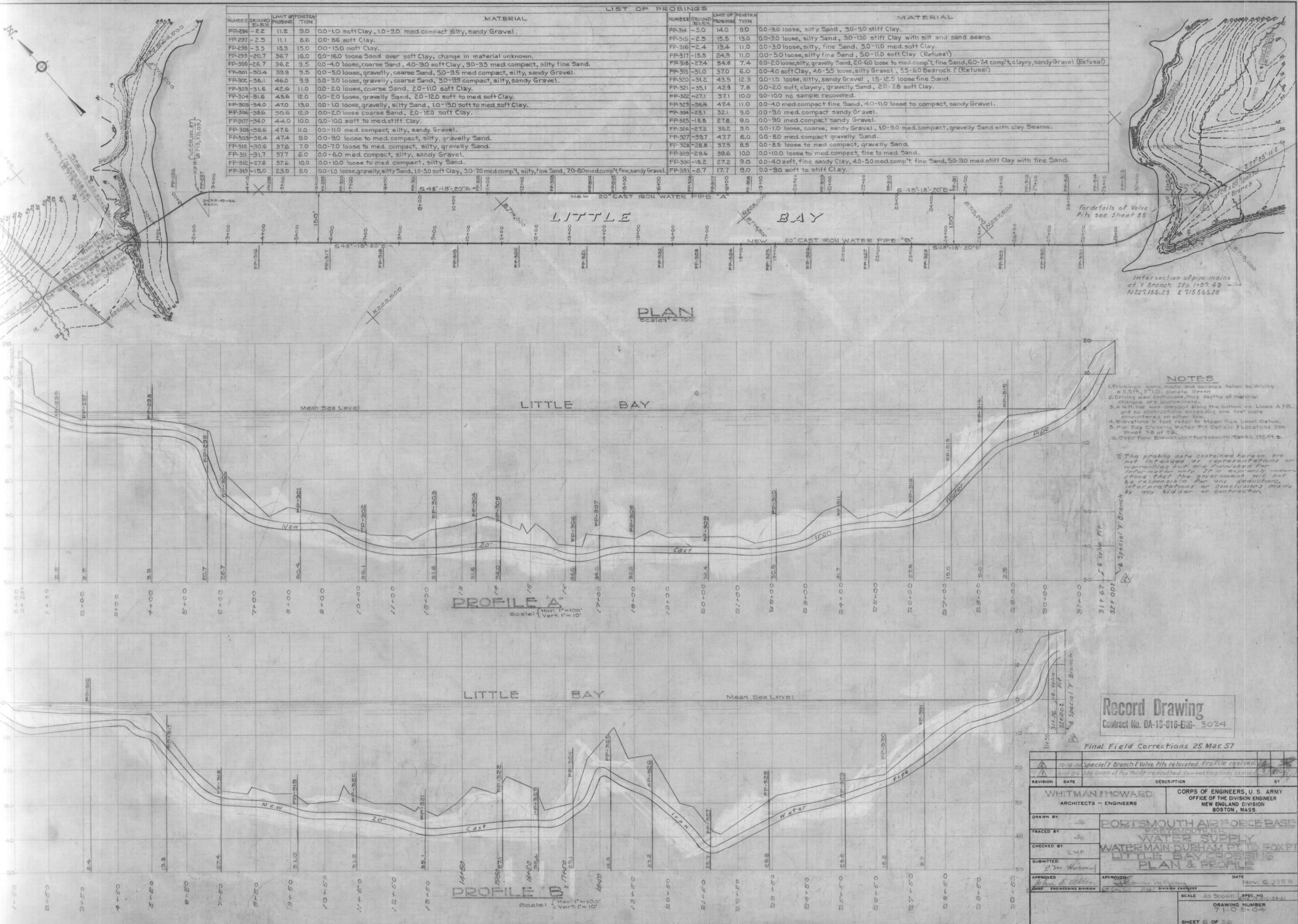
WHITMAN HOWARD
ARCHITECTS - ENGINEERS

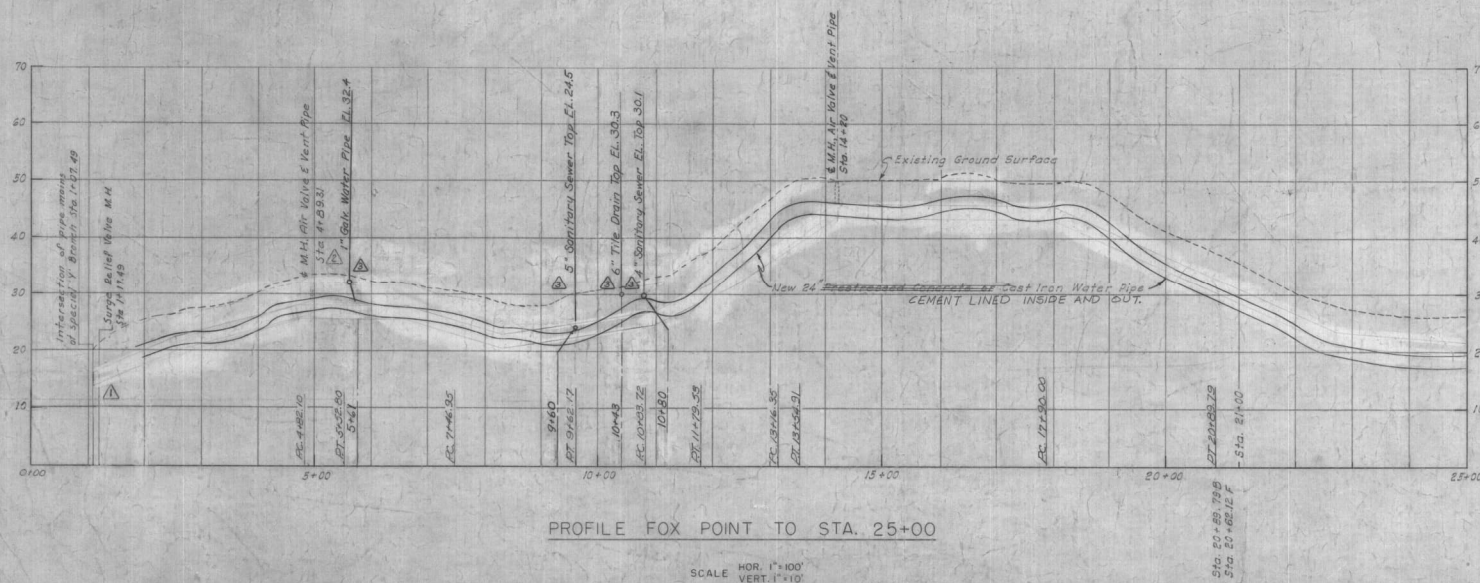
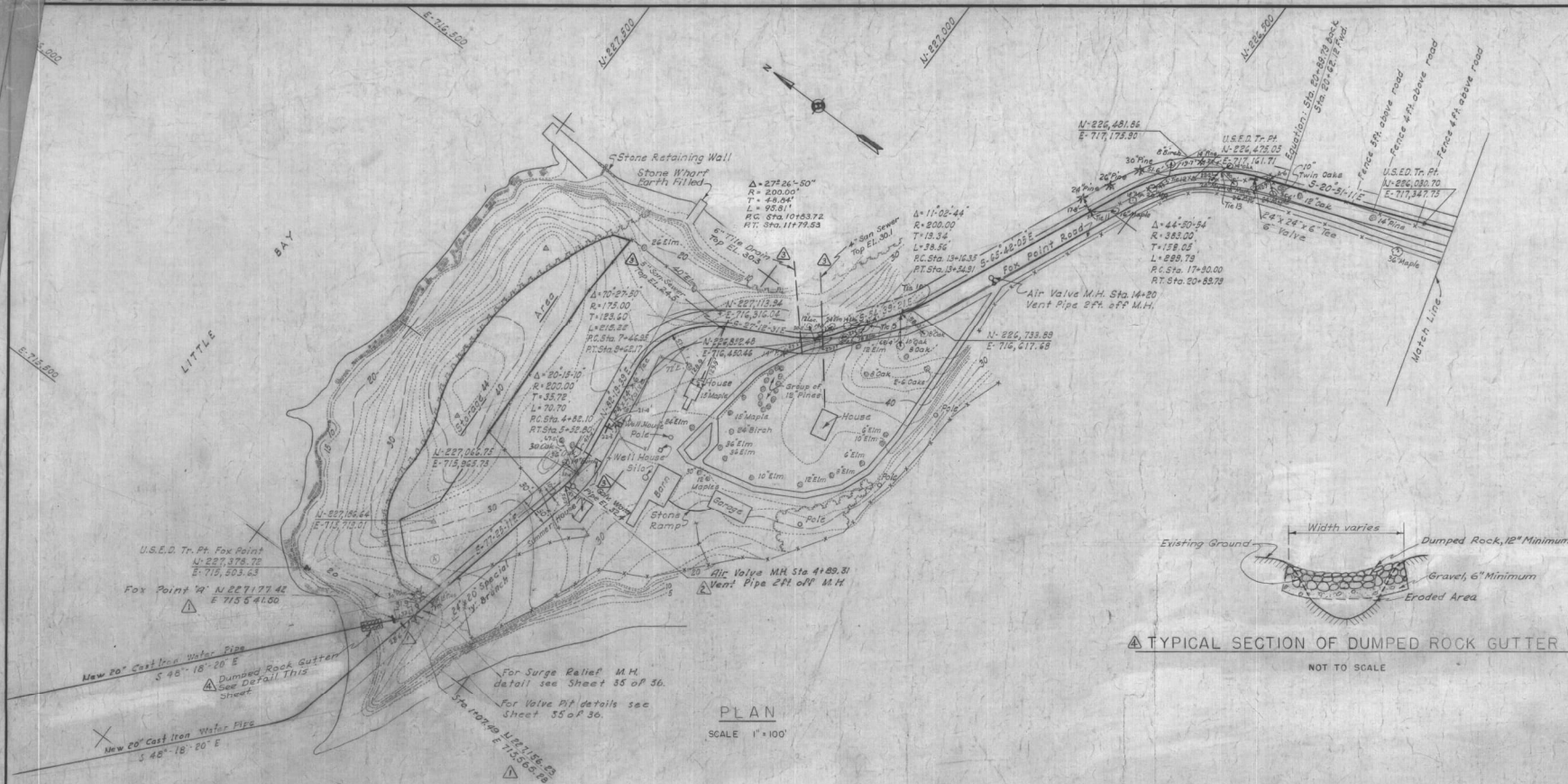
PORTSMOUTH AIR FORCE
ENGINEERING
WATER MAIN MADEBURY TO DUN
PLAN & PROFILE
STA. 103+76 TO 139+32

CORPS OF ENGINEERS, U. S. ARMY
OFFICE OF THE DIVISION ENGINEER
NEW ENGLAND DIVISION
BOSTON, MASS.

Record Drawing
Contract No. DA-19-016-ENG-3024

Scale As Shown
Drawing Number 71-C 5-C
Sheet 5 of 56



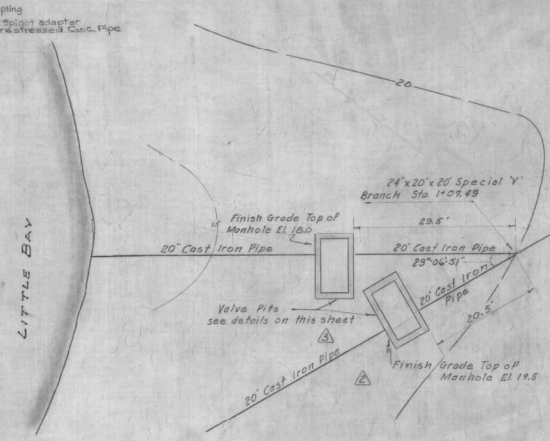


- NOTES:
1. Elevations refer to Mean Sea Level unless otherwise noted.
 2. For Crossing Valve Pit Details see Sheet No. 1.
 3. For Details of Air Vents and Vent Pipe see Sheet No. 2.
 4. For Detail of Surge Relief Valve M.H. see Sheet No. 3.
 5. Overflow Elevation - Portsmouth Tanks 17'.
 6. For Legend of Boringe see Sheet No. 2 of 2.
 7. For Hydrostatic Thrust Block Details see Sheet No. 4.
 8. All graded areas within limits of work shall be sloped to provide adequate drainage.
 9. Minimum cover over pipe shall be 4 ft. shown on Plan.
 10. Limit of Construction Easement is limit of right of way.

