

COPY NO. _____

SAGAMORE AVENUE SEWER EXTENSION

**CITY OF PORTSMOUTH
PORTSMOUTH, NEW HAMPSHIRE**

**RE-BIDDING, CONTRACT REQUIREMENTS
AND SPECIFICATIONS**

NOVEMBER 2021

**City Contract No. 12-22
CWSRF No. CS-330106-17
WP No. 11304C**

CITY OF PORTSMOUTH
PORTSMOUTH, NEW HAMPSHIRE
BIDDING, CONTRACT REQUIREMENTS
AND SPECIFICATIONS
FOR
SAGAMORE AVENUE SEWER EXTENSION

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WP NO. 11304C

NOVEMBER 2021



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Advertisement for Bids

Owner Name: City of Portsmouth

Project Number: 12-22

Project Address: Sagamore Avenue Area

Portsmouth

NH 03801

Street # and name

City/Town

State ZIP

Sealed bids for the construction of the Sagamore Avenue Sewer Extension project including the installation of a low pressure sewer system will be received by the front desk of City Hall, 1 Junkins Avenue, Portsmouth, NH 03801 until 2:00 PM local time on December 21, 2021 and then at said office publicly opened and read aloud. An Optional Pre-Bid Meeting will be held in person on December 9, 2021 at 11:00 AM. The Optional Pre-Bid Meeting will be held at the DPW training conference room located on the first floor at 680 Peverly Hill Road, Portsmouth, NH 03801.

The Sagamore Avenue Sewer Extension Project includes the installation of approximately 8,500 linear feet of sewer system within City Owned rights of way on Sagamore Avenue, Wentworth House Road, Shaw Road, Cliff Road, and Walker Bungalow. Approximately 8,000 linear feet of the proposed 2-inch and 3-inch sewer system is low pressure, approximately 500 feet of 8-inch traditional gravity sewer, and approximately 600 linear feet of 8-inch water main. The project includes five bid alternates that, if awarded, includes construction of private property low pressure sewer systems including the installation of grinder pump stations, electrical improvements, and site restoration along with sidewalk improvements along Sagamore Avenue.

Completion dates for the project specified in the **NOTICE TO PROCEED** as follows:

The Base Bid shall be Substantially Completed by December 30, 2022.

The Base Bid shall be Finally Completed by May 31, 2023.

If the Contract includes Bid Alternate No. 1:

The work associated with Bid Alternate No. 1 shall be Substantially Completed within 150 calendar days from "Notice to Proceed".

The work associated with Bid Alternate No. 1 shall be Finally Completed within 210 calendars from "Notice to Proceed".

If the Contract includes Bid Alternates No. 2-5:

The work associated with Bid Alternate No. 2- 5 shall be Substantially Completed by a timeframe to be negotiated.

The work associated with Bid Alternate No. 2- 5 shall be Finally Completed by a timeframe to be negotiated.

Liquidated damages will be in the amount of \$1,500 **plus** additional fines incurred for non-compliance with the Consent Decree

(<http://www.portsmouthwastewater.com/PDFs/September2016ConsentDecreeSecondModificationSagamoreAveSouthSewerSchedule.pdf>) for each calendar day of delay from the date established for Base Bid substantial completion, \$1,500 for each calendar day of delay from the date established for Base Bid final completion; the same liquidated damages for the Base Bid applies to Bid Alternative No. 1 for substantial completion and final completion; liquated damages of \$1,500 for each calendar day of delay from the date established for Bid Alternate No. 2 - 5 substantial completion, and \$1,500 for each calendar day of delay from the date established for Bid Alternate Nos. 2 - 5 final completion.

1. Each General Bid shall be accompanied by a Bid Security in the amount of 10% of the Total Bid Price.
2. 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.
3. Any contract or contracts awarded under this Advertisement for Bids are expected to be funded in whole or in part by: **(Select all appropriate.)**

- A loan from the NH CWSRF.
 - A loan from the NH DWSRF.
 - 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 loan or grant from USDA Rural Development.
 - A Community Development Block Grant (CDBG) from the NH Community Development Finance Authority.
4. 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**.
 5. 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.
 6. The successful Bidder on this work is subject to U.S. Department of Labor's Davis Bacon wage provisions.
 7. The successful bidder on this work is subject to the "American Iron and Steel (AIS)" requirements of the CWSRF and DWSRF programs.
 8. No Bidder may withdraw a Bid within 60 days after the actual date of opening thereof. Once the Lowest qualified bidder is identified, the Lowest qualified Bidder shall not withdraw their bid alternate pricing for 9-months. It is anticipated the City will not be able to award the Bid Alternate work at the time of the bid opening.
 9. **The Optional Pre-Bid Conference will be held in person at 11:00 AM on December 9, 2021 at the DPW training conference room, located on the first floor, at 680 Peverly Hill Road, Portsmouth, NH 03801.**

The Contract Documents may be examined at the following locations:

<https://www.cityofportsmouth.com/finance/purchasing-bids-and-proposals>

Documents are not available for pickup

The Issuing Office for the Bidding Documents is the City of Portsmouth. Prospective Bidders may examine the Bidding Documents at the following locations:

1. City of Portsmouth Website (<http://cityofportsmouth.com/finance/purchasing.htm>)
2. Dodge Data and Analytics/Dodge Reports (<http://construction.com>).

Bidding Documents may be obtained in PDF format on-line at <http://cityofportsmouth.com/finance/purchasing.htm>. Interested parties will be furnished one PDF download set of Bidding Documents at no cost to the interested parties. No paper sets will be distributed by the Issuing Office.

By Order of the Portsmouth City Council

City of Portsmouth, New Hampshire

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:

City Hall Front Desk at City Hall, 1 Junkins Avenue, Portsmouth, NH 03801.

Each sealed envelope containing a BID must be plainly marked on the outside as BID for "Sagamore Avenue Sewer Extension" 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. Once the Lowest qualified bidder is identified, the Lowest qualified Bidder shall not withdraw their bid alternates pricing for 9-months. It is anticipated the City may not elect to award Bid Alternates at the time of the bid opening. Within 9-months of the bid opening, the OWNER may choose to award any combination of the bid alternates or none of the bid alternates.

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 ten percent (10%) of the total amount of the BID. As soon as the BID prices have been compared, the OWNER, if requested, 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, if requested, 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 based on Total Base Bid Price. The City reserves the right to award the Base Bid and any combination of Bid Alternates in an order that best suits the City.

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 in coordination with NHDES. The Contractor shall maintain the sign throughout the duration of the contract.

SAFETY AND HEALTH REGULATIONS

This project is subject to all of 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) One electronic copy in PDF format to NHDES.
- c) 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 be pre-qualified with New Hampshire Department of Transportation Roadway Construction
- I. The Bidder shall not have failed to complete previous contracts on time, including approved time extensions.
- J. The Bidder or subcontractor shall have installed a minimum of ten E/One grinder pump stations and over 10,000 LF of low pressure sewers in the last five years. The Bidder to provide references for these projects as part of the bid submittal.

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 are to be submitted to Owner in writing. Interpretations or clarifications considered necessary by Owner in response to such questions will be issued by Addenda delivered to all parties recorded as having received the Bidding Documents. Questions received less than seven working 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.

SRF Contracts Only

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 funded in whole or in part by a loan available through NHDES's Clean Water and/or Drinking Water SRF programs, 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.

Both the “**Heavy**” General Wage Decision (GWD) for Rockingham County, NH25, publication date 10/29/2021 and the “**Highway**” GWD, NH13, publication date 1/01/2021 apply to this project.

The “**Heavy**” General Wage Decision applies to work associated with the new sewer system and new water system construction, temporary trench patch paving, site restoration and any other work not specifically identified under “**Highway**”.

The “**Highway**” General Wage Decision applies to work associated with roadway restoration and paving, driveway restoration, sidewalks, walkways and curbing.

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.

Guidance for USDOL conformance procedures is available using the following link:

<https://www.dol.gov/agencies/whd/government-contracts/construction/faq/conformance>

The following guidance is for classifications/rates missing from the “Heavy” GWD, NH25, publication date 10/29/2021.

When requesting skilled trade classifications and proposing rates: the minimum rate that may be approved is \$27.24 + \$23.58 fringe or a total rate of \$50.82 per hour.

A copy of the applicable DOL wage determinations is included in PART D - FEDERAL PROVISIONS, RULES, REGULATIONS AND FORMS in these project documents.

Bidders shall refer to the above-referenced [PART D - FEDERAL PROVISIONS, RULES, REGULATIONS AND FORMS](#) for additional information on guidance and Davis Bacon requirements.

Multiple wage determinations apply, the Contractor is responsible for keeping track of all work performed under each wage rate determination.

AMERICAN IRON AND STEEL (AIS) PROVISIONS

The successful bidder on this work is subject to the "**American Iron and Steel (AIS)**" requirements of the CWSRF and DWSRF programs, 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.

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:

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.
- 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 NHDES 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 NH 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 Sagamore Avenue Sewer Extension 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:

The Base Bid shall be Substantially Completed by December 30, 2022.

The Base Bid shall be Finally Completed by May 31, 2023.

If the Contract includes Bid Alternate No. 1:

The work associated with Bid Alternate No. 1 shall be Substantially Completed within 150 calendar days from "Notice to Proceed".

The work associated with Bid Alternate No. 1 shall be Finally Completed within 210 calendars from "Notice to Proceed".

If the Contract includes Bid Alternates No. 2-5:

The work associated with Bid Alternate No. 2- 5 shall be Substantially Completed by a timeframe to be negotiated.

The work associated with Bid Alternate No. 2- 5 shall be Finally Completed by a timeframe to be negotiated.

Liquidated damages will be in the amount of \$1,500 **plus** additional fines incurred for non-compliance with the Consent Decree

(<http://www.portsmouthwastewater.com/PDFs/September2016ConsentDecreeSecondModificationSagamoreAveSouthSewerSchedule.pdf>) for each calendar day of delay from the date established for Base Bid substantial completion, \$1,500 for each calendar day of delay from the date established for Base Bid final completion; the same liquidated damages for the Base Bid applies to Bid Alternative No. 1 for substantial completion and final completion; liquated damages of \$1,500 for each calendar day of delay from the date established for Bid Alternate No. 2 - 5 substantial completion, and \$1,500 for each calendar day of delay from the date established for Bid Alternate Nos. 2 - 5 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.

The BIDDER hereby certifies, by checking the boxes below, that the following documents are included with this bid proposal:

- DBE Subcontractor Utilization Form NHDES Form #NHDES-W-09-059 (Formerly EPA Form 6100-4).
- DBE Subcontractor Performance Forms NHDES-09-NHDES-W-09-058 (Formerly EPA Form 6100-3) **Submit one form for each DBE subcontractor.**
- Bidder's **American Iron and Steel** acknowledgement.

All of these forms are in the SRF Federal Provisions: [Section D](#) of the front-end documents.

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?
------------------------------	-----------------------------	---

<input type="checkbox"/> Yes	<input type="checkbox"/> No	Do you have any pending legal actions, claim before arbitration panels and or any claims or legal actions before any regulatory boards? 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)

List any subcontractors whom you would expect to use for the following (unless this work is to be done by your own organization)

Civil Engineering

Utility Installation

Other please describe:

Please list banks with whom you conduct business.

Yes

No

Do you grant the Engineer permission to contact this (these) institutions?

NOTE: Bidders may be required to furnish their latest financial statement as part of the award process.

Respectfully Submitted:

Signature:

Date:

Printed Name:

Title:

Street # and name

City/Town

State ZIP

[Signed Name] Being duly sworn, deposes and says that they are [Position Title]of [Organization] and all the answers to the foregoing questions and all statement contained therein are true and correct.

Sworn to before me this day of , 20

, Notary Public

My Commission Expires

Seal

Attest:

BIDDER agrees to perform all the work described in the CONTRACT DOCUMENTS for the following unit prices or lump sum:

NOTE: BIDS shall include sales tax and all other applicable taxes and fees.

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
<u>CWSRF Eligible Bid Items</u>					
<u>Low Pressure and Gravity Sewers</u>					
1	3,075	LF	2-inch HDPE Low Pressure Sewer Pipe, All Depths The sum of \$ _____ _____	\$ _____	\$ _____
			Per Linear Foot		
2	2,275	LF	3-inch HDPE Low Pressure Sewer Pipe, All Depths The sum of \$ _____ _____	\$ _____	\$ _____
			Per Linear Foot		
3	1,230	LF	1 ½-inch HDPE Low Pressure Sewer Service Pipe, All Depths The sum of \$ _____ _____	\$ _____	\$ _____
			Per Linear Foot		
4	59	EA	Low Pressure Sewer Lateral Assembly The sum of \$ _____ _____	\$ _____	\$ _____
			Per Each		
5	375	LF	8-inch Gravity PVC Sewer Pipe, all depths The sum of \$ _____ _____	\$ _____	\$ _____
			Per Linear Foot		
6	175	LF	4-inch or 6-inch Gravity PVC Sewer Service Pipe, All Depths The sum of \$ _____ _____	\$ _____	\$ _____
			Per Linear Foot		
7	6,550*	LF	2-inch Rigid Pipe Trench Insulation The sum of \$ _____ _____	\$ _____	\$ _____
			Per Linear Foot		
8	20	VF	4-ft Diameter Sewer Manhole The sum of \$ _____ _____	\$ _____	\$ _____
			Per Vertical Foot		
9	7	VF	4-ft Diameter Sewer Cleanout Manholes The sum of \$ _____ _____	\$ _____	\$ _____
			Per Vertical Foot		

Item No.	Qty	Unit	Brief Description of Item with Unit Bid Price in Words	Unit Bid In Figures	Amount In Figures
10	26	VF	5-ft Diameter Sewer Cleanout Manholes The sum of \$ _____ Per Vertical Foot	\$ _____	\$ _____
11	10	EA	5-ft Diameter Combination Valve Manhole The sum of \$ _____ Per Each	\$ _____	\$ _____
12	14	EA	Capping Existing Sewer, Drain, or Water Pipe The sum of \$ _____ Per Each	\$ _____	\$ _____
Water Mains					
13	25*	LF	Ductile Iron Water Main Relocation, All Sizes The sum of \$ _____ Per Linear Foot	\$ _____	\$ _____
14a	4	EA	1-inch Corporation Stop and Tap The sum of \$ _____ Per Each	\$ _____	\$ _____
14b	3	EA	2-inch Corporation Stop and Tap The sum of \$ _____ Per Each	\$ _____	\$ _____
15	150	LF	1-inch Copper Water Service The sum of \$ _____ Per Linear Foot	\$ _____	\$ _____
16	100	LF	2-inch Copper Water Service Pipe The sum of \$ _____ Per Linear Foot	\$ _____	\$ _____
17a	4	EA	1-inch Curb Stop and Box The sum of \$ _____ Per Each	\$ _____	\$ _____
17b	3	EA	2-inch Curb Stop and Box The sum of \$ _____ Per Each	\$ _____	\$ _____

Item No.	Qty	Unit	Brief Description of Item with Unit Bid Price in Words	Unit Bid In Figures	Amount In Figures
18	40	LF	6-inch Diameter Perforated HDPE Storm Drain Pipe, All Depths The sum of \$ _____ _____	\$ _____	\$ _____
Per Linear Feet					
Roadway Restoration and Site Restoration					
19	1,025	TN	Local Road Temporary Pavement The sum of \$ _____ _____	\$ _____	\$ _____
Per Ton					
20	1,025	TN	Local Road Pavement (Binder Course) The sum of \$ _____ _____	\$ _____	\$ _____
Per Ton					
21a	275	TN	Local Road Pavement (Surface Course) for Permanent Trench The sum of \$ _____ _____	\$ _____	\$ _____
Per Ton					
21b	550	TN	Local Road Pavement (Surface Course) for Full Width Overlay The sum of \$ _____ _____	\$ _____	\$ _____
Per Ton					
22	20	TN	Driveway/Sidewalk/Parking Lot Pavement The sum of \$ _____ _____	\$ _____	\$ _____
Per Ton					
23	9,100	SY	Milling (1.5-inch Depth) The sum of \$ _____ _____	\$ _____	\$ _____
Per Square Yard					
24	85	CY	Gravel Driveway/Walkway The sum of \$ _____ _____	\$ _____	\$ _____
Per Cubic Yard					
25	20*	LF	Bituminous Curb The sum of \$ _____ _____	\$ _____	\$ _____
Per Linear Foot					
26	220*	SY	Loam and Seed The sum of \$ _____ _____	\$ _____	\$ _____
Per Square Yard					

Item No.	Qty	Unit	Brief Description of Item with Unit Bid Price in Words	Unit Bid In Figures	Amount In Figures
General Project					
27	70	EA	Pre-blast Survey The sum of \$ _____ _____	\$ _____	\$ _____
			Per Each		
28	70	EA	Radon Tests The sum of \$ _____ _____	\$ _____	\$ _____
			Per Each		
29	35	EA	Test Pit Excavation The sum of \$ _____ _____	\$ _____	\$ _____
			Per Each		
30	2,750*	CY	Trench Excavation - Ledge The sum of \$ _____ _____	\$ _____	\$ _____
			Per Cubic Yard		
31	40*	CY	Replacement of Unsuitable Material Above Pipe Bedding and Initial Backfill The sum of \$ _____ _____	\$ _____	\$ _____
			Per Cubic Yards		
32	40*	CY	Excavation Below Grade and Replacement Backfill The sum of \$ _____ _____	\$ _____	\$ _____
			Per Cubic Yard		
33	10*	CY	Backfill with Flowable Fill The sum of \$ _____ _____	\$ _____	\$ _____
			Per Cubic Yard		
34	1	LS	Erosion and Sedimentation Control The sum of \$ _____ _____	\$ _____	\$ _____
			Per Lump Sum		
35	1	LS	Traffic Control The sum of \$ _____ _____	\$ _____	\$ _____
			Per Lump Sum		
36	40	WK	Electronic Traffic Control Message Board The sum of \$ _____ _____	\$ _____	\$ _____
			Per Week		

Item No.	Qty	Unit	Brief Description of Item with Unit Bid Price in Words	Unit Bid In Figures	Amount In Figures
37	51	EA	Property Inspection The sum of \$ _____	\$ _____	\$ _____
Per Each					
38	1	LS	Mobilization & Demobilization (max. 5% excluding the allowances) The sum of \$ _____	\$ _____	\$ _____
Per Lump Sum					
39	1	Allow	Uniform Police Officer for Traffic Control The sum of <u>\$ Forty Thousand Dollars & Zero Cents</u>	<u>\$ 40,000.00</u>	<u>\$ 40,000.00</u>
Per Allowance					
40	1	Allow	Liquid Asphalt Price Adjustment The sum of <u>\$ Twelve Thousand Dollars & Zero Cents</u>	<u>\$ 12,000.00</u>	<u>\$ 12,000.00</u>
Per Allowance					

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

PVC SDR 21 is an acceptable alternative to HDPE SDR 11, for any bid description above that state "HDPE". The term "HDPE" now means either "HDPE" or "PVC".

BASE BID: Total of Items 1 through 40 above.

_____ (\$ _____)
 _____ (use figures)

 _____ (use words)

BID SCHEDULE
BID ALTERNATE No. 1

Item No.	Qty	Unit	Brief Description of Item with Unit Bid Price in Words	Unit Bid In Figures	Amount In Figures
<u>CWSRF Eligible Bid Items</u>					
<u>Low Pressure and Gravity Sewers</u>					
41	975	LF	2-inch HDPE Low Pressure Sewer Pipe, All Depths The sum of \$_____	\$_____	\$_____
			Per Linear Foot		
42	1,600	LF	3-inch HDPE Low Pressure Sewer Pipe, All Depths The sum of \$_____	\$_____	\$_____
			Per Linear Foot		
43	510	LF	1 ½-inch HDPE Low Pressure Sewer Service Pipe, All Depths The sum of \$_____	\$_____	\$_____
			Per Linear Foot		
44	22	EA	Low Pressure Sewer Lateral Assembly The sum of \$_____	\$_____	\$_____
			Per Each		
45	2,300*	LF	2-inch Rigid Pipe Trench Insulation The sum of \$_____	\$_____	\$_____
			Per Linear Foot		
46	6	VF	4-ft Diameter Sewer Cleanout Manholes The sum of \$_____	\$_____	\$_____
			Per Vertical Foot		
47	6	VF	5-ft Diameter Sewer Cleanout Manholes The sum of \$_____	\$_____	\$_____
			Per Vertical Foot		
48	5	EA	5-ft Diameter Combination Valve Manhole The sum of \$_____	\$_____	\$_____
			Per Each		
49	2	EA	Decommission of Underground Leaching Basin on Sagamore Grove The sum of \$_____	\$_____	\$_____
			Per Each		

Item No.	Qty	Unit	Brief Description of Item with Unit Bid Price in Words	Unit Bid In Figures	Amount In Figures
50	6	EA	Capping Existing Sewer, Drain, or Water Pipe The sum of \$ _____	\$ _____	\$ _____

Per Each					
Water Mains					
51	615	LF	8-inch Ductile Iron Water Main The sum of \$ _____	\$ _____	\$ _____

Per Linear Foot					
52	25*	LF	Ductile Iron Water Main Relocation, All Sizes The sum of \$ _____	\$ _____	\$ _____

Per Linear Foot					
53	1	EA	8-inch Gate Valve The sum of \$ _____	\$ _____	\$ _____

Per Each					
54	8	EA	1-inch Corporation Stop and Tap The sum of \$ _____	\$ _____	\$ _____

Per Each					
55	1	EA	2-inch Corporation Stop and Tap The sum of \$ _____	\$ _____	\$ _____

Per Each					
56	210	LF	1-inch Copper Water Service The sum of \$ _____	\$ _____	\$ _____

Per Linear Foot					
57	20	LF	2-inch Copper Water Service Pipe The sum of \$ _____	\$ _____	\$ _____

Per Linear Foot					
58	8	EA	1-inch Curb Stop and Box The sum of \$ _____	\$ _____	\$ _____

Per Each					
59	1	EA	2-inch Curb Stop and Box The sum of \$ _____	\$ _____	\$ _____

Per Each					
60	2	EA	Hydrant Assembly The sum of \$ _____	\$ _____	\$ _____

Per Each					

Item No.	Qty	Unit	Brief Description of Item with Unit Bid Price in Words	Unit Bid In Figures	Amount In Figures
61	1	EA	8-inch x 12-inch Tapping Sleeve and Valve The sum of \$ _____ _____ Per Each	\$ _____	\$ _____
62	1	LS	Temporary Water Main The sum of \$ _____ _____ Per Lump Sum	\$ _____	\$ _____
Management of Contaminated Soils and Waste Materials					
63	1	LS	Management of Contaminated Soil and Waste Materials The sum of \$ _____ _____ Per Lump Sum	\$ _____	\$ _____
64	1	Allow	Removal and Disposal of Excess Contaminated Soil and Waste Materials The sum of \$ <u>Fifteen Thousand Dollars & Zero Cents</u> _____ Per Allowance	\$ <u>15,000.00</u>	\$ <u>15,000.00</u>
65	1	Allow	Treatment of Contaminated Groundwater The sum of \$ <u>Two Thousand Dollars zero cents</u> _____ Per Allowance	\$ <u>2,000.00</u>	\$ <u>2,000.00</u>
Roadway Restoration and Site Restoration					
66a	275	TN	Local Road Temporary Pavement The sum of \$ _____ _____ Per Ton	\$ _____	\$ _____
66b	275	TN	Local Road Pavement (Binder Course) The sum of \$ _____ _____ Per Ton	\$ _____	\$ _____
66c	300	TN	Local Road Pavement (Surface Course) for Full Width Overlay The sum of \$ _____ _____ Per Ton	\$ _____	\$ _____
66d	20	TN	Driveway/Sidewalk/Parking Lot Pavement The sum of \$ _____ _____ Per Ton	\$ _____	\$ _____
67a	300	TN	NHDOT Temporary Pavement The sum of \$ _____ _____ Per Ton	\$ _____	\$ _____

Item No.	Qty	Unit	Brief Description of Item with Unit Bid Price in Words	Unit Bid In Figures	Amount In Figures
67b	300	TN	NHDOT Pavement (Binder Course) The sum of \$ _____ _____	\$ _____	\$ _____
			Per Ton		
67c	450	TN	NHDOT Pavement (Surface Course) The sum of \$ _____ _____	\$ _____	\$ _____
			Per Ton		
68	8,900	SY	Milling (1.5-inch Depth) The sum of \$ _____ _____	\$ _____	\$ _____
			Per Square Yard		
69	7	CY	Gravel Driveway/Walkway The sum of \$ _____ _____	\$ _____	\$ _____
			Per Cubic Yard		
70	750*	SY	Loam and Seed The sum of \$ _____ _____	\$ _____	\$ _____
			Per Square Yard		
<u>General Project</u>					
71	25	EA	Pre-blast Survey The sum of \$ _____ _____	\$ _____	\$ _____
			Per Each		
72	25	EA	Radon Tests The sum of \$ _____ _____	\$ _____	\$ _____
			Per Each		
73	15	EA	Test Pit Excavation The sum of \$ _____ _____	\$ _____	\$ _____
			Per Each		
74	1,050*	CY	Trench Excavation - Ledge The sum of \$ _____ _____	\$ _____	\$ _____
			Per Cubic Yard		
75	20*	CY	Replacement of Unsuitable Material Above Pipe Bedding and Initial Backfill The sum of \$ _____ _____	\$ _____	\$ _____
			Per Cubic Yards		

Item No.	Qty	Unit	Brief Description of Item with Unit Bid Price in Words	Unit Bid In Figures	Amount In Figures
76	20*	CY	Excavation Below Grade and Replacement Backfill The sum of \$ _____ Per Cubic Yard	\$ _____	\$ _____
77	10*	CY	Backfill with Flowable Fill The sum of \$ _____ Per Cubic Yard	\$ _____	\$ _____
78	1	LS	Erosion and Sedimentation Control The sum of \$ _____ Per Lump Sum	\$ _____	\$ _____
79	1	LS	Traffic Control The sum of \$ _____ Per Lump Sum		\$ _____
80	30	WK	Electronic Traffic Control Message Board The sum of \$ _____ Per Week	\$ _____	\$ _____
81	1	LS	Utility Support and Coordination with City Departments The sum of \$ _____ Per Lump Sum	\$ _____	\$ _____
82	1	Allow	Utility Support and Coordination with Independent Utility Companies The sum of \$ <u>Twelve Thousand Five Hundred Dollars Zero Cents</u> Per Allowance	\$ <u>12,500.00</u>	\$ <u>12,500.00</u>
83	14	EA	Property Inspection The sum of \$ _____ Per Each	\$ _____	\$ _____
84	1	LS	Mobilization & Demobilization (max. 5% excluding the allowances) The sum of \$ _____ Per Lump Sum	\$ _____	\$ _____
85	1	Allow	Uniform Police Officer for Traffic Control The sum of \$ <u>Sixty Thousand Dollars & Zero Cents</u> Per Allowance	\$ <u>60,000.00</u>	\$ <u>60,000.00</u>

Item No.	Qty	Unit	Brief Description of Item with Unit Bid Price in Words	Unit Bid In Figures	Amount In Figures
86	1	Allow	Liquid Asphalt Price Adjustment The sum of <u>\$ Eight Thousand Dollars And Zero Cents</u>	\$ <u>8,000.00</u>	\$ <u>8,000.00</u>
Per Allowance					

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

PVC SDR 21 is an acceptable alternative to HDPE SDR 11, for any bid description above that state "HDPE". The term "HDPE" now means either "HDPE" or "PVC".

BID Alternate No. 1: Total of Items 41 through 86 above.

_____ (\$ _____)

 _____ (use figures)

 _____ (use words)

Total Bid (Base Bid + Bid Alternate No. 1):

_____ (\$ _____)

 _____ (use figures)

 _____ (use words)

BID SCHEDULE

BID ALTERNATE No. 2

Item No.	Qty	Unit	Brief Description of Item with Unit Bid Price in Words	Unit Bid In Figures	Amount In Figures
<u>Water Services</u>					
87	1,240	LF	2-inch HDPE Water Service Pipe The sum of \$ _____ _____	\$ _____	\$ _____
			Per Linear Foot		
88	315*	CY	Trench Excavation - Ledge The sum of \$ _____ _____	\$ _____	\$ _____
			Per Cubic Yard		
89	2	EA	2-inch Curb Stop and Box The sum of \$ _____ _____	\$ _____	\$ _____
			Per Linear Foot		

BID Alternate No. 2: Total of Items 87 through 89 above.

_____ (\$ _____)
 (use figures)

 (use words)

Total Bid (Base Bid + Bid Alternate No. 2):

_____ (\$ _____)
 (use figures)

 (use words)

Total Bid (Base Bid + Bid Alternate No. 1 + Bid Alternate No. 2):

_____ (\$ _____)
 (use figures)

 (use words)

BID SCHEDULE
BID ALTERNATE No. 3

Item No.	Qty	Unit	Brief Description of Item with Unit Bid Price in Words	Unit Bid In Figures	Amount In Figures
<u>Roadway Restoration</u>					
90	14	VF	Catch Basin The sum of \$ _____ _____	\$ _____	\$ _____
			Per Vertical Foot		
91	40	LF	12-inch Diameter HDPE Storm Drain, all depths The sum of \$ _____ _____	\$ _____	\$ _____
			Per Linear Foot		
92	450	SY	Concrete Sidewalk and Walkway The sum of \$ _____ _____	\$ _____	\$ _____
			Per Square Yard		
93	10	EA	Detectable Warning Device for Sidewalk Ramps The sum of \$ _____ _____	\$ _____	\$ _____
			Per Each		
94	260	LF	Granite Curb – Remove and Reset The sum of \$ _____ _____	\$ _____	\$ _____
			Per Linear Foot		

BID Alternate No. 3: Total of Items 90 through 94 above.
 _____ (\$ _____)
 (use figures)

 (use words)

Total Bid (Base Bid + Bid Alternate No. 3):
 _____ (\$ _____)
 (use figures)

 (use words)

Total Bid (Base Bid + Bid Alternate No. 1 + Bid Alternate No. 2 + Bid Alternate No. 3):
 _____ (\$ _____)
 (use figures)

 (use words)

BID SCHEDULE
BID ALTERNATE No. 4

Item No.	Qty	Unit	Brief Description of Item with Unit Bid Price in Words	Unit Bid In Figures	Amount In Figures
<u>Low Pressure and Gravity Sewers</u>					
95	4,250	LF	1 ½-inch HDPE Low Pressure Sewer Service Pipe, All Depths The sum of \$ _____	\$ _____	\$ _____
			Per Linear Foot		
96	1,050	LF	4-inch or 6-inch Gravity PVC Sewer Service Pipe, All Depths The sum of \$ _____	\$ _____	\$ _____
			Per Linear Foot		
97	375*	LF	Rigid Pipe Trench Insulation The sum of \$ _____	\$ _____	\$ _____
			Per Linear Foot		
98	10	LF	12-inch Diameter or Smaller HDPE Storm Drain Pipe, All depths The sum of \$ _____	\$ _____	\$ _____
			Per Linear Foot		
99	48	EA	Submersible Grinder Pump Station – model DH071 The sum of \$ _____	\$ _____	\$ _____
			Per Each		
100	1	EA	Submersible Grinder Pump Station – model DH151 (Multi-Family) The sum of \$ _____	\$ _____	\$ _____
			Per Each		
101	60	EA	Decommission Septic Tank/Tight Tank The sum of \$ _____	\$ _____	\$ _____
			Per Each		
<u>Building Repair</u>					
102	3	EA	Relocation of Indoor Plumbing The sum of \$ _____	\$ _____	\$ _____
			Per Each		

Item No.	Qty	Unit	Brief Description of Item with Unit Bid Price in Words	Unit Bid In Figures	Amount In Figures
103	55*	LF	Additional Footage to Relocate Indoor Plumbing The sum of \$ _____ _____	\$ _____	\$ _____
Per Linear Foot					
Electrical Work					
104	6	EA	Circuit Breaker/Panel Improvement The sum of \$ _____ _____	\$ _____	\$ _____
Per Each					
105	1	Allow	Electrical Service Upgrade The sum of \$ <u>Fifteen Thousand Dollars</u> and Zero Cents	\$ <u>15,000.00</u>	\$ <u>15,000.00</u>
Per Allowance					
106	2	EA	Electrical Step Up Transformer The sum of \$ _____ _____	\$ _____	\$ _____
Per Each					
107	14	EA	Restoration of Finished Basement The sum of \$ _____ _____	\$ _____	\$ _____
Per Each					
Driveway Restoration					
108	190	TN	Driveway/Parking Lot Pavement The sum of \$ _____ _____	\$ _____	\$ _____
Per Ton					
109	20	CY	Gravel Driveway/Walkway The sum of \$ _____ _____	\$ _____	\$ _____
Per Cubic Yard					
Site Restoration					
110	3,475*	SY	Loam and Seed The sum of \$ _____ _____	\$ _____	\$ _____
Per Square Yard					
111	60*	EA	Protect Existing Tree The sum of \$ _____ _____	\$ _____	\$ _____
Per Each					
112	160	EA	Remove Shrub The sum of \$ _____ _____	\$ _____	\$ _____
Per Each					

Item No.	Qty	Unit	Brief Description of Item with Unit Bid Price in Words	Unit Bid In Figures	Amount In Figures
113	5	EA	Remove Tree (< 6-inch Diameter) The sum of \$ _____ _____	\$ _____	\$ _____
			Per Each		
114	7	EA	Remove Tree (≥ 6-inch Diameter) The sum of \$ _____ _____	\$ _____	\$ _____
			Per Each		
115	2	EA	Tree Planting The sum of \$ _____ _____	\$ _____	\$ _____
			Per Each		
116	160*	EA	Shrub Planting The sum of \$ _____ _____	\$ _____	\$ _____
			Per Each		
117	40*	LF	Wooden Fence - Remove and Reset The sum of \$ _____ _____	\$ _____	\$ _____
			Per Linear Foot		
118	65*	SF	Stone Retaining Wall Less than 5-ft High The sum of \$ _____ _____	\$ _____	\$ _____
			Per Square Foot		
119	50*	SY	Stone Patio or Walkway - Remove & Replace The sum of \$ _____ _____	\$ _____	\$ _____
			Per Square Yard		
120	80*	SY	Brick Patio or Walkway - Remove and Replace The sum of \$ _____ _____	\$ _____	\$ _____
			Per Square Yard		
121	60*	SF	Raised Wooden Porch and Deck - Remove and Replace The sum of \$ _____ _____	\$ _____	\$ _____
			Per Square Foot		
122	60*	SF	Wooden Step or Ramp - Remove and Replace The sum of \$ _____ _____	\$ _____	\$ _____
			Per Square Foot		

Item No.	Qty	Unit	Brief Description of Item with Unit Bid Price in Words	Unit Bid In Figures	Amount In Figures
123	3*	CY	Concrete Steps and Minor Structures – Remove and Replace The sum of \$ _____	\$ _____	\$ _____
Per Cubic Yard					
124	120*	LF	Replace Buried Sprinkler/Irrigation Pipe The sum of \$ _____	\$ _____	\$ _____
Per Linear Foot					
125	35*	LF	Granite Curb – Remove and Reset The sum of \$ _____	\$ _____	\$ _____
Per Linear Foot					
General Project					
126	13	EA	Test Pit Excavation The sum of \$ _____	\$ _____	\$ _____
Per Each					
127	230*	CY	Trench Excavation - Ledge The sum of \$ _____	\$ _____	\$ _____
Per Cubic Yard					
128	20*	CY	Replacement of Unsuitable Material Above Pipe Bedding and Initial Backfill The sum of \$ _____	\$ _____	\$ _____
Per Cubic Yard					
129	10*	CY	Excavation Below Grade and Replacement Backfill The sum of \$ _____	\$ _____	\$ _____
Per Cubic Yard					
130	1	LS	Erosion and Sedimentation Control The sum of \$ _____	\$ _____	\$ _____
Per Lump Sum					
131	10*	LF	Relocate Utilities on Private Property The sum of \$ _____	\$ _____	\$ _____
Per Linear Foot					
132	1	LS	Mobilization & Demobilization (max. 5% excluding the allowance) The sum of \$ _____	\$ _____	\$ _____
Per Lump Sum					

Item No.	Qty	Unit	Brief Description of Item with Unit Bid Price in Words	Unit Bid In Figures	Amount In Figures
133	1	Allow	Liquid Asphalt Price Adjustment The sum of \$ <u>Twelve Thousand Dollars and Zero Cents</u>	\$ <u>12,000.00</u>	\$ <u>12,000.00</u>
			Per Allowance		
134	1	Allow	Sewer Pipe Price Adjustment The sum of \$ <u>Twelve Thousand Dollars and Zero Cents</u>	\$ <u>12,000.00</u>	\$ <u>12,000.00</u>
			Per Allowance		

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

PVC SDR 21 is an acceptable alternative to HDPE SDR 11, for any bid description above that state "HDPE". The term "HDPE" now means either "HDPE" or "PVC".