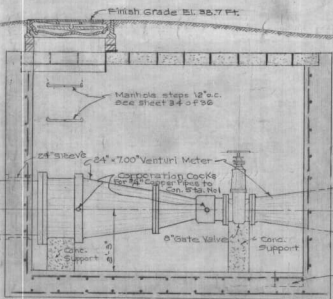
Record Drawing
Contract No. DA-19-016-ENG-3024

Final Field Corrections 23 APRIL 57

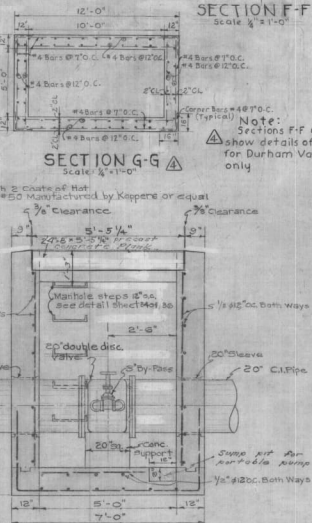
	4-9-57	Reck Gutter and Section added (K)
	5-20-58	Deck Water and Drain Pipe added (C)
	6-20-58	Air Valve Manhole added
	12-15-61	Special P Branch and Valve Pih Profile revised
REVISION	DATE	DESCRIPTION
<p align="center">CORPS OF ENGINEERS U.S. ARMY OFFICE OF THE DISTRICT ENGINEER NEW ENGLAND DIVISION BOSTON, MASS.</p>		
DIST BY <i>9/27</i>	DR BY <i>A.E. 9/27</i>	CK BY <i>J.W. 9/27</i>
CHIEF DESIGNER <i>L.B. 10/27</i>		
PROJECT ENGINEER <i>B.L. 10/27</i>		
SUBMITTED BY <i>W.H. 10/27</i>		
CHECK, MILITARY BRANCH <i>W.H. 10/27</i>		
APPROVED <i>[Signature]</i>		
CHECK ENGINEERING DIV. 		
PORTSMOUTH AIR PORTSMOUTH WATER, SU WATERMAN FOX PT PLAN & PRO STA. 0+00 TO		
APPROVED DISTRICT ENGINEER		



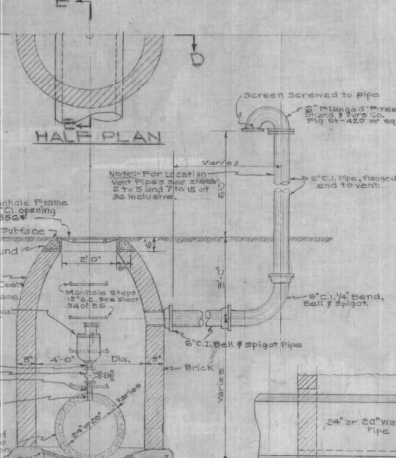
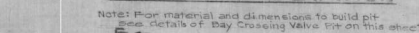
LOCATION-BAY CROSSING VALVE PITS
FOX POINT
Scale: 1"=10'



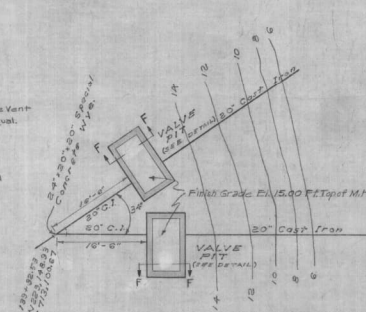
DETAIL OF VENTURI METER PIT
AT CONTROL STATION



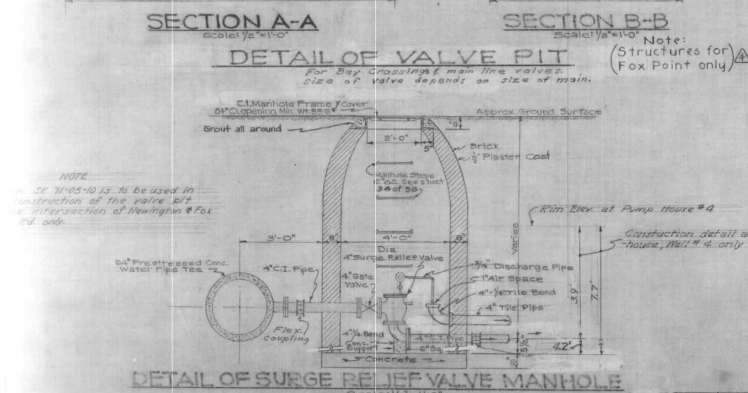
SECTION B-B



SECTION E-E



LOCATION-BAY CROSSING VALVE PITS

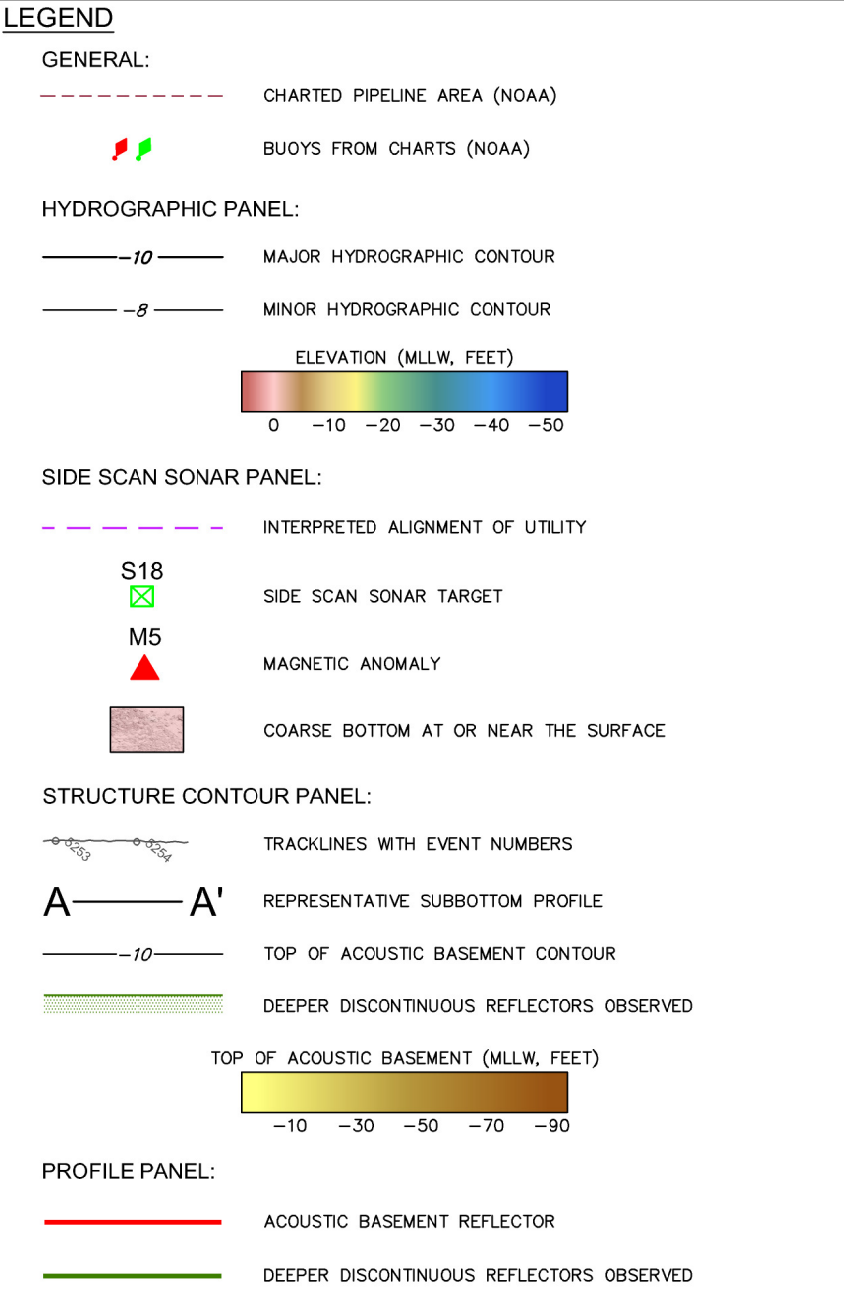
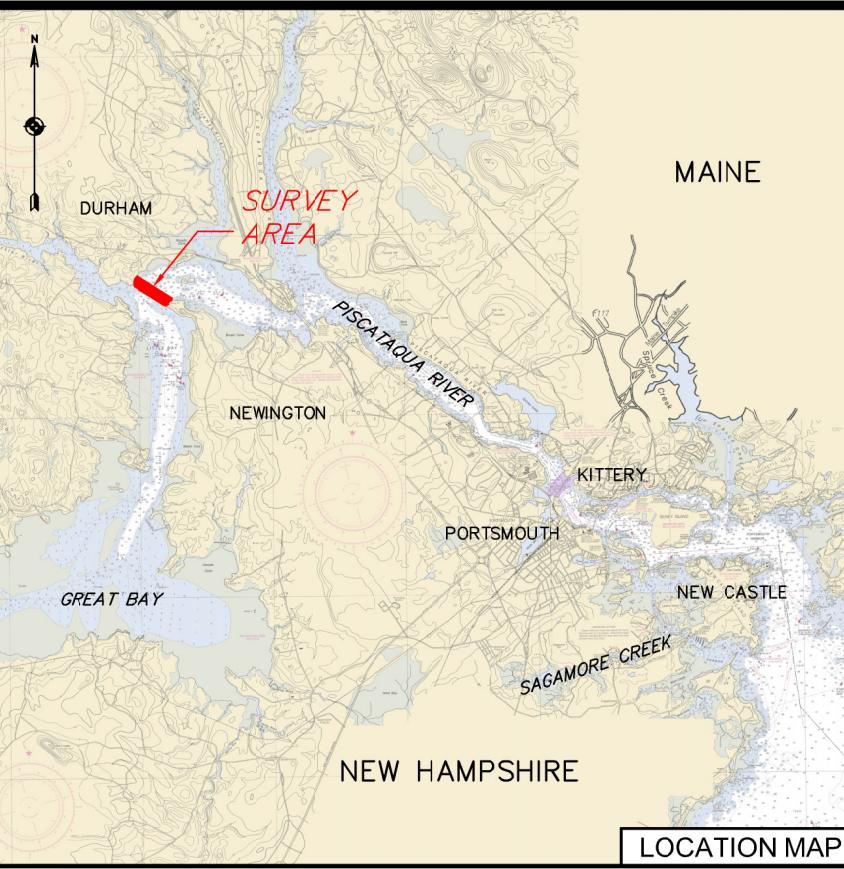
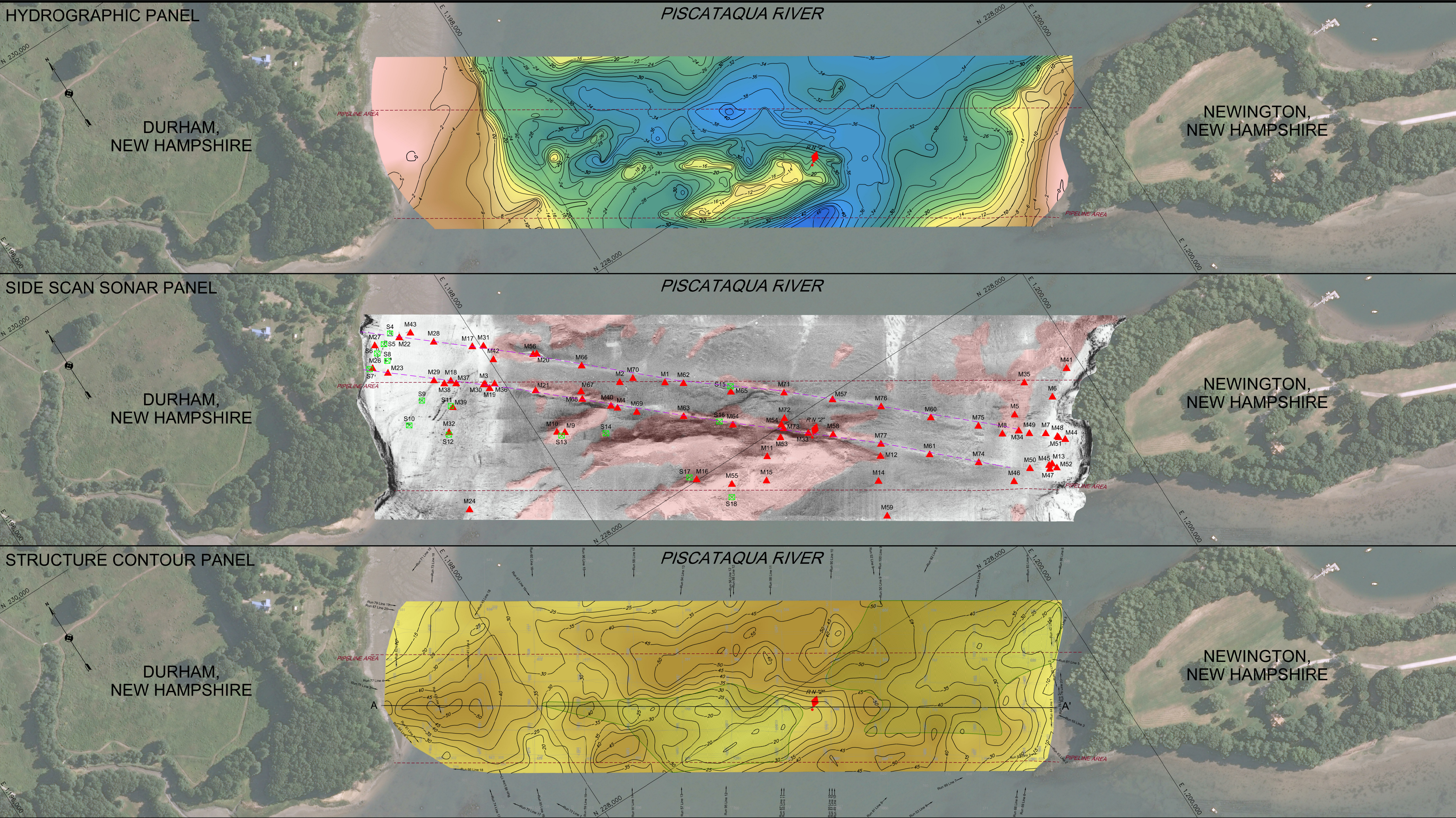