BID Alternate No. 4: Total of Items 95 –134 above.

_____ (\$ _____)
(use figures)

_____ (use words)

Total Bid (Base Bid + Bid Alternate No. 4):

_____ (\$ _____)
(use figures)

_____ (use words)

Total Bid (Base Bid + Bid Alternate No. 1 + Bid Alternate No. 2 + Bid Alternate No. 3 + Bid Alternate No. 4):

_____ (\$ _____)
(use figures)

_____ (use words)

BID SCHEDULE
BID ALTERNATE No. 5

Item No.	Qty	Unit	Brief Description of Item with Unit Bid Price in Words	Unit Bid In Figures	Amount In Figures
<u>Low Pressure and Gravity Sewers</u>					
135	1,150	LF	1 ½-inch HDPE Low Pressure Sewer Service Pipe, All Depths The sum of \$ _____	\$ _____	\$ _____
Per Linear Foot					
136	450	LF	4-inch or 6-inch Gravity PVC Sewer Service Pipe, All Depths The sum of \$ _____	\$ _____	\$ _____
Per Linear Foot					
137	175*	LF	Rigid Pipe Trench Insulation The sum of \$ _____	\$ _____	\$ _____
Per Linear Foot					
138	10	EA	Submersible Grinder Pump Station – model DH071 The sum of \$ _____	\$ _____	\$ _____
Per Each					
139	4	EA	Submersible Grinder Pump Station – model DH152 (Duplex station) The sum of \$ _____	\$ _____	\$ _____
Per Each					
140	3	EA	Traffic-Bearing Sewer Manhole for Grinder Pump Station The sum of \$ _____	\$ _____	\$ _____
Per Each					
141	16	EA	Decommission Septic Tank/Tight Tank The sum of \$ _____	\$ _____	\$ _____
Per Each					
<u>Building Repair</u>					
142	1	EA	Relocation of Indoor Plumbing The sum of \$ _____	\$ _____	\$ _____
Per Each					

Item No.	Qty	Unit	Brief Description of Item with Unit Bid Price in Words	Unit Bid In Figures	Amount In Figures
Electrical Work					
143	3	EA	Circuit Breaker/Panel Improvement The sum of \$ _____ _____	\$ _____	\$ _____
			Per Each		
144	1	Allow	Electrical Service Upgrade The sum of \$ <u>Ten Thousand Dollars</u> and Zero Cents _____	\$ <u>10,000.00</u>	\$ <u>10,000.00</u>
			Per Allowance		
145	4	EA	Electrical Step-Up Transformer The sum of \$ _____ _____	\$ _____	\$ _____
			Per Each		
Driveway Restoration					
146	60	TN	Driveway/Parking Lot Pavement The sum of \$ _____ _____	\$ _____	\$ _____
			Per Ton		
147	30	CY	Gravel Driveway/Walkway The sum of \$ _____ _____	\$ _____	\$ _____
			Per Cubic Yard		
Site Restoration					
148	800*	SY	Loam and Seed The sum of \$ _____ _____	\$ _____	\$ _____
			Per Square Yard		
149	10*	EA	Protect Existing Tree The sum of \$ _____ _____	\$ _____	\$ _____
			Per Each		
150	2	EA	Remove Tree (< 6-inch Diameter) The sum of \$ _____ _____	\$ _____	\$ _____
			Per Each		
151	5	EA	Remove Tree (≥ 6-inch Diameter) The sum of \$ _____ _____	\$ _____	\$ _____
			Per Each		
152	3	EA	Tree Planting The sum of \$ _____ _____	\$ _____	\$ _____
			Per Each		

Item No.	Qty	Unit	Brief Description of Item with Unit Bid Price in Words	Unit Bid In Figures	Amount In Figures
153	30*	EA	Shrub Planting The sum of \$ _____ _____	\$ _____	\$ _____
Per Each					
154	50*	LF	Wooden Fence - Remove and Reset The sum of \$ _____ _____	\$ _____	\$ _____
Per Linear Foot					
155	70*	SF	Stone Retaining Wall Less than 5-ft High The sum of \$ _____ _____	\$ _____	\$ _____
Per Square Foot					
156	15*	SY	Brick Patio or Walkway - Remove and Replace The sum of \$ _____ _____	\$ _____	\$ _____
Per Square Yard					
157	55*	SF	Wooden Step or Ramp - Remove and Replace The sum of \$ _____ _____	\$ _____	\$ _____
Per Square Foot					
158	2*	CY	Concrete Steps and Minor Structures – Remove and Replace The sum of \$ _____ _____	\$ _____	\$ _____
Per Cubic Yard					
159	50*	LF	Replace Buried Sprinkler/Irrigation Pipe The sum of \$ _____ _____	\$ _____	\$ _____
Per Linear Foot					
160	10*	LF	Granite Curb – Remove and Reset The sum of \$ _____ _____	\$ _____	\$ _____
Per Linear Foot					
General Project					
161	6	EA	Test Pit Excavation The sum of \$ _____ _____	\$ _____	\$ _____
Per Each					
162	100*	CY	Trench Excavation - Ledge The sum of \$ _____ _____	\$ _____	\$ _____
Per Cubic Yard					

Item No.	Qty	Unit	Brief Description of Item with Unit Bid Price in Words	Unit Bid In Figures	Amount In Figures
163	10*	CY	Replacement of Unsuitable Material Above Pipe Bedding and Initial Backfill The sum of \$ _____	\$ _____	\$ _____
Per Cubic Yard					
164	10*	CY	Excavation Below Grade and Replacement Backfill The sum of \$ _____	\$ _____	\$ _____
Per Cubic Yard					
165	1	LS	Erosion and Sedimentation Control The sum of \$ _____		\$ _____
Per Lump Sum					
166	40*	LF	Relocate Utilities on Private Property The sum of \$ _____	\$ _____	\$ _____
Per Linear Foot					
167	1	LS	Mobilization & Demobilization (max. 5% excluding the allowance) The sum of \$ _____		\$ _____
Per Lump Sum					
168	1	Allow	Liquid Asphalt Price Adjustment The sum of \$ <u>Eight Thousand Dollars and Zero Cents</u>	\$ <u>8,000.00</u>	\$ <u>8,000.00</u>
Per Allowance					
169	1	Allow	Sewer Pipe Price Adjustment The sum of \$ <u>Eight Thousand Dollars and Zero Cents</u>	\$ <u>8,000.00</u>	\$ <u>8,000.00</u>
Per Allowance					

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

PVC SDR 21 is an acceptable alternative to HDPE SDR 11, for any bid description above that state "HDPE". The term "HDPE" now means either "HDPE" or "PVC".

BID Alternate No. 5: Total of Items 135 – 169 above.

_____ (\$ _____)
_____ (use figures)
_____ (use words)

Total Bid (Base Bid + Bid Alternate No. 5):

_____ (\$ _____)
_____ (use figures)
_____ (use words)

Total Bid (Base Bid + Bid Alternate No. 1 + Bid Alternate No. 2 + Bid Alternate No. 3 + Bid Alternate No. 4 + Bid Alternate No. 5):

_____ (\$ _____)
_____ (use figures)
_____ (use words)

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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Acknowledgement of Notice	2
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Payment Bond.....	7
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Notice to Proceed	11
Acknowledgement of Notice	11
Change Order	12
Certificate of Substantial Completion	13
Certificate of Substantial Completion.....	15
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NOTICE OF AWARD

Dated _____

TO: _____

ADDRESS: _____
Street Address City/Town State ZIP

Project Number 11304C Owner Contract Number 12-22

Project : Sagamore Avenue Sewer Extension 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 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 Sagamore Avenue Sewer Extension.
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 10 calendar days after the date of the **NOTICE TO PROCEED** unless the period for completion is extended otherwise by the **CONTRACT DOCUMENTS**. Completion dates for the project specified in the **NOTICE TO PROCEED** as follows:
The Base Bid shall be Substantially Completed by December 30, 2022.
The Base Bid shall be Finally Completed by May 31, 2023.

If the Contract includes Bid Alternate No. 1:

The work associated with Bid Alternate No. 1 shall be Substantially Completed within 150 calendar days from "Notice to Proceed".

The work associated with Bid Alternate No. 1 shall be Finally Completed within 210 calendars from "Notice to Proceed".

If the Contract includes Bid Alternates No. 2-5:

The work associated with Bid Alternate No. 2- 5 shall be Substantially Completed by a timeframe to be negotiated.

The work associated with Bid Alternate No. 2- 5 shall be Finally Completed by a timeframe to be negotiated.

Liquidated Damages:

- A. Contractor and Owner recognize that time is of the essence as stated above and that Owner will suffer financial loss if the Work is not completed within the times specified in above, plus any extensions thereof allowed in accordance with the General Conditions. The parties also recognize the delays, expense, and difficulties involved in proving in a legal or arbitration proceeding the actual loss suffered by Owner if the Work is not completed on time. Accordingly, instead of requiring any such proof, Owner and Contractor agree that as liquidated damages for delay (but not as a penalty), Contractor shall pay Owner \$1,500 for each day **plus** additional fines as outlined in the table below for each calendar day that expires after the time specified in above for Base Bid and Bid Alternate No. 1 until the work associated with Base Bid and/or Bid Alternate No. 1 is complete. After Substantial Completion of Base Bid or Bid Alternate No. 1, if Contractor shall neglect, refuse, or fail to complete the remaining Work within the Contract Time or any proper extension thereof granted by Owner, Contractor shall pay Owner \$1,500 for each calendar day that expires after the time specified above for completion and readiness for Base Bid final payment until the Work is completed and ready for final payment.

<u>Penalty Per Violation Per Day</u>	<u>Period of Noncompliance</u>
\$ 500	1 st through 14 th Day
\$ 750	15 th through 30 th Day
\$1, 000	31 st Day and Beyond

- B. After Substantial Completion of Base Bid or Bid Alternate No. 1, if Contractor shall neglect, refuse, or fail to complete the remaining Work within the Contract Time or any proper extension thereof granted by Owner, Contractor shall pay Owner \$1,500 for each calendar day that expires after the time specified above for completion and readiness for Base Bid final payment until the Work is completed and ready for final payment. Liquidated damages for failing to timely attain Final Completion for the Base Bid and Bid Alternate 1 completion are not additive and will not be imposed concurrently.
 - C. If the Bid Alternates No. 2 – 5 is awarded, Liquidated damages will be in the amount of \$1,500 for each calendar day of delay from the date established for the substantial completion and \$1,500 for each calendar day of delay from the date established for final completion. These liquidated damages shall be applied after the completion of the Base Bid; therefore, the liquidate damages for Bid Alternates No. 2 – 5 is not cumulative with the Base Bid or Bid Alternate No. 1.
 - D. Time limits for Base Bid, Substantial Completion, and Final Completion are independent. Liquidated damages shall accrue simultaneously for each violation.
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 AND SUPPLEMENTAL GENERAL CONDITIONS
 - q. SPECIAL CONDITIONS
 - r. FEDERAL PROVISIONS, RULES, REGULATIONS AND FORMS
 - s. DRAWINGS prepared by: Wright-Pierce numbered C-1 through C-20, E-1 through E-3 and dated November 2021
 - t. SPECIFICATIONS prepared or issued by: Wright-Pierce and dated November 2021
 - u. 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. 12-22

PROJECT: Sagamore Avenue Sewer Extension

ENGINEER'S CONTRACT NO. 11304C

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)

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: Sagamore Avenue Sewer Extension DATE OF ISSUANCE: _____

OWNER: City of Portsmouth OWNER PROJECT NO. 12-22

OWNER ADDRESS: _____
Street Name City/Town State ZIP

CONTRACTOR: _____

CONTRACT FOR: _____

ENGINEER: Wright-Pierce ENG. PROJECT NO. 11304C

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 <div style="display: flex; justify-content: space-between; border-bottom: 1px solid black;"> days date </div>
Previous Change Orders	Net change from previous Change Orders <div style="display: flex; justify-content: space-between; border-bottom: 1px solid black;"> days date </div>
Contract Price prior to this Change Order	Contract Time prior to this Change Order <div style="display: flex; justify-content: space-between; border-bottom: 1px solid black;"> days date </div>
Net Increase (Decrease) of this Change Order	Net Increase (decrease) this Change Order <div style="display: flex; justify-content: space-between; border-bottom: 1px solid black;"> days date </div>
Contract Price with all approved Change Orders	Contract Time with all Change Orders <div style="display: flex; justify-content: space-between; border-bottom: 1px solid black;"> days date </div>

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:	APPROVED BY:
_____ Engineer	_____ Owner	_____ Contractor	_____ NHDES
_____ Date	_____ Date	_____ Date	_____ Date

CERTIFICATE OF SUBSTANTIAL COMPLETION

Owner Project No. 12-22 Engineer Project No. 11304C
Project: Sagamore Avenue Sewer Extension
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
NHDES CLEAN WATER AND DRINKING WATER
STATE REVOLVING FUND



Owner Project No. 12-22 Engineer Project No. 11304C
Project: Sagamore Avenue Sewer Extension
Owner: City of Portsmouth, NH
Contractor:
Engineer: Wright-Pierce
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 and NHDES, 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:

NHDES 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: Sagamore Avenue Sewer Extension

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: _____
Title

BY: _____
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.

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- 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.

General Conditions

- 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.

General Conditions

- 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

General Conditions

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.

General Conditions

- 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.

General Conditions

- 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

General Conditions

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.

General Conditions

- 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.



POLLUTION CONTROL PROJECT

PROJECT NUMBER CS-330 ____ - ____

PROJECT NAME

Funds Provided by NHDES State Revolving Fund

Loan Amount: \$ _____

Yellow #FFFF00

Blue #000080

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

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-2.4
SC-52	Project Sign; Supplement to GC-52	C-2.4
SC-58	Work Performed at Night and on Sundays and Holidays; Supplement to GC-58	C-2.4
SC-60	Permits	C-2.5
SC-62	Use of Explosives	C-2.5

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.

Add the following after Paragraph 24.6.

24.7 Liquid Asphalt Adjustment. Liquid asphalt pricing adjustments shall be made in accordance with the following:

All bid items involving hot mix asphalt (HMA) concrete containing asphalt cement will be subject to a price adjustment. The unit prices submitted on the bid form (included in Specification Section A), shall be based upon the priced furnished by the NHDOT Bureau of Materials and Research that is in effect on the date the bids for this project are opened. The price adjustment will be based on the total percent of virgin

asphalt cement in the approved mix designs. The monthly price of asphalt cement will be furnished by the NHDOT Bureau of Materials and Research on the first business day following the 14th calendar day of each month. The asphalt cement price at the time of the bid advertisement is \$562.50 (CMS Month – November 2021). The price adjustment, as provided herein, upwards or downwards, will be made at the end of each month in which the work was accomplished as follows:

A contract adjustment will be made based on the following formula:

(monthly price minus the base price) X (Approved Mix Design percent of virgin asphalt cement) X (tons of pavement used)

Tons of impervious (regular) hot mix pavement used shall be calculated based the following formula:

(Square Yards of HMA accepted for payment) X (specified thickness of pavement in inches) X 0.055 tons per Square-Yard inch.)

Once the dollar value of the adjustment for a month is calculated, it will be included for payment to the Contractor in the next monthly pay estimate under the Adjustment Allowance.

The adjustments for liquid asphalt pricing will be made as a lump sum in each applicable month. The Contractor shall provide to the Engineer the Contractor's basis for the calculated adjustment when submitting his monthly pay estimate for review.

24.8 Bid Alternate No. 1, Bid Alternate No. 4, & Bid Alternate No. 5 Sewer Pipe Adjustment. Sewer Pipe pricing adjustments shall be made in accordance with the following:

It is anticipated that the Bid Alternate No. 1, Bid Alternate No. 4, and Bid Alternate No. 5 will be award to the Contract after the Base Bid has been awarded. An inflation adjustment will be permitted based on the material cost for the sewer pipes. If there is an inflation price adjustment of at least five percent (5%), it will be paid through the price adjustment allowance bid item. This allowance only applies to HDPE sewer pipe and PVC sewer pipe. The price escalation adjustment shall be determined using the Engineer News Record (ENR) Material Cost Index at the time of bid advertisement (November 2021 = 4,939.95) and at the time of award of Bid Alternates No. 1, Bid Alternates No. 4, & Bid Alternates No. 5.

The price adjustment shall be calculated using this equation:

Allowable Inflation Escalation = (Direct Material Cost) X (Future Index / Bid Index)

SC-27 INSURANCE REQUIREMENTS

At the end of paragraph 27.2, add the following: "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 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 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

Add the following after Paragraph 27.9 of the General Conditions:

"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-52 PROJECT SIGN

Delete "See Exhibit 1 for details of construction".

Add "See Specification Section 01580 – Project Identification and Signs 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 6:00 PM, Monday through Friday, unless authorized by the City of Portsmouth. Requests for adjustments in work schedule must be received a minimum of one week in advance. The City's list of holidays are included in Paragraph 58.3."

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-60 PERMITS

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

- h. Building Permit (to be obtained from the City of Portsmouth Building Inspector's Office; Code Enforcement).
- i. Electrical Permit (to be obtained from the City of Portsmouth Building Inspector's Office; Code Enforcement).
- j. Plumbing Permit (to be obtained from the City of Portsmouth Building Inspector's Office; Code Enforcement).
- k. Excavation Permit, Blasting Permit, Drain Layers Permit (to be obtained from the City of Portsmouth Public Works Department).
- l. New Hampshire Department of Environmental Services Shoreland Permit (See Appendix C of the Specifications).
- m. New Hampshire Department of Environmental Services Wetland Permit (See Appendix C of the Specifications).
- n. The City will waive all City permitting fees for this project.
- o. New Hampshire Department of Transportation (NHDOT) Excavation Permit (Long Form) with sample surety bond.

SC-62 USE OF EXPLOSIVES

Add paragraph 62.5 as follows:

- 62.5 The Contractor shall be responsible for notifying the City of Portsmouth Fire Department prior to each blasting operation.
- 62.6 Refer to Specification Section 01546 for additional requirements related to the use of explosives.

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 disbursement 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.

The NHDES SRF programs must ensure that contracts and subcontracts that are funded with SRF loans comply with these federal requirements and must report to EPA on DBE accomplishments.

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 NHDES by October 15 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 NHDES by the October 15 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). The Owner is required to submit these forms to NHDES when requesting authorization to award the construction contract.
- 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.



**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:	

¹ 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.

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



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



FEDERAL RULE: 40 CFR Part 33

FORMERLY EPA FORM 6100-3

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 <input type="checkbox"/> Other:		Meets/exceeds EPA Certification Standards? <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
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
						/ /	<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
						/ /	<input type="checkbox"/> Yes <input type="checkbox"/> No

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) Steel¹⁰

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;*
- *Bollards;*
- *Cast Iron Hinged Hatches, Square and Rectangular;*
- *Benches (Iron or Steel);*
- *Cast Bases;*

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.

- Cast Iron Riser Rings;
- Catch Basin Inlet;
- Cleanout/Monument Boxes;
- Construction Covers and Frames;
- Curb and Corner Guards;
- Drainage Grates, Frames and Curb Inlets;
- Inlets;
- Junction Boxes;
- Lampposts;
- Manhole Covers, Rings and Frames, Risers;
- Meter Boxes;
- Service Boxes;
- Steel Hinged Hatches, Square and Rectangular;
- Steel Riser Rings;
- Trash receptacles;
- Tree Grates;
- Tree Guards;
- Trench Grates; and
- Valve Boxes, Covers and Risers.

(g) Municipal Castings (Cont.)

- Curb Openings;
- Detectable Warning Plates;
- Downspout Shoes (Boot, Inlet);

(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

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.

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

The following examples (including their appurtenances necessary for their intended use and operation) are NOT considered construction materials: pumps, motors, gear reducers, drives (including variable frequency drives (VFDs)), electric/pneumatic/manual accessories used to operate valves (such as electric valve actuators), mixers, gates (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.

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.

(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 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.

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

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

(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, 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

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

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

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

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-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

American Iron and Steel 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 American Iron and Steel requirement as mandated in EPA's State Revolving Fund Programs.

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;
- ✓ 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.

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
NHDES CLEAN WATER AND DRINKING WATER
STATE REVOLVING FUND



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 NHDES 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 State of New Hampshire (State) 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 State Revolving Fund 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 State 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 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.

(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:

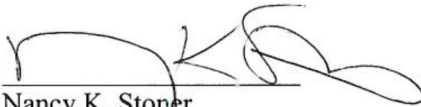
- What percentage of total project costs were consumables or incidental costs?
- What percentage of materials costs were consumables or incidental costs?
- Did these percentages vary by type of project (drinking water vs. wastewater treatment plant vs. pipe)?

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:	

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](#).

(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: NH20210025 10/29/2021

Superseded General Decision Number: NH20200025

State: New Hampshire

Construction Type: Heavy

County: Rockingham County in New Hampshire.

HEAVY CONSTRUCTION PROJECTS

Note: Under Executive Order (EO) 13658, an hourly minimum wage of \$10.95 for calendar year 2021 applies to all contracts subject to the Davis-Bacon Act for which the contract is awarded (and any solicitation was issued) on or after January 1, 2015. If this contract is covered by the EO, the contractor must pay all workers in any classification listed on this wage determination at least \$10.95 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on the contract in calendar year 2021. If this contract is covered by the EO and a classification considered necessary for performance of work on the contract does not appear on this wage determination, the contractor must pay workers in that classification at least the wage rate determined through the conformance process set forth in 29 CFR 5.5(a)(1)(ii) (or the EO minimum wage rate, if it is higher than the conformed wage rate). The EO minimum wage rate will be adjusted annually. Please note that this EO applies to the above-mentioned types of contracts entered into by the federal government that are subject to the Davis-Bacon Act itself, but it does not apply to contracts subject only to the Davis-Bacon Related Acts, including those set forth at 29 CFR 5.1(a)(2)-(60). Additional information on contractor requirements and worker protections under the EO is available at www.dol.gov/whd/govcontracts.

Modification Number	Publication Date
0	01/01/2021
1	02/12/2021
2	07/16/2021
3	10/29/2021

* ELEC0490-008 06/01/2021

	Rates	Fringes
ELECTRICIAN.....	\$ 31.70	21.30

IRON0007-039 09/16/2020

	Rates	Fringes
IRONWORKER (Reinforcing and Structural).....	\$ 27.24	23.58

PLUM0131-005 06/07/2021

	Rates	Fringes
PIPEFITTER.....	\$ 37.00	24.40

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 www.dol.gov/whd/govcontracts.

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

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

Union Rate Identifiers

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

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

Survey Rate Identifiers

Classifications listed under the ""SU"" identifier indicate that no one rate prevailed for this classification in the survey and the published rate is derived by computing a weighted average rate based on all the rates reported in the survey for that classification. As this weighted average rate includes all rates reported in the survey, it may include both union and non-union rates. Example: SULA2012-007 5/13/2014. SU indicates the rates are survey rates based on a weighted average calculation of rates and are not majority rates. LA indicates the State of Louisiana. 2012 is the year of survey on which these classifications and rates are based. The next number, 007 in the example, is an internal number used in producing the wage determination. 5/13/2014 indicates the survey completion date for the classifications and rates under that identifier.

Survey wage rates are not updated and remain in effect until a new survey is conducted.

Union Average Rate Identifiers

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

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

WAGE DETERMINATION APPEALS PROCESS

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

- * an existing published wage determination
- * a survey underlying a wage determination
- * a Wage and Hour Division letter setting forth a position on a wage determination matter
- * a conformance (additional classification and rate) ruling

On survey related matters, initial contact, including requests for summaries of surveys, should be with the Wage and Hour Regional Office for the area in which the survey was conducted because those Regional Offices have responsibility for the Davis-Bacon survey program. If the response from this initial contact is not satisfactory, then the process described in 2.) and 3.) should be followed.

With regard to any other matter not yet ripe for the formal process described here, initial contact should be with the Branch of Construction Wage Determinations. Write to:

Branch of Construction Wage Determinations
Wage and Hour Division
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

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

Wage and Hour Administrator
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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.

3.) If the decision of the Administrator is not favorable, an interested party may appeal directly to the Administrative Review Board (formerly the Wage Appeals Board). Write to:

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200 Constitution Avenue, N.W.
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4.) All decisions by the Administrative Review Board are final.

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END OF GENERAL DECISION"

"General Decision Number: NH20210013 01/01/2021

Superseded General Decision Number: NH20200013

State: New Hampshire

Construction Type: Highway

County: Rockingham County in New Hampshire.

HIGHWAY CONSTRUCTION PROJECTS (excluding tunnels, building structures in rest area projects & railroad construction; bascule, suspension & spandrel arch bridges designed for commercial navigation, bridges involving marine construction; and other major bridges).

Note: Under Executive Order (EO) 13658, an hourly minimum wage of \$10.95 for calendar year 2021 applies to all contracts subject to the Davis-Bacon Act for which the contract is awarded (and any solicitation was issued) on or after January 1, 2015. If this contract is covered by the EO, the contractor must pay all workers in any classification listed on this wage determination at least \$10.95 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on the contract in calendar year 2021. If this contract is covered by the EO and a classification considered necessary for performance of work on the contract does not appear on this wage determination, the contractor must pay workers in that classification at least the wage rate determined through the conformance process set forth in 29 CFR 5.5(a)(1)(ii) (or the EO minimum wage rate, if it is higher than the conformed wage rate). The EO minimum wage rate will be adjusted annually. Please note that this EO applies to the above-mentioned types of contracts entered into by the federal government that are subject to the Davis-Bacon Act itself, but it does not apply to contracts subject only to the Davis-Bacon Related Acts, including those set forth at 29 CFR 5.1(a)(2)-(60). Additional information on contractor requirements and worker protections under the EO is available at www.dol.gov/whd/govcontracts.

Modification Number	Publication Date
0	01/01/2021

* SUNH2011-029 08/15/2011

	Rates	Fringes
CARPENTER (Excluding Form Work).....	\$ 23.13	2.51
CARPENTER (Form Work Only).....	\$ 20.57	1.06
ELECTRICIAN.....	\$ 23.22	2.78
INSTALLER - GUARDRAIL.....	\$ 22.29	11.84

IRONWORKER, REINFORCING.....	\$ 18.00	0.00
IRONWORKER, STRUCTURAL.....	\$ 34.45	17.20
LABORER: Blaster Rock.....	\$ 28.38	9.46
LABORER: Common or General.....	\$ 16.99	2.60
LABORER: Flagger.....	\$ 10.42	1.37
LABORER: Highway/Parking Lot Striping.....	\$ 16.77	0.00
LABORER: Landscape.....	\$ 14.65	0.00
LABORER: Pipelayer.....	\$ 18.29	4.33
OPERATOR: Auger.....	\$ 26.07	0.00
OPERATOR: Backhoe.....	\$ 27.72	4.17
OPERATOR: Bobcat/Skid Steer/Skid Loader.....	\$ 19.25	0.00
OPERATOR: Bucket.....	\$ 30.00	0.00
OPERATOR: Bulldozer.....	\$ 24.59	6.11
OPERATOR: Crane.....	\$ 23.95	3.29
OPERATOR: Drill Rig Caissons....	\$ 36.86	19.78
OPERATOR: Excavator.....	\$ 24.72	5.58
OPERATOR: Grader/Blade.....	\$ 25.16	6.97
OPERATOR: Loader.....	\$ 24.10	5.72
OPERATOR: Mechanic.....	\$ 16.92	3.44
OPERATOR: Oiler.....	\$ 29.54	16.15
OPERATOR: Paver (Asphalt, Aggregate, and Concrete).....	\$ 23.43	0.00
OPERATOR: Roller.....	\$ 22.27	6.57
OPERATOR: Post Driver/Pounder....	\$ 27.24	7.90
TRUCK DRIVER, Includes all axles including Dump Trucks (Excludes Low Bed Trucks).....	\$ 17.59	2.99
TRUCK DRIVER: Low Bed Truck.....	\$ 21.43	6.30

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

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Note: Executive Order (EO) 13706, Establishing Paid Sick Leave
for Federal Contractors applies to all contracts subject to the
Davis-Bacon Act for which the contract is awarded (and any

solicitation was issued) on or after January 1, 2017. If this contract is covered by the EO, the contractor must provide employees with 1 hour of paid sick leave for every 30 hours they work, up to 56 hours of paid sick leave each year. Employees must be permitted to use paid sick leave for their own illness, injury or other health-related needs, including preventive care; to assist a family member (or person who is like family to the employee) who is ill, injured, or has other health-related needs, including preventive care; or for reasons resulting from, or to assist a family member (or person who is like family to the employee) who is a victim of, domestic violence, sexual assault, or stalking. Additional information on contractor requirements and worker protections under the EO is available at www.dol.gov/whd/govcontracts.

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END OF GENERAL DECISION

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DIVISION 1
General Requirements

SECTION 01010SUMMARY OF WORKPART 1 - GENERAL1.1 DESCRIPTION:

- A. Location: The Work locations include, but are not limited to, locations within the Right-of-Ways on the following streets and easements in the City of Portsmouth, New Hampshire.
 - 1. Cliff Road
 - 2. Sagamore Avenue (Route 1A)
 - 3. Sagamore Grove
 - 4. Shaw Road
 - 5. Walker Bungalow Road
 - 6. Wentworth House Road (Route 1B)
- B. The Owner is under a Consent Decree from EPA and NHDES. The Contractor must follow the requirements of the Consent Decree and shall request a copy of the Consent Decree from the Owner.
- C. Work Included: The Work includes, but is not limited to, the following:
 - 1. New Sewer System:
 - a. Low pressure sewers
 - b. Gravity sewers and manholes
 - c. Combination air/vacuum valves
 - d. Sewer cleanout and valve manholes
 - e. Sewer service laterals
 - f. Grinder pump stations
 - g. Maintaining sewer service throughout construction.
 - 2. New Water System:
 - a. Water main, valves and hydrants
 - b. Water services
 - c. Disinfection of water mains and appurtenances
 - d. Removal and disposal or abandonment of existing water main, valves and services.
 - e. Temporary water service system and laterals
 - 3. Testing of sanitary sewers, water mains, valves and manholes for proper installation and performance.
 - 4. All related site work including but not limited to trench excavation, ledge excavation, groundwater dewatering, disposal of excess excavated materials, filter fabric, bedding, backfill, compaction, road/drive subbase, paving, loam/seed and landscaping.
 - 5. Other miscellaneous work shown in the Specifications for a complete and operational system.
- D. Related Work Specified Elsewhere
 - 1. Coordination: Section 01050
 - 2. Alternates: Section 01100

3. Construction Schedules: Section 01310
 4. Temporary Facilities and Controls: Section 01500
 5. Traffic Regulation: Section 01570
 6. Temporary Water Main: Section 02620
 7. Site work, piping, structures, testing requirements are specified in Division 2.
- E. 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, temporary piping, etc. The cost shall include the cost for all labor, tools, equipment and materials necessary.
- F. Permits
1. State
 - a. NHDES Shoreland Permit
 - b. NHDES Wetlands Permit
 - c. NHDOT Excavation Permit (Long Form)
 - i. NHDOT requires the Contractor to submit the following after the Owner awards the contract:
 - (1) Long Form Excavation Permit (include all supplemental info for environmental checklist)
 - (2) \$50,000 Surety Bond - including original hard copy
 - (3) Final Plans - 1 full size and 1 half size
 - (4) Traffic Control Plan - should reference to MUTCD and any Typical Applications (TA's) that will be followed
 2. Local
 - a. Order of Conditions
 - b. Blasting Permit
 - c. Drain Layers Permit
 - d. City Excavation Permit
 - e. Flagging Permit
 - f. Residential Plumbing/Mechanical/Gas Permit
 - g. Commercial Plumbing/Mechanical/Gas Permit
 - h. Electrical Permit: Residential
 - i. Electrical Permit: Commercial

3. Memorandum of Understanding (MOU) – the City will enter into MOU with each property owner that will cover permission for the Contractor to perform excavation at each private property.

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.
3. The Owner will operate and maintain all existing City owned 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.
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.

3.2 CONSTRUCTION SEQUENCE

A. Construction of the proposed facilities may disrupt the existing structures and operations. To maintain continuous operations, the construction must be divided into phases or sequenced appropriately.

1. Should the Bid Alternates be awarded, the sequence of construction must allow for specific properties with failed septic systems or currently utilizing holding

tanks to connect following testing of the low-pressure sewer systems. At a minimum this will include 1145 Sagamore Avenue, 1150 Sagamore Avenue, 209 Walker Bungalow, and 220 Walker Bungalow.

- 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 the Base Bid (Right-of-Way) and Bid Alternate No. 1 (Right-of-Way) and Bid Alternate No. 3 (Right-of-Way) are completed before starting any work associated with Bid Alternate No. 2 or Bid Alternate No. 4 (Private property or as called out on the Contract Documents) or Bid Alternate No. 5 (Private property or as called out on the Contract Documents).

3.3 SITE ACCESS LIMITATIONS

- A. Work on private property shall not occur until written sign off is received from the resident and the OWNER. The sign offs will be coordinated by the Owner.
- B. The pay limits for work on private property is pipe trench width pay limit plus 2-ft both sides of the trench.
- C. NHDOT Right of Way restrictions shall always be followed.

3.4 SCHEDULE LIMITATIONS AND WORK RESTRICTIONS/ REQUIREMENTS

- A. Work Hours:
 - 1. Work hours are defined in the Section 00700 (General Conditions) and Section 00800 (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 AM and 6 PM, except during emergencies.
 - 4. The Contractor shall request permission to work outside the work hours specified above at least 7-days 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 sewer, water, and storm drain 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.
 - 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. Proposed Road Closures:
1. All road closures on local roads require coordination with and approval from the Portsmouth Department of Public Works (DPW). The Contractor shall coordinate implementation of detours with the DPW. There will not be any road closures allowed on NHDOT Routes 1A and 1B.
- F. Pavement Maintenance and Winter Shutdown Period:
1. The Contractor shall maintain pipe trenches with compacted gravel until pavement operations can be completed.
 2. No excavation in paved NHDOT roadways shall be allowed after November 15.
 3. All NHDOT streets shall be paved prior to any “winter shutdown period”, which is defined as November 15th to April 1st. Any temporary pavement placed prior to winter shutdown shall be removed during the following construction season.
- G. Tree Cutting/Clearing:
1. Tree cutting and/or clearing is prohibited between June 1 and July 31 to protect the Northern Long-eared Bat.
 2. Contractor shall notify residents at least 24-hours before entering their property to cut tree limbs or cut down trees.

END OF SECTION

SECTION 01045CUTTING, CORING AND PATCHINGPART 1 - GENERAL1.1 DESCRIPTION

- A. Work Included - This section establishes general requirements pertaining to cutting, excavating, coring, fitting, and patching of the Work required to:
1. Make alterations to existing structures.
 2. Make the parts fit properly.
 3. Replace work not conforming to requirements of the Contract Documents.
 4. Contractor is responsible for all cutting, coring, and rough and finish patching. Contractor shall coordinate the work of any and all subcontracting trades performing the work.
 5. Contractor is responsible for reviewing with the Owner and Engineer and receiving permission to proceed prior to cutting and coring and patching.
- B. Related Work Specified Elsewhere:
1. Pipe Sleeves and Seals are specified in Section 15092.
- C. Quality Assurance:
1. Perform all cutting, coring and patching in strict accordance with pertinent requirements of these Specifications, and in the event no such requirements are determined, in conformance with the Engineer's written direction.
- D. Submittals:
1. Provide a shop drawing submittal to include the following information:
 - a. Identification of coring and cutting subcontractor including: Company name, business address contact information, or if by Contractor indicated as such.
 - b. List of type of coring and cutting equipment proposed to be used with equipment cuts of the equipment.
 - c. Schedule indicating the: location of the core or cut, size and any potential obstructions or embedded conduits and wiring.
 - d. Key plan indicating the location of anticipated cores and cuts.
 2. Request for the Engineer's consent:
 - a. Prior to cutting which affects structural safety, submit written request to the Engineer for permission to proceed with cutting.
 - b. Should conditions of the work, or schedule, indicate a required change of materials or methods for cutting and patching, Contractor shall notify the Engineer and secure written permission prior to proceeding.