DETAIL OF SURGE RELIEF VALVE MANHOLE

Record Drawing
Contract No. DA-19-016-ENG- 3024

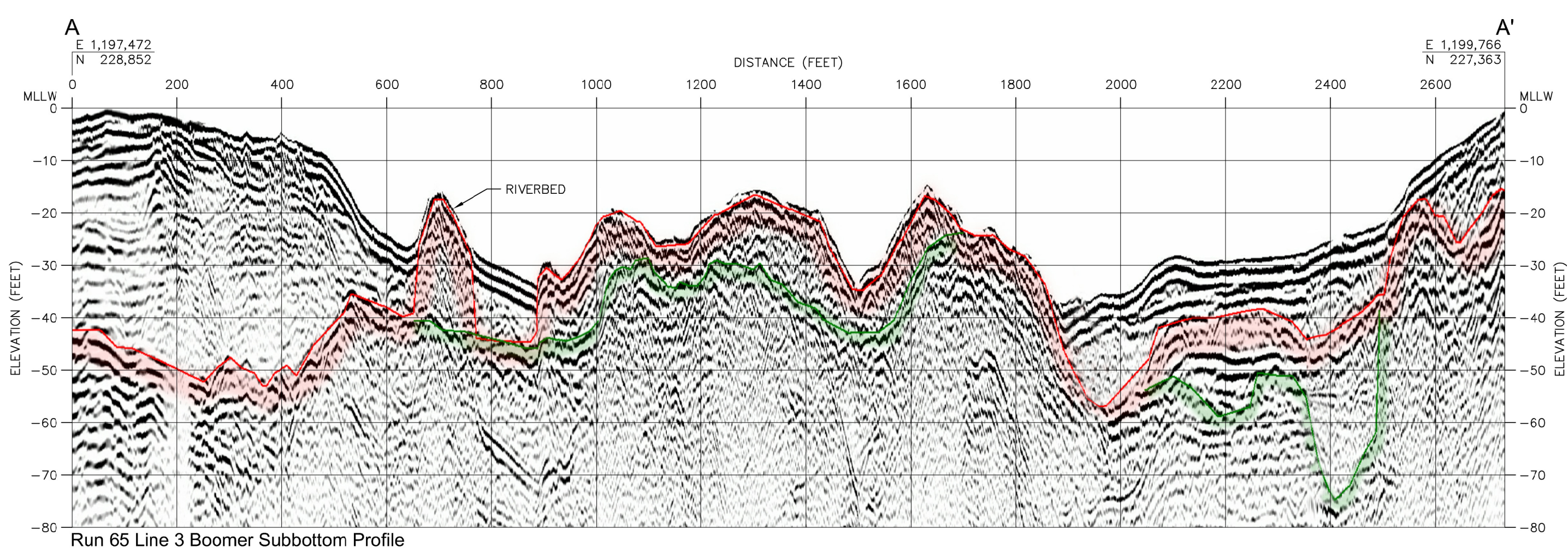
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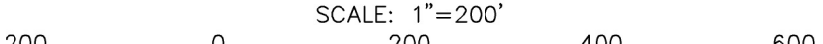

APPENDIX C
Marine Geophysical Survey Figure



- NOTES
- GRID SYSTEM IS IN FEET AND IS THE NEW HAMPSHIRE STATE PLANE COORDINATE SYSTEM, NAD83.
 - ELEVATIONS ARE IN FEET AND ARE REFERENCED TO MEAN LOWER LOW WATER (MLLW) USING TIME AND HEIGHT OFFSETS FOR NOAA SUBORDINATE STATION DOVER PT. NH (STATION ID 8421897) APPLIED TO PRELIMINARY WATER LEVELS AT PORTLAND (STATION ID 8418150).
 - HYDROGRAPHIC CONTOUR INTERVAL IS 2 FEET. ACOUSTIC BASEMENT CONTOUR INTERVAL IS 5 FEET. CONTOURS WERE GENERATED USING QUICKSURF.
 - GEOLOGICAL INTERPRETATIONS ARE BASED ON THE ANALYSIS OF HYDROGRAPHIC, SIDE SCAN SONAR, MAGNETOMETER AND SUBBOTTOM PROFILER DATA. DEPTHS BELOW THE BOTTOM TO ACOUSTIC REFLECTORS HAVE BEEN DETERMINED USING AN ACOUSTIC VELOCITY OF 5000 FT/SEC. FOR ADDITIONAL INFORMATION REGARDING THE INTERPRETATION PRESENTED REFER TO OSI FINAL REPORT NO. 18ES028.
 - CHARTED FEATURES ARE APPROXIMATE AND WERE PLOTTED FROM NOAA ENC CHART USSNH01M (DATED SEPT. 2018) AND USSNH01M (DATED JUNE 2018). SOUNDINGS ARE IN FEET AT MEAN LOWER LOW WATER (MLLW).
 - SHORELINE AND ONSHORE FEATURES ARE APPROXIMATE AND WERE TAKEN FROM DIGITAL ORTHOPHOTO QUADRANGLES FLOWN IN 2016 AND OBTAINED FROM NH GRANIT.
 - THE INFORMATION PRESENTED ON THIS DRAWING REPRESENTS THE RESULTS OF SURVEYS PERFORMED BY OCEAN SURVEYS, INC. ON 9, 11-12 OCTOBER 2018 AND CAN ONLY BE CONSIDERED AS INDICATING THE CONDITIONS EXISTING AT THAT TIME. REUSE OF THIS INFORMATION BY CLIENT OR OTHERS BEYOND THE SPECIFIC SCOPE OF WORK FOR WHICH IT WAS ACQUIRED SHALL BE AT THE SOLE RISK OF THE USER AND WITHOUT LIABILITY TO OSI.

PROFILE PANEL



SURVEY VESSEL: R/V ABLE II	ECHOSOUNDER: ODOM ECHOTRAC MKIII		
SIDE SCAN SONAR: KLEIN 3000	MAGNETOMETER: GEOMETRICS B82		
NAVIGATION SYSTEM: TRIMBLE SPS-361 IN COAST GUARD DIFFERENTIAL MODE			
SURVEY ACQUISITION SOFTWARE: HYPACK 2017A, DISCOVER	SUBBOTTOM PROFILER: APPLIED ACOUSTICS BOOMER		
SURVEY PROCESSING SOFTWARE: HYPACK 2017A, CHESAPEAKE SONARWIZ 6			
SCALE: 1"=200'			
CHECK GRAPHIC SCALE BEFORE USING			
			
			
OCEAN SURVEYS, INC. OLD SAYBROOK, CONNECTICUT (860) 388-4637 www.oceansurveys.com			
PREPARED FOR: WRIGHT-PIERCE			
MARINE GEOPHYSICAL SURVEY PROPOSED HDD CROSSING PISCATAQUA RIVER DURHAM TO NEWINGTON, NEW HAMPSHIRE			
PROJECT MANAGER: A. LINREIN	SURVEY DATE: 9, 11-12 OCTOBER 2018	PROJECT NUMBER: 18ES028A	
DRAFTED BY: A. RIZZO	DATE: 7 DECEMBER 2018	DRAWING: 1	SHEET: 1 OF 1

APPENDIX D
Permits



The State of New Hampshire
Department of Environmental Services

Robert R. Scott, Commissioner



July 14, 2023

CITY OF PORTSMOUTH
680 PEVERLY HILL RD
PORTSMOUTH NH 03801

Re: Approved Standard Dredge and Fill Wetlands Permit Application (RSA 482-A)
NHDES File Number: 2020-02959; Subject Property: 180 Piscataqua Rd, Durham, Tax Map #12, Lot #5-2

Dear Owner:

On July 14, 2023, the New Hampshire Department of Environmental Services (NHDES) Wetlands Bureau approved the above-referenced application to dredge and fill 5,400 square feet within tidal waters and tidal wetlands to replace the subaqueous drinking water transmission line across Little Bay, from Durham to Newington. The project will temporarily impact a total of 78,460 square feet of jurisdictional area during construction, including 2,995 square feet within palustrine emergent wetlands, 26,595 square feet within the tidal buffer zone, 2,120 square feet within tidal marsh, and 46,750 square feet within tidal waters.

Compensatory mitigation is provided for permanent impacts to tidal surface waters as a one-time payment of \$60,839.03 into the Aquatic Resource Mitigation (ARM) Fund within the Salmon Falls - Piscataqua River Watershed account.

In accordance with RSA 482-A:10, RSA 21-O:14, and Rules Env-WtC 100-200, **any person aggrieved by this decision may file a Notice of Appeal directly with the NH Wetlands Council (Council) within 30 days of the decision date, July 14, 2023.** Every ground claiming the decision is unlawful or unreasonable must be fully set forth in the Notice of Appeal. Only the grounds set forth in the Notice of Appeal are considered by the Council. Information about the Council, including Council Rules, is available at <https://www.nhec.nh.gov/wetlands-council/about>. For appeal related issues, contact the Council Appeals Clerk at (603) 271-6072.

In accordance with RSA 482-A:3, II(a) and Env-Wt 313.02(b), as your project is a major project located in a great pond or in public waters of the state, your application must also be approved by the Governor and the Executive Council. Upon expiration of the appeal period, a redacted copy of the file is submitted to the Governor and the Executive Council for their consideration. Information about the Governor and the Executive Council is available at <https://www.nh.gov/council/>.

Sincerely,

Philip Trowbridge, P.E., Manager
Land Resources Management, Water Division

Enclosure: Copy of Decision

cc: Agent
Portsmouth Municipal Clerk/Conservation Commission
Durham Municipal Clerk/Conservation Commission
Newington Municipal Clerk/Conservation Commission
Abutters
ec: Assistant Administrator, Wetlands Bureau

www.des.nh.gov

29 Hazen Drive • PO Box 95 • Concord, NH 03302-0095
NHDES Main Line: (603) 271-3503 • Subsurface Fax: (603) 271-6683 • Wetlands Fax: (603) 271-6588
TDD Access: Relay NH 1 (800) 735-2964

DECISION:

Dredge and fill 5,400 square feet within tidal waters and tidal wetlands to replace the subaqueous drinking water transmission line across Little Bay, from Durham to Newington. The project will temporarily impact a total of 78,460 square feet of jurisdictional area during construction, including 2,995 square feet within palustrine emergent wetlands, 26,595 square feet within the tidal buffer zone, 2,120 square feet within tidal marsh, and 46,750 square feet within tidal waters.

Compensatory mitigation is provided for permanent impacts to tidal surface waters as a one-time payment of \$60,839.03 into the Aquatic Resource Mitigation (ARM) Fund within the Salmon Falls - Piscataqua River Watershed account.

CONDITIONS:

1. All work shall be done in accordance with City of Portsmouth Little Bay Subaqueous Water Transmission Main Permit Drawing plans dated May 2023, by Wright-Pierce, last received by the NH Department of Environmental Services (NHDES) on May 18, 2023; and, in accordance with the Salt Marsh Restoration Plan and narrative dated July 2021, received by NHDES on July 23, 2021, per Env-Wt 307.16.
2. This permit is contingent on the permittee obtaining ownership, construction easements, or written permission from affected property owners to authorize any work outside of the existing right-of-way, per RSA 482-A:11, II and Env-Wt 311.11(d).
3. This permit is contingent on the permittee providing a final planting plan for review and approval by NHDES and the NH Natural Heritage Bureau (NHB), reflecting the recommendations provided by the NHB relative to NHB Datacheck #NHB20-2107. Selected plant species shall be common coastal species, native to NH and suitable to the appropriate habitat (salt tolerant, where specified).
4. Within 30 days of the start of construction sufficient notice shall be provided to affected abutters and property owners, the NHDES Spill Response Section Planning and Preparedness Manager, the NHDES Shellfish Program Manager, local commercial shellfish harvesters, the NH Commercial Fisherman's Association, the Pease Development Authority Division of Ports and Harbors Chief Harbormaster, and any other parties who may be affected by the construction activities, per RSA 482-A:11, II.
5. Work in tidal waters shall occur between November 15 and March 15, to protect fish migration and larval setting stage of fish and shellfish, per Env-Wt 307.10(i).
6. Tidal docking installation shall be done by barge or upland to prevent the driving of construction equipment in or through tidal waters or tidal wetlands, per Env-Wt 606.05(b).
7. No activity shall be conducted in such a way as to cause or contribute to any violation of surface water quality standards, per Env-Wt 307.03(a).
8. All work including management of soil stockpiles, shall be conducted so as to minimize erosion, minimize sediment transfer to surface waters or wetlands, and minimize turbidity in surface waters and wetlands, per Env-Wt 307.03(b).
9. All activities associated with the project shall be conducted in compliance with applicable requirements of RSA 483-B and Env-Wq 1400, the Protected Shoreland, during and after construction, per Env-Wt 307.07.
10. Heavy equipment shall not be operated in any jurisdictional area unless specifically authorized by this permit, per Env-Wt 307.15(a).
11. Equipment shall be staged and refueled outside of jurisdictional areas, per Env-Wt 307.15
12. The person in charge of construction equipment shall: inspect such equipment for leaking fuel, oil, and hydraulic fluid each day prior to entering surface waters or wetlands or operating in an area where such fluids could reach groundwater, surface waters, or wetlands; repair any leaks prior to using the equipment in such areas; maintain oil spill kits and diesel fuel spill kits, as applicable, on site so as to be readily accessible at all times during construction; and, train each equipment operator in the use of the spill kits, per Env-Wt 307.03(g).

MITIGATION:

13. The permit is contingent on submittal of a check for cleared payment in the amount of \$60,839.03 to the Aquatic Resource Mitigation Fund, within the Salmon Falls - Piscataqua River Watershed Account, by the applicant as calculated per Env-Wt 803.07 and RSA 482-A:30. No work is authorized under this approval until the ARM payment is received.
14. In accordance with Env-Wt 807.01(b), the payment shall be received by NHDES within 120 days from the approval decision or NHDES will deny the application.

CONSTRUCTION MONITORING:

15. The project shall be monitored during construction by an on-site certified wetland scientist, or qualified professional, in accordance with the Turbidity Monitoring Plan dated July 2021, received by NHDES on July 23, 2021; and weekly construction monitoring reports shall be provided to NHDES through the duration of the project, per Env-Wt 307.16 and Env-Wt 307.18.
16. The permittee shall submit a report to NHDES within 60-days following completion of the project, that has been prepared by a certified wetland scientist, or qualified professional, containing narrative, exhibits, and photographs, as necessary to report the status of the project area and that describes the stability of and status of impacted jurisdictional areas and including a description of any necessary adjustments; monitoring of erosion, sedimentation and turbidity controls, per Env-Wt 307.18.

POST-CONSTRUCTION MONITORING:

17. The qualified professional shall monitor the restored salt marsh areas for five growing seasons following the completion of the project to ensure that post-construction substrate and vegetation schemes are as close as practicable to pre-construction conditions and the area has been fully restored in accordance with Env-Wt 307.12, per Env-Wt 307.16 and the Salt Marsh Restoration Plan dated July 2021, received by NHDES on July 23, 2021.
18. The qualified professional shall submit annual monitoring reports to NHDES by December 31 of each year for five growing seasons following the completion of the project, per Env-Wt 307.16 and Env-Wt 307.18.
19. The permittee, qualified professional(s), and permittee's contractor(s) shall coordinate with NHDES to adaptively manage the Salt Marsh Restoration plan and to take remedial actions as may be necessary to optimize restoration potential of impacted salt marsh areas. Adaptive management/remedial actions may include, though not be limited to, modifying the hydraulic regime, modifying material gradation and depth, or removal of invasive species, per Env-Wt 307.12.
20. If determined necessary by the permittee, qualified professional(s), the permittee's contractor(s) and NHDES, adaptive management and remedial actions shall only commence after obtaining written approval from the NHDES Wetlands Bureau, per Env-Wt 307.12.

FINDINGS:

1. This project is classified as a major project per Rule Env-Wt 407.02(a), for impacts to tidal waters and tidal wetlands (priority resource areas as defined by Env-Wt 103.66(f)).
2. On September 23, 2021, the department received correspondence from the NH Fish & Game Department, indicating that, based on the proposed plans and information provided, the NHFG Marine Division had no further comments or concerns with the project (NHB identification number: NHB20-2107).
3. On August 23, 2021, the permittee received correspondence from the NH Natural Heritage Bureau (NHB; relative to NHB datacheck #NHB20-2107), indicating that NHB understands "that the cofferdams are temporary and that any resulting impacts to sheet flow of tidal water across the intertidal system will be temporary as well." NHB requested explanation of the constraints that prevented the use of a turbidity curtain in lieu of the temporary cofferdam and trestle system. NHB also provided recommendations related to the final planting plan for restoration of temporary impacts.
4. NHDES finds that, based on site-specific challenges and limitations of effectively implementing a turbidity curtain (anticipated current velocity and water depth) in the areas subject to trench excavation, the approved coffer dam and trestle system are a less impacting alternative. Minimal sediment suspension is expected during trestle and cofferdam installation and removal; and, during excavation of the pipe trench, the coffer dam is expected to retain turbidity and suspended sediments.

5. NHDES finds that this permit is contingent upon the permittee providing a final planting plan for review and approval by NHDES and the NH Natural Heritage Bureau (NHB), reflecting the recommendations provided by the NHB relative to NHB Datacheck #NHB20-2107. Based on local availability, selected plant species will be common coastal species, native to NH and suitable to the appropriate habitat (salt tolerant, where specified).
6. No comments were received by NHDES from the Durham or Newington Conservation Commissions about this application. In correspondence dated July 23, 2021, and throughout the technical review process, the permittee indicated to NHDES that coordination with each municipality was on-going and changes were incorporated to the extent possible.
7. On June 07, 2023, the applicant obtained a statement from the Pease Development Authority, Division of Ports and Harbors regarding the project's impact on navigation and passage stating, "[w]e examined the proposed site and found that the structure will have no negative effect on navigation in the channel," per Rule Env-Wt 603.09.
8. In correspondence dated February 02, 2021, the NH Shellfish Initiative expressed concern about potential closure of shellfish farms and how farmers will be notified.
9. NHDES finds that the project as approved and conditioned will not have an unreasonable adverse impact on local shellfish harvesters. Harvesters will be provided notice prior to the start of construction to adequately manage their operations accordingly and turbidity will be contained within the approved cofferdam, reducing the risk of sedimentation over nearby shellfish farms.
10. In correspondence dated February 15, 2021, the NH Commercial Fisherman's Association stated that "...without being trenched [the new watermain] would create a 24" wall in its underwater route that could create obstruction to benthic species moving through this area with unknown consequences to these species and related habitat."
11. NHDES finds that the project as approved and conditioned will not have an unreasonable adverse impact on the movement of benthic invertebrates. The existing 20-inch watermain currently rests on the bed of Little Bay. The new 24-inch watermain will be located between the two existing mains. The landward extents of the new watermain on either shoreline will be buried within the intertidal zone.
12. In correspondence dated February 11, 2021, Virgin Oyster Company LLC stated that "...on incoming tides a large eddy forms over the entire farm and it may concentrate any suspended solids produced in dredging on the shoreline."
13. NHDES finds that the project as approved and conditioned, will not have an unreasonable adverse impact on water quality or aquatic habitats. The approved plans include measures to contain turbidity and suspended sediments within the constructed cofferdam, reducing the risk of sedimentation over nearby wetland and tidal habitats, and to actively monitor turbidity outside of the cofferdams to ensure that water quality standards are maintained throughout the duration of work. The project is also subject to review and authorization under the applicable standards of the Section 401 Water Quality Certification program.
14. In correspondence dated April 08, 2021, an attorney on behalf of an abutter to the project asked several clarifying questions about the proposed design, construction methods, jurisdictional boundary delineations, construction easements and appropriate authorization for work outside of existing easements, restoration and stabilization of salt marsh and shoreline impacts.
15. NHDES finds that the requisite construction sequencing details pursuant to RSA 482-A and Env-Wt Chapter 300 and 600 have been included in the approved plans and application materials; and, that the proposed cofferdam and temporary trestle system has been designed to achieve the least environmentally impacting practicable method for installing the new HDPE drinking water main.
16. NHDES finds that the limits of jurisdictional areas have been delineated by a NH Certified Wetland Scientist, as required by Env-Wt 306.05(a)(1).
17. NHDES finds that the project as approved and conditioned will obtain all necessary authorizations from affected property owners to conduct any work in jurisdictional areas outside of the existing right-of-way, per RSA 482-A:11, II and Env-Wt 311.11(d).
18. NHDES finds that the project as approved and conditioned will not have an unreasonable adverse impact on salt marsh. Per the approved Salt Marsh Restoration Plan, existing salt marsh will be removed and preserved during construction. Upon completion of construction, salt marsh will be replaced and monitored for five growing seasons to ensure long term restoration and stabilization of temporarily impacted salt marsh and tidal shoreline.
19. On June 01, 2023, NHDES held a public hearing on the proposed project. Two individuals testified at the hearing. Testimony included comments pertaining to alternative construction methods (i.e., jet plowing) and alteration of tidal currents and local sediment transport processes.