PART 2 - PRODUCTS2.1 MATERIALS

- A. Materials for replacement of work shall be equal to those of adjacent construction and shall comply with the pertinent sections of these Specifications.

PART 3 - EXECUTION

3.1 CONDITIONS

- A. Inspection:
 - 1. Inspect existing conditions, including elements subject to movement or damage during cutting, excavating, coring, backfilling, and patching.
 - 2. After uncovering the work, inspect conditions affecting installation of new work.
- B. Discrepancies:
 - 1. If uncovered conditions are not as anticipated, immediately notify the Engineer and secure needed directions.
 - 2. Do not proceed in areas of discrepancy until all such discrepancies have been fully resolved.

3.2 PREPARATION PRIOR TO CUTTING AND CORING

- A. Provide all required protection including, but not necessarily limited to, shoring, bracing and support to maintain structural integrity of the work.
- B. All cutting and coring shall be performed in such a manner as to limit the extent of patching.
- C. All holes cut through concrete and masonry walls or slabs shall be core drilled unless otherwise approved. No structural members shall be cut without approval of the Engineer and all such cutting shall be done in a manner directed by Engineer. No holes may be drilled in beams or other structural members without obtaining prior approval. All work shall be performed by mechanics skilled in this type of work.

3.3 CORING

- A. Coring shall be performed with an approved non-impact rotary tool with diamond core drills. Size of holes shall be suitable for pipe, conduit, sleeves, equipment or mechanical seals to be installed.
- B. All equipment shall conform to OSHA standards and specifications pertaining to plugs, noise and fume pollution, wiring and maintenance.
- C. Provide protection for existing equipment, utilities and critical areas against water or other damage caused by drilling operation.
- D. Slurry or tailings resulting from coring operations shall be vacuumed or otherwise removed from the area following drilling. Slurry or tailings shall not be allowed to enter floor drains.
- E. Work area (e.g., adjacent walls, floors, ceilings, pipes, conduits, etc.) shall be cleaned to remove splash residues from coring operation.

3.4 CUTTING

- A. Cutting shall be performed with a concrete wall saw and diamond saw blades of proper size.
- B. Provide for control of slurry generated by sawing operation on both sides of wall.
- C. When cutting a reinforced concrete wall, the cutting shall be done so as not to damage bond between the concrete and reinforcing steel left in structure. Cut shall be made so that steel neither protrudes nor is recessed from face of the cut.

1. Apply epoxy paint (5 mils DFT minimum) to exposed reinforcing cut during coring that will not be covered with new concrete or repair material.
- D. Adequate bracing of area to be cut shall be installed prior to start of cutting. Check area during sawing operations for partial cracking and provide additional bracing as required to prevent a partial release of cut area during sawing operations.
- E. Provide equipment of adequate size to remove cut panel.
- F. Slurry or tailings resulting from cutting operations shall be vacuumed or otherwise removed from the area following drilling. Slurry or tailings shall not be allowed to enter floor drains.
- G. Work area (e.g., adjacent walls, floors, ceilings, pipes, conduits, etc.) shall be cleaned to remove splash residues from cutting operation.

3.5 PERFORMANCE

- A. Perform all required excavating and backfilling as required under pertinent sections of these specifications. Perform cutting, coring and demolition by methods which will prevent damage to other portions of the work and will provide proper surfaces to receive installation of repair and/or new work. Perform fitting and adjustment of products to provide finished installation complying with the specified tolerances and finishes.
- B. Coring or cutting which exposes cut surfaces of reinforcing steel or structural steel shall be coated. Coating shall be 10 mil (dry film thickness) applied in two 5 mil (dry film thickness) coats of a single component moisture cured coal tar urethane or two part coal tar epoxy corrosion barrier. Alternately the exposed steel can be cut back two inches from the surface and a non-shrink grout applied over the steel flush to the concrete core or cut surface.
- C. Rough patching shall be such as to bring the cut or cored area flush with existing construction unless otherwise shown.
- D. Finish patching shall match existing surfaces as approved.

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 his subcontractor's operations shall be made good by the Contractor at no additional cost to the Owner.
- C. Other Construction Contractors will be interfacing with this Contract and working within the work area and in the vicinity of this Contract. The Contractor, under this contract, shall act as Construction Coordinator and shall coordinate construction activities with other Contractors working for Owner.

1.2 COORDINATION WITH OTHERS

- A. City of Portsmouth:
 - 1. Contractor shall coordinate access, egress, detours and traffic control, if required, at each site with the City of Portsmouth Police Department. The Contractor shall notify City of Portsmouth Police, Fire Department and Rescue Squad at least 24 hours in advance of any street closings or detours.
 - 2. Contractor shall coordinate all work on City property with the Owner.
 - 3. The Contractor shall be responsible for coordinating and maintaining public services to all public and private properties.
- B. New Hampshire Department of Transportation (NHDOT)
 - 1. Contractor shall coordinate access, egress, detours and traffic control, if required, on state highways 1A and 1B with NHDOT.
- C. City of Portsmouth Water Department
 - 1. Contractor shall be responsible for coordinating all work in the vicinity of water lines with the City of Portsmouth Water Department. Contractor shall bear all costs for the Water Department's inspection requirements, temporary facilities, water main adjustments and other requirements.
- D. Private Property Owners
 - 1. Contractor shall be responsible for coordinating all work on private property upon receipt of an access agreement between Owner and Property Owner.
- E. 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.

- F. Consolidated Communications
1. The Contractor shall be responsible for coordinating all work around Consolidate Communications facilities with Consolidate Communications 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 all work around Fairpoint Communications facilities with Fairpoint Communications and shall bear all costs of inspection requirements, temporary facilities relocation and 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 Owner a construction schedule indicating the times to perform the work required. The Contractor shall update the schedule when required and give each resident one week notice before the start of any work outside City Rights of Way. The Contractor shall provide the facility personnel enough time to obtain access agreements, materials and perform the work required of them. The Contractor shall daily communicate with the Resident Project Representative and Owner 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/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 plumbing subcontractor that they are required to coordinate their work .
- K. Snow Removal Coordination: The Contractor shall be responsible for all snow removal activities in construction and laydown areas onsite.

END OF SECTION

SECTION 01070ABBREVIATIONS & SYMBOLSPART 1 - GENERAL1.1 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 and 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
ANSI	American National Standards Institute
API	American Petroleum Institute
ASA	American Standards Association
ASCE	American Society of Civil 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 Conduit Television
CEM	Cement
c.f.	Cubic Foot
c.f.m.	Cubic Foot Per Minute
c.f.s.	Cubic Foot Per Second
CI	Cast Iron
CIPRA	Cast Iron Pipe Research Association
CIPP	Cured-In-Place Pipe
CSI	Construction Specifications Institute
c.y.	Cubic Yards
DC	Direct Current
DES	Department of Environmental Services
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
HP	Horsepower
in.	Inches
inter.	Interlock
kva	Kilovolt-ampere
kw	Kilowatt
lb.	Pound
MACP	Manhole Assessment and Certification Program
max.	Maximum
MGD	Million Gallons Per Day
MH	Manhole
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
N/A	Not Available or Not Applicable
OS&Y	Outside Screw and Yoke
PACP	Pipeline Assessment and Certification Program
PCA	Portland Cement Association
ppm	Parts Per Million
%	Percent
psi	Pounds Per Square Inch
psig	Pounds Per Square Inch Gage
PVC	Polyvinyl Chloride
rpm	Revolutions Per Minute
s.f.	Square Foot
STL. W.G.	U.S. Steel Wire, Washburn and Moen, American Steel and Wire Cos., or Roebling Gage
s.y.	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
Fed. Spec.	Federal Specifications issued by the Federal Supply Service of the General Service Administration, Washington, D.C.

END OF SECTION

SECTION 01150BMEASUREMENT 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 work day.
 - 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. Contractor's Partial Payment Requests shall be submitted in two parts; one part for EPA/DES grant eligible quantities and one part for non-eligible quantities. The breakdown of quantities will be determined by the Engineer.

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. The pay limits for work on private property is pipe trench width pay limit plus 2-ft both sides of the trench.
1. Pre-construction photographs and videos.
 2. Project record documents.
 3. Project meetings including one public meeting.
 4. Cooperation and coordination with other Contractors and utility companies including related inspection costs and other costs (Refer to Section 01050).
 5. Utility crossings and relocations, unless otherwise paid for.
 6. Temporary utility services to buildings, as required to maintain service during construction.
 7. Minor Items such as relocation of sign posts, guard rails, rock wall, mail boxes, building roof gutters/leaders, wood piles, wooden stairs not connected to the building; planter boxes, sheds, swing sets, granite stepping stones, rock wall curbs, traffic loop detectors, pavement markings, trench drain; etc., damaged as a result of construction activities.
 8. Trench boxes, steel and/or wood sheeting as required, including that left in place.
 9. Maintenance of all existing sewer flows and repair of existing sewer pipes.
 10. Dewatering as necessary.
 11. Dust control.
 12. Management, removal, and disposal of clean excess soil.
 13. Quality assurance testing.
 14. Final cleaning of sewers and force mains.
 15. Clearing, grubbing, and stripping.
 16. Routine flagman services.
 17. Construction schedules, bonds, insurance, shop drawings, warranties, guarantees, certifications and other submittals required by the Contract Documents.
 18. 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.
 19. Temporary construction necessary for construction sequencing and other facilities not permanently incorporated into the work.
 20. Weather protection.
 21. Permits not otherwise paid for or provided by the Owner.
 22. Visits to the project site or elsewhere by personnel or agents of the Contractor, including manufacturer's representatives, as may be required.
 23. Contract administration and insurance.
 24. 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.
 25. Earthwork (Except Ledge).
 26. Earthwork to access septic system covers for septic system inspections.

27. Test pits to establish in place field soils density, groundwater conditions, or requirements for dewatering.
28. Test Pits for the Contractor's benefit.
29. Pipe markings.
30. Temporary resetting or replacement of existing street and traffic signs and temporary traffic signals where necessary.
31. Raising and lowering of existing frames and covers of buried utilities to grade unless payment is otherwise provided for.
32. Vertical adjustment of existing frames, covers and grates to match final grades and curb faces.
33. Removing and replacing existing sewer manhole inverts to accommodate new and replacement pipes.
34. Locating and verifying the locations of water and sewer services within the limits of work. Capping or plugging existing underground utilities as shown on the plans and dye testing as required to determine bulkheading and reconnection requirements.
35. Removal of temporary or permanent pavement markings, prior to paving. This includes removing markings that are applied on the winter binder layer, prior to installation of the wearing course.
36. Furnishing and installing permanent pavement markings for roadway and parking lots.
37. Completion of the Storm Water Pollution Prevention Plan as well as required inspections, monitoring and reporting.
38. Preparing and submitting initial and subsequent revisions to the construction schedule.
39. Furnishing and installing project sign.
40. Engineer's temporary field office/trailer and its utilities.
41. Time and costs associated with using Elation Systems, or approved equal web-based software, to track Davis-Bacon compliance documentation.

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.
- C. PVC SDR 21 is an acceptable alternative to HDPE SDR 11, for any bid descriptions below that state 'HDPE', the term 'HDPE' now represents either 'HDPE' or 'PVC'." Since the contract was designed around HDPE pipe, if PVC SDR 21 piping is used in lieu of HDPE for low pressure sewers, the PVC piping, fittings, and adapters will be provided at no additional cost to the Owner. Only one pipe material shall be accepted for the entire contract."

BASE BID

CWSRF ELIGIBLE BID ITEMS

Low Pressure Sewers and Gravity Sewers

(1), (2), (41) and (42) – 2-inch, and 3-inch HDPE Low Pressure Sewer Pipe, all depths

- A. Method of Measurement: Low pressure sewer shall be measured along the center line of the pipe, including fittings. Pipe installed inside the structure will not be measured for payment.
- B. Basis of Payment:
 - 1. The contract unit price per linear foot for low pressure sewer shall be full compensation for all labor, materials, and equipment necessary to complete this work including sawcut, management, removal and disposal of pavement; excavation (except ledge excavation); dewatering; bedding; furnishing and installing pipe, valves and fittings, including but not limited to wyes, tees, bends, and concrete thrust blocks; furnishing and installing tracer wire and appurtenances; installation of impervious material dams; cutting and capping abandoned water mains; coring into existing manholes including prepping the manhole for coring; furnishing and installing link seal; connecting to existing sanitary sewer manholes including furnishing and installing necessary pipes, fittings, and pipe supports for inside drop connections; removing and disposing of materials and pipes; patching abandoned pipe openings where necessary; masonry materials; constructing new inverts and modifying existing inverts; backfill including aggregate base and subbase material; compaction; cleaning; testing; maintaining existing flows including temporary bypass pumping; and all else incidental thereto for which payment is not provided under other items.
 - 2. Payment for this work on interim requisitions shall be according to the following percentages:
 - a. Low pressure sewer acceptably set in place and backfilled - 90 percent.
 - b. Low pressure sewer successfully tested - 10 percent.

(3), (43), (95) and (135) – 1 1/2 -inch Low Pressure HDPE Sewer Service Pipe, all depths

- A. Method of Measurement: This item shall consist of installing low pressure sanitary sewer service as shown on the Drawings and/or as determined in the field. Measurement shall be from along the centerline of the pipe.
- B. Basis of Payment:
 - 1. The contract unit price per linear foot shall be full compensation for all labor, materials, and equipment necessary to complete this work including sawcut, management, removal and disposal of pavement; excavation (except ledge excavation); dewatering; bedding; furnishing and installing pipe and fittings; furnishing and installing tracer wire and appurtenances; connection to existing low pressure sewer service; connection to grinder pump station when applicable; backfilling including aggregate base and subbase material; compaction; cleaning; testing; and all else incidental thereto for which payment is not provided under other items.

2. Payment for this work on interim requisitions shall be according to the following percentages:
 - c. Low pressure sewer service pipe acceptably set in place and backfilled - 90 percent.
 - d. Low pressure sewer service pipe successfully tested - 10 percent.

(4) and (44) – Low Pressure Sewer Lateral Assembly

- A. Method of Measurement: This item shall consist of installing lateral assembly as shown on the Drawings. Measurement shall be number of lateral assemblies furnished and installed.
- B. Basis of Payment:
 1. The contract unit price per each shall be full compensation for all labor, materials, and equipment necessary to complete this work including sawcut, management, removal and disposal of pavement; excavation (except ledge excavation); dewatering; bedding; furnishing and installing corporation stops, lateral assemblies, curb stops, and valve box; furnishing and installing tracer wire and appurtenances; backfilling including aggregate base and subbase material; compaction; cleaning; and all else incidental thereto for which payment is not provided under other items.
 2. Payment for this work on interim requisitions shall be according to the following percentages:
 - a. Low pressure sewer service assembly acceptably set in place and backfilled - 90 percent.
 - b. Low pressure sewer service assembly successfully tested - 10 percent.

(5) –8-inch Gravity PVC Sewer Pipe, all depths

- A. Method of Measurement: Sewer pipe measured for payment shall be the number of linear feet installed measured along the center line of the pipe as laid including fittings. Pipes shall be measured between centers of the manholes minus half the inside diameter of each manhole. Pipe installed into the manhole will not be measured for payment.
- B. Basis of Payment:
 1. The contract unit price per linear foot for sewer pipe shall be full compensation for all labor, materials, and equipment necessary to complete this work including sawcut, management, removal and disposal of pavement; excavation (except ledge excavation); dewatering; bedding; furnishing and installing pipe and fittings; connecting into new manholes or core opening into existing manholes and connecting into existing manhole; rebuilding existing manhole channel and bench; installation of impervious material dams; backfill including aggregate base and subbase material compaction; cleaning; testing; and all else incidental thereto for which payment is not provided under other items.
 2. Payment for this work on interim requisitions shall be according to the following percentages:
 - a. Gravity sewer pipe acceptably set in place and backfilled - 90 percent.
 - b. Gravity sewer pipe successfully tested - 10 percent.

(6), (96) and (136) – 4-inch and 6-inch Gravity PVC Sewer Service Pipe, all depths

- A. Method of Measurement: Sewer pipe measured for payment shall be the number of linear feet installed measured along the center line of the pipe as laid including fittings.
- B. Basis of Payment:
 - 1. The contract unit price per linear foot for sewer pipe shall be full compensation for all labor, materials, and equipment necessary to complete this work including sawcut, management, removal and disposal of pavement; excavation (except ledge excavation), dewatering, bedding, furnishing and installing pipe, fittings and cleanouts, making connections to existing pipe and grinder pump station, where applicable; backfill including aggregate base and subbase material, compaction, testing, maintaining existing flows; and all else incidental thereto for which payment is not provided under other items.
 - 2. Payment for this work on interim requisitions shall be according to the following percentages:
 - a. Gravity sewer service pipe acceptably set in place and backfilled - 90 percent.
 - b. Gravity sewer service pipe successfully tested - 10 percent.

(7), (45), (97) and (137) – Rigid Pipe Trench Insulation

- A. Method of Measurement: Pipe trench insulation accepted for payment shall be the actual linear feet of trench insulation installed and accepted complete in place.
- B. Basis of Payment: The contract unit price per linear foot for pipe trench insulation shall be full compensation for all labor, materials, tools and equipment necessary to complete this work including; excavation (except ledge excavation); dewatering; bedding; furnishing and installing insulation; backfill; compaction; and all else incidental thereto for which payment is not provided under other items.

(8) – 4-ft Diameter Sewer Manhole

- A. Method of Measurement: Sanitary manholes accepted for payment shall be the actual vertical feet of structures installed and accepted complete in place, from the lowest invert to finish grade.
- B. Basis of Payment:
 - 1. The contract unit price per vertical foot shall be full compensation for all labor, materials, tools and equipment necessary to complete this work including sawcut, management, removal and disposal of pavement; excavation (except ledge excavation); dewatering; bedding; furnishing and installing precast concrete sections; furnishing and installing frames; installing covers; furnishing and installing masonry materials and waterproofing; constructing inverts; backfilling including aggregate base and subbase material compaction; cleaning; testing; maintaining existing flows during construction; and all else incidental thereto for which payment is not provided under other items.
Payment for this work on interim requisitions shall be according to the following percentages:
 - a. Sewer manhole acceptably set in place and backfilled - 90 percent.
 - b. Sewer manhole successfully cleaned, successfully tested, and final adjustment of frame and cover - 10 percent.

(9), (10), (46) and (47) – 4-ft and 5-ft Diameter Sewer Cleanout Manholes

- A. Method of Measurement: Sanitary sewer cleanout manholes accepted for payment shall be the actual vertical feet of structures installed and accepted complete in place from the lowest invert to finish grade.
- B. Basis of Payment:
 - 1. The Contract unit price per vertical foot shall be full compensation for furnishing all labor, supervision, materials, and equipment necessary to the construction including sawcut, management, removal and disposal of pavement; excavation (except ledge excavation); dewatering; bedding; obtaining the frames and covers from the Owner's DPW building; installing frames and covers; furnishing and installing masonry materials and waterproofing; backfilling including aggregate base and subbase; compaction; furnishing and installing HDPE pipe, PVC pipe, couplings, adapters, cleanouts, true union ball valves, fittings, and pipe supports; cleaning; testing; adjustment of frame and cover to final grade; and for all other work and expenses incidental thereto.
 - 2. Payment for this item shall be as follows:
 - a. Sewer cleanout manhole acceptably set in place and backfilled - 90 percent.
 - b. Sewer cleanout manhole successfully cleaned, successfully tested, and final adjustment of frame and cover - 10 percent.

(11) and (48) – 5-ft Diameter Combination Valve Manholes

- A. Method of Measurement: Combination (air/vacuum release) valve manholes accepted for payment shall be the actual number of structures installed and accepted complete in place.
- B. Basis of Payment:
 - 1. The Contract unit price per each shall be full compensation for furnishing all labor, supervision, materials, and equipment necessary to the construction including sawcut, management, removal and disposal of pavement; excavation (except ledge excavation); dewatering; bedding; obtaining the frames and covers from the Owner's DPW building; installing frames and covers; furnishing and installing masonry materials and waterproofing; backfilling including aggregate base and subbase; compaction; furnishing and installing combination (air and vacuum release) valves, pipe supports and appurtenances; furnishing and installing HDPE pipe, PVC pipe, couplings, adapter, cleanouts, true union ball valves, fittings, and pipe supports; furnishing and installing solid sleeve coupling; cleaning; testing; adjustment of frame and cover to final grade; and for all other work and expenses incidental thereto.
 - 2. Payment for this item shall be as follows:
 - a. Combination valve manhole acceptably set in place and backfilled - 90 percent.
 - b. Combination valve manhole successfully cleaned, successfully tested, and final adjustment of frame and cover - 10 percent.

(12) and (50) – Capping Existing Sewer, Drain, or Water Pipes

- A. Method of Measurement: Capping of existing sewer, drain, or water pipes accepted for payment shall be per each for the actual number of pipes capped and accepted by the Engineer.
- B. Basis of Payment: Capping existing sewer, drain, or water pipes shall be paid for at the unit price per each stated in the Bid Schedule. The contract unit price per each shall be full compensation for all labor, materials, and equipment necessary to complete this work including sawcut, management, removal and disposal of pavement; excavation (except ledge excavation); cleaning the pipe; furnishing and installing caps, sewer bricks, mortar, and cement; backfilling including aggregate base and subbase material; compaction; maintaining existing flows during construction; and all else incidental thereto for which payment is not provided under other items.

Water Mains and Storm Drains

(13) and (52) – Ductile Iron Water Main Relocation, All Sizes

- A. Method of Measurement: The quantity to be paid for under this item is the actual number of linear feet of pipe as measured along the pipe centerline as laid including all fittings and valves. Mains to be paid for under this item shall be pipe repaired due to direct conflicts with existing or proposed underground utilities only as approved by Engineer. Water mains repaired for other reasons are not paid for under this item. This includes all existing water mains relocated to avoid line and grade conflicts with sewer lines and to provide 18-inch vertical separation from new sewer lines.
- B. Basis of Payment:
 - 1. Relocated water main shall be paid for at the unit price per linear foot stated in the Bid Schedule. Said unit price shall be full compensation for furnishing all materials, labor, equipment, and tools necessary to the construction including sawcut, management, removal and disposal of pavement; excavation (except ledge); furnishing and installing pipes, pipe fittings (except valves), bronze wedges, polywrap; connections and couplings to existing pipes; furnishing and placing all bedding and initial backfill including aggregate base and subbase; compaction; thrust blocks and supports; cleaning, flushing, disinfecting, and testing; temporary taps and fittings required for testing; removal and disposal of existing water lines being replaced; temporary utilities for construction and to maintain existing service during construction; and for all other work and expenses incidental thereto for which payment is not provided under other items.
 - 2. Payment for this work on interim requisitions shall be according to the following percentages:
 - a. Water main successfully set in place and backfilled - 80 percent.
 - b. Water main pressure flushed, tested, and disinfected - 20 percent.

(14a), (14b), (54), and (55) – Corporation Stops and Taps

- A. Method of Measurement: The quantity of corporation stops and taps to be paid for under this item shall be the actual number of stops furnished and installed in the main for service connections.

- B. Basis of Payment: Corporation stops and taps shall be paid for at the unit price per each stated in the Bid Schedule. Said unit price shall be full compensation for all fittings, labor, equipment, and tools necessary for the installation of the corporation stops including sawcut, management, removal and disposal of pavement; excavation (except ledge); furnishing corporation stop; tapping the main; backfilling including aggregate base and subbase; compaction; adjustment and for all work and expenses incidental thereto for which payment is not provided under other items.

(15), (16), (56) and (57) – Copper Service Pipe

- A. Method of Measurement: The quantity of copper service pipe to be paid for under this item shall be the actual length in feet as measured along the center line of the pipe as laid.
- B. Basis of Payment: Pipe shall be paid for at the unit price per linear foot stated in the Bid Schedule. Said unit price shall be full compensation for all service pipe, main pipe and fittings, labor, equipment, tools, and other materials required for sawcut, management, removal and disposal of pavement; excavation (except ledge); the furnishing and installing copper service pipes and fittings; locating and verifying the locations of water services to be connected to, utility crossings and relocations, laying, setting, and jointing all pipes and fittings; for making all connections to existing services; for cleaning, testing, and disinfecting; backfilling including aggregate base and subbase; compaction; pipe and buried utility markings and location tape; providing tie sheet to Engineer; and for all other work and expenses incidental thereto for which payment is not provided under other items.
 - 1. Payment will be made for a water service when the tie sheet for that water service has been received and accepted by the Engineer.

(17a), (17b), (58), (59) and (89) – Curb Stop and Box

- A. Method of Measurement: The quantity of curb stops and boxes to be paid for under this item shall be the actual number furnished and installed for service connections.
- B. Basis of Payment: Curb stops and boxes shall be paid for at the unit price per each curb stop stated in the Bid Schedule. Said unit price shall be full compensation for all fittings, labor, equipment, tools, and other materials required for sawcut, management, removal and disposal of pavement; excavation (except ledge); furnishing and installing curb stop and box; backfilling including aggregate base and subbase; compaction; adjustment of curb box and cover to final grade; and for all other work and expenses incidental thereto for which payment is not provided under other items.

(18) – 6-inch Diameter Perforated HDPE Storm Drain Pipe, All Depths

- A. Method of Measurement: Perforated storm drain 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. Pipes shall be measured along the centerline of the pipe minus half the inside diameter of each structure. Pipe installed into the structure will not be measured for payment.
- B. Basis of Payment: The contract unit price per linear foot for perforated storm drain pipe installed shall be full compensation for all labor, materials, and equipment necessary to complete this work including sawcut, management, removal and disposal

of pavement; excavation (except ledge excavation); removing and disposing of non-AC pipe where required; dewatering; bedding; furnishing and installing perforated HDPE pipe and fittings; backfill including aggregate base and subbase material; compaction; core opening into existing manholes and connecting into existing manhole/catch basin; connection to existing piping as required; maintaining existing flows during construction; and all else incidental thereto for which payment is not provided under other items.

Roadway Restoration and Site Restoration

(19), (20), (21a), (21b), (22), (66a), (66b), (66c), (66d), (108), and (146) – Local Road Temporary Pavement, Pavement (Binder Course), Pavement (Surface Course) for Permanent Trench, Pavement (Surface Course) for Full Width Overlay, and Driveway/ Sidewalk Pavement

A. Method of Measurement:

1. The quantity of bituminous concrete pavement to be paid for under this item includes:
 - a. Temporary Pavement - The number of tons of temporary binder pavement placed and removed at the direction of the Engineer, calculated as described below, within the payment limits of trench paving shown on the Drawings.
 - b. Binder Course Pavement - The number of tons of binder pavement placed and removed at the direction of the Engineer, calculated as described below, within the payment limits shown on the Drawings.
 - c. Surface Course Pavement for Permanent Trench - The number of tons of surface pavement placed at the direction of the Engineer, calculated as described below, within the payment limits shown on the Drawings.
 - d. Surface Course Pavement for Full Width Overlay - The number of tons of surface pavement placed at the direction of the Engineer, calculated as described below, within the payment limits shown on the Drawings.
 - e. Driveway/Sidewalk/Parking Lot Pavement - The number of tons of driveway/sidewalk pavement hand-placed at the direction of the Engineer, calculated as described below, within the payment limits shown on the Drawings.
2. Actual widths will be used in computing area wherever the width of pavement removed and replaced is less than the limits indicated on the Drawings.
3. The conversion factor to change volume of bituminous concrete pavement measured in place to tons will be 0.055 tons per square yard per inch of thickness.

- B. Basis of Payment: Pavement shall be paid for at the Contract unit price per tons stated in the Bid Schedule. Said unit price shall be full compensation for furnishing all materials, labor, equipment and tools necessary to complete this work including sawcut, management, removal and disposal of pavement; furnishing, installing, and preparing base material; application of tack coat; the placement pavement; furnishing and installing of pavement markings; raising of utility structures frames and covers/grates to match final pavement elevation; and all else incidental thereto for which payment is not provided under other items. No additional payment will be made to the contractor for repair work done by the Contractor in maintaining

bituminous concrete pavement.

(23) and (68) – Milling (1.5–inch depth)

- A. Method of Measurement: The quantity to mill existing pavement to be paid for under this item shall consist of the number of square yards of area mill/ground as shown on the Drawings and as authorized/directed by the Engineer. Actual pavement dimensions will be used in calculating area wherever the width and/or the length of pavement removed differs than the limits shown on the Drawings.
- B. Basis for Payment: The Contract unit price per square yard shall be full compensation for furnishing all labor, materials, tools and equipment necessary to complete this work including grinding the existing pavement to a depth of 1.5 inches; management, removal and disposal of existing roadway materials; broom cleaning existing ground surfaces; and all else incidental thereto for which payment is not provided under other items.

(24), (69), (109) and (147) – Gravel Driveways/Walkways

- A. Method of Measurement: the quantity of gravel driveways/walkways shall be the number of cubic yards of new gravel sidewalks/walkways as shown on the Drawings and/or as directed by the Engineer.
- B. Basis of Payment: The Contract unit price per cubic yard of new gravel driveway/walkway shall constitute full compensation for all materials, labor, and equipment necessary to complete this work including excavation (except ledge excavation); preparing subgrade; furnishing and installing subbase, aggregate base, and aggregate surface and leveling course (gravel); compaction; raising of utility structures frames and covers/grates to match final pavement elevation; rough and fine grading; site restoration, and all else incidental thereto for which payment is not provided under other items.

(25) - Bituminous Curb

- A. Method of Measurement: The quantity of replacement of bituminous curb to be paid for under this item shall be the linear feet of curb removed and replaced within the payment limits defined in the Documents and directed by the Engineer
 - 1. Curb removed for the convenience of or damaged by the Contractor is not covered by this bid item.
- B. Basis of Payment: Replacement of bituminous curb shall be paid for at the unit price per linear foot stated in the Bid Schedule shall constitute full compensation for all labor, equipment and materials necessary to complete this work including management, removal and disposal of curb; excavation and backfill; subgrade preparation; placement of new curb; repair of loam and seed behind curb; and for all other work and expenses incidental thereto for which payment is not provided under other items.

(26), (70), (110), and (148) – Loam and Seed

- A. Method of Measurement: The quantity of loam and seed shall consist of the number of square yards of loam and seed installed at the direction of the Engineer within the limits of work shown on the drawings.

1. The pay limit for loaming and seedings is equal to the pay limit for the pipe trench plus 2 feet on each side of the trench.
- B. Basis of Payment:
1. The square yard unit price shall be full compensation for furnishing all labor, materials, and equipment required to place and grade loam, furnish and place seed, mulch, lime, fertilize and water, assure and maintain grass growth until final acceptance by the Engineer; and for all other work including grading of paved and unpaved areas disturbed during construction and expenses indicated thereto for which payment is not provided under other items. This price shall include clean-up and restoration of property including property boundary monuments and markers by a New Hampshire licensed PLS, replacement of shrubs, fences, trees and mulch that are not identified to be removed and which are displaced at the convenience of the Contractor. This price shall include removal, management, and disposal of existing pavement, sidewalk, concrete, structures, and other manmade features in areas that will be replaced with loam and seed and plantings. This price includes the clearing, grubbing, and stripping and stockpiling of topsoil. Areas disturbed for the Contractor's convenience shall be restored at no additional cost to the Owner.
 2. Payment for this work on interim requisitions shall be according to the following percentages:
 - a. Completion of the installation of the loaming and seeding accepted by the Engineer – 80 percent
 - b. Final contract completion and consistent coverage and growth of the new turf – 20 percent

General Project

(27) and (71) – Pre-blast Survey

- A. Method of Measurement: Pre-blast surveys accepted for payment shall be the actual pre-blast surveys conducted as directed by the Engineer.
- B. Basis of Payment: The contract unit price per each shall be full compensation for all labor, materials, and equipment necessary to complete this work including: obtaining permission to enter the building; conducting the pre-blast surveys; providing the survey results to the property owner, Engineer, and Owner; and all else incidental thereto for which payment is not provided under other items.

(28) and (72) – Radon Tests

- A. Method of Measurement: Radon tests accepted for payment shall be the actual buildings that have a set of two radon tests conducted and analyzed as directed by the Engineer.
- B. Basis of Payment: The contract unit price per each shall be full compensation for all labor, materials, and equipment necessary to complete this work including: obtaining permission to enter the building; hiring a NH certified radon professional to perform the work; installing and collecting the radon air test equipment in the building's basement of the building prior to blasting work; installing and collecting the radon air test equipment in the building's basement after blasting occurs; laboratory analysis of

the tests; provide the laboratory results to the property owner, Engineer, and Owner; and all else incidental thereto for which payment is not provided under other items.

(29), (73), (126) and (161) - Test Pit Excavation

- A. Method of Measurement: The quantity to be paid for under this item shall be the actual number of test pits performed as shown on the Drawings or authorized by the Engineer up to pit size of five cubic yards.
- B. Basis of Payment: Test pit excavations shall be paid for at the unit price per each test pit as stated in the Bid Schedule. Said unit price shall be full compensation for furnishing all labor, tools, and equipment including: sawcut, management, removal and disposal of pavement; excavation (except ledge excavation); dewatering, backfill including aggregate base and subbase, compaction, temporary pavement; coordination with utility companies; repair of any utility lines and services broken during construction; providing the test pit result information to the Engineer; and for all other work and expenses incidental thereto for which payment is not provided under other items.

(30), (74), (88), (127) and (162) - Trench Excavation - Ledge

- A. Method of Measurement:
 - 1. Ledge excavation measured for payment shall be the number of cubic yards of ledge removed during construction. This quantity shall be determined by:
 - a. Exposing the ledge profile for measurement. Excavation and backfill of the earth overburden shall be considered incidental, and no separate payment shall be made, therefore.
 - b. Should the Contractor elect to pre-drill and blast ledge without exposing the ledge surface for measurement, ledge depths shall be determined by the Resident Project Representative at the time of drilling or, when direct drilling observation is not conducted, the ledge profile shall be measured after excavation, and 20% of the ledge volume thus measured shall be deducted due to ledge expansion caused by the blasting operation.
 - 2. The payment limit for trench width shall be between vertical planes which are a distance apart equal to the sum of 18 inches plus 1-1/3 times the nominal outside diameter of pipe which is to be installed in the trench (min. of 3 feet) and extending from the top of the ledge surface to a depth of 12 inches below the invert grade of the pipe. Where two pipes are installed in the same trench, trench ledge excavation shall be measured as the actual volume of ledge removed between vertical planes which are a distance apart equal to the sum of 3 feet plus the sum of the pipe's nominal outside diameter. Where three pipes are installed in the same trench, trench ledge excavation shall be measured as the actual volume of ledge removed between vertical planes which are a distance apart equal to the sum of 4.5 feet plus the sum of the pipe's nominal outside diameter.
 - 3. Ledge excavation for structures (including manholes) shall be measured as 18 inches outside the structure and extending to a depth of 12 inches below the base of the structure indicated on the Drawings.

4. Rocks or boulders greater than two cubic yards volume shall be considered as ledge excavation. Volume of rocks shall be determined from their average length, width, and depth as measured by the Engineer.
- B. Basis of Payment:
1. The contract unit price per cubic yard for ledge excavation shall be full compensation for all labor, materials, tools and equipment necessary to complete the excavation including drilling, blasting, excavating, loading and disposing the excess or unusable material outside the work limits, suitable replacement backfill, and all else incidental thereto for which payment is not provided under other items.
 2. Not all the potential ledge locations are identified on the Drawings and ledge could be encountered anywhere within the limits of work. Such ledge, if encountered, is not considered a Differing Subsurface or Physical Condition. The unit price in the bid form shall apply to all ledge encountered and removed.

(31), (75), (128) and (163) – Replacement of Unsuitable Material Above Pipe Bedding and Initial Backfill

- A. Method of Measurement: Quantity to be paid for under this item shall be the number of cubic yards of material removed and replaced with materials from off-site as authorized by the Engineer. The payment limit for this item shall be between vertical planes that are a distance apart equal to a maximum of 6-feet extending from the top of the initial backfill layer to the bottom of the aggregate subbase layer as called out in the Contract Drawings for the length of the excavation as directed by the Engineer.
- B. Basis of Payment:
1. Excavated unsuitable materials shall be paid for at the unit price per cubic yard stated in the Bid Schedule. Said unit price shall be full compensation for furnishing all labor, equipment, and tools necessary for the excavation of unsuitable material including the disposal of materials; furnishing installing and compacting replacement suitable backfill, and for all other work and expenses incidental thereto for which payment is not provided under other items.
 2. Material excavated that could have, in the opinion of the Engineer, remained in place through the use of adequate dewatering efforts shall be replaced by the Contractor at no additional cost to the Owner.
 3. Excess backfill material may be available during the Contract. This item shall be used to pay for excavation of unsuitable materials above the initial backfill layer only if no suitable backfill material previously excavated under this Contract is available.

(32), (76), (129) and (164) - Excavation Below Grade and Replacement Backfill

- A. Method of Measurement: Quantity to be paid for under this item shall be the number of cubic yards of material replaced below the pipe or structure bedding with materials from off-site as authorized by the Engineer. The payment limit for this item shall be between vertical planes that are a distance apart equal to the sum of 18 inches plus 1-1/3 times the nominal diameter of pipe to be installed (minimum 3 feet) extending from the typical excavation depth called out in the contract drawings (bottom of bedding layer) to the depth accepted by the Engineer for the length of the excavation as directed by the Engineer.

- B. Basis of Payment:
1. Excavated unsuitable materials below the bedding elevation shall be paid for at the unit price per cubic yard stated in the Bid Schedule. Said unit price shall be full compensation for furnishing all labor, equipment, and tools necessary for the excavation of unsuitable material; furnishing, installing and compacting replacement suitable backfill; furnishing and installing filter fabric, and for all other work and expenses incidental thereto for which payment is not provided under other items. Disposal of unsuitable material is an incidental work item.
 2. Material excavated below pipe bedding grade that could have, in the opinion of the Engineer, remained in place through the use of adequate dewatering efforts shall be replaced by the Contractor at no additional cost to the Owner.

(33) and (77) - Backfill with Flowable Fill

- A. Method of Measurement: Quantity to be paid for under this item shall be the number of cubic yards of flowable fill used as backfill as authorized by the Engineer. The payment limit for this item shall be between vertical planes that are a distance apart equal to a maximum of 5-feet and extending to a depth and length as directed by the Engineer.
- B. Basis of Payment: Backfill with flowable fill shall be paid for at the unit price per cubic yard stated in the Bid Schedule. Said unit price shall be full compensation for furnishing all labor, equipment, and tools necessary for excavation (except ledge); furnishing installing and compacting flowable fill, hardening of flowable fill; coordination with utility companies, and for all other work and expenses incidental thereto for which payment is not provided under other items.

(34), (78), (130) and (165) - Erosion and Sedimentation Control

- A. Method of Measurement: Erosion and sedimentation control shall be paid for at the Lump Sum unit price as stated in the Bid Schedule.
- B. Basis of Payment: Erosion and sedimentation control shall be paid for a lump sum price stated in the Bid Schedule. Said lump sum price shall be full compensation for preparation of Stormwater Pollution Prevention Plan (SWPPP); installation, maintenance, and removal of the type and quantity of erosion control devices as required to meet NPDES General Permit and SWPPP; and all else incidental thereto for which payment is not provided under other items. 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.

(35) and (79) - Traffic Control

- A. Method of Measurement: Traffic regulation and control will be paid for at the Lump Sum unit price as stated in the Bid Schedule.
- B. Basis of Payment: Payment for traffic regulation and control shall constitute full compensation for all traffic regulation and control efforts and including all labor, materials, equipment, signage and supervision required to provide comprehensive and professional traffic regulation and control at all project locations, coordinating and scheduling with City of Portsmouth Police Department for uniform police detail for the work; traffic control plan, temporary pavement markings for traffic re-

routing and pedestrian safety; and all else incidental thereto for which payment is not provided under other items. Payment under this item will be made for full-time dedicated flaggers only. Part-time flaggers will not be considered adequate. 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.

1. This lump sum item does not include the cost for uniform police detail's time on site nor electronic message boards.

(36) and (80) - Electronic Traffic Control Message Boards

- A. Method of Measurement: The electronic traffic control message boards will be paid for at the unit price per board-week as stated in the Bid Schedule.
- B. Basis of Payment: Electronic traffic control message boards (minimum of 76-inch high and 134-inch wide) shall be paid for each message sign at the unit price per week stated in the Bid Schedule. Said unit price shall be full compensation for furnishing all materials, labor, and equipment necessary to complete this work including furnishing, operating, and maintaining the portable changeable message sign per week; all necessary moves of the sign; and all else incidental thereto for which payment is not provided under other items.

(37) and (83) – Property Inspections

- A. Method of Measurement: The quantity of inspections for properties that are connecting to the sewer system measured for payment shall be the actual complete inspections and accepted by the Engineer.
- B. Basis of Payment: The payment shall be for full compensation for all labor, materials, tools and equipment necessary to complete the work including all coordination with relevant parties including the City Engineering Department, the Engineer, and the effected property owners; obtaining access agreements from property owner to conduct these inspections; arranging for inspections; performing complete septic system inspections by a New Hampshire licensed Septic System Evaluator; submitting completed septic system inspection reports to the Engineer and City Engineering Department; performing inspection of the building's electrical system that is related to how grinder pump system will be powered; performing inspection of the building's indoor plumbing that is related to any relocation of indoor plumbing piping and appurtenances; all three inspections shall be completed and accepted by Owner and Engineer prior to any construction activities on the private property; and all else incidental thereto for which payment is not provided under other items.

(38) – Mobilization/Demobilization for Base Bid (max. 5% excluding the allowances)

- A. Method of Measurement: Mobilization/demobilization shall be paid for at the Lump sum price as stated in the Bid Schedule. Total of bid item shall not exceed 5% of Total Amount of the Base Bid excluding the allowances.
- 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; provided pre-construction photographs/videos; and the Owner has approved the following: Construction Schedule, Erosion Control Plan, Pre-Blast Survey and Blasting Plan, Traffic Control Plan, Health and Safety Plan, Project Sign (and installed), Temporary Facilities (including Engineer's field office/trailer), and Pre-Construction photographs/videos. "Operational" shall mean the temporary field office is fully functional and power and internet are functioning. For the purposes of payment on this item, demobilization includes, but is not limited to: removal of Engineer's field office/trailer from the project area; and other demobilization related tasks. 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 Base Bid contract

(39) and (85) – Uniform Police Officer for Traffic Control

- A. Method of Measurement: Allowance of \$100,000 (\$40,000 for base bid and \$60,000 for bid alternate No. 1) is to be included and carried in the bid schedule.
- B. Basis of Payment:
 - 1. The payment shall cover the cost charged to the Contractor by the City of Portsmouth Police Department for providing Uniformed Police Officers and/or cruisers for traffic control in addition to the required flag persons, only in areas required by the Owner. Excluded from this payment are any costs associated with traffic control, including flag persons, that shall be paid for under a separate allowance.
 - 2. Payment for this item shall be on the basis of invoices presented by the Police Department to the Contractor for the work. No mark-up will be added by the Contractor to the invoice.

(40), (86), (133) and (168) – Liquid Asphalt Price Adjustment

- A. Method of Measurement: Allowance of \$20,000 to be included and carried in the bid schedule.
- B. Basis of Payment:
 - 1. The payment shall cover the potential increase in cost of materials when the pavement is placed compared to the unit bid prices in the Bid Schedule. Refer to Division 0, Section C – Special Conditions for details.
 - 2. Payment for this item shall be on the of changes in cost indexes. The increase in cost index must be at least 5 percent for the Contractor to receive this allowance. No mark-up will be added by the Contractor to the allowance.

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BID ALTERNATE No. 1

Bid items that have the same measurement and payment as Base Bid are listed in the above section.

All of the Bid Alternate No. 1 bid items are eligible for the CWSRF loan.

The following items are only specific to Bid Alternate No. 1.

Low Pressure Sewer

(49) – Decommission of Underground Leaching Basin on Sagamore Grove

- A. Method of Measurement: Decommissioned underground leaching basins accepted for payment shall be the actual number of structures decommissioned in Sagamore Grove right-of-way and accepted by the Engineer.
- B. Basis of Payment: Decommissioned leaching basins shall be paid for at the unit price per each stated in the Bid Schedule. The contract unit price per each shall be full compensation for all labor, materials, and equipment necessary to complete this work including sawcut, management, removal and disposal of pavement; excavation (except ledge excavation); cleaning; pumping and disposing of remaining liquids and solids from underground precast tank; drill holes through the base of the underground precast tank; furnishing and installing sand into the underground precast tank; backfilling including aggregate base and subbase material; compaction; and all else incidental thereto for which payment is not provided under other items.

Water Mains and Storm Drains

(51) – 8-inch Ductile Iron Water Main

- A. Method of Measurement: The quantity of water main to be paid for under this item shall be the actual length in feet as measured along the center line of the pipe as laid including all fittings and valves.
- B. Basis of Payment:
 - 1. Water main shall be paid for at the unit price per linear foot stated in the Bid Schedule. Said unit price shall be full compensation for furnishing all materials, labor, equipment, and tools necessary to the construction including sawcut, management, removal and disposal of pavement; excavation (except ledge); furnishing and installing pipes, pipe fittings (except valves), bronze wedges, polywrap; connections and couplings to existing pipes; furnishing and placing all bedding and initial backfill including aggregate base and subbase; compaction; thrust blocks and supports; cleaning, flushing, disinfecting, and testing; temporary taps and fittings required for testing; removal and disposal of existing water lines being replaced; and for all other work and expenses incidental thereto for which payment is not provided under other items.
 - 2. Payment for this work on interim requisitions shall be according to the following percentages:
 - a. Water main successfully set in place and backfilled - 80 percent.
 - b. Water main pressure flushed, tested and disinfected - 20 percent.

(53) - 8-inch Gate Valve

- A. Method of Measurement: The quantity of gate valves to be paid for under this item shall be the actual number of valves and valve boxes installed complete in place. Payment for gate valves installed on hydrant branches shall be paid for under Item No. (66), Furnish and Install Hydrant Assemblies.
- B. Basis of Payment: Gate valves shall be paid for at the unit price per each stated in the Bid Schedule. Said unit price shall be full compensation for furnishing all materials, labor, equipment, polywrap, and tools; sawcut, management, removal and disposal of pavement; excavation (except ledge); for installing, setting, and jointing the valve and valve box; for restraining joints; for thrust blocks and supports; backfilling including aggregate base and subbase; compaction; disinfection, cleaning and testing of installed valves and valve boxes; and for all other work and expenses incidental thereto for which payment is not provided under other items.

(60) – Hydrant Assembly

- A. Method of Measurement: The quantity of hydrant assemblies to be paid for under this item shall be the actual number installed complete in place.
- B. Basis of Payment:
 - 1. Hydrant assemblies shall be paid for at the unit price per each stated in the Bid Schedule. Said unit price shall be full compensation for furnishing all materials, labor, equipment, and tools; sawcut, management, removal and disposal of pavement; excavation (except ledge); for removal of existing hydrants where directed; for all thrust blocks and supports; restraining joints; furnishing and installing hydrant branch gate valve, tee, pipe and hydrant; hydrant snow markers; polywrap; backfilling including aggregate base and subbase; compaction; location tape; cleaning; testing; disinfection; adjustment of valve box and cover to final grade; and of all other work and expenses incidental thereto for which payment is not provided under other items.
 - 2. Payment for this work on interim requisitions shall be according to the following proceedings:
 - a. Hydrant assembly successfully set in place and backfilled – 80 percent
 - b. Hydrant assembly flushed, tested and disinfected – 20 percent.

(61) – 8-inch x 12-inch Tapping Sleeve and Valve

- A. Method of Measurement: Tapping sleeve and valve measured for payment shall be the actual number of tapping sleeve and valves installed complete in place.
- B. Basis of Payment: Tapping sleeve and valve shall be paid for at the unit price per each stated in the Bid Schedule. Said unit price shall be full compensation for furnishing all materials, labor, and equipment necessary to complete this work including sawcut, management, removal and disposal of pavement; excavation (except ledge excavation); furnishing, installing, setting, and jointing valves and valve boxes; restraining joints; backfill including aggregate base and subbase material; compaction; testing all sleeves, valves and valve boxes; providing one T-handle operator wrench; adjustment of valve box and cover to final grade;; and for all other work and expenses incidental thereto for which payment is not provided under other items.

(62) – Temporary Water Main

- A. Method of Measurement: Temporary water main measured for payment shall be lump sum.
- B. Basis of Payment: Temporary water lines, hydrant assemblies, saddles, taps, corporation stops and appurtenances shall be paid for at a lump sum price. The lump sum shall be full compensation for furnishing all materials, labor, and equipment necessary to provide a fully operational temporary water system including mainlines and services as specified; removing all temporary lines at the resumption of water service; placing and maintaining fill over temporary mains at drives, walks, etc.; making connections to buildings; excavation (except ledge excavation); connection to existing mains and services; cleaning, pressure testing, and disinfecting temporary lines; coordinating connections and shut-offs with the Owner; backfilling and repaving all trenches for the temporary water; and for all other work and expenses incidental thereto for which payment is not provided under other items.

Management and Disposal of Contaminated Soil and Fill

(63) - Management of Contaminated Materials and Waste Materials

- A. Method of Measurement: Management of contaminated materials measured for payment shall be based on the lump sum price stated in the Bid Schedule.
- B. Basis of Payment: Management of contaminated materials and soil/fill shall be paid for at the lump sum price stated in the Bid Schedule. Said unit price shall be full compensation for furnishing all labor, materials, tools, equipment, and incidentals required for managing excess materials and soil/fill; segregating, handling, staging, testing, and characterization of all contaminated soil and fill material suspected of being contaminated as well as the costs associated with characterizing the destination site as required to assess background conditions; all controls necessary to maintain compliance with regulatory requirements relative to handling contaminated soils and materials; submittal and approval of all required and specified Plans; analytical testing and characterization of all excavated contaminated soil and fill material handled; health and safety equipment; securing a staging area for stockpiling soil pending analytical testing, reuse, or disposal; protecting the excavation and stockpile areas; controlling the spread of airborne contaminants; all notifications, fees, permits, and taxes; and all other requirements specified in other sections of the Contract Documents; and any other work not covered by other bid items. All costs related to transporting soils to and, if not disposed of offsite, and reused, from the staging area shall be included for payment in this item.

(64) - Removal and Disposal of Excess Contaminated Soil and Waste Materials

- A. Method of Measurement: Removal and disposal of contaminated soil and waste materials shall be paid based on the Contractor's actual costs based on actual invoices submitted plus a markup of 15% for the final transport and disposal of excess soil and waste materials. The amounts submitted will be paid from this Bid Item.
- B. Basis of Payment: Final transport of contaminated soil and waste material shall be paid through a cash allowance. Said cash allowance shall be full compensation for all labor, equipment, and materials necessary to complete the work including

environmental controls to safely handle the material, and disposal of the material offsite in accordance with all federal, state, and local regulations. Contractor shall take all reasonable efforts to reuse excavated soils within the project.

1. Contractor will not be paid any additional increase in quantity or costs under this item resulting from improper soil management activities that result in soil contamination. Disposal of material excavated outside of the pay limits as defined elsewhere in the Contract Documents shall be done at the Contractor's expense, at no additional cost to the Owner.

(65) – Treatment of Contaminated Groundwater

- A. Method of Measurement: Treatment of contaminated groundwater shall be paid based on the Contractor's actual costs based on actual invoices submitted plus a markup of 15% for the operation of the treatment system. The amounts submitted will be paid from this Bid Item.
- B. Basis of Payment: The treatment of contaminated groundwater shall be paid through a cash allowance. Said cash allowance shall be full compensation for all labor, subcontractors, materials, tools and equipment necessary to complete this work including obtaining required permits; mobilizing; piping the mobile treatment unit (MTU); using an MTU; sampling and laboratory testing; discharging the pumped groundwater; transporting and disposing of floatable material and settleable material; demobilizing; and all else incidental thereto for which payment is not provided under other items.
 1. Payment shall be made only when an MTU is being utilized for treatment of contaminated groundwater. Oil/water separators and sedimentation tanks are not considered MTUs. The Engineer shall determine when an MTU is required on site in conjunction with the Contractor.

Roadway and Site Restoration

(67a), (67b), and (67c) – NHDOT Temporary Pavement, Pavement (Binder Course), and Pavement (Surface Course)

- A. Method of Measurement:
 1. The quantity of bituminous concrete pavement to be paid for under this item includes:
 - a. Temporary Pavement - The number of tons of temporary binder pavement placed and removed on NHDOT roadways at the direction of the Engineer, calculated as described below, within the payment limits of trench paving shown on the Drawings.
 - b. Binder Course Pavement - The number of tons of binder pavement placed and removed on NHDOT roadways at the direction of the Engineer, calculated as described below, within the payment limits shown on the Drawings.
 - c. Surface Course Pavement - The number of tons of surface pavement placed on NHDOT roadways at the direction of the Engineer, calculated as described below, within the payment limits shown on the Drawings.
 2. Actual widths will be used in computing area wherever the width of pavement removed and replaced is less than the limits indicated on the Drawings.

3. The conversion factor to change volume of bituminous concrete pavement measured in place to tons will be 0.055 tons per square yard per inch of thickness.
- B. Basis of Payment: Pavement shall be paid for at the Contract unit price per ton stated in the Bid Schedule. Said unit price shall be full compensation for furnishing all materials, labor, equipment and tools necessary to complete this work including sawcut, management, removal and disposal of pavement; furnishing, installing, and preparing base material; furnishing and installing crushed gravel; application of tack coat; the placement pavement; furnishing and installing of pavement markings; raising of utility structures frames and covers/grates to match final pavement elevation; grading shoulder; and all else incidental thereto for which payment is not provided under other items. No additional payment will be made to the Contractor for repair work done by the Contractor in maintaining bituminous concrete pavement.

General Project

(81) - Utility Support and Coordination with City Departments

- A. Method of Measurement: Utility support and coordination with City Departments shall be paid for at the Lump Sum unit price as stated in the Bid Schedule.
- B. Basis of Payment: Utility support and coordination with City Departments shall be paid for as a lump sum price stated in the Bid Schedule. Said lump sum price shall be full compensation for furnishing all labor, supervision, coordination with utility owner, materials, and equipment necessary to work with the utilities (sewer, water, drain, etc.) including but not limited to: timely communication and consultation with public entities and agencies; utility services (utility bracing, utility relocation, contacting Dig-Safe, etc.); utility inspection; working around utility prior to their relocations; and all else incidental thereto for which payment is not provided under other items. 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.

(82) – Utility Support and Coordination with Independent Utility Companies

- A. Method of Measurement: Allowance to be included and carried in the bid schedule.
- B. Basis of Payment:
 1. The payment shall cover the cost charged to the Contractor by the independent utility companies for providing utility services, including, but is not limited to: utility bracing; utility relocation; on-site inspection; and all else incidental for which payment is not provided under other items.

2. Basis of payment for this item shall be on the invoices presented by the utility companies for the work. No mark-up will be added by the Contractor to the invoice.

(84) – Mobilization/Demobilization for Bid Alternate No. 1 (max. 5% excluding the allowances)

- A. Method of Measurement: Mobilization/demobilization shall be paid for at the Lump sum price as stated in the Bid Schedule. Total of bid item shall not exceed 5% of Total Amount of the Bid Alternate No. 1 excluding the allowances.
- 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; provided pre-construction photographs/videos; and the Owner has approved the following: Construction Schedule, Erosion Control Plan, Pre-Blast Survey and Blasting Plan, Traffic Control Plan, Health and Safety Plan, Project Sign (and installed), Temporary Facilities (including Engineer's field office/trailer), and Pre-Construction photographs/videos. "Operational" shall mean the temporary field office is fully functional and power and internet are functioning. For the purposes of payment on this item, demobilization includes, but is not limited to: removal of Engineer's field office/trailer from the project area; and other demobilization related tasks. 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 Bid Alternate No. 1 contract.

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BID ALTERNATE No. 2

Bid items that have the same measurement and payment as Base Bid are listed in the above section.

All the Bid Alternate No. 2 bid items are ineligible for the CWSRF loan.

The following item is only specific to Bid Alternate No. 2.

(87) – 2-inch HDPE Water Service Pipe

- A. Method of Measurement: The quantity of HDPE service pipe to be paid for under this item shall be the actual length in feet as measured along the center line of the pipe as laid.
- B. Basis of Payment: Pipe shall be paid for at the unit price per linear foot stated in the Bid Schedule. Said unit price shall be full compensation for all service pipe, main pipe and fittings, labor, equipment, tools, and other materials required for sawcut, management, removal and disposal of pavement; excavation (except ledge); furnishing and installing HDPE service pipes and fittings;; locating and verifying the locations of water services to be connected to, utility crossings and relocations, laying, setting, and jointing all pipes and fittings; for making all connections to existing services; for cleaning, testing, and disinfecting; backfilling including aggregate base and subbase; compaction; pipe and buried utility markings and location tape; providing tie sheet to Engineer; and for all other work and expenses incidental thereto for which payment is not provided under other items.
 1. Payment will be made for a water service when the tie sheet for that water service has been received and accepted by the Engineer.

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BID ALTERNATE No. 3

Bid items that have the same measurement and payment as Base Bid are listed in the above section.

All of the Bid Alternate No. 3 bid items are ineligible for the CWSRF loan.

The following items are only specific to Bid Alternate No. 3.

(90) – Catch Basins

- A. Method of Measurement: Catch basins accepted for payment shall be the actual vertical feet of structures installed and accepted complete in place, measured vertically from the bottom of the sump to finish grade.
- B. Basis of Payment: The Contract unit price per vertical foot shall be full compensation for all labor, materials, tools and equipment necessary to complete this work including sawcut, management, removal and disposal of surface pavement; excavation (except ledge excavation); removing and disposing of existing catch basin where required; dewatering; bedding; furnishing and installing precast sections; furnishing and installing frames and grates at proper grade; furnishing and installing curb inlet, where required; furnishing and installing hoods; furnishing and installing storm drain pipe and fittings to connect to existing storm drain piping; backfilling including aggregate base, compaction; cleaning sumps; adjustment of frame and grate to final grade; maintaining existing flows including temporary bypass pumping; and all else incidental thereto for which payment is not provided under other items.

(91) – 12-inch Diameter HDPE Storm Drain Pipe, All Depths

- A. Method of Measurement: Storm drain 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. Pipes shall be measured along the centerline of the pipe minus half the inside diameter of each structure. Pipe installed into the structure will not be measured for payment.
- B. Basis of Payment: The contract unit price per linear foot for storm drain pipe installed shall be full compensation for all labor, materials, and equipment necessary to complete this work including sawcut, management, removal and disposal of pavement; excavation (except ledge excavation); removing and disposing of non-AC pipe where required; dewatering; bedding; furnishing and installing HDPE pipe and fittings; backfill including aggregate base and subbase material; compaction; connecting to drainage structures; connecting to existing piping as required; maintaining existing flows during construction; and all else incidental thereto for which payment is not provided under other items.

(92) - Concrete Sidewalks and Walkways

- A. Method of Measurement:
 - 1. The quantity of concrete sidewalks to be paid for under this item shall consist of the number of square yards of concrete sidewalk and walkways placed at the direction of the Engineer within the payment limits shown on the drawings.

2. Actual widths will be used in computing area wherever the width of Portland cement concrete pavement removed and replaced is less than the above specified limits.
 3. Sidewalks and walkways removed for the convenience of, or damaged by the Contractor is not covered by this bid item.
- B. Basis of Payment:
1. Pavement shall be paid for at the Contract Unit Price per square yard stated in the Bid Schedule. Said unit price shall be full compensation for furnishing all materials, labor, equipment and tools necessary for sawcut, management, removal and disposal of concrete sidewalks, and walkways; furnishing, installing, and preparing subbase material; furnishing and placement of Portland cement concrete sidewalks to the depths indicated on the Drawings; furnishing and installing expansion joint material and reinforcement; forming, curing, screeding, finishing, testing, form removal; joints sealing; raising of utility structures frames and covers/grates to match final pavement elevation; and all else incidental thereto for which payment is not provided under other items.

(93) – Detectable Warning Device for Sidewalk Ramps

- A. Method of Measurement: The quantity of detectable warning devices to be paid for under this item shall be the number of detectable warning devices installed and accepted complete in place.
- B. Basis of Payment: Contract Unit Price per each detectable warning device installed shall be full compensation for all labor, materials, tools and equipment necessary to complete this work including excavation (except ledge excavation); placement of base course; placement of concrete; placement of detectable warning devices; site restoration; and all else incidental thereto for which payment is not provided under other items. No additional payment will be made to the Contractor for repair work done by Contractor in maintaining detectable warning devices.

(94), (125), and (160) – Granite Curbs – Remove and Reset

- A. Method of Measurement: Removal and resetting of existing granite curbs, measured for payment shall be the actual linear footage of granite curbs as measured lengthwise along the front face of each section of curb that are removed and reset.
- B. Basis of Payment: The Contract unit price per linear foot for removal and resetting of existing granite curbs shall constitute full compensation for all labor, equipment and materials necessary to complete this work including removing and reinstalling granite curbs, subgrade preparation, placement of concrete fill and bedding, backfill, and all else incidental thereto for which payment is not provided under other items.

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BID ALTERNATE No. 4

Bid items that have the same measurement and payment as Base Bid are listed in the above section.

All of the Bid Alternate No. 4 bid items are ineligible for the CWSRF loan unless a property has a documented failed septic system.

The following items are only specific to Bid Alternate No. 4.

Low Pressure and Gravity Sewers

(98) – 12-inch Diameter or Smaller HDPE Storm Drain Pipe, All Depths

- A. Method of Measurement: Storm drain 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. Pipes shall be measured along the centerline of the pipe minus half the inside diameter of each structure. Pipe installed into the structure will not be measured for payment.
- B. Basis of Payment: The contract unit price per linear foot for storm drain pipe installed shall be full compensation for all labor, materials, and equipment necessary to complete this work including sawcut, management, removal and disposal of pavement; excavation (except ledge excavation); removing and disposing of non-AC pipe where required; dewatering; bedding; furnishing and installing HDPE pipe and fittings; backfill including aggregate base and subbase material; compaction; connecting to drainage structures; connecting to existing piping as required; maintaining existing flows during construction; and all else incidental thereto for which payment is not provided under other items.

(99), (100), (138) and (139) – Submersible Grinder Pump Station

- A. Method of Measurement: Submersible grinder pump stations accepted for payment shall be the actual number of grinder pump stations installed and accepted complete in place.
- B. Basis of Payment: The Contract unit price per each shall be full compensation for furnishing all labor, supervision, materials, and equipment necessary to the construction of the submersible grinder pump station to be complete, operational and satisfactorily tested as required by the Contract Specifications and Contract Drawings including: sawcut, management, removal and disposal of pavement; excavation (except ledge excavation); dewatering; bedding; furnishing and installing the HDPE tank, grinder pump, pipes, valves, fittings, couplings, pipe supports, controls, control/alarm panel; furnishing and installing grinder pump station's electrical service and appurtenances; furnishing and installing ballast around the bottom of the tank; cleaning; testing; connection to the existing service pipe; start-up; and all else incidental thereto for which payment is not provided under other items.

(101) and (141) – Decommission Septic Tank/Tight Tank

- A. Method of Measurement: Decommissioned septic tank or tight tanks accepted for payment shall be the actual number of septic tanks or tight tanks decommissioned and accepted by the Engineer.

- B. Basis of Payment: The contract unit price per each shall be full compensation for all labor, materials, and equipment necessary to complete this work including sawcut, management, removal and disposal of pavement; excavation (except ledge excavation); removal of septic system structures including manholes, vent pipes, and pump stations; cleaning; pumping and disposing of remaining liquids and solids from septic tank or tight tank; drill holes through the base of the septic tank or tight tank; furnishing and installing sand into the septic tank or tight tank; backfilling including aggregate base and subbase material; compaction; and all else incidental thereto for which payment is not provided under other items.

Building Repair

(102) and (142) – Relocation of Indoor Plumbing

- A. Method of Measurement: Relocated indoor plumbing accepted for payment shall be the actual number of building's indoor plumbing that was relocated no more than 12 feet horizontally from existing location where the sewer service exits the foundation/floor and accepted by the City's Plumbing Inspector, the City's Building Inspector, and the Engineer.
- B. Basis of Payment: The contract unit price per each shall be full compensation for all labor, materials, and equipment necessary to complete this work as required by the Contract Specifications and Contract Drawings including: pre-installation inspection by a Plumber; removing and disposing of existing pipe and fittings; capping abandoned pipes; furnishing and installing necessary pipes, fittings, and pipe supports; prepping the concrete foundation wall for coring; coring opening into the existing concrete foundation wall; furnishing and installing link seal; connection to existing and new piping; cleaning; testing; protecting interior areas not being disturbed; and all else incidental thereto for which payment is not provided under other items.

(103) – Additional Footage to Relocate Indoor Plumbing

- A. Method of Measurement: Additional piping necessary to relocate indoor plumbing shall be measured along the center line of the pipe including fittings. This bid item is for pipe and fittings required to go beyond 12 feet horizontally from existing location where the sewer service exits the foundation/floor. The pipe length accepted for payment shall be accepted by the City's Plumbing Inspector, the City's Building Inspector, and the Engineer.
- B. Basis of Payment: The contract unit price per foot shall be full compensation for all labor, materials, and equipment necessary to complete this work as required by the Contract Specifications and Contract Drawings including: removing and disposing of existing pipe and fittings; capping abandoned pipes; furnishing and installing necessary pipes, fittings, and pipe supports; connection to existing and new piping; cleaning; testing; protecting interior areas not being disturbed; and all else incidental thereto for which payment is not provided under other items.

Electrical Work

(104) and (143) – Circuit Breaker/Panel Improvement

- A. Method of Measurement: Improved circuit breaker/panels accepted for payment shall be the actual number of circuit breaker/panels upgraded by a New Hampshire licensed electrician and accepted by the City's Electrical Inspector, the City's Building Inspector, and the Engineer.
- B. Basis of Payment: The contract unit price per each shall be full compensation for all labor, materials, and equipment necessary to complete this work as required by the Contract Specifications and Contract Drawings including obtaining all required City electrical permits; temporary turning off electrical power; removing and disposing of removed electrical components; furnishing and install circuit breakers, circuit break panel, wiring, and conduits, and appurtenances; testing; coordinating City's Electrical Inspector's site visit; and obtaining approval of work from the City's Electrical Inspector; and all else incidental thereto for which payment is not provided under other items.

(105) and (144) – Electrical Service Upgrade

- A. Method of Measurement: Allowance to be included and carried in the bid schedule.
- B. Basis of Payment:
 - 1. The allowance shall be full compensation for all labor, materials, and equipment necessary to complete this work by a New Hampshire licensed electrician as required by the Contract Specifications and Contract Drawings including obtaining all required City electrical permits; temporary turning off electrical power; removing and disposing of removed electrical components; furnishing and install electrical service, service panel, wiring, and conduits, and appurtenances; testing; coordinating City's Electrical and Building Inspectors' site visits; and obtaining approval of work from the City's Electrical Inspector; and all else incidental thereto for which payment is not provided under other items.
 - 2. Payment for this item shall be on the basis of invoices presented by the New Hampshire licensed electrician for the work. Subcontractor mark-up in accordance with the General Conditions will be added by the Contractor to the invoice.

(106) and (145) – Electrical Step Up Transformer

- A. Method of Measurement: Electrical step up transformers accepted for payment shall be the actual number of new electrical transformer installed by a New Hampshire licensed electrician and accepted by the City's Electrical Inspector, the City's Building Inspector, and the Engineer.
- B. Basis of Payment: The contract unit price per each shall be full compensation for all labor, materials, and equipment necessary to complete this work as required by the Contract Specifications and Contract Drawings including obtaining all required City electrical permits; temporary turning off electrical power; removing and disposing of removed electrical components; furnishing and install electrical transformer, wiring, and conduits, and appurtenances; testing; coordinating City's Electrical Inspector's site visit; and obtaining approval of work from the City's Electrical Inspector; and all else incidental thereto for which payment is not provided under other items.

(107) – Restoration of Finished Basement

- A. Method of Measurement: Restoration of finished basement accepted for payment shall be the actual number of finish basements restored as directed and accepted by the Engineer.
- B. Basis of Payment: The Contract unit price per each shall be full compensation for furnishing all labor, supervision, materials, and equipment necessary to the complete the work as required by the Contract Specifications and Contract Drawings including: furnishing and installing drywall in locations that were disturbed for installation of electrical components; sanding drywall; painting the new drywall; and all else incidental thereto for which payment is not provided under other items.

Site Restoration

(111) and (149) - Protect Existing Trees

- A. Method of Measurement: Protect Existing trees shall be measured by the actual number of trees protected by the Contractor and accepted by the Engineer as authorized by the Engineer.
- B. Basis of Payment: The unit price for each shall be full compensation for furnishing all labor, materials and equipment required to protect the existing trees as identified in the plans, including but not limited to root feeding; hiring an New Hampshire licensed arborist; protective measures such as use of light weight and low ground pressure equipment, manual labor in lieu of equipment; and all else incidental thereto for which payment is not provided under other items.

(112), (113), (114), (150) and (151) - Remove Shrub and Tree

- A. Method of Measurement: The quantity to be paid for under this item shall be the actual number of trees/shrubs with their stumps completely removed with the resulting void completely restored as authorized by the Engineer.
 - 1. The diameter of the tree measured at the trunk will be used to determine which bid items the tree follows under.
 - 2. Basis of Payment: Removal of trees/shrubs with stumps shall be paid for at the unit price per each as stated in the Bid Schedule. Said unit price shall be full compensation for furnishing all materials, labor, and equipment necessary to complete this work including coordination with City Arborists, cutting the tree/shrub, excavation (except ledge excavation), properly removing and disposing of the tree/shrub and stump, backfill including aggregate base; compacting; site restoration, and all else incidental thereto for which payment is not provided under other items.

(115), (116), (152) and (153) - Tree and Shrub Planting

- A. Method of Measurement: Tree and shrub plantings shall be measured by the actual number of trees and shrubs planted by the contractor and accepted by the Engineer as authorized by the Engineer.

- B. Basis of Payment: The unit price for each tree and shrub shall be full compensation for furnishing all labor, materials, and equipment required to furnish and plant trees and shrubs as indicated on the plans and as directed by the Engineer. Trees, shrubs, and other flora disturbed for the Contractor's convenience shall be restored at no additional cost to the Owner.

(117) and (154) – Wooden Fence - Remove and Reset

- A. Method of Measurement: The quantity of reset wooden fence to be paid for under this item shall be the linear feet of wooden fence removed, stored, and reset as shown on the Contractor Drawings and/or as directed by the Engineer. Wooden fence removed for the convenience of or damaged by the Contractor is not covered by this bid item.
- B. Basis of Payment: Resetting of wooden fence shall be paid for at the unit price per linear foot stated in the Bid Schedule. Said unit price shall be full compensation for all labor, materials, equipment necessary to complete this work including excavation (except ledge excavation), backfill; compaction; removing and storing existing wooden fence; resetting of existing wooden fence; placing concrete to anchor the wooden fence, as necessary; and for all other work and expenses incidental thereto for which payment is not provided under other items. No additional payment will be made to the Contractor for repair work done by the Contractor in maintaining wooden fence.