20. NHDES finds that the requisite construction sequencing details pursuant to RSA 482-A and Env-Wt Chapter 300 and 600 have been included in the approved plans and application materials; and, that the proposed cofferdam and temporary trestle system has been designed to achieve the least environmentally impacting practicable method for installing the new HDPE drinking water main. Alternative methods, such as "jet plowing" were previously approved in a different location, subject to different tidal conditions and depths, and for different material/utility types than the subject 24-inch HDPE watermain. The approved construction method is expected to contain turbidity and suspended sediments within the constructed cofferdam, reducing the risk of sedimentation over nearby wetland and tidal habitats, and the permittee will actively monitor turbidity outside of the cofferdams to ensure that water quality standards are maintained throughout the duration of work.
21. NHDES finds that the project as approved and conditioned will not alter tidal currents and sediment transport processes in the vicinity of the project. Native substrate side casted from the trench, within the coffer dam, will be used to backfill the pipeline trench to restore exiting grades. A diver will be deployed to inspect that existing grades are properly restored.
22. NHDES finds that the project as approved and conditioned will not have an unreasonable adverse impact on the value of such areas as sources of nutrients for finfish, crustacea, shellfish and wildlife of significant value, nor will it damage or destroy habitats and reproduction areas for plants, fish and wildlife of importance.
23. The Department finds that the project as proposed and conditioned meets the requirements of RSA 482-A and the Wetlands Program Code of Administrative Rules Chapters Env-Wt 100-1000. No waivers of RSA 482-A or the Wetlands Program Code of Administrative Rules Chapters Env-Wt 100-1000 were requested or approved under this permit action.
24. Per Rule Env-Wt 313.04(a) and Env-Wt 605.03(a), compensatory mitigation is required as this project will result in 5,400 square feet of permanent impact to tidal surface waters.
25. Per Rule Env-Wt 801.03(b), the applicant is offering an in-lieu mitigation payment as specified in RSA 482-A:30, as permittee-responsible compensatory mitigation is not practicable.
26. The payment into the ARM fund shall be deposited in the NHDES fund for the Salmon Falls - Piscataqua Rivers watershed per RSA 482-A:29.
27. The Department decision is issued in letter form and upon receipt of the ARM fund payment, the Department shall issue a posting permit in accordance with Env-Wt 803.11(c). Work under this approval is not authorized until the ARM payment is received.
28. Per Rule Env-Wt 803.10(e), the department has accepted the proposal for an in-lieu mitigation payment as the proposal meets the requirements of Env-Wt 803.10(b), and of Env-Wt 803.10(c), and the mitigation type or combination of mitigation types listed in Rule Env-Wt 803.08(a) Table 800-1 that are available in the same watershed as the impacts for compensating jurisdictional area losses are not practicable.



William Cass, P.E.
Commissioner

THE STATE OF NEW HAMPSHIRE DEPARTMENT OF TRANSPORTATION

District 6 Office, PO Box 740, Durham, NH 03824



David Rodrigue, P.E.
Assistant Commissioner

DRIVEWAY PERMIT

To: Richard Reine
Town of Durham
8 Newmarket Road
Durham, NH 03824

City/Town: Durham
Route/Road: US 4 (U0000004)
Patrol Section: 606
Tax Map: 215
Lot: 19

Permit #: **06-133-259**
District: 06
Permit Date 7/11/2023

Development: Temporary Construction Access

Permission is hereby granted to construct (alter) a driveway, entrance, exit or approach adjoining US 4 (U0000004), pursuant to the location and specifications as described below. Failure to adhere to the standards and engineering drawings previously approved shall render this instrument null and void. Failure to start or complete construction of said facility within one calendar year of the date of this permit shall require application for permit extension or renewal in accordance with the Driveway Access Rules. Facilities constructed in violation of the permit specifications or the rules, shall be corrected immediately upon notification by a Department representative. Any cost by the State to correct deficiencies shall be fully borne by the landowner. The landowner shall defend, indemnify and hold harmless the Department and its duly appointed agents and employees against any action for personal injury and/or property damage sustained by reason of the exercise of this permit.

06-133-259

Drive 1 **Temporary Construction Access expires: 7/11/2024**
Location: Approximately 0.47 miles west of Back River Road on the south side of US 4 (U0000004).
GPS: 43.130753 N 70.869782 W.

Specifications: This permit authorizes a crushed stone access to be used as a Temporary Construction Access drive. Any change in use, increase in use or reconstruction of the driveway requires reapplication.

The right-of-way line is located at the stonewall.

The entrance shall be graded so that the surface of the drive drops 3 inches at a point 6 feet from US 4 (U0000004) edge of pavement to create a drainage swale.

The driveway shall not exceed 24 feet in width. The entrance of the drive may be flared; typically the flare radius is one half the driveway width.

A new 12 minimum inch diameter plastic culvert is required for drainage.

Other Conditions:

No structures, including buildings, permanent or portable signs, lights, displays, fences, walls, etc. shall be permitted on, over or under the Highway Right of Way.

No parking, catering or servicing shall be conducted within the Highway Right of Way.

The applicant shall comply with all applicable ordinances and regulations of the municipality or other State Agencies.

The Department has relied on the title and subdivision information provided by the landowner. The Department has not performed additional title research and makes no warranty or representation concerning landowner's legal right to access. In the event of a dispute about the landowner's legal right to the access provided herein, the landowner will defend and indemnify the Department.

All excavated topsoil, or in the absence of topsoil the top 6 inches of soil, within the limits of state ROW shall be properly re-used within the limits of the state ROW. All temporary stockpiles of the re-use material shall be located within the state ROW, or as otherwise approved by the District Engineer.

The Contractor shall be solely responsible for the handling, transport and disposal of any surplus material generated by their project and shall comply with all federal, state and local laws, ordinances and rules in doing so.

I/We, the contractor/Owner, certify that the property will not have any illicit unauthorized drainage connections to the NHDOT storm water drainage system. An illicit discharge is any direct or indirect discharge to the NHDOT drainage system that is not composed entirely of storm water. Illicit discharges include, without limitation, sewage, process wastewater, or wash water and any connections from floor drains, sinks, or toilets.

1. This permit is for temporary construction access to the City of Portsmouth's Little Bay Water Main Replacement Project.
2. The construction of one driveway entrance is permissible. Drive 1 shall be constructed per "City of Portsmouth Contract Drawings for Wagon Hill Farm Access Road Plans", dated May 2023, Standard Specifications for Stabilized Construction Entrance, and Figure 1.
3. No part of the right-of-way may be used for any purpose other than travel. All phases of the utility construction operations shall be conducted off the right-of-way.
4. The existing drainage along US Route 4 shall be maintained. No additional surface drainage will enter upon the Highway.
5. All season safe sight distance shall be maintained by the landowner as per RSA 236:13.
6. A copy of this permit shall be present at the site during construction.
7. All work is to be done at no cost to the State of New Hampshire.
8. This permit does not include or approve the location or installation of underground utilities.
9. A 36 inch by 36-inch sign with black letters on an orange background warning "Trucks Entering" must be placed and a certified flagger(s) or uniformed officer(s) shall be utilized when trucks are entering or exiting.
10. The drive surface shall be maintained in a manner to minimize tracking onto the highway.
11. The applicant will be responsible for mitigation should the future use of this driveway unfavorably impact the highway.
12. When the utility maintenance operation is completed the drive shall be removed and the shoulder, ditch line and slope restored. Contact the NHDOT office at 868-1133 upon restoration for approval.

Copies: District, Town, Patrolman
Wright-Pierce
Britt Eckstrom
230 Commerce Way, Suite 302
Portsmouth, NH 03801

Approved


Assistant District Engineer
For Director of Administration

NEW HAMPSHIRE DEPARTMENT OF TRANSPORTATION
District 1, 641 Main St, Lancaster, NH 03584
District 2, 8 Eastman Hill Road, Enfield, NH 03748
District 3, 2 Sawmill Rd, Gilford, NH 03249

District 4, 19 Base Hill Road, Swanzey, NH 03446
District 5, 16 East Point Drive, Bedford, NH 03110
District 6, PO Box 740, Durham, NH 03824

#9247

APPLICATION FOR DRIVEWAY PERMIT

Pursuant to the provisions of **Revised Statutes Annotated, Chapter 236, Section 13** (printed on reverse of application) and amendments thereto, and **Declaratory Ruling 2000-01**, permission is requested to: (*select one*): **Construct** (*Indicate quantity of*) 1 driveway entrance(s) to my property on the (*select*): **South** side of **NH Route 4 or Street/Road**: 156 Piscataqua Road in the **Town of Durham** at a location which will meet the requirements for safety specified in said statutes.

The driveway entrance(s) requested is (are) for access to: Industry (*select*). Other: **Temporary Construction Access**

Describe nature and size of industry, business or subdivision: **Temporary driveway for construction access drive on Wagon Hill Farm to access the City of Portsmouth Water Main Replacement construction site.**

50 Feet (*select*): **South** of Utility Pole Number: 22-73
2,500 Feet (*select Feet or Miles*): **West** of Road or Junction: **Back River Road**

Town Tax Map # 215 and Lot # 19


RECEIVED

JUN 27 2023

NHDOT DISTRICT 6

As the landowner (or designated applicant) I agree to the following:

1. To construct driveway entrance(s) only for the bonafide purpose of securing access to private property such that the highway right-of-way is used for no purpose other than travel.
 2. To construct driveway entrance(s) at permitted location(s).
 3. To construct driveway entrance(s) in accordance with statutes, rules, standard drawings, and permit specifications as issued by the New Hampshire Department of Transportation.
 4. To defend, indemnify and hold harmless the New Hampshire Department of Transportation and its duly appointed agents and employees against any action for personal injury and/or property damage sustained by reason of the exercise of this permit.
 5. To furnish and install drainage structures that are necessary to maintain existing highway drainage and adequately handle increased runoff resulting from the land development and obtain all easements thereto.
 6. I am the owner or a duly authorized agent of the owner of the parcel upon which the driveway will be constructed. I have provided accurate and complete title and subdivision information concerning the parcel to the Department. I understand that the Department is relying on this information in considering this application and that the Department does not perform independent title research or make judgments about title or access disputes.
- For new driveway(s), include copy of current deed and, if not the same, previous deed dated prior to July 1, 1971 of the parcel. If this parcel is part of a larger tract subdivided after July 1, 1971, then provide complete subdivision plans and deed history dating back to at least July 1, 1971.
 - Attach sketch or plan showing existing and proposed driveway(s) and the adjacent highway indicating distance to town road, town line, or other readily identifiable feature or landmark and also to the nearest utility pole (including pole numbers)


Signature of Landowner (Applicant)
Town of Durham

8 Newmarket Road
Mailing Address
Durham, NH 03824

Printed Name of Landowner **Richard Rene** Town/City, State, Zip Code

Date: **6.26.23**

Telephone Number(s) 603.868.5571 603-714-8322

Contact /Agent, if not Landowner: **Britt Eckstrom, Wright-Pierce** britt.eckstrom@wright-pierce.com 603.570.7126

FOR OFFICE USE ONLY:

GPS N = _____ GPS W = _____
Section: _____ Width: _____ Speed: _____
Right of Way: _____ Drainage: _____ SLD: _____
Conditions: _____
Permit Number Assigned: _____

3/13

§ 236:13 Driveways and Other Accesses to the Public Way. – I. It shall be unlawful to construct, or alter in any way that substantially affects the size or grade of, any driveway, entrance, exit, or approach within the limits of the right-of-way of any class I or class III highway or the state-maintained portion of a class II highway that does not conform to the terms and specifications of a written permit issued by the Commissioner of transportation.