(118) and (155) – Stone Retaining Wall Less Than 5-ft High

- A. Method of Measurement: Stone retaining walls less than 5-feet high are to be paid for under this item shall be the square foot of face of the stone retaining wall installed as shown on the Contractor Drawings and/or as directed by the Engineer. Stone retaining wall removed for the convenience of or damaged by the Contractor is not covered by this bid item.
- B. Basis of Payment: Stone retaining wall shall be paid for at the unit price per square foot stated in the Bid Schedule. Said unit price shall be full compensation for all labor, materials, equipment necessary to complete this work including sawcut, management, removal and disposal of stone retaining wall; excavation (except ledge excavation), backfill; compaction; furnishing and installing stone; placing concrete to anchor the retaining wall, as necessary; furnishing and installing underdrain pipe and fittings, as necessary; physically connecting the new retaining wall to the existing retaining wall; compaction; and for all other work and expenses incidental thereto for which payment is not provided under other items. No additional payment will be made to the Contractor for repair work done by the Contractor in maintaining the stone retaining wall.

(119), (120) and (156) – Stone or Brick Patio/Walkway - Remove and Replace

- A. Method of Measurement: Removal and resetting of brick or stone patios/walkways measured for payment under this item shall be the square yard of stone or brick removed and replaced as shown on the Contractor Drawings and/or as directed by the Engineer. Stone or brick patios/walkways removed for the convenience of or damaged by the Contractor is not covered by this bid item.

- B. Basis of Payment: The Contract unit price per square yard for removal and resetting of existing brick and stone patios/walkways shall constitute full compensation for all labor, equipment and materials necessary to complete this work including removing and reinstalling patios and walkways, subgrade preparation, placement of concrete fill and bedding, backfill, and all else incidental thereto for which payment is not provided under other items.

(121) – Raised Wooden Porch and Deck - Remove and Replace

- A. Method of Measurement: Removal and replacement of raised wooden porches and decks measured for payment under this item shall be the square foot of wood porch or deck removed and replaced as shown on the Contractor Drawings and/or as directed by the Engineer. Wooden porches and decks removed for the convenience of or damaged by the Contractor is not covered by this bid item.
- B. Basis of Payment: Remove and replacement of raised wooden porches and decks shall be paid for at the unit price per square foot stated in the Bid Schedule. Said unit price shall be full compensation for all labor, materials, equipment necessary to complete this work including excavation (except ledge excavation), backfill; compaction; removing and disposing of existing wooden porches and decks; furnishing and installing wooden porches and decks; placing concrete to anchor the wooden porches and decks, as necessary; and for all other work and expenses incidental thereto for which payment is not provided under other items. No additional payment will be made to the Contractor for repair work done by the Contractor in maintaining wooden porches or decks.
 - 1. The Contractor shall schedule work such that there is at least one egress from a building when working on this bid item.

(122) and (157) – Wooden Step or Ramp - Remove and Replace

- A. Method of Measurement: Removal and replacement of wooden steps or ramps measured for payment under this item shall be the square foot of wooden step treads or ramp removed and replaced as shown on the Contractor Drawings and/or as directed by the Engineer. Wooden steps and ramps removed for the convenience of or damaged by the Contractor is not covered by this bid item.
- B. Basis of Payment: Remove and replacement of wooden steps or ramps shall be paid for at the unit price per square foot stated in the Bid Schedule. Said unit price shall be full compensation for all labor, materials, equipment necessary to complete this work including excavation (except ledge excavation); removing and disposal existing wooden steps or ramps; furnishing and installing wooden steps or ramps; placing concrete to anchor the wooden steps or ramps, as necessary; and for all other work and expenses incidental thereto for which payment is not provided under other items. No additional payment will be made to the Contractor for repair work done by the Contractor in maintaining wooden steps or ramps.
 - 1. The Contractor shall schedule work such that there is at least one egress from a building when working on this bid item.

(123) and (158) - Concrete Step and Minor Concrete Structure – Remove and Replace

- A. Method of Measurement: The quantity of concrete steps to be paid for under this items shall consist of the actual number of cubic yards of concrete steps and miscellaneous cast-in-place concrete structures less than 1 cubic yard per location measured and accepted complete in place as directed by the Engineer. This excludes inverts for sewer or drainage structures.
- B. Basis of Payment: The contract unit price per cubic yard for concrete steps, headwalls, toe walls, thrust blocks and other minor concrete structures shall be full compensation for all labor, materials, equipment and supervision necessary to complete this work, including excavation, removal and disposal of existing steps or minor structures, foundation, concrete, embeds, formwork, testing, finishing, coating, reinforcement, stripping, anchors, joints and all else incidental thereto for which payment is not provided for under other items.
 - 1. The Contractor shall schedule work such that there is at least one egress from a building when working on this bid item.

(124) and (159) – Replace Buried Sprinkler/Irrigation Pipe

- A. Method of Measurement: The quantity of buried sprinkler pipes to be paid for under this item shall be the linear feet of sprinkler pipes and fittings replaced as shown on the Contractor Drawings and/or as directed by the Engineer. Buried sprinkler piping removed for the convenience of or damaged by the Contractor is not covered by this bid item.
- B. Basis of Payment: Replacement of buried sprinkler pipes shall be paid for at the unit price per linear foot stated in the Bid Schedule. Said unit price shall be full compensation for all labor, materials, equipment necessary to complete this work including excavation (except ledge excavation), backfill; compaction; removing and disposing of existing sprinkler pipe and fittings; furnishing and installing pipe, valves, fittings, and couplings; connecting to existing sprinkler system; cleaning; testing; and for all other work and expenses incidental thereto for which payment is not provided under other items.

(131) and (166) – Relocate Utilities on Private Property

- A. Method of Measurement: Relocation of existing utilities on private property measured for payment shall be the actual linear feet of relocated utility installed and accepted complete in place as a result of direct conflict with new sewer service piping and grinder pump station. Existing utilities repaired or replaced as a result of Contractor error or negligence, or not in direct conflict with new sewer services and grinder pump station will not be considered for payment.
- B. Basis of Payment: The contract unit price per linear foot for replacement of existing private property utilities shall be full compensation for all labor, materials, tools and equipment necessary to complete this work including: sawcut, management, removal and disposal of pavement; excavation (except ledge excavation); dewatering; removal and disposal of existing utilities including but is not limited to 2-inch diameter water services and smaller; furnishing and installing pipe, adaptors, fittings, joint restraints, thrust blocks; capping existing utilities, providing thrust restraints, as applicable; bedding; backfill including aggregate base and subbase material; compaction; cleaning; disinfection; testing; payment for time for the utility company

supervision; and all else incidental thereto for which payment is not provided under other items.

General Project

(132) – Mobilization/Demobilization for Bid Alternate No. 4 (max. 5% excluding the allowance)

- A. Method of Measurement: Mobilization/demobilization shall be paid for at the Lump sum price as stated in the Bid Schedule. Total of bid item shall not exceed 5% of separate Total Amount of Bid Alternate No. 4 excluding the allowances.
- 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; provided pre-construction photographs/videos (building interior, building exterior, and land); and the Owner has approved the following: Construction Schedule, Erosion Control Plan, Blasting Plan, Temporary Facilities (including Engineer's field office/trailer) and Pre-Construction photographs/videos. "Operational" shall mean the temporary field office is fully functional and power and internet are functioning. For the purposes of payment on this item, demobilization includes, but is not limited to: removal of Engineer's field office/trailer from the project area; and other demobilization related tasks. 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 Bid Alternate No. 4 contract.

(134) and (169) – Sewer Pipe Price Adjustment

- A. Method of Measurement: Allowance of \$20,000 to be included and carried in the bid schedule.
- B. Basis of Payment:
 1. The payment shall cover the potential increase in cost of materials if Bid Alternates No. 4 or 5 are not awarded at the time of the award of the Base Bid. This allowance only applies to HDPE pipe and PVC pipe. Refer to Division 0, Section C – Special Conditions for details.
 2. Payment for this item shall be on the of changes in cost indexes. The change in cost indexes must be at least 5 percent for the Contractor to receive this allowance. No mark-up will be added by the Contractor to the allowance.
 - a. Contractor shall provide invoices for HDPE pipe and PVC pipe to Engineer and Owner to document when the pipes were purchased.

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BID ALTERNATE No. 5

Bid items that have the same measurement and payment as Base Bid and Bid Alternate No. 4 are listed in the above section.

All the Bid Alternate No. 5 bid items are ineligible for the CWSRF loan unless a property has a documented failed septic system.

The following items are only specific to Bid Alternate No. 5.

(140) – Traffic Bearing Sewer Manhole for Grinder Pump Station

- A. Method of Measurement: Traffic bearing manholes for grinder pumps accepted for payment shall be the actual number of structures installed and accepted by the Engineer.
- B. Basis of Payment: The contract unit price per each shall be full compensation for all labor, materials, tools and equipment necessary to complete this work including sawcut, management, removal and disposal of pavement; excavation (except ledge excavation); dewatering; bedding; obtaining the frames and covers from the Owner's DPW building; installing frames and covers; furnishing and installing precast concrete sections, masonry materials, and waterproofing; backfilling including aggregate base and subbase material compaction; cleaning; testing; and all else incidental thereto for which payment is not provided under other items.
 - 1. The grinder pump station is paid under a separate bid item.

(167) – Mobilization/Demobilization for Bid Alternate No. 5 (max. 5% excluding the allowance)

- A. Method of Measurement: Mobilization/demobilization shall be paid for at the Lump sum price as stated in the Bid Schedule. Total of bid item shall not exceed 5% of separate Total Amount of Bid Alternate No. 5 excluding the allowances.
- 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; provided pre-construction photographs/videos (building interior, building exterior, and land); and the Owner has approved the following: Construction Schedule, Erosion Control Plan, Blasting Plan, Traffic Control Plan, Temporary Facilities (including Engineer's field office/trailer) and Pre-Construction photographs/videos. "Operational" shall mean the temporary field office is fully functional and power and internet are functioning. For the purposes of payment on this item, demobilization includes, but is not limited to: removal of Engineer's field office/trailer from the project area; and other demobilization related tasks. 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 Bid Alternate No. 5 contract.

END OF SECTION

SECTION 01100ALTERNATESPART 1 - GENERAL1.1 DESCRIPTION

- A. Work Included:
 - 1. Each Bidder shall be held fully responsible for examining the scope of the Alternates generally defined herein and for recognizing any modifications to the Work caused by any Alternate.
- B. Alternates:
 - 1. To enable the Owner to compare total costs where alternate materials and methods might be used, Alternates has been established as described in this Section of these Specifications.
- C. Related Work Specified Elsewhere:
 - 1. Materials and methods to be used in the Base Bid and in the Alternates have been described on the Drawings and in pertinent Sections of these Specifications.
 - 2. Method for stating the proposed Contract Sum is described in the Bid Form.
- D. Submittals:
 - 1. All Alternates described in this Section are required to be reflected on the Bid Form as submitted by bidders. However, do not submit alternates other than as described in this Section, except as provided for "substitutions" under the General Conditions.

PART 2 - PRODUCTS2.1 PRODUCT HANDLING

- A. If the Owner elects to proceed on the basis of the described Alternatives make all modifications to the Work required in furnishing and installing the selected Alternative to the approval of the Engineer and at no additional cost to the Owner other than as proposed on the Bid Form.

2.2 BID ALTERNATE NO. 1

- A. The work of this Alternate shall include all Bid Items listed under "Bid Alternate No. 1" heading on the Bid form and consists of all work located within the City right-of-way or easements or as called out on the Contract Drawings.

2.3 BID ALTERNATE NO. 2

- A. The work of this Alternate shall include all Bid Items listed under "Bid Alternate No. 2" heading on the Bid form or as called out on the Contract Drawings.

2.4 BID ALTERNATE NO. 3

- A. The work of this Alternate shall include all Bid Items listed under "Bid Alternate No.

3” heading on the Bid form or as called out on the Contract Drawings.

2.5 BID ALTERNATE NO. 4

A. The work of this Alternate shall include all Bid Items listed under “Bid Alternate No. 4” heading on the Bid form and consists of work located outside of the City right-of-way or easements or as called out on the Contract Drawings.

2.6 BID ALTERNATE NO. 5

A. The work of this Alternate shall include all Bid Items listed under “Bid Alternate No. 5” heading on the Bid form and consists of work located outside of the City right-of-way or easements or as called out on the Contract Drawings.

PART 3 - EXECUTION

3.1 ADVANCE COORDINATION

A. Immediately after award of the Contract, or as soon thereafter as the Owner has made a decision on whether the Alternate(s) will be selected, thoroughly and clearly advise all necessary personnel and suppliers as to the nature and extent of Alternates selected by the Owner. Use all means necessary to alert those personnel and suppliers involved as to all changes in the work caused by the Owner's selection or rejection of the Alternates.

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. Contractor, together with City Officials, and the Engineer shall schedule and attend one public information meeting with residents and business owners prior to the start of construction and at the beginning of construction following any temporary disruptions of the work (i.e. winter shutdown).
- C. 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.

3.5 PUBLIC MEETING

- A. Attendance: To the maximum extent practicable, assign the same person or persons

to represent the Contractor at the public meeting as will attend project meetings throughout progress of the Work. The Superintendent shall attend. Subcontractors, materials suppliers, and others may be invited to attend the public meetings in which their aspects of the Work are involved.

- B. Minimum agenda: Distribute data on, and discuss:
1. Channels and procedures for communications.
 2. Construction schedule, including sequence of critical work.
 3. Procedures for safety and first aid, security, quality control, housekeeping, and other related matters.

END OF SECTION

SECTION 01310CONSTRUCTION SCHEDULESPART 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. Private Property Coordination.
 - 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 DESCRIPTION

A. 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, 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 issues, including but not limited to excavations, fall protection and egress, as well as provisions for construction in hazardous environmental conditions at the wastewater treatment facility. The hazardous environmental conditions at the wastewater treatment facility include, but are not limited to, confined space entry, electrically-classified spaces, and chemical storage and handling areas, to name a few.
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.

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. The Contractor will overview the plan with the Owner (and staff), Engineer (and Resident Project Representative) at the beginning of the project, and subsequently when/if the safety plan is updated.
- D. 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.

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 OPERATION AND MAINTENANCE MANUALS

- A. Operation and Maintenance (O&M) Manuals are required for certain elements of the project, as specified herein.
- B. The Contractor shall provide a completed Operation and Maintenance Manual Certification Form (copy provided for Contractor's use at the end of this Specification Section) which shall be attached to every copy of every Manual and signed by the Contractor and Manufacturer.
- C. Each hard copy of an O&M Manual shall be provided in a stand-alone binder or shall be suitable for insertion into a 3-ring binder. Include the General Contractor's and Manufacturer's representative's contact information on the front cover. O&M manuals must be appropriate for the project and customized for the project. If a Manufacturer's standard O&M manual is included in the submittal, all non-applicable content must be removed or crossed out.
- D. O&M Manuals shall contain the following operational information:
 - 1. Safety Precautions: List personnel hazards, equipment or product safety precautions for all operating conditions.
 - 2. Operator Prestart: Include all procedures required to set up and prepare each system, equipment or component for use.
 - 3. Startup Procedures: Provide a narrative description for all startup operating procedures, include all control sequences.
 - 4. Shutdown Procedures: Provide a narrative description for all shutdown operating procedures, include all control sequences.

5. Post-Shutdown Procedures: Provide a narrative description for all post-shutdown operating procedures, include all control sequences.
 6. Normal Operating Procedures: Provide a narrative description of normal operating procedures. Include control diagrams with data to explain operation and control of systems and specific equipment.
 7. Emergency Operations: Include emergency procedures for equipment malfunctions to permit a short period of continued operation or to shut down the equipment to prevent further damage to systems and equipment. Include emergency shutdown instructions for fire, explosion, spills, or other foreseeable contingencies. Provide guidance on emergency operations of all utility systems including valve locations and portions of systems controlled.
 8. Operator Service Requirements: Include instructions for services to be performed by the operator such as lubrication, adjustment, inspection, alignment, spare parts installation and gage reading or recording.
 9. Environmental Conditions: Include a list of environmental conditions (temperature, humidity, and other relevant data) which are best suited for each product or piece of equipment and describe conditions under which the equipment should not be allowed to run.
- E. O&M Manuals shall contain the following maintenance information:
1. Lubrication Data: Include a table showing recommended lubricants for specific temperature ranges and applications. Also, include charts with a schematic diagram of the equipment showing lubrication points, recommended types and grades of lubricants, capacities and a lubrication schedule showing service interval frequency
 2. Preventative Maintenance Plan: Include the manufacturer's schedule for routine preventive maintenance, inspections, tests and adjustments required to ensure proper and economical operation as well as to ensure minimization of corrective maintenance and repair. Provide the manufacturer's projection of preventive maintenance work-hours on a daily, weekly, monthly, and annual basis including craft requirements by type of craft. For periodic calibrations, provide the manufacturer's specified frequency and procedures for each separate operation.
 3. Troubleshooting Guides: Include recommendations on procedures and instructions for correcting problems and making repairs. Provide step-by-step procedures to promptly isolate the cause of typical malfunctions. Describe clearly why the checkout is performed and what conditions are to be sought. Identify tests or inspections and test equipment required to determine whether parts and equipment may be reused or require replacement.
 4. Wiring and Control Diagrams: Provide Wiring diagrams and control diagrams. All diagrams shall be point-to-point drawings of wiring and control circuits including factory-field interfaces. Provide a complete and accurate depiction of the actual job specific wiring and control work. On diagrams, number electrical and electronic wiring and pneumatic control tubing and the terminals for each type, identically to the actual installation numbering.
 5. Maintenance and Repair Procedures: Include instructions and list the tools required to restore products and/or equipment to proper conditions or operating standards.

6. Removal and Replacement Instructions: Include step-by-step procedures, list required tools/supplies for removal, replacement, disassembly, and assembly of components, assemblies, subassemblies, accessories, and attachments. Provide tolerances, dimensions, settings and adjustments required. Instructions shall include a combination of text and illustrations.
 7. Spare Parts and Supply Lists: Include lists of spare parts and supplies required for maintenance and repair to ensure continued service or operation without unreasonable delays. Special consideration shall be required for facilities at remote locations. List spare parts and supplies that have a long lead times to obtain.
 8. Corrective Maintenance Work Hours: Include the manufacturer's projection of corrective maintenance work-hours including craft requirements by type of craft. Corrective maintenance that requires participation of the equipment manufacturer shall be identified and tabulated separately.
- F. O&M Manuals shall contain the following additional information:
1. Parts Identification: Provide identification and coverage for all parts of each component, assembly, subassembly, and accessory of the end items subject to replacement. Include special hardware requirements, such as requirements to use high-strength bolts and nuts. Identify parts by make, model, serial number, and source of supply to allow reordering without further identification. Provide clear and legible illustrations, drawings, and exploded views to enable easy identification of the items.
 - a. When illustrations omit a part number and description, both the illustration and a separate listing shall show the index, reference, or key number which shall cross-reference the illustrated part to the listed part. Parts shown in the listings shall be grouped by components, assemblies, and subassemblies. Parts data may cover more than one model or series of equipment, components, assemblies, subassemblies, attachments, or accessories, such as a master parts catalog, in accordance with the manufacturer's standard commercial practice.
 2. Warranty Information: List and explain the various warranties and include the servicing and technical precautions prescribed by the manufacturers or contract documents to keep warranties in force. Include warranty information for all primary components included in product systems.
 3. Personnel Training Requirements: Provide information available from the manufacturers to use in training designated personnel to operate and maintain the equipment and systems properly.
 4. Testing and Special Tools: Include information on test equipment required to perform specified tests and on special tools needed for the operation, maintenance, and repair of components.
 5. Contractor Information: Provide a list that includes the name, address, and telephone number of the General Contractor and each subcontractor installing the respective product or equipment. Include local representatives and service organizations most convenient to the project site. Provide the name, address, and telephone number of the product or equipment manufacturers.
 6. Written confirmation from the manufacturer that the Contractor has coordinated the equipment One Year Service Call. The Contractor shall arrange for the

Manufacturer to provide one additional service call of one 8 hour working day on site upon demand of the Owner for each type of equipment within the first year of operation (commencing upon date of Substantial Completion) at no additional cost to the Owner

1.5 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.

1.6 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.

1.7 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.

1.8 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. In Review (Status 5 on shop drawing log). The shop drawing is currently under review.
7. For Information Only (Status 6 on shop drawing log). The shop drawing review was for information only.

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^b

Manufacturer^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:

SPECIFICATION SECTION
OR DRAWING NO:

- OM-

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 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.
2. 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.

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. The quality of the photos and video are subject to approval by the Engineer.
- C. 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 and Workmanship.
- B. Manufacturer's Instructions and Manufacturer's Certificates.
- C. Manufacturer's Field Services.
- D. Testing Laboratory Services.

1.2 RELATED REQUIREMENTS

- A. Section 00700 - General Condition.
- B. Section 01340 - Submittals: Submittal of Manufacturer's Instructions.
- C. Section 02200 – Earthwork.

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 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 notify Engineer at least one full working day prior to needing testing laboratory services. Engineer will notify Independent Testing Laboratory. 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.

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:

- a. Wire, cable or busses of appropriate type, sized in accordance with the latest National Electrical Code for the applied loads.
 - b. Use only UL approved wire.
5. Conduit:
- a. Rigid steel, galvanized: ANSI C80.1.
 - b. Electrical metallic tubing: ANSI C80.3.
 - c. Other material approved by NEC.
6. Equipment: Provide appropriate enclosures for the environment in which used in compliance with NEMA Standards.
7. Temporary power shall be based upon the following minimum requirements:
8. Lighting - 300 watt per 1,000 square feet of floor area.
9. Receptacles - One 15 ampere duplex for 1,000 square feet of floor space.
10. 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.
11. 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.
12. 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. Water and Sanitary:
1. The General Contractor shall make necessary arrangements for connection to the municipal water supply and shall provide, at their 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 their 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. Have 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. Water:

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

C. 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 01546USE OF EXPLOSIVESPART 1 - GENERAL1.1 DESCRIPTION

A. Work Included:

1. Drilling, blasting, and removal of all ledge within the limits of excavation as indicated on the Contract Drawings.
2. Pre-blast and post-blast surveys of existing structures and utilities.
3. Seismic monitoring and documentation of all blasting.
4. Obtain a blasting permit from the City of Portsmouth. Permit form is available online at <https://portsmouthnh.viewpointcloud.com/>

B. Related Work Specified Elsewhere (When Applicable):

1. Section 02200 Earthwork
2. Section 02156 Temporary Excavation Support System
3. Section 02140 Temporary Dewatering System
4. Geotechnical Data Report is provided in Appendix A.

1.2 REFERENCES

- A. NFPA 495 (2010) - Explosive Material Code
- B. US Department of Interior Bureau of Mines – Structure Response and Damage Produced by Ground Vibration from Surface Mine Blasting (RI 8507)
- C. Occupational Safety and Health Administration (OSHA) 29 CFR 1910.109 Explosives and Blasting Agents
- D. State Blasting Regulations
- E. Local Blasting Regulations – City of Portsmouth’s Blasting Rules and Procedures, which are included in Appendix B.

1.3 QUALITY ASSURANCE

- A. Perform all blasting operations, including, but not limited to transportation, storage, handling, use and disposal, in accordance with all applicable Local, State and Federal laws, ordinances and code requirements, including NFPA 495, 29 CFR 1910.109, and State of New Hampshire Department of Transportation Standard Specifications for Road and Bridge Construction (latest revision), unless otherwise specified herein.
 1. Blasting shall follow the most restrictive laws, ordinances, and code requirements.
- B. All blasting operations shall be performed by a single firm.
- C. Qualifications:
 1. Blasting Subcontractor:
 - a. Shall possess a current blasting license issued by the appropriate regulatory authority within the project state.
 - b. Shall have a minimum 5-years’ experience on similar blasting projects.

2. Seismic Monitoring Subcontractor:
 - a. Shall be experienced in the use of seismographs and interpreting the information recorded.
 - b. Shall have a minimum 5 years' experience on similar blasting projects.
 - c. shall be selected and employed by the General Contractor.
 - d. may be the Blasting Subcontractor, upon approval of the Engineer.
3. Pre-Blast and Post-Blast Survey Subcontractor:
 - a. Shall be experienced in conducting pre-blast and post-blast surveys and documenting existing conditions of structures, buildings, utilities and monuments.
 - b. Shall have a minimum 5 years' experience on similar projects.
 - c. Shall be selected and employed by the General Contractor.
- D. The Blasting Subcontractor shall secure and pay for all necessary blasting permits, and furnish proof of permitting by all Local and State departments having jurisdiction.
- E. A Pre-Blast Meeting shall be conducted, at the discretion of the Owner and Engineer, by the Blasting Subcontractor to discuss blasting procedures prior to the commencement of blasting operations. The meeting shall be attended by the Engineer, Owner, Blasting Subcontractor, Seismic Monitoring Subcontractor, pre-blast and post-blast Survey Subcontractor, City of Portsmouth Departments, and local utility companies (Eversource and Fairpoint Communications).

1.4 SUBMITTALS

- A. Submit qualifications of the Blasting Subcontractor, Seismic Monitoring Subcontractor and Pre-Blast/Post-Blast Subcontractor, including the names and qualifications of the individuals who will be directly responsible for the work.
- B. Blasting Subcontractor – proof of liability insurance and permitting shall be submitted prior to mobilization of blasting materials.
- C. Submit blasting plan prior to the commencement of the blasting operations. The blasting plan shall include the following:
 1. All equipment that will be used in the blasting operations.
 2. Methods of matting or covering the blast area in open excavations to prevent flyrock and excessive air overpressure (airblast), and dust and fume mitigation.
 3. Diameter, spacing, depth and bottom of blast hole elevation. Amount of explosive used per hole, on each delay and the total for the blast.
 4. Calculations of ground vibration at adjacent structures and/or monitoring locations based on the proposed blasting plan and distances to adjacent structures and/or monitoring locations.
 5. Name and qualifications of individual responsible for the design of the blasting program.
 6. Description of audible warning system to be used.
- D. Submit a monitoring plan prepared by the Seismic Monitoring Subcontractor with the coordination of the Blasting Subcontractor. The monitoring plan shall include the following:
 1. Specifications of proposed instruments used to monitor ground vibrations and air overpressure. Submit calibration documents from within the past year.
 2. Plan indicating Blasting and Seismic Monitoring locations relative to existing buildings and/or other structures.

- E. Submit copy of blasting permits prior to beginning blasting operations.
- F. Submit pre-blast survey documentation/report.
- G. Submit post-blast survey documentation/report.
- H. All shop drawings shall submitted for information only.
- I. For work on NHDOT highways, NHDOT may require their review of the above submittals, including but is not limited to, detailed blasting plans and procedures.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Explosive charges and detonation devices shall be of a type suitable for the intended use. The use of blasting materials shall meet the manufacturer's specifications and safety requirements.
- B. Store all explosives in a secure manner, in compliance with all State and local laws and ordinances, and legibly mark all sch storage places. Storage shall be limited to such quantity as may be needed for the work underway.

PART 3 - EXECUTION

3.1 PRE-BLAST SURVEY

- A. Prior to commencing blasting operations and prior to installing excavation support systems, perform a pre-blast survey shall be conducted, and may be attended by the General Contractor, Blasting Subcontractor, and Engineer.
- B. The structures to be surveyed shall be within 250 feet in all directions from the edge of each blasting locale as shown on the seismic monitoring plan. Structures to be surveyed, and their distance from the blast site may be influenced by the blast design, predicted vibration level and site specific public relations requirements.
- C. The pre-blast surveyor subcontractor shall follow all of the Owner's conditions listed in the Blasting Rules and Procedures for notifying property owners, which include but are not limited to, certified mailings, and at least three attempts over a minimum of 1-week period to contact property owners.
- D. The pre-blast survey shall include color photographs and/or high definition videos of all structures, buildings (including items such as bridges, dams, etc.) and water supply wells within the pre-blast survey zone. The photos and videos shall include both the exterior of each building and structure and all accessible interior rooms of each building, at the discretion of the property owner. All photos shall have the date permanently imprinted on the image.
- E. Prior to blasting, all wells shall be documented and tested as follows:
 - 1. Flow test to measure the yield.
 - 2. Water quality tests by a State certified laboratory for bacteria and turbidity.
- F. The Owner will coordinate access for survey work on adjacent properties.
- G. The Pre-Blast Survey Subcontractor shall submit a final report, which shall include the following:
 - 1. Dated photographs with written identification of each, and/or high definition video of all buildings and other structures surveyed.

2. A written report shall be submitted a minimum of one week prior to commencement of blasting operations or excavation support system installation. The report will be made available to property owners on an as needed basis, with the cost borne by the Owner. The report shall include the following for each building, other structure, and wells:
 - a. Location and description.
 - b. Description of the overall condition.
 - c. Noted physical deficiencies, cracks, pertinent elevations and other physical conditions that could be potentially affected by blasting operations.
 - d. Yield and water quality test results of each water supply well.

3.2 PERFORMANCE - GENERAL

- A. Drilling and blasting materials and methods shall be those necessary to accomplish ledge excavation required for completion of the work indicated on the Contract Drawings.
- B. Blasting shall not commence until the pre-blast survey has been completed and submitted.
- C. Blasting shall not commence until approval is received from the Owner for local roads. For NHDOT highways, blasting shall not commence until approval is received from both NHDOT District 6 Engineer and the Owner.
- D. All explosives shall be stored and handled in a secure manner, in compliance with all Local, State and Federal laws, ordinances, and code requirements. Storage locations shall be legibly marked (vehicles placarded), and daily-use quantities limited to such quantities as may be needed for the current workday, including those necessary for changing site conditions. Explosives shall not be stored on site during non-working hours.
- E. All blasting shall be performed in accordance with all Local, State and Federal laws, ordinances and code requirements.
- F. All blasting areas shall be properly identified with appropriate signs or identification markers as required by law. Blasting signs notifying those approaching the blast site shall be placed at each entrance to the site or blasting area. Blasting notification signs shall be left in place while the above conditions prevail. Immediately remove signs after blasting operations have been completed.
- G. All blasting shall be conducted within the hours of a.m. – 4 p.m. from Monday through Friday, excluding state and federal holidays. Any and all blasting outside of these time limits shall be subject to approval from the Owner, and shall be in compliance with all Local, State and Federal laws, ordinances and code requirements.
- H. All safety precautions shall be taken to protect individuals in the direct vicinity of the blasting operations. Blasting mats or other means to prevent flying rock shall be utilized.
- I. Conduct blasting operations such that damage is prevented to adjacent buildings, other structures, water supply wells, public domain, natural resources and habitat. Acceptable peak particle velocity limits and peak air overpressure limits shall not be exceeded.

- J. General Contractor shall notify each abutting property owner and public utility company with buildings or other structures within a minimum 500-foot radius of the site work at least 10 days prior to initiating pre-blast surveys to enable the owners to take such steps as they may deem necessary to protect their property. The Contractor shall send the notification by certified mail with copies of the letters to be sent to all of the City's Departments listed in the City's Blasting Rules and Procedures, The actual blasting program to be implemented may require notification beyond the 500-foot radius. Notice shall be published in a local paper no more than 30 days and no less than 10 days prior to the initiation of the blasting.
- K. General Contractor shall notify the Engineer at least 72 hours prior to commencing blasting operations.
- L. An audible warning system shall be employed to warn all persons on site of blasting operations. Do not perform blasting work until the area is cleared and secure. Take appropriate precautions to prevent individuals from entering the blasting area. Provide sufficient flagmen outside the danger zone to stop all approaching traffic and pedestrians. The audible system shall include a warning that blasting is to commence, and notification that blasting is complete. Signs explaining the audible warning system shall be posted prior to blasting.
- M. When blasting in areas where rock removal is required adjacent to and below existing structures, care shall be taken at the excavation limits to minimize over-blasting (back break or side break) and fracturing of remaining rock. Hydraulic hammer line drilling, presplit, or other means may be required to minimize the impact to the remaining rock relative to the site-specific conditions and geologic structure.
- N. Perform at least one controlled test blast prior to commencement of production blasting in order to substantiate, or if necessary adjust, the proposed blast design to ensure vibration and overpressure limits are not exceeded. Coordinate scheduling of test blast/s with Engineer.

3.3 VIBRATION CONTROL

- A. All blasting operations shall be conducted to limit ground vibrations to acceptable limits to help ensure that adjacent structures and buildings are not damaged.
- B. Acceptable ground vibration limits shall be:
 - 1. The following vibration limits, Peak Particle Velocity (PPV) in inch/sec, shall be adhered to based upon the USBM Alternative Blasting Level Criteria (adopted from RI 8507, 1980) relative to vibration frequency of blasts:
 - a. Greater than 40 Hz - Maximum PPV = 2.0 in/s
 - b. Greater than 30 Hz but not more than 40 Hz - Maximum PPV = 1.5 in/s
 - c. Greater than 20 Hz but not more than 30 Hz - Maximum PPV = 1.0 in/s
 - d. Not more than 20 Hz - Maximum PPV = 0.5 in/s
- C. The peak air overpressures measured at the nearest above grade occupied structure shall not exceed 133 dB (0.014 psi).
- D. Blasting shall not be permitted less than 72 hours after completion of any and all concrete placements within 250 feet and has 33% of its 28-day design strength.
- E. Adherence to the above listed limits shall not relieve the Contractor of the responsibility to protect existing structures.

- F. If these values are exceeded, Contractor shall stop blasting and submit a revised blasting plan. The revised blasting plan shall indicate why the limits were exceeded and indicate what changes will be made to prevent future exceedances.

3.4 BLASTING DOCUMENTATION (BLAST LOGS)

- A. The Blasting Subcontractor shall prepare and maintain copies of all blasting logs which shall include, but not be limited to, the following information:
 - 1. Date, time and location of blast.
 - 2. Diagram of blast pattern showing the number, diameter, depth, subdrill, distribution, and powder factor for the explosives used per hole and per blast.
 - 3. Sequence and schedule of blasting rounds and delay pattern.
 - 4. Blast evaluations.
 - 5. Weather and temperature conditions.
- B. For each blast at all blast sites, the Seismic Monitoring Subcontractor shall monitor the blasting vibrations and overpressures at a minimum of two buildings or other structures within 250 feet of each blast. This may be adjusted dependent upon the blast design and site-specific conditions as deemed necessary. One monitoring location shall be the nearest structure. Monitoring locations shall preferably be in different directions from the blast. The buildings or other structures to be monitored shall be mutually agreed upon by the Engineer, General Contractor, and Blasting Subcontractor. Blast monitoring shall commence just before the blasts are set off. Record vibration and overpressure measurements, which shall include, but not be limited to:
 - 1. Identification of monitoring instrument, and serial number.
 - 2. Calibration certificate dated within the past year.
 - 3. Name of instrument operator.
 - 4. Building or other structure at which the monitoring instrument is located, and distance from such structure.
 - 5. Distance and direction of monitoring instrument from blast site.
 - 6. Date and time of reading.
 - 7. Type of ground at recording station.
 - 8. Peak particle velocity and frequency for all components (vertical, radial and perpendicular).
 - 9. Values of air overpressure.
 - 10. Printed copies of measurement readings.
 - 11. Blast vibration and air overpressure measurement records shall be made available to Owner and Engineer on a weekly basis as deemed necessary, or as requested.
- C. Crack Monitors:
 - 1. Where required, crack monitors shall be installed by the Seismic Monitoring Subcontractor. They may be required on structures that are within the zone of displacement or heave of the blast (within 20 feet), and/or at cracks in concrete and/or masonry that are greater than 1/16 inches (1.6 mm) wide and within 250 feet of the blast area. Crack monitor locations shall be as determined by the Engineer, Contractor, Blasting Subcontractor, or Seismic Monitoring Subcontractor. All crack monitors shall be documented on plans of the buildings or structures with reference numbers for each monitor.

2. All cracks shall be measured and documented prior to commencement of blasting. Crack widths shall be measured to the nearest 0.10 millimeters.
 3. Crack monitors shall be installed at the following locations:
 - a. Sagamore Creek bridge (multiple locations)
- D. Video Recording of Blasts:
1. Contractor shall digitally record each blast from two locations approximately perpendicular to one another. The recordings shall be named to identify the blast. Contractor shall maintain a library of all video recordings.

3.5 POST-BLAST SURVEY

- A. After conclusion of all blasting work, a post-blast survey shall be conducted at all buildings, structures and water supply wells that were part of the pre-blast survey. The survey may be attended by the General Contractor, Blasting Subcontractor, Engineer, and Owner. A report comparing the pre and post-blast conditions shall be provided.

3.6 DAMAGE TO STRUCTURES AND BUILDINGS

- A. The General Contractor shall be responsible for all damages caused by blasting operations regardless of the adherence to specified vibration limits.
- B. Such damage shall be repaired by the General Contractor at no additional cost to the Owner. The General Contractor shall submit proposed repairs, which shall be reviewed by the Engineer with no exceptions taken. Damages shall be defined as:
1. Physical damage to the structure or building.
 2. Newly formed cracks in concrete or masonry.
 3. Substantial increase in width and/or length of existing cracks in concrete or masonry.
 4. Structure or building movement.
 5. Reduction in water supply well yield or water quality.
- C. The extent of damages caused by blasting operations shall be determined by the Engineer. The Engineer will notify the General Contractor in writing of all damages caused by blasting operations. Disputes shall be resolved based on review of the pre-blast and post-blast surveys, seismic readings, etc.

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 directed by the Engineer but at least daily.
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 New Hampshire Department of Transportation (NHDOT) 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. A minimum of two 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 NHDOT.
- 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 at least two digital message boards at appropriate locations as determined by the local police department and/or the NHDOT 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.
- C. The Traffic Control Plan shall include the anticipated number of flaggers to be used for a given work area.

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.
- C. All temporary detours require approval from the Portsmouth Department of Public Works (DPW). The Contractor shall coordinate implementation of detours with the DPW.

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.
- C. Trenches will be backfilled or plated and roads shall be re-opened to provide safe vehicular and pedestrian traffic at the end of each working day.

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 01572GENERAL PERMIT FOR STORMWATER DISCHARGES FROM CONSTRUCTION
ACTIVITIES (NON-DELEGATED STATE)

Construction activities to be performed under this Project have been determined to require coverage under the National Pollutant Discharge Elimination System (NPDES) stormwater program that applies nationwide. The Environmental Protection Agency (EPA) has not delegated its authority to administer this program to the State of New Hampshire. The program provides that certain discharges are not allowed unless they are licensed, and the EPA is licensing certain discharges of stormwater from construction activities when the requirements of the Construction General Permit (CGP) are met. The EPA requires both the Owner (or their authorized Applicant) and Contractor to submit a Notice of Intent (NOI) and a Notice of Termination (NOT). The CGP, resources, tools and templates can be found here: <https://www.epa.gov/npdes/stormwater-discharges-construction-activities>.

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 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 excursion 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, Applicant (Owner or Contractor), Owner, Applicant (Owner or Contractor) address, 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 Applicant certifies that the information is true and agrees to meeting the requirements of the CGP, including standards for erosion and sedimentation control; inspection and 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 Authorized Representative(s) 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://epanet.zendesk.com/hc/en-us/categories/204532588>
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 Applicant can proceed unless notified by EPA to the contrary. The EPA will attempt to contact the Owner/Contractor regarding any problems or delays, but it is the responsibility of the Owner/Contractor to check the website or contact the EPA NOI Processing Center at 866-352-7755.

1.2 PERFORMANCE PHASE

- A. The Applicant (Owner or Contractor) must continue to comply with the Basic Performance Standards until: (1) they no longer meet the definition of the Applicant (Owner or Contractor) of a construction activity; or (2) the construction activity is complete, all disturbed soils have been finally stabilized, and temporary erosion and sediment controls have been removed. The Applicant (Owner or Contractor) then needs 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 Applicant (Owner or Contractor) use the NPDES eReporting Tool, or “NeT” system to prepare and submit a NOT. The NOT form provides information including, but not limited to, Applicant (Owner or Contractor), Owner, Applicant (Owner or Contractor) address, telephone number, 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 Applicant'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 Owner/Applicant 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 www.epa.gov/npdes/swpppguide. 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.

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.

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 folding conference table, 36 inches by 72 inches, and 8 folding chairs.
 - 3. Two 4-drawer steel filing cabinets with lock and key.
 - 4. Two large wastebaskets
 - 5. Two wall mounted fire extinguishers
 - 6. One inside/outside thermometer with maximum and minimum recordings, General Tools, Model DTR900, or equal.
 - 7. One rain gauge
 - 8. One first aid kit
 - 9. One each, broom, dust pan, brush
 - 10. One refrigerated, 5-gallon bottle water cooler with refills as needed.
 - 11. One multi-function gas meter. Gas meter shall be intrinsically safe for use in Class 1, Division 1, Group A, B, C, D hazardous environments. Meter shall be a multi-gas type meter consisting of 5 sensors as follows: oxygen (O₂); flammable/combustible (LEL); carbon monoxide (CO); hydrogen sulfide (H₂S); and a broad range hydrocarbon (BRH) or similar toxics sensor. Meter shall have audible alarms, visual readout display with backlight, straps or belt clip, as applicable. Contractor shall coordinate calibration of meter by an approved source and per manufacturer's recommendations in regard to

frequency, etc. Acceptable manufacturers are Enmet (Target Model), BW Technologies (GasAlert Micro 5 PID model), or equal.

- 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. Provide a wired connection with minimum 15mbps download and 5 mbps upload speedsOne 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 the AirPrint 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 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. Handle materials in a controlled manner with as few handlings as possible. Do not drop or throw material from heights.
6. 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. Repair, patch and touch up marred surfaces to specified finishes.
 - 2. Broom clean paved surfaces.
 - 3. Rake clean non-paved surfaces of the project site.
 - 4. 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.
2. Electrical System Record Drawing requirements are outlined in Section 16010.

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 three 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 wyeres 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. Grinder Pump Stations
 - a. Show ties to center of pump station covers.
 - b. Label size of grinder pump that are other than standard sized 70 gallon capacity.
 - c. The Wright-Pierce "Sanitary Sewer Service Location" forms shall be used to record grinder pump 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. 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.
- 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 and an electronic file (pdf format) consisting of a full scan of the bound paper set.
- 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.



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)

END OF SECTION

DIVISION 2
Site Work

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 the Contractor, 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 offsite in accordance with all Local, State and Federal Regulations.

B. Related Work Specified Elsewhere: (When Applicable)

1. Earthwork is specified in Section 02200.
2. 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.

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 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. Structural, mechanical, 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. Tank Cleaning: (unless indicated otherwise on the Drawings):
1. Contractor shall be responsible for removal and disposal of the liquid and solid contents of the existing septic tanks and other tanks.
- I. Tank Decommissioning/Abandonment
1. After the tank has been emptied of liquid and solid contents, Contractor shall drill holes in the bottom or break of the bottom of the tank. Then, Contractor shall fill the tank with sand.
- J. Maintain Treatment:
1. During demolition, maintain wastewater and water flows 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.

END OF SECTION

SECTION 02080CONTAMINATED SOIL AND WASTE MANAGEMENTPART 1 - GENERAL1.1 DESCRIPTION

- A. Work Included: Provide all labor, equipment, materials, supervision and documentation necessary to manage soil and waste resulting from Work as shown on the Drawings and as specified herein, including:
- B. Related Work Specified Elsewhere: (When Applicable)
 - 1. 01010, Summary of Work
 - 2. 01150, Measurement and Payment
 - 3. 01320, Safety and Health Plan
 - 4. 01340, Submittals
 - 5. 01400, Quality Control
 - 6. 01562, Dust Control
 - 7. 02140, Temporary Construction Dewatering System
 - 8. 02156, Temporary Excavation Support System
 - 9. 02200, Earthwork
 - 10. 02270, Temporary Erosion Control
 - 11. Geotechnical Data Report is provided in Appendix A.
- C. Project Conditions
 - 1. This work includes handling and disposal of uncontaminated soil. Contaminated soil and waste materials may be encountered during construction. The Contractor shall be prepared to take appropriate action should contaminated soils be encountered during construction.
 - 2. Notify the Owner and Engineer if unexpected subsurface conditions are encountered and discontinue work in the area until Owner provides notification to resume work.
 - 3. All costs associated with delineation, testing, excavation, remediation, treatment, handling, transport and/or disposal of soil and wastes not previously identified without prior written consent from the Owner or Engineer shall be the responsibility of the Contractor.
- D. Health and Safety
 - 1. The Contractor shall be responsible for providing workers that have safety training complying with OSHA, Title 29 CFR Part 1910, Occupational Safety and Health Standards, and Title 29 CFR Part 1926, Safety and Health Regulations for Construction Sites and NIOSH/OSHA/USCG/USEPA, Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities, DHHS/PHS/CDC/NIOSH, October 1985. The provided workers shall be responsible for actively coordinating activities with the Owner and Engineer.
 - 2. The Contractor shall provide a project-specific Safety and Health Plan for the health and safety of all on-site individuals during performance of the Work described herein, also including any individuals at disposal sites. The

Contractors plan shall include provisions for the protection of public health and safety in areas where excavations are located. The Contractor shall comply with all applicable provisions of federal, state, and local health and safety and occupational health and safety statutes and codes.

- E. Reporting
 - 1. If a reportable condition as defined in Federal or State Regulations occurs, the Contractor shall immediately notify the Owner and Engineer. Owner will notify the State Environmental Agency.

1.2 QUALITY ASSURANCE

- A. All work shall be conducted in compliance with the following site-specific plans prepared by the Contractor, as described herein:
 - 1. Site Specific Safety and Health Plan
 - 2. Soil and Waste Management Plan
 - 3. Dewatering Plan (refer to Section 02140)
- B. Objectives
 - 1. The objective of the excavated materials/soils management practices is to manage all soil and other contaminated excavated material at the site during the course of this contract in compliance with applicable Federal, state and local laws and regulations in a cost-effective manner. Contractor shall provide details in the SMP regarding their approach to Quality Assurance during soil excavation, dewatering monitoring and reporting.
 - 2. The objective of the dewatering plan is to manage and control groundwater, divert and handle site stormwater, including groundwater/stormwater discharge flows from/toward the excavation during the course of this contract in compliance with applicable Federal, state (including, but is not limited to NH Code of Administrative Rules Env-Or 600), and local laws and regulations in a cost-effective manner.
 - 3. The Contractor shall prevent any cross-contamination and/or mixing of materials. If cross-contamination occurs, the Contractor shall perform activities to correct the cross-contamination to the satisfaction of the Owner at no additional cost to the Owner and without delay to the project.
- C. Contractor Qualifications
 - 1. Contractor shall demonstrate the necessary skills, experience, training and qualifications to conduct the work specified herein.
 - 2. Contractor shall possess all required licenses, insurances, permits and trained employees to properly execute the work specified herein.
 - 3. Work shall be performed by personnel that are formally trained in handling contaminated soil and groundwater similar to that found on the project site and utilizing the proper equipment.
 - 4. All personnel involved in the transportation of waste from the site shall have the required Department of Transportation (DOT) and Occupational Safety and Health Administration (OSHA) training.

1.3 SUBMITTALS

- A. Provide submittals in accordance with Specification Section 01340.
- B. Submit the following Technical Documents prior to beginning work.
 - 1. Site Specific Safety and Health Plan
 - 2. Soil and Waste Management Plan
 - 3. Dewatering Plan (refer to Section 02140)
- C. Submit the following Quality Control Documents prior to beginning work.
 - 1. Name and current training certifications for personnel completing the work.
 - 2. Name and address of transporters to be used on the project to transport Regulated Soil.
 - 3. Current licenses and permits to operate in all states affected by transport.
 - 4. Disposal Facility Information: Facility Name & Address, Contact Person Name/Title/Phone Number, and Facility Permit Number.
 - 5. Written confirmation from the facility that they are permitted to accept and will accept material of the general quality and quantity described by these Specifications, and the Facility's acceptance criteria.
 - 6. Facility sampling frequency and analytical testing requirements.
 - 7. Written approval from the NHDES for disposal of Regulated Soil or use of Regulated Soil as cover soil in a solid waste disposal area at facilities located in the state of New Hampshire.
 - 8. The Owner shall approve the proposed transporter and disposal facility prior to the transport of any Regulated Soil.
- D. Submit the following documents during execution of Work:
 - 1. All records, certifications, and results associated with the testing or management of excavated materials shall be submitted to the Owner within time frames identified in the SMP.
 - 2. If the Contractor makes updates to the Site Specific Safety and Health Plan, Soil and Waste Management Plan, or the Dewatering Plan, the Contractor shall provide updated copies to the Owner and Engineer.
 - 3. All chemical analytical reports within 48 hours of the Contractor's receipt.
 - 4. Waste profile forms, material shipping records or any other forms, letters or documents that must be signed by the Owner to obtain authorizations for disposal no less than seven days in advance of shipping materials off site.
 - 5. Shipping papers or manifests that must be signed by the Owner no less than 14 days in advance of shipping materials off site.
 - 6. Registrations, letters, forms or applications to be sent to Federal, State or Local environmental regulatory agencies to the Engineer for review prior to submittal. Allow seven days for review. No adjustments for time or money will be made if re-submittals are required due to deficiencies.
 - 7. Certified manifests or shipping paper and weight slips from the approved disposal facilities for Regulated Soil transported and disposed of off-site within five days of Contractor's receipt. At a minimum, manifests and weight slips include the following:
 - a. Truck transporter name, address and telephone number.
 - b. Truck number, date and time of load-out.
 - c. Gross weight, tare weight and net weight of truck.

- d. Description of material being transported.

1.4 DEFINITIONS

- A. Soil (Natural Soils): Soil, otherwise known as natural soil, is defined for the purposes of the Contract as unconsolidated sand, gravel, silt and clay, and the organic material which has become part of the unconsolidated soil matrix. For this section only, soil may include broken and fragmented rock.
- B. Solid Waste: Includes all excavated material not classified as Soil.
- C. Unauthorized Over-Excavation: Consists of removal of materials beyond indicated elevations and width limits indicated in the Contract Documents without direction of the Engineer. Over-excavation material handling, transportation and disposal, backfilling and compaction shall be at the Contractor's expense. Over-excavations shall be backfilled and compacted as specified for excavations of the same class, unless otherwise directed by the Engineer.
- D. Unauthorized Excavation: Consists of removal of materials beyond indicated sub-grade elevations or Contract-defined limits as shown in the Contract documents without specific direction of the Engineer. Unauthorized excavation, handling material, transportation and disposal, backfilling and compaction shall be at the Contractor's expense. Unauthorized excavations shall be backfilled and compacted as specified for excavations of the same class, unless otherwise directed by the Engineer.
- E. Unknown Materials: Any material, that is not readily identifiable as nonhazardous waste, and which has not been previously characterized or encountered during site investigation activities. The Unknown Material classification is to be used in the event that an unexpected, unusual material is encountered for which special handling procedures shall be required in order to handle the material safely. The Owner reserves the right to apply generator knowledge to classify and profile the material as a previously encountered waste or as a known waste. In the event that a material is encountered which the Contractor is uncertain as to its nature, the Owner shall assess the material with the Contractor and inform the Contractor as to the nature of the material (known or unknown).

1.5 PERMITS

- A. Permits: Contractor shall obtain all permits required to conduct the Work included in this Section. Permits may include, but are not limited to the following:
 1. NPDES General Permit for Construction Dewatering Activity Discharges or NPDES Remediation General Permit (NHG910000)

1.6 HEALTH AND SAFETY

- A. Prepare a written Health and Safety Plan (HASP) as described in Section 01320. Such plan must be approved by signature by the Health and Safety Manager and provide for compliance with OSHA regulations including, as applicable 29 CFR 1910.120. All elements in 29 CFR 1910.120(b) (4) shall be addressed in the HASP.
- B. Designate, in name and title, the Contractor's Health and Safety Manager for all health and safety questions and concerns and provide a 24-hour contact phone number for the Health and Safety Manager.
- C. No work shall be performed related to excavation and handling of Regulated Soil

until a HASP is submitted to the Engineer. However, the time to perform under the Contract will begin on the date stipulated in the Notice to Proceed.

- D. Maintain the HASP on site and keep it current with Regulated Soil management activities including loading for transportation and actual site conditions.
- E. Provide personnel protective equipment as stipulated in the Contractor's HASP during the performance of Work in an area identified as potentially posing a risk to worker health and safety for workers employed by the Contractor and Subcontractors.
- F. Inform all on-site workers and Subcontractors of all site safety rules, known or potential hazards, and emergency response procedures.

1.7 SOIL AND WASTE MANAGEMENT PLAN

- A. Prepare a Soil and Waste Management Plan. The plan shall be in compliance with all applicable Federal, State and local regulations; shall be prepared and signed by the Contractor's Qualified Environmental Professional; and at a minimum shall describe detailed procedures that the Contractor plans to follow regarding management of all soil and groundwater, and include the following components:
 - 1. Schedule of activities
 - 2. Soil characterization procedures including sampling frequency, analytical methods and data quality management
 - 3. Storage area construction materials
 - 4. Storage location(s)
 - 5. Disposal facilities and reuse location(s) including address, Owner and Operator
 - 6. Soil segregation procedures
 - 7. Soil loading location and method
 - 8. Operating log to track soil origin, storage location and final disposition
 - 9. Inspection and maintenance procedures
 - 10. Erosion control, dust control, and anti-tracking procedures
 - 11. Emergency and preparedness procedures, including spill response plan
 - 12. Transportation routes
 - 13. Proposed transporters and disposal facilities
 - 14. Site security
- B. No work shall be performed related to excavation and handling of Regulated Soil until the Soil and Waste Management Plan is submitted to and no exceptions taken by the Engineer.
- C. Maintain the Soil and Waste Management Plan on-site and keep it current with Regulated Soil management activities including loading for transportation and actual site conditions.

PART 2 - PRODUCTS

2.1 EQUIPMENT

- A. The Contractor shall provide all employees and subcontractors with personal protective equipment and protective clothing as required by the Contractor's site-specific Safety and Health Plan and all applicable federal, state and local regulations.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine and test the areas and conditions under which excavating Regulated Soils is 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.
- B. Environmental Site Conditions/Safety and Health
 - 1. Site history indicates the potential for soil contamination which may require off-site disposal and management of excavated soils in conformance with all permits.
 - 2. Site history indicates the potential for groundwater contamination which will require storage, testing and disposal directly to the Town's gravity sewer or through other options as listed in Section 02140.
 - 3. The Contractor shall notify the workers of the contaminants that may be present and instruct them to be alert for evidence of contaminated soils. The Owner shall be notified by the Contractor of the presence of hazardous conditions different from those assumed for this document, if encountered.
 - 4. Refer to Section 01320, Safety and Health Plan, for additional safety and health requirements.

3.2 PREPARATION

- A. Temporary Secured Stockpile Area
 - 1. Before placing contaminated material in a temporary stockpile, provide a berm or other drainage barrier around the stockpile area. To prevent accumulation of storm water runoff within the stockpile area, polyethylene sheeting (or other approved method) shall be used to cover stockpiles and the barrier so that runoff is directed outside of the area. Stockpiled areas are to be secured with fencing.
 - 2. Place two complete layers of 6-mil (or greater) polyethylene sheeting on the ground in stockpile area, with a minimum overlap of 18 inches for adjacent sheets in each layer and stagger overlaps for each layer. The layers shall hang over the berm or containment.
 - 3. Frac tanks shall be covered and prevent accidental discharge until tested and disposed of in an approved method.
 - 4. Stockpiles shall be no greater than 250 cubic yards in volume. If space constraints, etc. make it infeasible to maintain separate stockpiles of soils to 250 cubic yards, the Soil and Waste Management Plan shall include a map with the locations of the composite samples for each stockpile shall be provided to the Engineer prior to the submittal of the samples to the off-site analytical laboratory. This will allow any portion of the stockpile, which came back as contaminated soil to be properly segregated and managed separately.
 - 5. Stockpiles all be established and maintained as per EPA requirements under the Construction General Permit Section 2.1.2.4. Requirements include the following:
 - a. Locate the piles outside of any natural buffers and physically separated from other stormwater controls
 - b. Protect from contact with stormwater (including run-on) using a temporary perimeter sediment barrier

- c. For all soils, provide cover or appropriate temporary stabilization to minimize sediment discharge and to contain and securely protect from wind
 - d. Do not hose down or sweep soil or sediment accumulated on pavement or other impervious surfaces into any stormwater conveyance (unless connected to a sediment basin, sediment trap, or similarly effective control), storm drain inlet, or surface water.
- B. Temporary Storage of Investigation Derived Waste (IDW)
1. IDW is defined as all soil cuttings, drilling fluids, decontamination fluids, and investigation derived wastes (including, but not limited to, personal protective equipment, disposable sampling devices, and polyethylene sheeting) generated during the drilling and sampling operations by the Contractor.
 2. IDW management will be conducted in the Temporary Secured Stockpile Area. Preparation of IDW storage must be included in the Contractor's Soil and Waste Management Plan.

3.3 EXCAVATION, BACKFILL AND COMPACTION

- A. Refer to Section 02200
- B. Contractor shall reuse uncontaminated material and urban fill where allowed by the Engineer. Contractor shall dispose of all excess soil and wastes resulting from excavation activities in accordance with federal, state and local regulations and these specifications. Transport shall be by a permitted and licensed waste transporter. The Contractor shall be responsible for supplying the proper manifests to be approved and signed by a representative of the Owner.

3.4 CLEANUP

- A. During the course of the work, the Contractor shall keep the Site and his operations clean and neat at all times. Contractor shall dispose of all residue resulting from the site clearing operations; and at the conclusion for the day's Work, he shall remove and haul away any surplus materials, lumber, equipment, temporary structures, and any other refuse remaining from the site clearing operations and shall leave the entire site in a neat and orderly condition.

3.5 CONTINGENCIES

- A. If during the course of the work, the presence of unforeseen, potentially hazardous materials or conditions becomes known, work in the immediate area shall be suspended and the Owner notified immediately. These conditions include, but are not limited to, finding buried containers, drums, or tanks or finding conditions which materially from those identified in the Bidding Documents.
- B. The effect of unforeseen hazardous conditions on the work shall be evaluated by the Contractor and, if necessary, the Contractor's Safety and Health Plan shall be revised to account for any new hazards due to the unforeseen conditions.

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.

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 - EXECUTION3.1 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.

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.
- F. All loam stripped and stockpiled shall be immediately seeded with 70% Domestic/30% Perennial Rye Grass.

END OF SECTION

SECTION 02140TEMPORARY CONSTRUCTION DEWATERING SYSTEMPART 1 - GENERAL1.1 DESCRIPTION

A. Work Included:

1. Design, furnish, operate, maintain, and remove temporary dewatering system to lower and control ground water table levels and hydrostatic pressures to permit excavation, backfill, and construction to be performed in the dry; collect and dispose of ground and surface water where necessary to complete the work.
2. Design, furnish, operate, maintain, and remove temporary treatment system for temporary dewatering system effluent prior to discharge to ground. Conduct compliance testing, in accordance with the requirements of the permitting authority.

B. Related Work Specified Elsewhere: (When Applicable)

1. Section 02156 Temporary Excavation Support System
2. Section 02200 Earthwork
3. Geotechnical Data Report is provided in Appendix A

1.2 DESIGN REQUIREMENTS

- A. Dewatering system shall be of sufficient size and capacity necessary to lower and maintain ground water table to an elevation at least one] foot below the lowest foundation subgrade or bottom of pipe trench to allow material to be excavated in a dry condition. Materials to be removed shall be sufficiently dry to permit excavation to grades shown and to stabilize excavation slopes where temporary excavation support systems are not required. Operate dewatering system continuously until backfill work has been completed.
- B. Control of surface and subsurface water is part of dewatering system requirements. Maintain adequate control so that:
 1. The stability of excavated and constructed slopes are not adversely affected by saturated soil, including water entering prepared subbase and subgrades where underlying materials are not free draining or are subject to swelling or freeze-thaw action.
 2. Erosion is controlled.
 3. Flooding of excavations or damage to structures does not occur.
 4. Surface water drains away from excavations.
 5. Excavations are protected from becoming wet from surface water, or insure excavations are dry before additional work is undertaken
 6. Prevent loss of fines, seepage, boils, quick conditions or softening of foundation strata.
 7. Maintain stability of sides and bottom of excavation. Construction operations are performed in the dry.

8. Any existing dewatering wells that can affect dewatering and excavation shall be sealed below the excavation subgrade.
- C. Design shall include an assessment of how the dewatering operations will affect the stability of all adjacent structures
- D. Contractor is responsible to perform whatever additional geotechnical investigations are needed to design the dewatering system to allow for proper construction of new facilities while protecting adjacent structures from damage due to settlement, and in accordance with this specification.

1.3 SUBMITTALS

- A. Provide submittals in accordance with Specification Section 01340.
- B. Submit qualifications of temporary dewatering system design engineer.
- C. Submit design calculations, description and complete scaled and dimensioned layout drawings of the proposed dewatering system, designed by an engineer. Such review shall not relieve the Contractor of sole responsibility for the dewatering system as necessary to prevent damage and settlement to adjacent structures, utilities, streets adjacent to excavations and for the safety of persons working within the excavated areas. Submittal shall identify:
 1. Location, depth and size of wellpoints, headers, sumps, ditches; size and location of discharge lines; capacities of pumps and standby units, and detailed description of dewatering methods to be employed to convey the water from site to adequate disposal.
 2. Estimated average, minimum and maximum pumping rates (total)
 3. Method to minimize or eliminate pumping of fines.
 4. Standby pumping equipment
 5. Standby power equipment
 6. Treatment tankage and discharge locations
 7. Sample monitoring log (flow, TSS, etc.).
 8. System removal requirements.
 9. Written approval from the Owner for disposal of the treated water.
- D. Submittals under this Section shall be provided concurrently with and coordinated with the submittals under Section 02156 (Temporary Excavation Support Systems).
- E. Submit monitoring results at the frequency required by the permitting authority.

PART 2 - PRODUCTS

Not Applicable

PART 3 - EXECUTION

3.1 PERFORMANCE

- A. General:
 1. Prior to any excavation below the ground water table, place system into operation to lower water table as required and operate it continuously 24 hours a day, 7 days a week until utilities and structures have been satisfactorily constructed, which includes the placement of backfill materials and dewatering is no longer required.

TEMPORARY CONSTRUCTION DEWATERING SYSTEM

2. 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.
 3. Thoroughly brace or otherwise protect against flotation all pipelines and structures which are not stable.
 4. Maintain standby backup equipment and power supply throughout the duration of the dewatering operation.
 5. Prevent soil particles from entering the discharge points.
 6. Ground water level shall be maintained at least one foot below the bottom of the excavation.
- B. Disposal of Water:
1. Dispose of water pumped or drained from the construction site in a suitable manner to avoid siltation of adjacent drainage structures and piping, wetlands or water bodies, 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. Provide treatment as necessary to prevent discharge of contaminated ground water caused by Contractor's operations, or any contaminated ground water that may pass through the excavation support system selected by the Contractor.
 4. Contractor must obtain all necessary regulatory approvals for the disposal of dewatering flows. These may include, among others, approval by the USEPA under the National Pollutant Discharge Elimination System (NPDES) program for construction activities.
- C. Damage:
1. Avoid damage to and settlement of adjacent buildings, roads, structures, utilities and other facilities.
 2. Any damage to or settlement of structures 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 corrugated metal, polyethylene or P.V.C. pipe.
 3. Entirely surround the underdrain and fill the space between the underdrain and the pipe or structure with free draining 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:

TEMPORARY CONSTRUCTION DEWATERING 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.

3.2 PRE-TREATMENT

- A. Contractor shall provide a settling tank (or tanks) to provide pre-treatment of groundwater prior to discharge. Tanks shall be sized to provide 60-minute hydraulic retention time at the anticipated maximum sustained pumping rate. Tanks shall have an underflow baffle to collect any floatables and shall have final overflow weir to allow for flow measurement and sample collection. The effluent weir shall be sized to allow for accurate flow measurement based on the anticipated pumping rates.
- B. Routine inspection of the settling tanks shall be carried out daily, with records maintained.
- C. Settling tanks shall be cleaned frequently to prevent excess deposition of solids which could overflow from the tank.
- D. Conduct effluent sampling requirements per the requirements of the permitting authority which is receiving the pre-treated dewatering system effluent.

3.3 MONITORING

- A. General:
 1. Contractor shall monitor the performance of the dewatering system and the groundwater level achieved throughout construction.
 2. Contractor shall monitor the effluent quality from the treatment system as required by the permitting authority.
- B. Corrective Action:
 1. If dewatering requirements are not satisfied due to inadequacy or failure of the dewatering system (loosening of the foundation strata, or instability of slopes, or damage to foundations or structures), the Contractor shall stop work and submit a revised temporary dewatering system design submittal. The revised plan shall indicate why the system revisions are needed and indicated what change will be made to address the issues. Contractor shall perform work necessary for reinstatement of foundation soil and damaged structure resulting from such inadequacy or failure by Contractor, at no additional cost to Owner.

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 or other systems designed by the Contractor. Related Work Specified Elsewhere (When Applicable):
1. Section 01546 Use of Explosives
 2. Section 02200 Earthwork
 3. Section 02140 Temporary Dewatering System
 4. Geotechnical Data Report 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 properly 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. The excavation support system shall be designed to accommodate an additional 2 feet of excavation below the bottom of excavation shown on the Contract Drawings.
- 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 workmen, 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 internal lateral bracing shall be located so that the braces shall not pass through walls and/or slabs of existing or proposed structures.
- D. The support system shall provide adequate room to properly perform the installation and to allow for inspection of the installation.
- E. 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.
- D. 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.
- E. Submittals under this Section shall be provided concurrently with and coordinated with the submittals under Section 02401 (Temporary Dewatering System).

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.

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.

3.2 INSTALLATION

- A. Install excavation support system in accordance with all applicable State and Federal regulations including the Occupational Safety and Health Act.

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 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 existing 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 the usual manner.
- 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. The use of explosives is specified in the Supplementary Conditions section of this Contract, and in Division 1.
 2. Traffic Regulation is specified in Division 1.
 3. Clearing and Grubbing, Dewatering, Filter Fabric, Temporary Erosion Control, Stripping and Stockpiling of Topsoil, Sheeting, Landscaping, and Paving are specified in the appropriate sections of this Division.
 4. Section 01400 - Quality Control.
 5. 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 C-117-90 and ASTM C-136-93 (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 D-1557-91 (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 D 1556-90, (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 D-698-91 (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

The Independent Testing Laboratory shall conform to the following procedures and standards:

- A. Submit test results in accordance with the procedure specified in the General and Supplementary Conditions.
- B. 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).
- C. Field density tests on embankment materials shall be as follows:
- D. Tests shall be taken on every 200 cubic yards of embankment material.
- E. 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.

- F. Trenches: Field density test in trenches shall be taken at 75 linear foot intervals on every third lift.
- G. In addition to the above tests the Independent Testing Laboratory will perform additional density tests at locations and times requested by the Engineer.
- H. 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 Subbase: 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. Shall meet the requirements of NHDOT 304.3 crushed gravel. 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>
2 inch	95-100
1 inch	55-85
No. 4	27-52
No. 200	0-12

- B. Aggregate Surface and Leveling Course: Shall be screened or crushed aggregate of hard durable particles free from vegetable matter, lumps or balls of clay and other deleterious substances. Shall meet the requirements of NHDOT 304.33 crushed aggregates. The gradation of the part that passes a 2-inch sieve shall meet the following grading requirements:

<u>Sieve Designation</u>	<u>Percent by Weight Passing Square Mesh Sieves</u>
1-1/2 inch	100
1 inch	90-100
No. 4	30-65
No. 200	0-10

- C. Gravel: 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

- D. 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

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. Shall meet the requirements of NHDOT 304.4 crushed stone. Gradation requirements shall be as follows:

<u>Sieve Designation</u>	<u>Percent by Weight Passing Square Mesh Sieve</u>
2 inch	100
1-1/2 inch	85-100
3/4 inch	45-75
No. 4	10-45
No. 200	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
¼ 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

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 select fill.
PVC or PE Pipe	screened stone.

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 select fill
PVC or PE Pipe	Screened stone

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 insure 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. Compaction:

1. After grading, compact subgrade surfaces to the depth and percentage of maximum density for each area classification.

D. 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, and Riprap and Stone Ditch Protection 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 140oF, 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 (both directions)	ASTM D4595-86	120 pounds
Grab Elongation	ASTM D4632-86	50 percent
Mullen Burst Strength	ASTM D3786-87	210 psi
Puncture Strength	ASTM D3787	60 pounds
Trapezoid Tear Strength	ASTM D4533-85	50 pounds
Water Flow Rate	ASTM D4491-85	120 gal/min/sf
Equivalent Opening Size (EOS)	ASTM D4751	U.S. Std. Sieve #80
Coefficient of Permeability	ASTM D4491-85	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>
Grab Tensile Strength (both directions)	ASTM 4595-86	195 pounds
Grab Elongation	ASTM D4632-86	20 percent
Mullen Burst Strength	ASTM D3786-87	340 psi
Puncture Strength	ASTM D3787	85 pounds
Trapezoid Tear Strength	ASTM D4533-85	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 02270
TEMPORARY EROSION CONTROL
(NEW HAMPSHIRE)

PART 1 - GENERAL

1.1 DESCRIPTION

A. 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 "Stormwater Management and Erosion and Sediment Control handbook for Urban and Developing Areas in New Hampshire" prepared by the New Hampshire Natural Resources Conservation Commission.

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.

- B. Berms
 - 1. Berm shall be constructed of degradable woven silt sock material. No synthetic materials shall be allowed.
 - 2. Filtrexx SiltSoxx Natural Original silt sock or equivalent.
- C. Sand Bags:
 - 1. Heavy cloth bags of approximately one cubic foot capacity filled with sand or gravel.
- D. Mulches:
 - 1. Loose hay, straw, peat moss, wood chips, bark mulch, crushed stone, wood excelsior, or wood fiber cellulose.
 - 2. Type and use shall be as specified in "Stormwater Management and Erosion and Sediment Control Handbook for Urban and Developing Areas in New Hampshire" prepared by the NHDES, RECD, and the USDA Soil Conservation Service, herein after referred to as the NHSCH.
- E. Mats and Nettings:
 - 1. Woven organic materials (coco or jute) that is wildlife-friendly. No synthetic materials shall be allowed.
 - 2. Type and use shall be as specified in the NHSCH.
 - 3. East Coast Erosion Control EC-7Y Coir Mat or equivalent.
- F. Permanent Seed:
 - 1. Conservation mix appropriate to the predominant soil conditions as specified in the NHSCH and subject to approval by the Engineer.
- G. Temporary Seeding:
 - 1. Use species appropriate for soil conditions and season as specified in the NHSCH and subject to approval by the Engineer.
- H. Water:
 - 1. The Contractor shall provide water and equipment to control dust, as directed by the Engineer.
- I. 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

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.

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. Maintenance:
 - 1. 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.

- C. Removing and Disposing of Materials:
1. When no longer needed, material and devices for temporary erosion control shall be removed and disposed of as approved by the Engineer.
 2. 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.
 3. When dispersed over adjacent areas, the material shall be scattered to the extent that it causes no unsightly conditions nor creates future maintenance problems.

END OF SECTION

SECTION 02419
GRAVEL SURFACING

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to work of this Section.
- B. Related Work Specified Elsewhere: (When Applicable)
 - 1. Earthwork: 02200.

1.2 DESCRIPTION OF WORK

- A. This work shall consist of furnishing and placing one or more courses of granular material on a prepared surface in accordance with the specifications in reasonably close conformity with the lines, grades, thicknesses and typical cross sections, as shown on the plans or established by the Engineer.

1.3 SUBMITTALS

- A. Refer to 02200 – Earthwork for required material submittals.

PART 2 - PRODUCTS

2.1 ROADWAY GRAVEL

- A. Roadway gravel shall be aggregate subbase and/or gravel as described in these Specifications.

PART 3 - EXECUTION

3.1 PLACING

- A. If the required compacted depth of roadway gravel exceeds 9 inches the courses shall be constructed in 2 or more layers of approximately equal thicknesses. The maximum completed thickness of any roadway gravel layer shall not exceed 9 inches.
- B. Each layer of aggregate shall be placed over the full width of the section. When conditions restrict operations over the full width, the Engineer may authorize the Contractor to place less than full width layers. When the Contractor places material to complete the full width, the exposed edge of the previously placed aggregate shall be cleaned of all contamination before additional roadway gravel is placed adjacent thereto.
- C. Roadway gravel courses may be placed upon frozen surfaces when such surfaces have been properly constructed.
- D. The material as spread shall be well mixed with no pockets of either fine or coarse material. Segregation of large or fine particles will not be allowed.