II. Pursuant to this section, a written construction permit application must be obtained from and filed with the department of transportation by any abutter affected by the provisions of paragraph I. Before any construction or alteration work is commenced, said permit application shall have been reviewed, and a construction permit issued by said department. Said permit shall:

(a) Describe the location of the driveway, entrance, exit, or approach. The location shall be selected to most adequately protect the safety of the traveling public.

(b) Describe any drainage structures, traffic control devices, and channelization islands to be installed by the abutter.

(c) Establish grades that adequately protect and promote highway drainage and permit a safe and controlled approach to the highway in all seasons of the year.

(d) Include any other terms and specifications necessary for the safety of the traveling public.

III. For access to a proposed commercial or industrial enterprise, or to a subdivision, all of which for the purposes of this section shall be considered a single parcel of land, even though acquired by more than one conveyance or held nominally by more than one owner:

(a) Said permit application shall be accompanied by engineering drawings showing information as set forth in paragraph II.

(b) Unless all season safe sight distance of 400 feet in both directions along the highway can be obtained, the commissioner shall not permit more than one access to a single parcel of land, and this access shall be at that location which the commissioner determines to be safest. The commissioner shall not give final approval for use of any additional access until it has been proven to him that the 400-foot all season safe sight distance has been provided.

(c) For the purposes of this section, all season safe sight distance is defined as a line which encounters no visual obstruction between 2 points, each at a height of 3 feet 9 inches above the pavement, and so located as to represent the critical line of sight between the operator of a vehicle using the access and the operator of a vehicle approaching from either direction.

IV. No construction permit shall allow:

(a) A driveway, entrance, exit, or approach to be constructed more than 50 feet in width, except that a driveway, entrance, exit, or approach may be flared beyond a width of 50 feet at its junction with the highway to accommodate the turning radius of vehicles expected to use the particular driveway, entrance, exit or approach.

(b) More than 2 driveways, entrances, exits or approaches from any one highway to any one parcel of land unless the frontage along that highway exceeds 500 feet.

V. The same powers concerning highways under their jurisdiction as are conferred upon the commissioner of transportation by paragraphs I, II, III and IV shall be conferred upon the planning board in cities and towns in which the planning board has been granted the power to regulate the subdivision of land as provided in RSA 674:35, and they shall adopt such regulations as are necessary to carry out the provisions of this section. Such regulations may delegate administrative duties, including actual issuance of permits, to a highway agent, board of selectmen, or other qualified official or body. Such regulations, or any permit issued under them, may contain provisions governing the breach, removal, and reconstruction of stone walls or fences within, or at the boundary of, the public right of way, and any landowner or landowner's agent altering a boundary in accordance with such provisions shall be deemed to be acting under a mutual agreement with the city or town pursuant to RSA 472:6, II (a).

VI. The commissioner of transportation or planning board shall retain continuing jurisdiction over the adequacy and safety of every existing driveway, entrance, exit, and approach to a highway, whether or not such access was constructed or installed pursuant to a permit under this section, and, unless the access is a public highway, the owners of property to which the access is appurtenant shall have continuing responsibility for the adequacy of the access and any grades, culverts, or other structures pertaining to such access, whether or not located within the public right of way. If any such access is or becomes a potential threat to the integrity of the highway or its surface, ditches, embankments, bridges, or other structures, or a hazard to the safety of the traveling public, by reason of siltation, flooding, erosion, frost action, vegetative growth, improper grade, or the failure of any culvert, traffic control device, drainage structure, or any other feature, the commissioner of transportation or planning board or their designee may issue an order to the landowner or other party responsible for such access to repair or remove such hazardous condition and to obtain any and all permits required therefor. The order shall describe the hazard, prescribe what corrective action or alteration in the location or configuration of such access shall be required, and set a reasonable time within which the action shall be completed. Such an order shall be sent by certified mail, and shall be enforceable to the same extent as a permit issued under this section. If the order is not complied with within the time prescribed, the commissioner or planning board or their designee may cause to be taken whatever action is necessary to protect the highway and the traveling public, and the owner or other responsible party shall be civilly liable to the state or municipality for its costs in taking such action.

§ 236:14 Penalty. – Any person who violates any provision of this subdivision or the rules and regulations made under authority thereof shall be guilty of a violation if a natural person, or guilty of a misdemeanor if any other person; and, in addition, shall be liable for the cost of restoration of the highway to a condition satisfactory to the person empowered to give such written permission.

Wagon Hill Farm

12-8-1 =

12-8-2
RECEIVED

FIDUCIARY DEED

JUN 27 2023

89 SEP 15 PM 3:10
REGISTER OF DEEDS
STRAFFORD COUNTY

014416

I, MURIEL T. BOURQUE, of Durham, County of Strafford, State of New Hampshire, duly appointed on April 22, 1988 as Executrix under the Will of Mary H. Tirrell, late of Durham, County of Strafford, State of New Hampshire, by the power conferred by the Consent to Sell Real Estate filed in the Strafford County Probate Court on September 26, 1988, Probate Court #A23186, and every other power, do hereby for the sum of Three Million One Hundred Thousand Dollars (\$3,100,000.00) paid, grant to the Town of Durham, New Hampshire a municipal corporation having a place of business at 13-15 Newmarket Road, Durham, NH the following:

A certain tract of land with the buildings thereon, situate on both sides of the Piscataqua Bridge Road (also known as U.S. Route #4) in Durham, Strafford County and State of New Hampshire, known as the Chesley Homestead Farm, now more commonly known as the Wagon Hill Farm and bounded and described as follows:

Bounded on the Northerly side by the Old Road (now Watson Road); on the Easterly side by land now or formerly of Edward W. Emerson Heirs; on the Southerly side by the Oyster River; and on the Westerly side by land now or formerly of Forrest Emery. Containing one hundred forty-two (142) acres, more or less.

Subject, however, to the perpetual easement and right of way over a strip of land having a width of forty (40) feet granted by Elizabeth W. Chesley to the United States of America by instrument dated October 15, 1953 and recorded in Strafford County Records, Book 622, Page 316.

Meaning and intending to convey the same premises conveyed to LORING V. TIRRELL and MARY H. TIRRELL as joint tenants, with rights of survivorship, by ELIZABETH W. CHESLEY, on July 1, 1960, and recorded in the Strafford County Registry of Deeds, Book 719, Page 186, said LORING V. TIRRELL being deceased, Strafford County Probate Court #A16885, and MARY H. TIRRELL being deceased on April 8, 1988.

Signed on this 15th day of September, 1989.

Ronald B. Willoughby
WITNESS

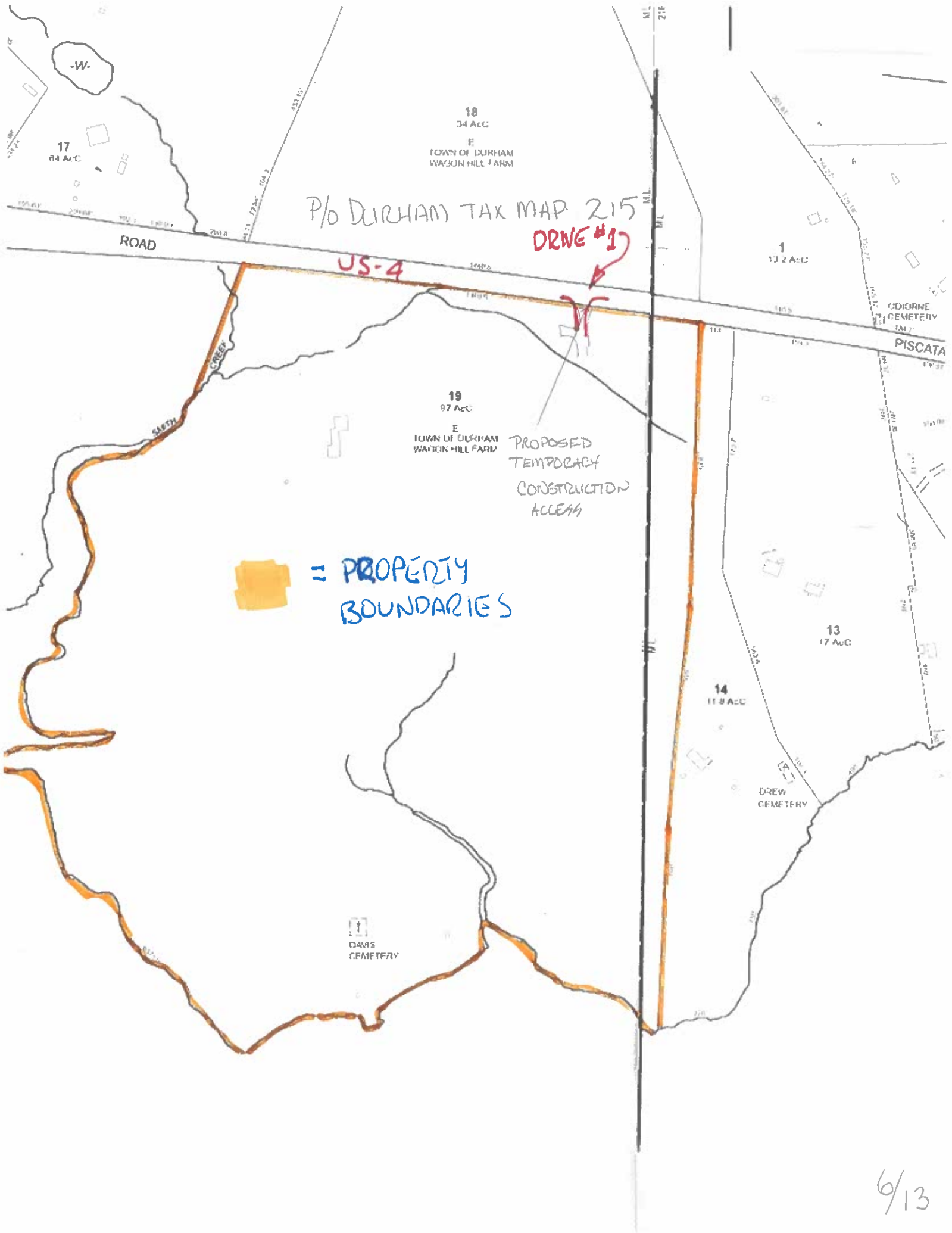
Muriel T. Bourque
MURIEL T. BOURQUE
Executrix of the Estate of
Mary H. Tirrell

STATE OF NEW HAMPSHIRE
STRAFFORD, SS.

Before me, the undersigned officer, personally appeared Muriel T. Bourque, Executrix under the Will of Mary H. Tirrell, and acknowledged that she voluntarily executed the foregoing instrument in her capacity as Executrix, on this 15th day of September, 1989.

Ronald B. Willoughby
Notary Public/Justice of the Peace

5/13



P/O DURHAM TAX MAP 215

DRIVE #1

US-4

PROPOSED
TEMPORARY
CONSTRUCTION
ACCESS

 = PROPERTY
BOUNDARIES

6/13

STANDARD SPECIFICATIONS FOR STABILIZED CONSTRUCTION ENTRANCE

Definition

A stabilized construction entrance is a portion of the construction road, which is constructed with filter fabric and large stone.

Purpose

Temporary stabilized construction entrances provide an area where mud can be dislodged from tires before the vehicle leaves the construction site to reduce the amount of mud transported onto paved roads.

Conditions Where Practice Applies

Temporary stabilized construction entrances can be used wherever traffic leaves a construction site and moves directly onto a public road or street.

Design Criteria

Pad Dimensions

The minimum length of the stone pad should be 15 m (50 ft.) Longer entrances will provide better cleaning action. The pad should extend the full width of the construction access road or 3m (10 ft.) whichever is greater. The aggregate should be placed at least six inches thick.

Materials

Stone Size

The stone size shall meet the requirements of erosion control stone Section 585.2.1.4. Stone used for the construction entrance should be large enough so that it does not get picked up and tracked off the site by the vehicle traffic.

Filter Fabric

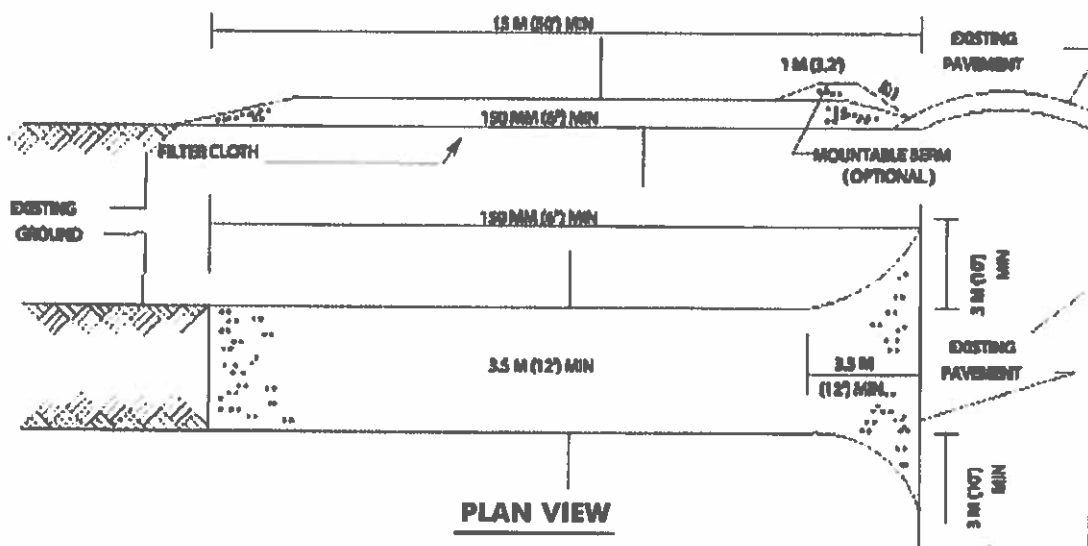
The geotextile filter fabric shall be placed over the entire area prior to placing the stone.

Maintenance

Mud and soil particles will eventually clog the voids in the stone and the effectiveness of the stone pad will not be satisfactory. When this occurs, the pad should be topdressed with new stone. Complete replacement of the stone pad may be necessary if it becomes completely clogged.



STABILIZED CONSTRUCTION ENTRANCE DETAILS

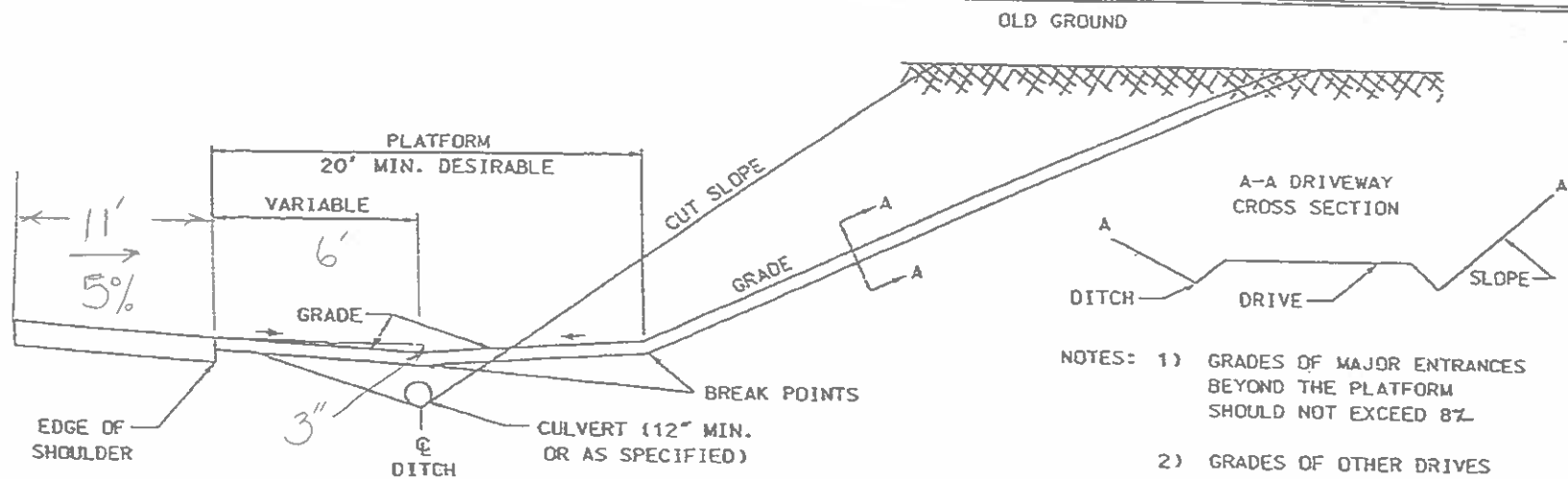


CONSTRUCTION REQUIREMENTS

1. Stone Size - Use 37 mm (1 1/2 in.) stone.
2. Length - Not less than 15m (50 ft.) (Except on a single residence lot where a 9m (30 ft.) minimum length would apply).
3. Thickness - Not less than 150mm (6 in.).
4. Width - 3.5 meter (twelve (12) ft.) minimum, but not less than the full width at points where ingress or egress occurs. 7 meters (twenty-four (24) ft.) if single entrance to site.
5. Filter Cloth - Will be placed over the entire area prior to placing of stone.
6. Surface Water - All surface water flowing or diverted toward construction entrances shall be piped across the entrance. If piping is impractical, a mountable berm with 5:1 slopes will be permitted.
7. Maintenance - The entrance shall be maintained in a condition which will prevent tracking or flowing of sediment onto public rights-of-way. All sediment spilled, dropped, washed or tracked onto public rights-of-way must be removed immediately.
8. When washing is required, it shall be done on an area stabilized with stone and which drains into an approved sediment trapping device.
9. Periodic inspection and needed maintenance shall be provided after each rain.

FIGURE 3

8/13



TYPICAL RURAL DRIVE IN CUT SECTION

- NOTES:
- 1) GRADES OF MAJOR ENTRANCES BEYOND THE PLATFORM SHOULD NOT EXCEED 8%.
 - 2) GRADES OF OTHER DRIVES BEYOND THE PLATFORM SHOULD NOT EXCEED 15%.
 - 3) THE ALGEBRAIC DIFFERENCE BETWEEN TWO ADJACENT GRADES SHOULD NOT EXCEED 10%.
 - 4) DITCHES ARE RECOMMENDED FOR UNCURBED DRIVEWAYS IN CUT SLOPES.
 - 5) USE SLOPE END SECTIONS ON CULVERT PIPES.
 - 6) ALL DRIVEWAYS SHALL HAVE A SECTION CONTIGUOUS TO THE HIGHWAY WHICH APPROXIMATES LEVEL GROUND.

DATE

11/27/2006

FIGURE 1

DCM

Figure 1

CITY OF PORTSMOUTH
CONTRACT DRAWINGS FOR
WAGON HILL FARM ACCESS ROAD

DURHAM, NH
MAY 2023

RECEIVED

JUN 27 2023

NHDOT DISTRICT 6

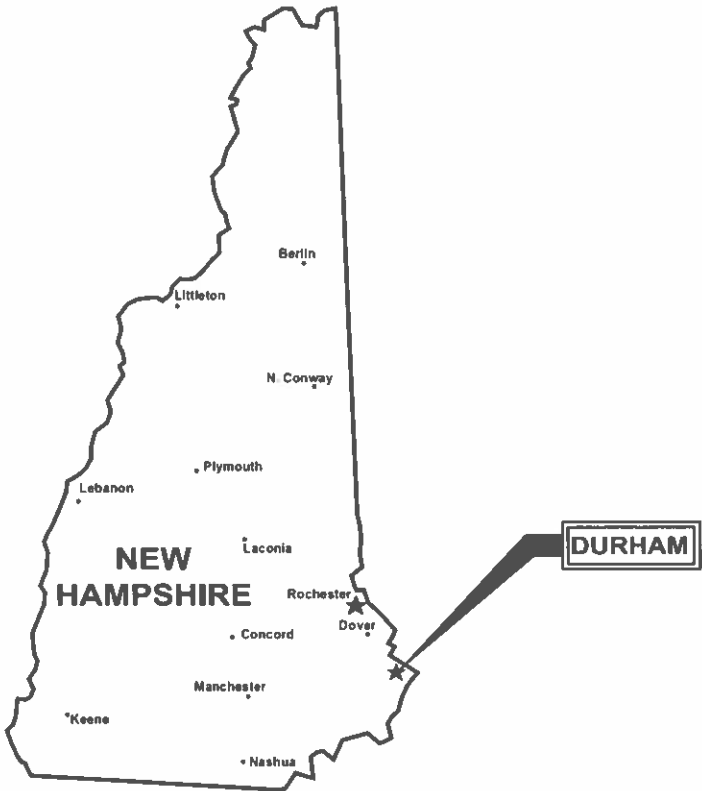
DRAWING INDEX

GENERAL

COVER SHEET

CIVIL

- C-1 SHEET INDEX
- C-2 GENERAL NOTES, LEGEND AND ABBREVIATIONS
- C-3 EXISTING CONDITIONS
- C-4 CONSTRUCTION ACCESS ROAD PLAN VIEW I - STA 100+00 TO 112+00
- C-5 CONSTRUCTION ACCESS ROAD PLAN VIEW II - STA 112+00 TO 118+00
- C-6 DETAILS
- C-7 EROSION CONTROL NOTES & DETAILS



LOCATION PLAN

NOT FOR CONSTRUCTION

WRIGHT-PIERCE 
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Offices Throughout New England
888.621.8156 | www.wright-pierce.com

FOR REVIEW _____
FOR BIDDING _____
WP PROJECT No. 14202A



WRIGHT-PIERCE

SHEET INDEX
SCALE: 1"=125'

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JUN 27 2023

NHDOT DISTRICT 6

CITY OF PORTSMOUTH
WAGON HILL FARM - ACCESS ROAD
DURHAM, NEW HAMPSHIRE

WRIGHT-PIERCE
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DESIGNED BY: _____	_____	_____	_____	_____	_____
CAD CORP: _____	_____	_____	_____	_____	_____
CAD: W. EDGAR _____	_____	_____	_____	_____	_____
CHECKED BY: _____	_____	_____	_____	_____	_____
DATE: _____	_____	_____	_____	_____	_____
APPROVED BY: _____	_____	_____	_____	_____	_____
DATE: _____	_____	_____	_____	_____	_____
PROJECT NO: 14202 _____	_____	_____	_____	_____	_____

DRAWING
C-1

SHEET INDEX



EXISTING CONDITIONS PLAN - WAGON HILL FARM
SCALE: 1"=125'