3.2 SHAPING AND COMPACTING

- A. Compaction of each layer of aggregate subbase and roadway gravel shall continue until a density of not less than 95 percent of the maximum density has been achieved

for the full width of the layer. The maximum density shall be determined in accordance with AASHTO T-180, Method D. Field density tests will be made by the sand cone method in accordance with AASHTO T-191 or at the option of the Owner's Representative, by use of Nuclear devices in accordance with ASTM D6938 or by the water balloon test methods in accordance with ASTM-D2167.

- B. The surface of each layer shall be maintained during compaction operations in such manner that a uniform texture is produced and the aggregate firmly keyed. The moisture content of the material shall be maintained at the proper percent to attain the required compaction.

3.3 SURFACE TOLERANCE

- A. The completed surface of the designated course shall be shaped and maintained to a tolerance, above or below the required cross-sectional shape, of 1/2 inch.

END OF SECTION

SECTION 02431CATCH BASINS, GRATES AND FRAMESPART 1 - GENERAL1.1 DESCRIPTION

- A. Work Included: Construct catch basins, grates, frames and brick masonry in conformance with the dimensions and locations shown on the Drawings.
- B. Related Work Specified Elsewhere: (Where applicable)
 - 1. Pipe, trench excavation and backfill, paving and dewatering are specified in the appropriate Sections in this Division.

1.2 QUALITY ASSURANCE

- A. Precast Catch Basin Base, Barrel and Top Sections:
 - 1. Conform to ASTM C478-97 except as modified herein, on the Drawings, or as directed by the Engineer.
 - 2. Minimum strength of 4,000 psi at 28 days
 - 3. Testing:
 - a. Determine concrete strength by tests on 6 inch by 12 inch vibrated test cylinders cured in the same manner as the bases, barrels and tops.
 - b. Have tests conducted at manufacturer's plant or at an approved testing laboratory.
 - c. Have not less than 2 tests made for each 100 vertical feet of precast catch basin sections.
- B. Frames and Covers:
 - 1. Acceptable Manufacturers:
 - a. EJ Group, Inc.
 - b. Neenah Foundry Company
 - c. Or equivalent.
- C. Masonry:
 - 1. Brick: Shall comply with the ASTM Standard Specifications for Sewer Brick (made from clay or shale), Designation C32, for Grade SS, hard brick.
 - 2. Cement: ASTM C-150.
 - 3. Hydrated Lime: ASTM C-207.
 - 4. Sand: ASTM C144.

1.3 SUBMITTALS TO THE ENGINEER

- A. Submit shop Drawings and manufacturer's literature in conformance with the Standard General Conditions of the Construction Contract.
- B. Bases, Barrel Sections and Tops: Submit test results and receive approval from the Engineer prior to delivery to the site.

PART 2 - PRODUCTS

2.1 PRECAST CATCH BASIN SECTIONS

- A. Dimensions, as shown on the Drawings.
- B. Use flat tops or eccentric cones as appropriate. Exterior face of cone sections shall not flare out beyond the vertical.
- C. Joints: Bell-and-spigot or tongue-and-groove formed on machine rings to ensure accurate joint surfaces.
- D. Constructed to support an HS-20 wheel loading.
- E. Openings:
 - 1. Provide openings in the risers to receive pipes entering the catch basin of the types and materials approved by the Engineer.
 - 2. Make openings at the manufacturing plant or cut openings in the field.
 - 3. Size: To provide a uniform annular space between the outside wall of pipe and the riser.
 - 4. Location: To permit setting of the entering pipes at the correct elevations.
- F. Joints:
 - 1. Joint gaskets to be flexible self seating butyl rubber joint sealant installed according to manufacturer's recommendations. For cold weather applications, use adhesive with joint sealant as recommended by manufacturer.
 - 2. Acceptable Materials:
 - a. Kent-Seal No. 2
 - b. Ram-Nek
 - c. Or equivalent.
 - 3. Joints between precast sections shall conform to related standards and manufacturer's instructions.

2.2 FRAMES AND GRATES

- A. All essential details of design shall conform to the Drawings. Standard castings differing in non-essential details may be approved by the Engineer.
- B. All frames and grates shall be made of cast iron and shall have machined bearing surfaces to prevent rocking under traffic.
- C. Grate castings will be smooth with no sharp edges.
- D. Constructed to support an HS-20 wheel loading.

2.3 MASONRY

- A. Brick:
 - 1. Sound, hard, uniformly burned, regular and uniform in shape and size, compact texture, and satisfactory to the Engineer.
 - 2. Immediately remove rejected brick from the work.
- B. Mortar:
 - 1. Composition (by volume):
 - a. 1 part portland cement.
 - b. 1/2 part hydrated lime.
 - c. 4-1/2 parts sand.

2. The proportion of cement to lime may vary from 1:1/4 for hard brick to 1:3/4 for softer brick, but in no case shall the volume of sand exceed 3 times the sum of the volume of cement and lime.
- C. Cement:
1. Shall be Type II Portland cement.
- D. Hydrated Lime:
1. Shall be Type S.
- E. Sand:
1. Shall consist of inert natural sand.
- F. Grading:

<u>Sieve</u>	<u>Percent Passing</u>
No. 4	100
No. 8	95-100
No. 16	70-100
No. 30	40-75
No. 50	10-35
No. 100	2-15
No. 200	0-5

PART 3 - EXECUTION

3.1 PERFORMANCE

- A. Precast Catch Basin Sections:
1. Perform jointing in accordance with manufacturer's recommendations and as approved by the Engineer.
 2. Install barrels and tops level and plumb.
 3. Make all joints water tight.
 4. Solidly fill annular spaces around pipes entering the catch basin with non-shrink grout or other material approved by the Engineer.
 5. Cut openings (as required) carefully to prevent damage to barrel sections and tops. Damaged barrel sections and tops shall be replaced by the Contractor at no additional expense to the Owner.
- B. Pipe Connections to Catch Basins: Connect pipes to catch basins with joint design and materials approved by the Engineer.
- C. Masonry:
1. Laying Brick:
 - a. Use only clean bricks in brickwork for catch basins.
 - b. Moisten the brick by suitable means until they are neither so dry as to absorb water from the mortar or so wet as to be slippery when laid.
 - c. Lay each brick in a full bed and joint of mortar without requiring subsequent grouting, flushing, or filling, and thoroughly bond as directed.
 - d. Construct all joints in a neat workmanlike manner, construct the brick surfaces inside the manholes so they are smooth with no mortar extending beyond the bricks and no voids in the joints. Maximum mortar joints shall be 1/2 inch.

2. Curing:
 - a. Protect brick masonry from drying too rapidly by using burlaps which are kept moist, or by other approved means.
 - b. Protect brick masonry from the weather and frost as required.
- D. Frames and Grates:
 1. Set all frames in a full bed of mortar, true to grade and concentric with the catch basin opening.
 2. Completely fill all voids beneath the bottom flange to make a watertight fit.
 3. Place a ring of mortar at least one inch thick around the outside of the bottom flange, extending to the outer edge of the catch basin all around its circumference.
 4. Clean the frame seats before setting the covers in place.
- E. Bedding and Backfilling:
 1. Bedding material of catch basin shall be 6 inches of screened stone (see Section 02200).
 2. Backfill 18 inches all around catch basin with gravel borrow.

END OF SECTION

SECTION 02435CULVERTS AND STORM DRAINSPART 1 - GENERAL1.1 DESCRIPTION

- A. Work Included:
 - 1. Provide and install culvert or storm drain pipe and sections of the type(s), size(s) and in the location(s) shown on the Drawings and as specified herein.
- B. Related Work Specified Elsewhere:
 - 1. Excavation and backfill, dewatering, catch basins, pavement, borrow and bedding material are specified in the appropriate sections in this division.

1.2 SUBMITTALS

- A. Submit, in duplicate, sworn certificates of inspections and tests performed at the location of manufacturers.
- B. Submit shop drawings in accordance with the General Conditions of the Construction Contract.

1.3 DELIVERY, STORAGE AND HANDLING

- A. Exercise care when handling pipe to prevent damage of any nature to pipe and finish.
- B. Immediately remove damaged materials and replace at no additional cost to the Owner.
- C. Store materials above ground on platforms, skids or other adequate supports.

1.4 FIELD QUALITY CONTROL

- A. Acceptance will be on the basis of tests of materials and inspection of the complete product.
- B. Inspection may be made at the place of manufacture or on the construction site after delivery, or both, and the pipe shall be subject to rejection at any time due to failure to meet all of the specification requirements, even though sample pipe units may have been accepted as satisfactory at the place of manufacture.
- C. Immediately remove from the project site all rejected pipe.

PART 2 - PRODUCTS2.1 MATERIALS

- A. Pipe shall be Corrugated Polyethylene (PE) Pipe
- B. Materials for pipes shall conform to Standards listed as follows:

1. Corrugated polyethylene pipe (smooth interior). This pipe and fittings shall have a smooth interior and corrugated exterior and conform to the requirements of AASHTO M252 and AASHTO M294 or ASTM F2648. The pipe joint system shall be watertight (WT) and shall meet or exceed the current ASTM D3212 Lab Test Requirements and the current ASTM F1417 Watertight Field Test Requirements. Coiled pipe will not be accepted.

PART 3 - EXECUTION

3.1 INSPECTION

- A. Examine areas to receive piping for the following:
 1. Obstructions that adversely affect the installation and quality of the work.
 2. Deviations beyond allowable tolerances for clearances.
- B. Examine pipe and fittings before installation to assure no defective materials are incorporated.
- C. Start the work only when conditions are satisfactory.
- D. Remove and replace all defective materials at no additional cost to the Owner.

3.2 INSTALLATION

- A. Do not install pipe, nor backfill, between December 15 and April 1 without the written permission of the Engineer.
- B. Begin laying the pipe at the downstream end.
- C. Lay paved or partially lined pipe with the lining on the bottom.
- D. Join flexible pipe sections and metal end sections by coupling bands.
- E. Assemble the plates for structural plate arches according to the manufacturer's assembly instructions and as shown on the Drawings.

END OF SECTION

SECTION 02480LANDSCAPINGPART 1 - GENERAL1.1 DESCRIPTION

A. 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. Furnish, place, and test topsoil, seed, lime, and fertilizer where shown on the drawings and protect and maintain seeded areas disturbed by construction work, as directed by the Engineer.
 - 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 SUBMITTALS AND TESTING

A. 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. The certification shall include the guaranteed percentages of purity, weed content and germination of the seed, and also the net weight and date of shipment. No seed may be sown until the Contractor has submitted the certificates and certificates have been approved.
 4. 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. If existing topsoil is inadequate or additional topsoil is needed, chemical and composition soil sample tests for this mixture is required before using in any areas.
4. Have soil samples tested by an independent soils testing laboratory, approved by the Engineer, at the Contractor's expense.
5. Have soil samples tested for physical properties, composition, 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.
6. 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.

1.3 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.

1.4 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.
3. No fertilizer except limestone should be applied within any wetlands or within a Vegetated Buffer Strip or Limited Cut Area in accordance with the City of Portsmouth Zoning Ordinance 10.1018.24.

PART 2 - PRODUCTS

2.1 MATERIALS FOR GRADING AND SEEDING

A. Topsoil:

1. Fertile, friable, natural topsoil typical of the locality, without admixture of subsoil, refuse or other foreign materials and obtained from a well-drained site.
2. Mixture of $\frac{3}{4}$ loam and $\frac{1}{4}$ compost for all topsoil areas.
 - a. Loam
 - i. Shall consist of a mixture of 40% sand, 40% silt, and 20% clay particles.
 - b. Compost
 - i. Manufactured through the controlled aerobic, biological decomposition of biodegradable materials.
 - ii. Has undergone mesophilic and thermophilic temperatures, which significantly reduces the viability of pathogens and weed seeds, and stabilizes the carbon such that it is beneficial to plant growth.
 - iii. Typically used as a soil amendment, but may also contribute plant nutrients.
 - iv. Bears little physical resemblance to the raw material which it originated.
 - v. Is an organic matter source that has the unique ability to improve the chemical, physical, and biological characteristics of soils or growing media.
 - vi. The sanitization through the generation of thermophilic heat shall meet the standards of the Processes to Further Reduce Pathogens (PFRP), as defined by the Code of Federal Regulations Title 40, Part 504, Appendix B, Section B.
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. Topsoil depth shall be 6-inches, unless otherwise indicated.

- B. Fertilizer:
1. Low phosphate, slow release nitrogen fertilizer (N-P₂O₅-K₂O) 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 City of Portsmouth, State of New Hampshire, and federal fertilizer laws and ordinances.
 2. The fertilizer shall have no more than 1% phosphorous. 3:1:3 or 10:0:10 N:P:K (Nitrogen: Phosphorous: Potassium) is acceptable.
 3. The fertilizer shall consist of at least 50% slow release nitrogen components, meaning half of the nitrogen will not be immediately available. 75% of nitrogen shall be organic.
 4. 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 600 lbs/acre.
- 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. Limestone shall be 50 percent calcium plus magnesium oxide.
 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.
- 3. Grass seed shall meet the requirements of the New Hampshire Agricultural and Vegetable Seeds Law. As specified in the law, the mixture shall include no "primary noxious weed seeds".
- 4. Seed which has become wet, moldy, or otherwise damaged will not be acceptable.
- 5. NHDOT Park seed Type 15 shall normally be used on loam areas. This seed mixture shall conform to Table 1.

Table 1 - Park Seed Type 15

Kind of Seed	Minimum Purity (%)	Minimum Germination (%)	Pounds/Acre (Kilograms/Hectare)
Creeping Red Fescue ^c	96	85	40 (45)
Perennial Ryegrass ^a	98	90	50 (55)
Kentucky Bluegrass ^b	97	85	25 (30)
Redtop	95	80	5 (5)
			TOTAL 120 (135)

NOTES TO TABLE 1:

- ^a Ryegrass shall be a certified fine-textured variety such as Pennfine, Fiesta, Yorktown, Diplomat, or equal.
- ^b Bluegrass shall be a certified variety such as Merion, Baron, Majestic Touchdown, Nugget, Ram One, or equal.
- ^c Fescue varieties shall include -Creeping Red and/or Hard Reliant, Scaldis, Koket, or Jamestown.

6. NHDOT Slope Seed Type 45 shall be used on slopes that exceed 2:1. This seed mixture shall conform to Table 2.

Table 2 – Slope Seed Type 45

Kind of Seed	Minimum Purity (%)	Minimum Germination (%)	Pounds/Acre (Kilograms/Hectare)
Creeping Red Fescue ^c	96	85	40 (45)
Perennial Ryegrass ^a	98	90	50 (55)
Redtop	95	80	5 (5)
Alsike Clover	97	90 ^e	5 (5)
Birdsfoot Trefoil ^d	98	80 ^e	5 (5)
Lance-Leaved Coreopsis	95	80	4 (4.5)
Oxeye Daisy	95	80	3 (3)
Blackeyed Susan	95	80	4 (4.5)
Wild Lupine	95	80	4(4.5)
			TOTAL 95 (106.5)

NOTES TO TABLE 2:

- ^a Ryegrass shall be a certified fine-textured variety such as Pennfine, Fiesta, Yorktown, Diplomat, or equal.
^c Fescue varieties shall include -Creeping Red and/or Hard Reliant, Scaldis, Koket, or Jamestown.
^d Empire variety preferred) Inoculum specific to birdsfoot trefoil must be used with this mixture. The inoculum shall be a pure culture of nitrogen-fixing bacteria selected for maximum vitality and the ability to transform nitrogen from the air into soluble nitrates and to deposit them in the soil. The inoculum shall not be used later than the date indicated on the container or later than specified. The inoculum shall be subject to approval.
^e Includes not more than 10 percent hard seed for alsike clover and not more than 25 percent hard seed for birdsfoot trefoil. If necessary, to meet this requirement, extra seed shall be supplied at no expense to the Owner

7. A New England wetland seed mix shall be used to restore temporarily impacted wetland areas, as approved by the Engineer.

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 specimen quality and certified by the supplier to be free of disease and infestation.
 - 5. The Owner and Engineer reserves the right to refuse/reject any plant material that fails to meet the standards set forth in the ANSI A300 Part 6 Standard Practices for Planting and Transplanting and/or the City of Portsmouth, NH Planting Requirements.
 - 6. 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.

7. 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.
8. 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.
9. 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.
10. Caliper of trees shall be measured one foot above ground.
11. 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.
12. 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.
13. 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.
14. 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.

15. 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.
16. 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.
17. 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. Before spreading topsoil, the subgrade shall be raked by approved means. Remove all stones greater than four inches and all debris or rubbish to a depth of 6 inches. Such materials shall be removed from the site.
 2. Scarify the subgrade to a depth of 2 inches to allow the bonding of the topsoil with the subsoil.
 3. Apply topsoil to a depth of 6 inches or as directed on areas to be seeded.
 4. Trim and rake the topsoil to true grades free from unsightly variations, humps, ridges or depressions.
 5. Remove all objectionable material and form a finely pulverized seed bed.
- 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.

- D. Seed and Sod Bed
 - 1. 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.
 - 2. Fine rake surface to receive seed or sod.
 - 3. After natural settlement and a light rolling, the completed work shall conform to the lines, grades, pitches, and spot elevations shown on the plans.
 - 4. Seeding may be done immediately thereafter, provided the seed bed has remained in a good friable condition and has not become wet.
- E. Placing Fertilizer:
 - 1. Distribute fertilizer uniformly at a rate determined by the soils test over the areas to be seeded.
 - 2. Incorporate fertilizer into the soil to a depth of at least 3 inches by discing, harrowing, or other methods acceptable to the Engineer.
 - 3. The incorporation of fertilizer may be a part of the tillage operation specified above.
 - 4. Distribution by means of an approved seed drill equipped to sow seed and distribute fertilizer at the same time will be acceptable.
- F. Placing Lime:
 - 1. Uniformly distribute lime immediately following or simultaneously with the incorporation of fertilizer.
 - 2. Distribute lime at a rate determined from the pH test, to a depth of at least 3 inches by discing, harrowing, or other methods acceptable to the Engineer.

3.2 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.

3.3 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 otherwise 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 and are prohibited for use in a wetland or wetland buffer.

3.4 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.

3.5 GUARANTEE

- A. The Contractor shall submit a written guarantee to the Engineer, after Provisional Acceptance of grass, covering reseeded areas which do not survive through one full growing season after the date of Provisional Acceptance, at no cost to the Owner.

3.6 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.

3.7 PLANTING METHOD

- A. The Owner and Engineer reserve the right to refuse/reject any planting method or action that fails to meet the standards set forth in the ANSI A300 Part 6 Standard Practices for Planting and Transplanting and/or the City of Portsmouth, NH Planting Requirements.
- B. The Contractor shall excavate plant pits, furnish and place all plants, and then maintain them in a satisfactory manner until final acceptance.
- C. All pits shall be dug by hand to the size and shape as shown on the Drawings.
- D. For tree and shrub planting, soil used for backfilling shall be improved topsoil as recommended by soil analysis consisting of no more than 20% Organic Compost, 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.
- E. 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.
- F. The root ball of the tree shall be worked so that the root collar of the tree is visible and no girdling roots are present.
- G. The root collar of the tree shall be 2"-3" above grade of the planting hole for finished depth.

- H. 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 wire and burlap shall be removed from the root ball planting pit.
- I. All plantings shall be backfilled in three lifts and all lifts shall be watered so the planting will be set and free of air pockets.
- J. An earth berm shall be placed around the perimeter of the planting hole except where curbed planting beds or pits are being used.
- K. 2"-3" of mulch shall be placed over the planting area.
- L. 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.

3.8 PLANTING SEASON

- A. Do all planting work within the dates herein specified.

3.9 PRUNING, PAINTING, SPRAYING

- A. Pruning:
 - 1. Contractor shall notify residents at least 24-hours before entering their property to cut tree limbs, prune branches, or cut down trees.
 - 2. 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.
 - 3. 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.

3.10 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.
- B. Stakes and guys shall be used where appropriate and/or necessary. Guy material shall be non-damaging to the tree.

3.11 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. At the time of planting is complete the planting shall receive additional water to ensure complete hydration of the roots, backfill material, and mulch layer.
- C. All lifts while backfilling shall be watered so the planting will be set and free of air pockets.

- D. 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.

3.12 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.

3.13 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.

3.14 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.

3.15 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 property owner shall take over maintenance of the planting. Nevertheless, the guarantee of all plant material will remain with the Contractor.
- 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.

3.16 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. At final acceptance of the project all areas shall have a close stand of grass with no weeds present and no bare spots greater than three inches (3") in diameter over greater than five percent (5%) of the overall seeded area.
- C. All plantings shall be established and replaced as required by the Guarantee Period.
- D. After all necessary corrective work has been completed, the Engineer will certify in writing the final acceptance of the planting.

3.17 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 02482TREE PROTECTION AND PRUNINGPART 1 - GENERAL1.1 DESCRIPTIONA. Work Included:

1. The Work as described by this Section consists of all special excavation required to protect and maintain the existing trees and complete the work as indicated in the Contract Documents, and as specified hereunder:
 - a. Protect trees and roots from mechanical damage during construction throughout the project area
 - b. Special Excavation is required in all locations where work occurs underneath the canopy of a tree.
 - c. Special Excavation shall consist of hand excavation to expose existing tree roots.
 - d. Exposed tree roots to be preserved shall be exposed and cut by hand with clean, sterilized equipment by the Project Arborist.
2. 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.

B. Related Work Specified Elsewhere:

1. Section 01050 – Coordination
2. Section 01400 - Quality Control
3. Section 02200 – Earthwork
4. Section 02480 - Landscaping

1.2 QUALITY ASSURANCE

- A. All work under this section shall be overseen by an approved certified arborist (hereinafter referred to as the Project Arborist).
- B. All canopy pruning and root pruning shall be completed by the Contractor under the direction of the Project Arborist.
- C. No penetration of the tree trunk shall be allowed except as approved by the Project Arborist.
- D. Notify the Project Arborist when roots greater than 2 inches are encountered.
- E. Project Arborist shall be hired directly by the Contractor.
- F. Contractor shall provide adequate notification of work within the subject area to accommodate Project Arborist to be on site.

PART 2 - PRODUCTS2.1 MATERIALS FOR TREE PROTECTION

- A. Snow fencing: Snow fencing shall be new four-foot height wooden lath snow fencing, painted red. Stakes for snow fencing shall be six-foot-long stamped metal drive stakes, commonly used to support snow fencing.

- B. Primary Tree Protection/Trunk protection
 - 1. boards shall be 8' lengths of 2"x4" lumber
 - 2. strapping shall be 16 gauge galvanized steel wire
- C. Signage
 - 1. A minimum of two signs should be attached to all tree protection areas at no greater than fifty (50') foot intervals. The signs should be a minimum of two (2') feet x two (2') feet, bearing the following phrase in red letters on white background at least four (4") inches in height: TREE PROTECTION ZONE - KEEP OUT!
 - 2. On a separate portable sign located in the general work area, in red lettering on white background not less than two (2") inches in height is to be the following: PROHIBITED ACTIVITIES: followed by the list below in letters not less than one (1") inch
 - a. entry of machinery or people.
 - b. storage of building materials.
 - c. parking of any kind.
 - d. erection or placement of site facilities.
 - e. removal or stockpiling of soil or site debris.
 - f. disposal of liquid waste including paint and concrete wash.
 - g. excavation or trenching of any kind (including irrigation or electrical connections).
 - h. attaching any signs or any other objects to the tree.
 - i. placement of waste disposal or skip bins.
 - j. pruning and removal of branches, except as directed by the Project Arborist and approved by the property owner.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Provide all equipment necessary for the proper tree protection and pruning.
- B. Using colored ribbon, Contractor and Project Arborist shall tag all trees and shrubs within 25 feet of the centerline of the alignment as follows:
 - 1. Yellow – Trunk and root protection. Root pruning expected
 - 2. Orange – Trunk and root protection. Root pruning not expected
 - 3. Red – Tree to be removed.
- C. Prior to commencing construction, the Contractor shall stake out the limits of work, including all sidewalk excavation, sidewalk construction, trenching, bridge work, roadway, building construction, and driveway construction.
- D. After tagging trees, establishing the tree protection zone and staking out limits of work, but before any work begins, Contractor shall conduct a pre-construction meeting with the Project Arborist and the Engineer. The pre-construction meeting shall be conducted at least two weeks prior to construction to review tree protection procedures and to identify trees and shrubs to be protected or removed.
- E. No trees shall be tagged for removal or removed by the Contractor without approval of the property owner.

3.2 TREE PROTECTION

- A. Protect trees from stockpiling, material storage including soil, vehicle parking and driving within the tree drip line. Restrict foot traffic to prevent excessive compacting of soil over root systems.
- B. Protect root system from flooding, erosion, excessive wetting and drying resulting from de watering and other operations.
- C. Above-ground surface runoff shall not be directed into the tree canopy area from adjacent areas. Ensure that construction does not trap water within the tree drip line.
- D. Protect existing plant materials from unnecessary cutting, breaking and skinning of roots and branches, skinning and bruising of bark.
- E. When trees are noted to be removed, use air/vacuum excavation of around root structure as needed to protect roots of nearby trees designed for protection/preservation.
- F. Primary tree protection shall be provided for each tree within the work area unless the tree is noted to be removed on the plans or its removal is approved by the Project Arborist. The work area shall be considered to extend 10 feet beyond the backs of the limit of work as designated on the plans.
- G. Secondary tree protection shall consist of snow fencing used to define the work area. Snow fencing shall not obstruct pedestrian or vehicular access to private residences.
- H. Primary tree protection shall include 2"x 4" boards in 8-foot lengths vertically strapped around the trunk, at a maximum of 8 inches apart, on center, wrapped with wire, not fasteners.
- I. Primary and secondary tree protection shall be installed prior to any construction and shall be maintained during the construction period. The Owner and Contractor or Engineer shall inspect primary and secondary tree protection every other week during the construction period.
- J. When trees are noted to be removed, use air excavation as needed to help preserve nearby trees selected for preservation.
- K. When trenching, pull material away from the trunk to limit root damage.
- L. Signage, as described elsewhere in this section, shall be posted to all secondary tree protection fencing in a way that is visible to all workers.
- M. Tree protection shall consist of the following measures:
 - 1. No storage or dumping of any materials or equipment shall be allowed.
 - 2. No parking shall be allowed.
 - 3. No foot traffic or vehicle traffic shall be allowed.
 - 4. Vertical mulching shall be required if soil compaction levels exceeds 75% or more than 3 passes by heavy equipment are expected.
 - 5. If foot or vehicular travel is required within the tree protection area, a layer of at least 12 inches of wood chips, mulch, or other equivalent matting or protection shall be laid down to protect the roots. The matting shall be removed and the area restored to pre-construction conditions upon completion of the work.
 - 6. No soil sterilant shall be used adjacent to preserved trees.

3.3 PRUNING

- A. Contractor shall notify residents at least 24-hours before entering their property to cut tree limbs, prune branches, or cut down trees.
- B. Selective pruning of branches that would interfere with construction may be conducted only by the Project Arborist after approval by the Owner.
- C. Pruning of roots shall be conducted only by the Project Arborist with sharp, sterilized hand pruning instruments. Do not break, chop, or mutilate.
- D. No roots greater than 1.5 inches shall be cut other than by the Project Arborist.
- E. All roots shall be cut cleanly with hand pruners or hand saw to promote regrowth.

3.4 TREE SURGERY

- A. All trees overhanging the back of the sidewalk or within the public right-of-way line shall be pruned in accordance with ANSI A300 standards for pruning. Trees shall be trimmed and limbed to provide the following equipment clearances within the work zone, except where overhead lines are present that would make it impossible for equipment to damage the trees:
 - 1. 33 feet over the roadway (from face of curb to face of curb)
 - 2. 14 to 16 feet from the face of curb to the back of the sidewalk (which is approximately co-located with the right-of-way line).
- B. Existing trees shall be trimmed of all dead, diseased, and obviously weak limbs at the direction of the Project Arborist. The presence of any disease condition, fungus fruit bodies, decayed trunk or branches, split crotches or branches, cracks, or other structural weaknesses should be reported in writing to the Engineer and corrective measures recommended.
- C. All cuts shall be made as close as possible to the trunk or parent limb, without cutting onto the branch collar or leaving a protruding stub. Bark at the edge of all pruning cuts should remain firmly attached.
- D. All branches too large to support with one hand shall be precut to avoid splitting or tearing of the bark. Where necessary, ropes or other equipment should be used to lower large branches or stubs to the ground.
- E. Equipment that will damage the bark and the cambium layer shall not be used on or in the tree. The use of pruning spurs is not permitted for pruning operations on live trees.
- F. Sharp tools shall be used so that clean cuts will be made at all times.
- G. All cut limbs shall be removed from the crown upon completion of the pruning.

3.5 EXCAVATION AROUND TREES

- A. Limits of Special Excavation area as indicated above.
- B. Within all Special Excavation areas, the Project Arborist shall be on-site to oversee excavation, identify limits of the root system, including lateral and support roots for the tree, and direct contractor in exposing roots, cutting roots and protection/relocation of roots and treating/covering ends of roots as required. When trenching, pull material away from the trunk to limit root damage.

3.6 FINISH GRADING

- A. Maintain existing grades within drip line of trees unless otherwise indicated.
- B. Soil Preparation: If soil within drip line of trees is compacted, then prior to watering or fertilizing trees, area within the drip lines shall be tilled to break up the top two inches of existing soil.

3.7 CLEAN-UP

- A. 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. Material generated during any of the activities described herein shall be removed from the site at the end of each working day as directed by the Engineer. The Contractor shall repair any damage to site or structures to restore them to original condition, as directed by the Engineer, at no cost to the Owner.

3.8 PUBLIC HEALTH AND SAFETY

- A. Upon encountering any condition of tree work or tree health which might threaten the public health, safety, and welfare and which is not directly addressed by this specification section, the arborists and the Contractor shall notify the Engineer immediately and shall make recommendations pertaining to the resolution of said conditions.

3.9 LIABILITY

- A. The Contractor shall be responsible for the protection of all existing trees and plants, unless specified for removal on the Drawings or designated for removal in the field by the Project Arborist, for the length of the construction period, including liability for all damages as specified herein. The placement of additional protection devices beyond those specified herein shall be at the Contractor's discretion.

END OF SECTION

SECTION 02510CEMENT CONCRETE SIDEWALKSPART 1 - GENERAL1.1 DESCRIPTION

- A. Work Included: This work shall consist of the construction of new cement concrete sidewalks and walkways in accordance with these specifications and in reasonably close conformity with the lines and grades shown on the Drawings or established by the Contracting Officer.
- B. Related Work Specified Elsewhere: When applicable, aggregate base and subbase, bituminous concrete paving and granite curbs are specified in the appropriate sections in this Division.

1.2 RELATED DOCUMENTS

- A. State of New Hampshire Department of Transportation Standard Specifications for Road and Bridge Construction, 2016 or latest edition, herein after referred to as NHDOT Specifications.

1.3 QUALITY ASSURANCE

- A. Materials: Use only materials furnished by a bulk cement concrete producer regularly engaged in the production of Portland cement concrete.
- B. Submittals: A certificate of compliance shall be furnished to the Contracting Officer that the materials supplied comply with the specification requirements.

1.4 SUBMITTALS

- A. Refer to 03300 – Cast in Place Concrete for required material submittals.

PART 2 - EXECUTION2.1 MATERIALS

- A. The Portland cement concrete shall be Class "A" concrete and conform to the requirements of NHDOT Specifications Section 520.
- B. The reinforcements, joint material and protective coating shall conform to the requirements of NHDOT Specifications Section 608.

PART 3 - EXECUTION3.1 EXCAVATION

- A. Excavation shall be to the depth and width that will permit the installation and bracing of the forms. The foundation shall be shaped and compacted to a firm, even surface conforming to the section shown on the plans. All soft and yielding material shall be removed and replaced with acceptable material.
- B. Base course materials shall conform to the requirements of NHDOT Specifications, Section 209.2.1.2.

3.2 FORMS

- A. Forms shall be of wood or metal and shall extend for the full depth of the concrete. All forms shall be true, free from warp and of sufficient strength to resist the pressure of the concrete without springing. Bracing and staking of forms shall be such that the forms remain in both horizontal and vertical alignment until their removal.

3.3 PLACING CONCRETE

- A. The foundation shall be thoroughly moistened immediately prior to placing the concrete. The proportioning, mixing and placing of the concrete shall be in accordance with good construction practices, as stated in the requirements of the NHDOT specifications Section 520.3.

3.4 FINISHING

- A. Concrete shall be finished by use of wood, or magnesium floats, by skilled concrete finishers. A fine-grained broom finish shall be applied.
- B. All outside edges and expansion or construction joints shall be edged with an edging tool having a radius of ¼-inch. All crack control joints in sidewalks subject to foot traffic shall be edged with a jointing tool.

3.5 JOINTS

- A. Construct transverse and longitudinal crack control joints by sawing, jointing tool or other approved method to a minimum depth of one third the slab thickness. If the jointing tool is not capable of constructing a joint to the correct depth, saw the joint to the correct depth.
- B. Saw crack control joints as soon as concrete has hardened sufficiently to permit sawing without excessive raveling and before uncontrolled shrinkage cracking occurs, usually between four and twenty-four hours.
- C. Crack control joints shall match existing joints and/or be spaced in accordance with NHDOT Specification Section 608.3.2.6.
- D. Expansion joints shall match existing joints. Slabs shall be placed alternately and the joints coated with an approved bituminous material before placing the adjacent slab.
- E. When a concrete sidewalk is constructed adjacent to a curb, building, retaining wall, light pole base or other fixed structure, a 1/4 inch thick premolded joint filler shall be used between the slab and the structure. Joint filler shall be installed for the full depth of the slab.

3.6 CURING

- A. Concrete shall be cured for a minimum of 7 days. Curing compounds will not be allowed. Curing shall be by moist burlap or plastic sheets, or by other approved materials placed in close contact with the finished concrete as soon as the concrete has set sufficiently to avoid damage from the placement of the coverings. During the curing period, all traffic, both pedestrian and vehicular, shall be excluded. Vehicular traffic shall be excluded for such additional time as may be directed.

3.7 COATINGS

- A. Protective coatings shall be applied in accordance with NHDOT Specification Section 534.3.

END OF SECTION

SECTION 02511BRICK PAVINGPART 1 - GENERAL1.1 DESCRIPTION

A. Work Included:

1. The extent of brick paving is shown on the drawings. The work includes removal of existing bituminous concrete and/or Portland cement pavement; regrading; placement and compaction of brick on asphalt and brick on concrete pavements-drives, sidewalk, cross-walks; and associated work.

B. Work Not Included:

1. Removal and replacement of paving for the convenience of the contractor will not be considered for payment.

C. Related work specified elsewhere:

1. Excavation and embankment, aggregate base and subbase bituminous concrete paving, bituminous concrete curbs, granite, pavement markings, and cast-in-place concrete.

1.2 SUBMITTALS

A. Submit the following in accordance with Section 01340:

1. Samples:

- a. Furnish five individual samples of brick showing extreme variations in color and texture.
- b. Furnish five individual samples of brick showing "nominal" color and texture.

2. Test reports:

- a. Test reports for brick are to be submitted to the Engineer for review.
- b. Testing and reports are to be completed by an independent laboratory.
- c. Test reports shall show:
 - i. Compressive strength.
 - ii. 24 hr. cold water absorption.
 - iii. 5 hr. boil absorption.
 - iv. Initial rate of absorption (suction).

3. Certificates:

- a. Prior to delivery, submit to Engineer certificates attesting compliance with the applicable specifications for grades, types or classes included in these specifications.

1.3 QUALITY ASSURANCE

A. Product Delivery Storage and Handling:

1. Store brick off the ground to prevent contamination by weed, dust or any materials likely to cause staining or any other defects.
2. Cover bricks when necessary to protect from elements.