RECEIVED
JUN 27 2023
NHDOT DISTRICT

NHDOT DISTRICT 6

**CITY OF PORTSMOUTH
WAGON HILL FARM - ACCESS ROAD
DURHAM, NEW HAMPSHIRE**

DRAWING
C-3

EXISTING CONDITIONS PLAN

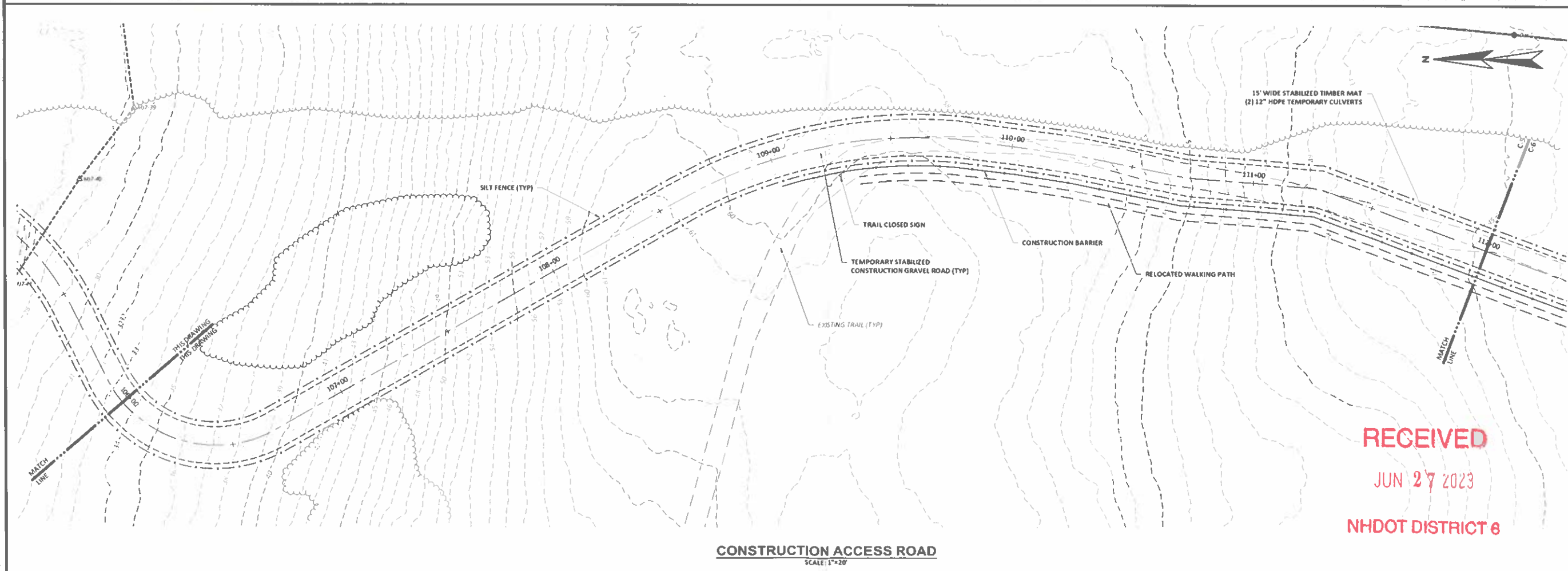
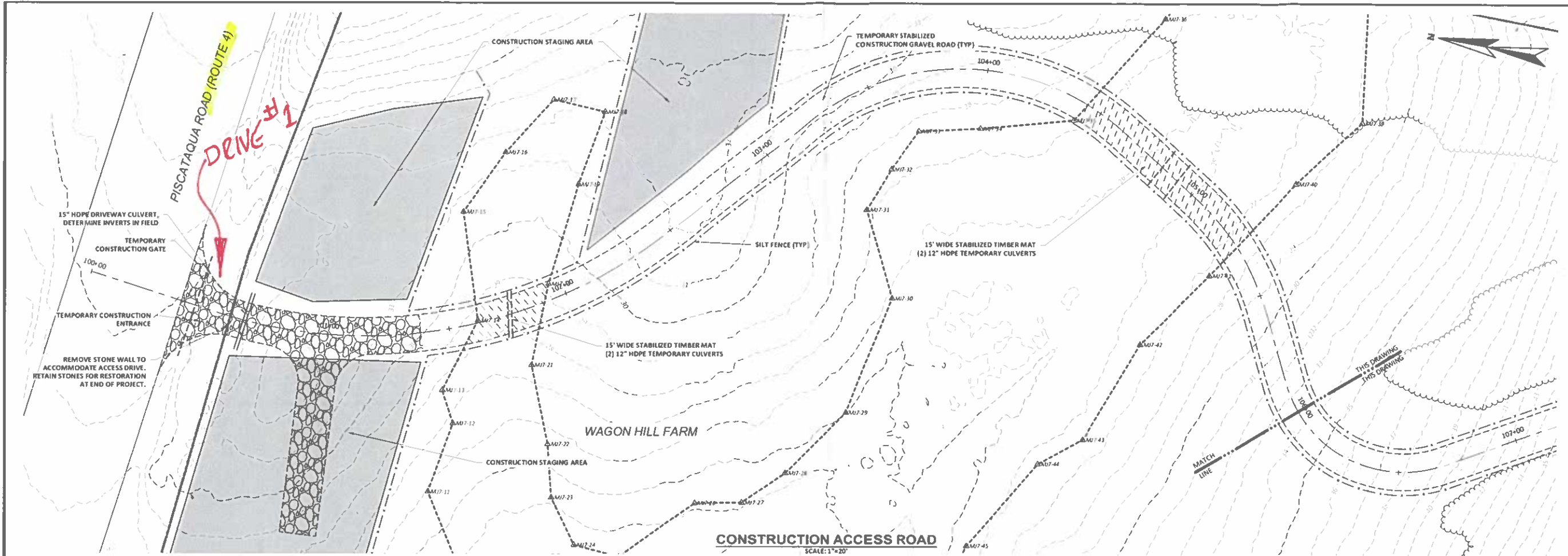
WRIGHT-PIERCE 
Engineering a Better Environment
888.621.8156 | www.wright-pierce.com

NO	SUBMISSIONS/REVISIONS	APPRO'D	DATE
DESIGNED BY: B. LECSTROM			
CAD. CORR: CAD. WLEDGAR			
CHECKED BY: DATE:			
APPROVED BY: DATE:			
PROJECT NO: 34202			

$$\frac{12}{13}$$

LAST SAVED BY: WILLIAM EDGAR 5/27/2023 4:18 PM

P:\US\W\PORTSMOUTH\14302-SUBADAMS\OSWATER\TRAFFIC\DRAWINGS\CONSTRUCTION\14302-02-ACCESSROAD_PUMPPLAN_1.DWG | 5/27/2023 4:17:40 PM | WILLIAM EDGAR



RECEIVED

JUN 27 2023

NHDOT DISTRICT 6

SUBMISSIONS/REVISIONS		APP'D	DATE
NO	DESCRIPTION		
1	DESIGNED BY: B. ECKSTROM		
2	CAD CORP: W. EDGAR		
3	CHECKED BY:		
4	DATE:		
5	APPROVED BY:		
6	DATE:		
7	PROJECT NO: 14302		



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CITY OF PORTSMOUTH
WAGON HILL FARM - ACCESS ROAD
DURHAM, NEW HAMPSHIRE

CONSTRUCTION ACCESS ROAD PLAN VIEW /
STA. 100+00 TO STA. 112+00

DRAWING
C-5

13/13

APPENDIX E
Easements and Licenses

Doc # 230005384 05/12/2023 02:50:36 PM

Book 5110 Page 453

Page 1 of 4

Catherine A. Berube
Register of Deeds, Strafford County

NOTICE OF CONDEMNATION

The City of Portsmouth has on the 12th day of May, 2023, filed with the New Hampshire Board of Tax and Land Appeals, a Declaration of Taking for the fee title and a temporary construction easement to the following property in the Town of Durham owned by Janet Mackie and Sandy MacLean.

Said premises being located on the southerly side of Piscataqua Road in the Town of Durham, County of Strafford, more particularly bounded and described as follows:

Permanent Easement Area:

The permanent right and easement to construct, reconstruct, maintain, repair and operate a water line with associated appurtenances or other facilities over, under or through land of Janet Mackie and Sandy MacLean, and more particularly described as follows:

Beginning at a rebar to be set on the southerly side of an existing Water Line Easement (S.C.R.D. Book 623, Page 285) over Town of Durham Tax Map 12, Lot 5-2, which parcel is located along Route 4, Town of Durham, County of Strafford, State of New Hampshire, said point being the northwest corner of the area herein described;

Thence S 81° 47' 14" E, a distance of 99.89' (+/-) (L4)¹ to a rebar to be set at the Mean High Water Line of the Little Bay; Thence along the Mean High Water Line of the Little Bay in a southerly direction 55' (+/-) with a tie of S 33° 50' 33" W, a distance of 54.83' to a rebar to be set at the Mean High Water Line;

Thence N 48° 48' 13" W, a distance of 7.91' (+/-) (L5) to a point;

Thence continuing N 48° 48' 13" W, a distance of 82.90' (L6) to the rebar to be set at the point of beginning.

Said area contains 2,453 square feet (+/-) or 0.06 acres (+/-), and is shown as Area "A" Proposed Permanent Water Line Easement in Favor of The City of Portsmouth on a plan entitled "Easement Plan for The City of Portsmouth Over Land of Sandy F. Maclean & Janet A. Mackie (Tax Map 12, Lot 5-2), Route 4, Durham, New Hampshire" dated February 14, 2022 and revised July 6, 2022 by Doucet Survey, LLC.

Temporary Construction Easements:

The temporary right and easement for the purpose of constructing, replacing and improving new and existing water lines and associated valves, vaults and other related infrastructure as shown on the plan attached as Exhibit A. Said temporary construction easement area shall be affected for the term of the construction project, and shall commence September 1, 2023 and terminate December 31, 2024, or one (1) year after completion of the construction project, whichever comes first. Further taking the temporary right and easement for the purpose of conducting any and all restoration work as may be required by the State of New Hampshire Department of Environmental Services or any other State or federal agency, for a period of five (5) years after the completion of construction, or terminating December 31, 2029, whichever comes first.

The temporary construction easement areas are more particularly described as follows:

Temporary Construction Easement Area A:

Beginning at a rebar to be set on the northerly side of an existing Water Line Easement (S.C.R.D. Book 623, Page 285) over Town of Durham Tax Map 12, Lot 5-2, which parcel is located along Route 4, Town of Durham, County of Strafford, State of New Hampshire, said point being the southwest corner of the area herein described;

¹ (L#) Is in reference to the line table as shown on the referenced plan.

Thence N 08° 00' 56" E, a distance of 30.00' (L1) to a rebar to be set;

Thence S 81° 47' 14" E, a distance of 199.82' (+/-) to a rebar to be set at the Mean High Water Line of the Little Bay;

Thence along the Mean High Water Line of the Little Bay in a southerly direction 38' (+/-) with a tie of S 29° 03' 57" W, a distance of 32.10' to a rebar to be set at the Mean High Water Line;

Thence N 81° 47' 14" W, a distance of 188.29' (+/-) (L2) to the rebar to be set at the point of beginning.

Said area contains 5,910 square feet (+/-) or 0.13 acres (+/-), and is shown as Proposed Temporary Construction Easement on a plan entitled "Easement Plan for The City of Portsmouth Over Land of Sandy F. Maclean & Janet A. Mackie (Tax Map 12, Lot 5-2), Route 4, Durham, New Hampshire" dated February 14, 2022 and revised July 6, 2022 by Doucet Survey, LLC.

Temporary Construction Easement Area :

Beginning at a rebar to be set on the southerly side of an existing Water Line Easement (S.C.R.D. Book 623, Page 285) over Town of Durham Tax Map 12, Lot 5-2, which parcel is located along Route 4, Town of Durham, County of Strafford, State of New Hampshire, said point being the northeast corner of the area herein described;

Thence running along the Permanent Easement to be conveyed to The City of Portsmouth S 48° 48' 13" E, a distance of 82.90' (L6) to a point;

Thence N 82° 01' 26" W, a distance of 67.28' (L7) to a point;

Thence S 24° 47' 49" W, a distance of 45.59' (L8) to a point;

Thence N 86° 01' 24" W, a distance of 79.17' (L9) to a point;

Thence N 36° 39' 45" W, a distance of 47.11' (L10) to a point;

Thence N 08° 12' 46" E, a distance of 61.57' (L11) to a point at the southerly side of the existing Water Line Easement;

Thence S 81° 47' 14" E, a distance of 122.95' (L3) to the rebar to be set at the point of beginning.

Said area contains 12,219 square feet or 0.28 acres, and is shown as Proposed Temporary Construction Easement in Favor of The City of Portsmouth on a plan entitled "Easement Plan for The City of

Portsmouth Over Land of Sandy F. Maclean & Janet
A. Mackie (Tax Map 12, Lot 5-2), Route 4, Durham,
New Hampshire" dated February 14, 2022 and
revised July 6, 2022 by Doucet Survey, LLC.

Respectfully submitted,

THE CITY OF PORTSMOUTH

By and through its attorney,

Dated: 5/12/2023

By: 

Trevor P. McCourt, Esq.

Assistant City Attorney

Bar No. 272308

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