3. Do not deliver cement, lime and similar perishable materials to the site until suitable storage is available. Store such materials in weatherproof structures, and ensure that materials are in perfectly fresh condition when brought out for use.
 4. Protect reinforcement from elements.
- B. Job Conditions:
1. Staining:
 - a. Prevent grout on mortar from staining the face of masonry to be left exposed.
 - b. Protect all existing buildings, entrance pads, etc. from grout or droppings of mortar and damage during construction.
 - c. Perform grouting and/or mortar work when temperature is at least 50° and rising and the temperature of the existing pavement or ground surface is 40° or higher.
- C. Paving Quality Requirements:
1. Provide final surface of uniform texture, conforming to required grades and cross sections.
 - a. Surface will not be acceptable if there are irregularities exceeding 3/16 inches in 10 feet.

PART 2 - PRODUCTS

2.1 BRICKS

- A. Bricks shall be all new bricks obtained from one reputable manufacturer with a history of making paving bricks for use in New Hampshire.
- B. Bricks shall conform to requirements of A.S.T.M. Standard Specifications for Building Bricks (made of clay or shale) Designation C62-75A for grade SW with the following modifications:
 1. The maximum average cold water absorption limit shall not exceed 8% for five bricks.
 2. The maximum average 5 hour boil absorption limit shall not exceed 17% for five bricks.
 3. The compressive strength shall not be less than 6000 pounds per square inch (PSI).
 4. The initial rate of absorption shall be above 5 grams per minute per thirty square inches.
 5. The bricks shall not be cored or have frogs.
- C. The bricks shall be No. 1, water struck type for paving.
- D. Bricks shall be of standard size (2 1/4" x 3 3/4" x 8") with permissible variations not to exceed 1/16" in depth, 1/8" in width or 1/4" in length.

2.2 MORTAR, GROUT

- A. Cement - An Approved brand of portland cement conforming to ASTM C150, Type 1. (No Air Entraining Agent)
- B. Mason's Sand - Aggregate for use in masonry mortar, grout and the play area shall consist of natural sand, light in color, obtained from a single source, with no organic materials present.

1. Grading: Aggregate for use in masonry mortar shall comply with the following limits:

Item	<u>Limit</u>
<u>Mass percent passing</u>	
sieve	
4.75 mm (No.4)	100
2.36 mm (No. 8)	95 to 100
0.150 mm (No. 100)	25 max.
0.075 mm (No. 200)	10 max.
Fineness modulus	1.6 to 2.5
Water demand, ratio by mass	0.65 max.

2. If the fineness modulus varies by more than 0.20 from the value assumed in selecting the proportions for the mortar, the aggregate shall be rejected unless suitable adjustments are made, subject to approval by the Engineer, in proportions to compensate for the change in grading.

Water shall be fresh, clean water suitable for human consumption.

- C. Lime - Approved brand of plastic hydrated, such as New England 4X, conforming to ASTM Specification C207, Type "S".
- D. Mortar shall be type M mortar.

1.	Parts by volume Portland Cement	Parts by volume Hydrated Lime a Damp Loose Condition	Parts by volume Sand, Measure in
	1	.25	2.8 - 3.75

2. Mortar shall not have an air content of more than 12% (BIA requirement).
- E. Sand-Cement Grout - as shown in the drawings for brick work, and granite paving stones.
 1. Proportions:
 - a. 1 part cement
 - b. 6 parts masonry sand
 2. Thoroughly mix in a dry condition and apply in a dry condition.

PART 3 - EXECUTION

3.1 BRICKS SET WITH SAND CEMENT GROUT

- A. Pavement Removal:
 1. Mechanically cut pavement to be removed to a straight line unless otherwise directed by the Engineer.
 2. Pavement shall not be unnecessarily disturbed or destroyed.
- B. Base Preparation:
 1. Refer to the Drawings and the specification of this Division for placement and compaction of the subgrade, foundation, and bituminous base courses.

2. Sand-Cement Grout: A layer of sand-cement grout material one (1") inch in thickness shall be spread upon the properly prepared bituminous base course except all edge conditions. This course shall be firm but not compacted.
 3. The completed surface of each course shall be shaped and maintained to a tolerance, above or below the required cross- sectional shape, of 3/16 of an inch.
- C. Brick Placement: Perform all masonry work with skilled workmen under adequate supervision. A journeyman brick mason shall supervise all brick placement. Lay all masonry true to lines and grade with all surfaces true, and corners straight and plumb. Lay exposed-to-view masonry blocks with an individual unit-to-unit level tolerance not to exceed 1/8-inch and an overall tolerance from the grade not to exceed 1/4-inch in 10 feet in any direction. Lay no unit having chipped edges of face, in exposed-to-view locations. Remove any such unit, if installed and replace with a new undamaged unit.
1. Edges: Mortar all edge bricks to the bituminous base and buildings or curbs as shown on the Drawings. See Bricks on Concrete base for expansion joint dimensions.
 2. Pavement: The brick shall be laid in patterns shown on the Drawings. The joints shall be hand tight, leaving only as much space between bricks as occurs naturally from rough surface or slight irregularities. A piece of paper shall not be able to slide between the bricks. When necessary, the brick will be struck and broken. The Engineer will require replacement of improperly broken bricks. No spaces shall be larger than 1/8 inch left at broken brick areas. No struck bricks shall be less than two (2") inches in length.
- D. Compaction: After the bricks are carefully laid upon the properly prepared sand-cement grout base, a 3/8" sheet of plywood shall be placed upon the bricks and carefully set with a compactor until the bricks reach a firm, unyielding bed and present a surface of the proper grade and slope. Any divergence from line and grade is to be corrected by taking up and relaying the bricks. After setting the bricks, a sufficient amount of sand-cement grout shall be spread over the surface and thoroughly swept or raked so as to fill the joints. All surplus sand-cement grout remaining on the brick paved areas after the joints have been properly filled shall be removed by sweeping. Avoid raking out the joints during the removal of excess sand-cement. A final application of sand free of grout shall be spread on the sidewalk.
- E. Watering: Thoroughly water the brickwork to saturate wet the Sand- Cement Grout using a sprinkler without washing off the layer of sand.
- F. Cleanup: The sand shall remain on the brick work surface for a minimum of 24 hours, after which time the brick surface shall be swept clean. Avoid raking grout out of the joints.

3.2 BRICKS ON CONCRETE BASE

- A. Base Preparation:
1. Refer to the Drawings and the specification of this Division for placement and compaction of the subgrade, base and reinforced concrete courses.
 2. The completed surface of each course shall be shaped and maintained to a tolerance, above or below the required cross- sectioned shape, of 3/16 of an inch.

- B. Placing Concrete:
 - 1. The concrete shall be placed in slabs unless otherwise shown on the Drawings or as specified by the Engineer. The slabs shall be separated from the curb by formed expansion joint fillers 1/2 inch in thickness. Joint filler shall be placed around existing structures as directed by the Engineer. The slab shall be struck off with a screed. See the Cast-in-Place Concrete specification for protection and curing. The concrete shall cure at least 48 hours before installation of brick paving.
 - 2. Reinforcing steel shall have a two (2") inches cover distance to any slab edge or joint.
- C. Mortar Base: A one half inch (1/2") layer of cement mortar shall be placed on the wetted concrete surface.
- D. Brick Placement:
 - 1. Refer to Section 3.1.E. of this Specification with the following modifications.
 - a. Wetted bricks shall be placed on the cement-mortar layer using a concave joint.
 - b. Joints between bricks shall be 1/4" to 3/8" and completely filled. Avoid staining bricks with mortar.
 - c. Immediately following sufficient setting of the mortared joints, the exposed brick surface shall be cleaned with muriatic acid solution and any marks removed.

END OF SECTION

SECTION 02513CBITUMINOUS CONCRETE PAVING (NEW HAMPSHIRE)PART 1 - GENERAL1.1 DESCRIPTION

- A. Work Included:
 - 1. Furnish all plant, labor, equipment and materials required to install bituminous concrete pavement courses, including sidewalks, driveways, temporary and permanent trench paving and restoration of pavement markings as shown on the Drawings and as specified herein.
 - 2. Remove bituminous asphaltic and/or Portland cement pavement, and replace bituminous asphaltic pavement, base, binder courses and surface courses, including temporary pavement, within the area(s) shown on the Drawings and as directed by the Engineer.
 - 3. Keep pavement removal to a minimum width suitable for the required construction.
 - 4. Apply pavement markings to the permanent paving as specified.
- B. Work Not Included: Removal and replacement of paving for the convenience of the Contractor will not be considered for payment.
- C. Related Work Specified Elsewhere (When Applicable):
 - 1. Excavation, backfill, aggregate base and subbase.

1.2 QUALITY ASSURANCE

- A. Materials: Use only materials furnished by a bulk bituminous concrete producer regularly engaged in the production of hot mixed, hot laid bituminous concrete.
- B. Equipment: Provide, maintain and operate pavers, dump trucks, tandem, 3-wheel and pneumatic tired rollers well suited to the mixtures being placed. Provide, maintain and operate hand equipment as required. When applicable, provide, maintain and operate trimming equipment and materials.
- C. Mix Requirements, Method of Placement and Compaction: Standard Specifications for Road & Bridge Construction, State of New Hampshire, Department of Transportation, latest edition, hereinafter called NHDOT Standards for mixing, placing and compacting bituminous concrete surfaces are applicable to this work.

1.3 SUBMITTALS

- A. A certificate of compliance shall be furnished to the Engineer that the materials supplied comply with the specification requirements.
- B. Delivery slips shall be furnished with each load of mix delivered to the project. Information shall include:
 - 1. Vehicle identification.
 - 2. Date.
 - 3. Project.
 - 4. Identification of material.
 - 5. Gross, tare and net weights.

6. Signed by the bituminous concrete producer.
7. Stamped by a licensed public weigh master.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Hot Bituminous Paving Mix:
 1. Binder Course - 19.0 mm nominal maximum aggregate size.
 2. Surface Course - 12.5 mm nominal maximum aggregate size.
 3. Sidewalks and Drives - 9.5 mm nominal maximum aggregate size.
- B. Composition of Mixtures - Control Points

SIEVE SIZE	GRADING			
	TYPE 25 mm	TYPE 19 mm	TYPE 12.5 mm	TYPE 9.5 mm
	PERCENT BY WEIGHT PASSING - COMBINED AGGREGATE			
37.5 mm	100			
25 mm	90-100	100		
19 mm	90	90-100	100	
12.5 mm	-	90	90-100	100
9.5 mm	-	-	90	90-100
4.75 mm	-	-	-	90
2.36 mm	19-45	32-42	42-52	46-56
1.18 mm	-	-	-	-
0.60 mm	-	-	-	-
0.30 mm	-	-	-	-
0.075 mm	1-7	2-8	2-10	2-10

- C. Tack Coat:
 1. Emulsified type, Grade RS-1, CRS-1, HFMS-1, CSS-1, 1h
- D. Pavement markings shall be in accordance with Section 02577.

PART 3 - EXECUTION

3.1 GENERAL

- A. Grade Control:
 1. The Contractor shall establish and maintain the required lines and grades, including crown and cross-slope, for each course during construction operations.
- B. Trench areas shall receive initial paving as the work progresses where trenches are in paved streets. Not more than 300 linear feet of backfill trench shall be left unpaved.
- C. Reset all existing manholes to finished grade as required at no additional cost to the Owner.

3.2 PAVEMENT REMOVAL

- A. General:

1. Exercise extreme care in the removal of pavement so that pavement will not be unnecessarily disturbed or destroyed.
 2. Mechanically cut pavement to be removed to a straight line, unless otherwise directed by the Engineer.
 3. All pavement removed shall become the property of the Contractor and disposed of at acceptable locations designated by the Owner and at no additional cost to the Owner.
- B. New Hampshire DOT Areas:
1. When removing pavement under the jurisdiction of the New Hampshire Department of Transportation (NHDOT) strictly adhere to all DOT regulations controlling pavement openings.

3.3 SURFACE PREPARATION

- A. Tack coats shall conform to the NHDOT Standard Specifications.
- B. Tack Coat:
1. Apply to contact surfaces of previously constructed asphalt or Portland cement concrete and surfaces abutting or projecting into asphalt concrete pavement. Distribute at rate of 0.05 to 0.15 gallons per square yard of surface.

3.4 PLACING THE MIX

- A. General:
1. Place asphalt concrete mixture on prepared surface. Minimum allowable temperature for placing is 250°F. Maximum shall be 325°F. Place in areas inaccessible to paving machine and small areas by hand. Place each course to required grade, cross-slope and compacted thickness.
- B. Protection:
1. After final rolling, do not permit vehicular traffic on pavement until it has cooled and hardened to the extent that the pavement will not be damaged.

3.5 PAVEMENT MARKINGS

- A. Material, approved by the Engineer, is to be furnished and applied after the installation of permanent paving.
- B. Apply pavement markings in accordance with existing markings. Match paint color, marking dimensions, layout and other details with existing markings in the vicinity of the project.

END OF SECTION

SECTION 02525GRANITE CURBSPART 1 - GENERAL1.1 DESCRIPTION

- A. Work Included: This work shall consist of furnishing and installing curb or edging, or removing and relaying existing curbing or edging in accordance with these specifications and in reasonably close conformity with the lines and grades shown on the Drawings or established by the Engineer. The types of curbs are designated as follows:

Type 1 - Vertical granite curb

Type 5 - Sloped granite edging

- B. Related Work Specified Elsewhere: Excavation and Embankment, Aggregate Base and Subbase, Bituminous Concrete Paving and Landscaping are specified in the appropriate Sections of this Division.

1.2 SUBMITTALS

- A. Submit shop drawings in accordance with the applicable sections of Division 1, and the General Conditions of the Specifications.
- B. Provide dimensional information, layout diagrams, and source of materials.
- C. Submit mortar mix design.
- D. Submit masonry contractor's qualifications.

PART 2 - PRODUCTS2.1 MATERIALS

- A. General:
1. The stone for curbing and edging shall be hard, durable, quarried granite.
 2. It shall be gray in color, free from seams, cracks or other structural defects and shall be of smooth splitting character.
 3. The curb may contain natural color variations that are characteristic of the granite source.
 4. The dimensions, shape and other details shall be as shown on the Drawings.
- B. Source:
1. The Contractor shall submit for approval the name of the quarry which is the proposed source of the granite for curb materials.
 2. Samples shall be submitted for acceptance by the Engineer when requested.
- C. Finish and Surface Dimensions:
1. Vertical Curb, Type 1:
 - a. The individual curb stones shall conform to the dimensions indicated on the Drawings.
 - b. Individual stones shall be furnished in minimum lengths of 6 feet, unless otherwise specified.

- c. The exposed face of the stone curb shall be free from indications of drill holes. Half drill holes not larger than 3/4 inches diameter will be permitted in the arris line in the plane of the back.
 - d. The top surface shall be sawed or dressed to an approximately true plane with no depression or projection on that surface of over 1/8 inch.
 - e. The top front arris line shall be pitched straight and true with no variations from a straight line greater than 1/4 inch.
 - f. The top back arris line shall meet the same requirement as the top front arris except that indentations of a maximum of 3/8 inch will be allowed.
 - g. There shall be no projection or depression on the back face which would exceed a batter of 1 horizontal on 3 vertical for a distance from the top of 3 inches.
 - h. The front face shall be at right angles to the top and shall be smooth split and have no projections greater than one inch or depressions greater than 1/2 inches, measured from the vertical plane of the face through the top arris line, for a distance down from the top of 8 inches. The remainder of the face shall have no projections or depressions greater than one inch measured in the same manner.
 - i. The ends of the curb shall be approximately square with the planes of the top, back and face and so finished that when the sections are placed end to end with the required minimum spacing of 1/4 inch no more than 5/8 inch space shall show in the joint for the full width of the top surface and for the entire exposed front face. The remainder of the end may extend back no more than 8 inches from the plane of the joint.
 - j. The bottom surface may be sawn or split.
 - k. Drill holes through the curb will be allowed providing they are at least 9 inches below the top and are mortared full with portland cement mortar before placing the stone.
2. When curbing is specified on the Drawings with a radius of 60 feet or less, it shall be cut on the specified radius.
3. Curb Inlets: Inlets used at catch basins shall conform to the applicable requirements of Vertical Curb, Type 1, and to the shape, dimensions and details as shown on the Drawings.
4. Sloped Edging, Type 5:
- a. The individual edging stones shall conform to the dimensions indicated on the Drawings.
 - b. Individual stones shall be furnished in minimum lengths of two (2) feet, unless otherwise specified.
 - c. The exposed face shall be smooth split to an approximate true plane having no projections or depressions which will allow over one (1) inch to show between a two (2) foot straightedge and the face when the straightedge is placed as closely as possible on any part of the face.
 - d. Half drill holes not more than three (3) inches in length and 3/4 inch in diameter will be permitted along the bottom.
 - e. The arris line, top front shall be straight and true with no variation from a straight line greater than 1/8 inch.

- f. The arris lines at the bottom of the face shall be straight and true so that not over one (1) inch shall show between the stone and a straightedge for the full length of the stone.
 - g. The ends shall be square to the length at the face and so finished that when the stones are placed end to end, no space more than 1 1/2 inches will show in the joint for the width of the face.
 - h. When sloped edging is specified on the Drawings with a radius of thirty (30) feet or less, it shall be cut on the specified radius.
5. Terminal curb, Type 1: Shall meet the requirements of Vertical Curb, Type 1 as contained herein.
- D. Joint Mortar:
- 1. Shall consist of one (1) part Portland cement and two (2) parts sand and mixed with sufficient water to form a plastic composition.
 - 2. The Portland cement shall conform to AASHTO M85, Type II-A.
 - 3. The sand shall consist of the following gradation:
 - 100% Passing the No. 8 sieve
 - 15-40% Passing the No. 50 sieve
 - 0-10% Passing the No. 100 sieve
 - 0-5% Passing the No. 200 sieve

PART 3 - EXECUTION

3.1 REMOVAL OF CURBING

- A. The Contractor shall carefully remove, store and clean curb specified on the Drawings or designated for resetting.
- B. Curbing damaged or destroyed, as a result of the Contractor's operations or because of his failure to store and protect it in a manner that would prevent loss or damage, shall be replaced with curbing of equal quality at the Contractor's expense.

3.2 EXCAVATION

- A. Excavation shall be made to the required depth and base material upon which the curb is to be set shall be compacted to a firm, even surface.
- B. All soft and unsuitable material shall be removed and replaced with suitable material which shall be thoroughly compacted.

3.3 INSTALLATION

- A. The curb and sloped edging shall be set so that the front top arris line is in close conformity to the line and grade required.
- B. All space beneath the curbing shall be filled and thoroughly tamped with material meeting the requirements of the bed course material.

3.4 JOINTS

- A. The required spacing between stones shall be a minimum of 1/4 inch and a maximum of 5/8 inch for Type 1 curb.
- B. The required spacing between stones shall be a maximum of 1/2 inch for Type 5 curb.
- C. Joints between stones shall be carefully filled with mortar along the back portion of the joint to prevent loss of backfill material.

3.5 BACKFILLING

- A. After the joints have set, any remaining excavated areas shall be filled and tamped with approved material placed in eight (8) inch layers.

3.6 CURB INLETS

- A. Curb placed adjacent to curb inlets shall be installed with steel dowels cemented into each stone with epoxy grout.

END OF SECTION

SECTION 02527BITUMINOUS CONCRETE CURBSPART 1 - GENERAL1.1 DESCRIPTION

A. Work Included:

1. This work shall consist of constructing a hot-mixed, hot-laid bituminous concrete curb on a completed bituminous surface in accordance with these Specifications and within reasonable close conformity to the lines and grades shown on the Drawings or established by the Engineer.

B. Related Work Specified Elsewhere:

1. Section 02513, Bituminous Concrete Paving.

1.2 QUALITY ASSURANCE

- A. Use only materials which are furnished by a bulk bituminous concrete producer which is regularly engaged in production of hot-mix, hot laid bituminous concrete and approved for use by the NHDOT.

1.3 SUBMITTALS

A. Certificates:

1. Provide certificates in lieu of laboratory test reports.
2. Certify that materials comply with Specification requirements.
3. Signed by bituminous concrete producer and Contractor.

1.4 JOB CONDITIONS

A. Weather Limitations:

1. Bituminous concrete curbs shall not be placed on a wet surface.
2. Construct between the dates of May 1 and November 22, and then only when the air temperature in the shade is 40° F or above.

PART 2 - PRODUCTS2.1 MATERIALS

- A. Materials for bituminous concrete curbing shall be as required in Section 609 of the State of New Hampshire Department of Transportation's "Standard Specifications for Highways and Bridges," latest version.

PART 3 - EXECUTION3.1 PERFORMANCE

A. Conditioning of the Existing Surface:

1. Thoroughly clean of all objectionable material.
2. Apply a light tack coat of 0.08 to 0.20 gallons per fifteen linear feet of curb area.

- B. Equipment:
 - 1. The curb shall be placed by an approved power operated extruding type machine using the shape mold called for. A tight bond shall be obtained between the base and the curb. The Engineer may permit the placing of curbing by other than mechanical curb placing machines when short sections or sections with short radii are required. The resulting curbing shall conform in all respects to the curbing produced by the machine.
- C. Placing:
 - 1. Place mix at temperature between 275 - 325°F.
 - 2. Where conditions necessitate joints in curb, they shall be constructed to ensure bond between old and new sections of the curb. Prior to placing the new curb material, the old joint shall be tack coated.
- D. Curing:
 - 1. Protect from traffic until the heat of the mix has dissipated and the mix has obtained the proper hardness.
- E. Backfilling:
 - 1. Backfill as soon as possible after mix has obtained the proper degree of hardness.

END OF SECTION

SECTION 02577PAVEMENT MARKINGSPART 1 - GENERAL1.1 DESCRIPTION

A. Work Included:

1. This work shall consist of providing final reflective pavement lines and markings during paving operations as shown on the plans. It shall consist of providing temporary pavement markings during construction.

1.2 RELATED DOCUMENTS

- A. State of New Hampshire Department of Transportation Standard Specifications for Road and Bridge Construction, 2016 or latest edition, herein after referred to as NHDOT Specifications.

1.3 SUBMITTALS

- A. All submittals shall be in accordance with 01340 – Submittals, and the General Conditions of the Construction Contract.
- B. Submit product data for all pavement marking materials.

PART 2 - PRODUCTS2.1 MATERIALS - TAPE

- A. Pavement tape for final and temporary pavement marking shall meet the requirements of NHDOT Specifications Section 632.

2.2 MATERIALS - PAINT

- A. Pavement marking paint for final and temporary pavement marking shall meet the requirements of NHDOT Specifications Section 632.

PART 3 - EXECUTION3.1 GENERAL

- A. All pavement lines and markings shall be applied in accordance with the NHDOT Specifications Section 632.

3.2 ESTABLISHMENT PERIOD

- A. The establishment period shall be in accordance with the NHDOT Specifications Section 632.

3.3 PAVEMENT MARKING TAPE MATERIAL REPLACEMENT PROVISION GUARANTEE

- A. The Contractor shall supply the Owner with a written guarantee for a minimum of two years for all materials contained in these specifications.

B. The period of guarantee shall begin from the date of application to the road.

3.4 PREPARATION OF SURFACE FOR PAINT

A. The surface preparation for paint shall be in accordance with the NHDOT Specifications Section 632.

3.5 APPLICATION OF PAINT

A. The application of paint shall be in accordance with the NHDOT Specifications Section 632.

3.6 REMOVING LINES AND MARKINGS

A. When it is necessary to remove pavement lines and markings, it shall be done by grinding, high temperature flame, sand blasting, solvent or other acceptable means. The method chosen must be capable of completely eradicating the existing line or marking without damage to the pavement. Burning and grinding to remove temporary markings from final pavement or from existing pavement not to be resurfaced will not be permitted.

END OF SECTION

SECTION 02601MANHOLES, COVERS AND FRAMESPART 1 - GENERAL1.1 DESCRIPTION

- A. Work Included: Construct manholes, covers, frames, brick masonry, inverts and apply waterproofing in conformance with the dimensions, elevations, and locations shown on the Drawings and as specified herein.
- B. Related Work Specified Elsewhere (when applicable):
 - 1. Final sewer testing is specified in this Division.
 - 2. Pipe, excavation, backfill, paving and dewatering are specified in the appropriate Sections in this Division.
 - 3. Concrete and grout are specified in Division 3.

1.2 QUALITY ASSURANCE

- A. Precast Manhole Base, Barrel and Top Sections:
 - 1. Conform to ASTM C478-97 except as modified herein, and on the Drawings.
 - 2. Average strength of 4,000 psi at 28 days.
 - 3. Testing:
 - a. Determine concrete strength by tests on 6-inch by 12-inch vibrated test cylinders cured in the same manner as the bases, barrels and tops.
 - b. Have tests conducted at the manufacturer's plant or at a testing laboratory approved by the Engineer.
 - c. Have not less than 2 tests made for each 100 vertical feet of precast manhole sections.
- B. Frames and Covers:
 - 1. Acceptable Manufacturers:
 - a. EJ Castings
- C. Masonry:
 - 1. Brick: Shall comply with the ASTM Standard Specifications for Sewer Brick (made from clay or shale), Designation C32, for Grade SS, hard brick.
 - 2. Cement: ASTM C-150.
 - 3. Hydrated Lime: ASTM C-207
 - 4. Sand: ASTM C144
- D. Waterproofing:
 - 1. Acceptable Manufacturers:
 - a. Karnak #220 AF Fibered Emulsion Dampproofing, Karnak Corp., Clark, NJ.
 - b. PPS 922 Superseal, International Precast Supply.
 - c. Or equal.

1.3 SUBMITTALS

- A. Submit shop drawings and manufacturer's literature in conformance with Section 01340 and the Standard General Conditions of the Construction Contract.

- B. Precast Manhole Sections: Submit test results and receive approval from the Engineer prior to delivery to the site.

PART 2 - PRODUCTS

2.1 PRECAST MANHOLE SECTIONS

- A. Dimensions, shall be as shown on the Drawings:
1. Base & Riser Sections:
 - a. Diameter: As shown on the Drawings.
 - b. Length: As required.
 - c. Wall Thickness: Not less than 5 inches.
 - d. Joints: Bell-and-spigot or tongue-and-groove formed on machine rings to insure accurate joint surfaces.
 2. Tops:
 - a. Diameter: Eccentric cone type, 30 inches I.D. at top, 48 inches I.D. at bottom unless otherwise shown on the Drawings.
 - b. Length: 4 feet.
 - c. Wall thickness: Not less than 5 inches at the base, tapering to not less than 8 inches at the top.
 - d. Joints: Bell-and-spigot or tongue-and-groove formed on machine rings to insure accurate joint surfaces.
 - e. Exterior face of cone sections shall not flare out beyond the vertical.
 3. Flat Slab Tops:
 - a. Location: Where shallow installations do not permit the use of a cone-type top and where indicated on the Drawings.
 - b. Slab thickness: Not less than 6 inches.
 - c. Constructed to support an HS-20 wheel loading.
- B. Openings:
1. Provide openings in the risers to receive pipes entering the manhole.
 2. Make openings at the manufacturing plant.
 3. Size: To provide a uniform annular space between the outside wall of pipe and riser.
 4. Location: To permit setting of the entering pipes at the correct elevations.
 5. Openings shall have a flexible watertight union between pipe and the manhole base.
 - a. Cast into the manhole base and sized to the type of pipe being used.
 - b. Type of flexible joint being used shall be approved by the Engineer. Install materials according to the Manufacturer's instructions.
 - i. Lock Joint Flexible Manhole Sleeve made by Interpace Corporation.
 - ii. Kor N Seal made by National Pollution Control System, Inc.
 - iii. Press Wedge II made by Press-Seal Gasket Corporation.
 - iv. A-Lok Manhole Pipe Seal made by A-Loc Corporation.
 - v. Or equivalent.
- C. Joints:
1. Joint gaskets to be flexible self-seating butyl rubber joint sealant installed according to manufacturer's recommendations. Install a double row of joint

sealants for every manhole joint. For cold weather applications, use adhesive with joint sealant as recommended by manufacturer.

Acceptable Materials:

- a. Kent-Seal No. 2
 - b. Ram-Nek
 - c. Or equivalent.
2. Joints between precast sections shall conform to related standards and manufacturer's instructions.
- D. Waterproofing:
1. The exterior surface of all manholes shall be given two coats of waterproofing material at a application rate as recommended by the manufacturer.
 2. The coating shall be applied after the manholes have cured adequately and can be applied by brush or spray in accordance with the manufacturer's written instruction.
 3. Sufficient time shall be allowed between coats to permit sufficient drying so that the application of the second coat has no effect on the first coat.

2.2 FRAMES AND COVERS

A. Standard Units:

1. Made of cast iron conforming to ASTM A48-76, Class 30 minimum.
2. Have machined bearing surfaces to prevent rocking.
3. Castings shall be smooth with no sharp edges.
4. Constructed to support an HS-20 wheel loading.
5. Dimensions and Style shall conform to the Drawings, Standard castings differing in non-essential details are subject to approval by the Engineer:
 - a. Covers –
 - i. Owner shall provide to the Contractor the solid 30-inch diameter cover with clipper ship symbol (EJ product No. NPR15-2963B) for manholes in in the roadway.
 - ii. Owner shall provide to the Contractor the solid 30-inch diameter cover with “SEWER” stamped for manholes located outside of roadways.
 - b. Frame –
 - i. Owner shall provide to the Contractor the 30-inch diameter clear opening, with flange bracing ribs (EJ product No. NPR15-2963B)
6. Minimum weight of frame and cover shall be 370 lbs.

MASONRY

A. Brick:

1. Sound, hard, uniformly burned, regular and uniform in shape and size, compact texture, and satisfactory to the Engineer.
2. Immediately remove rejected brick from the work.

B. Mortar:

1. Composition (by volume):
 - a. 1 part Portland cement.
 - b. 1/2 part hydrated lime.
 - c. 4-1/2 parts sand.

2. The proportion of cement to lime may vary from 1:1/4 for hard brick to 1:3/4 for softer brick, but in no case shall the volume of sand exceed 3 times the sum of the volume of cement and lime.
- C. Cement shall be Type II Portland cement.
- D. Hydrated lime shall be Type S.
- E. Sand:
1. Shall consist of inert natural sand.
 2. Grading:

<u>Sieve</u>	<u>Percent Passing</u>
No. 4	100
No. 8	95-100
No. 16	70-100
No. 30	40-75
No. 50	10-35
No. 100	2-15
No. 200	0-5

PART 3 - EXECUTION

3.1 PERFORMANCE

- A. Precast Manhole Sections:
1. Perform jointing in accordance with manufacturer's recommendations and as approved by the Engineer.
 2. Install riser sections and tops level and plumb.
 3. Make all joints watertight.
 4. When necessary, cut openings carefully to prevent damage to barrel sections and tops. Replace damaged manhole sections and tops at no additional cost to the Owner.
 5. When manhole steps are included in the Work, install barrel sections and tops so that steps are in alignment.
- B. Drop Manholes:
1. The difference in elevation between the invert of the inlet pipe and outlet pipe is to be either less than 6-inches (which does not require a drop manhole) or more than 24-inches (which does require a drop manhole).
 2. Where difference in elevation between the invert of the inlet pipe to the invert of the outlet pipe exceeds 24 inches, construct a drop manhole as shown on the Drawings or as directed by the Engineer.
- C. Adjust to Grade:
1. Adjust tops of manholes to grade with brick masonry.
 2. Concrete rings are not acceptable for adjusting to grade.
 3. In paved areas, set frame and cover to final grade after binder pavement is placed and the grade of surface pavement has been determined.
- D. Pipe Connections to Manholes: Connect pipes to manholes with joint design and materials approved by the Engineer.
- E. Invert Channels:

1. After manhole and all pipes entering or exiting the manhole have been installed, construct the invert channels and shelf.
 2. Channels to be smooth and semicircular in shape conforming to the inside of the adjacent sewer section.
 3. Make changes in direction of flow with smooth curves having a radius as large as permitted by the size of the manhole.
 4. Stop the pipes at the inside face of the manhole where changes of direction occur.
 5. Form invert channels and shelf with brick.
 6. The maximum change in elevation from the invert of the inlet pipe to the invert of the outlet pipe is 6-inches. Shape invert to make smooth transition in vertical grade.
 7. Slope the floor of the manhole (shelf) to the flow channel, as shown on the Drawings.
- F. Masonry:
1. Laying Brick:
 - a. Use only clean bricks in brickwork for manholes.
 - b. Moisten the brick by suitable means until they are neither so dry as to absorb water from the mortar nor so wet as to be slippery when laid.
 - c. Lay each brick in a full bed and joint of mortar without requiring subsequent grouting, flushing, or filling, and thoroughly bond as directed.
 - d. Construct all joints in a neat workmanlike manner. Construct the brick surfaces inside the manholes so they are smooth with no mortar extending beyond the bricks and no voids in the joints. Maximum mortar joints shall be 1/2 inch.
 - e. Outside faces of brick masonry shall be plastered with mortar from 1/4-inch to 3/8-inch thick.
 - f. Completed brickwork shall be watertight.
 2. Curing:
 - a. Protect brick masonry from drying too rapidly by using burlaps which are kept moist, or by other approved means.
 - b. Protect brick masonry from the weather and frost as required.
- G. Frames and Covers:
1. The Contractor shall pick up the frames and covers from the Owner's DPW building.
 2. Set all frames in a full bed of mortar, true to grade and concentric with the manhole opening.
 3. Set the frame and cover so that the hinge opens into the flow of traffic.
 4. Completely fill all voids beneath the bottom flange to make a watertight fit.
 5. Place a ring of mortar at least one inch thick around the outside of the bottom flange, extending to the outer edge of the manhole all around its circumference.
 6. Clean the frame seats before setting the covers in place.
- H. Plugging and Patching:
1. Fill all exterior cavities with non-shrink grout and with bituminous waterproofing once the concrete and mortar has set.
 2. Touch up damaged water proofing.

- I. Cleaning:
 - 1. Thoroughly clean manholes, steps, frames and covers of all debris and foreign matter.
- J. Bedding and Backfilling:
 - 1. Bedding of manholes shall be 6 inches of 3/4" screened stone.
 - 2. Backfill a minimum of 18 inches all around manhole with gravel borrow.

3.2 MANHOLE TESTING

- A. General:
 - 1. Perform a vacuum test on all manholes.
 - 2. All testing must be performed in the presence of the Engineer.
 - 3. Suitably plug all pipes entering each manhole and brace plugs to prevent blow out.
- B. Vacuum Test:
 - 1. The manhole shall be tested by a vacuum test after assembly of the manhole, connection piping and backfilling. Vacuum testing to be conducted prior to construction of invert channels.
 - 2. Plug all lifting holes completely with non-shrink grout.
 - 3. Properly tighten all boot clamps and brace all plugs to prevent them from being sucked into the manhole.
 - 4. Install the testing equipment according to the manufacturer's instructions.
 - 5. A vacuum of 10 inches of Hg shall be drawn on the manhole and the loss of 1 inch of Hg vacuum timed. The manhole shall be considered to have passed the test if the time for the loss of 1 inch of Hg vacuum is:
 - a. Greater than 2 minutes for manholes less than 10-feet deep.
 - b. Greater than 2.5 minutes for manholes 10 to 15-feet deep.
 - c. Greater than 3 minutes for manholes more than 15-feet deep.
 - 6. If the manhole fails the initial test, the Contractor shall locate the leak(s) and make repairs. The manhole shall be retested until a satisfactory test result is obtained.
- C. Manhole Repairs:
 - 1. Correct leakage by reconstruction, replacement of gaskets and/or other methods as approved by the Engineer.
 - 2. The use of lead-wool or expanding mortar will not be permitted.
- D. After the manholes have been backfilled and prior to final acceptance, any signs of leaks or weeping visible inside the manholes shall be repaired and the manhole made watertight.

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. Polywrap 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).
- B. Acceptable Manufacturers:
 - 1. Tyler
 - 2. Griffin
 - 3. Union
 - 4. US Pipe
 - 5. 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 6 inches in diameter and larger: Class 52. 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. 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 16 inches.
 - (4) Test pressure two times working pressure.
 - (5) Grip Rings™, Romac Industries, 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. 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.
 4. 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 ANS 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 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 ENCASUREMENT (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 insure 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 140oF, 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. 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 ENCASUREMENT (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.

- 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 02620TEMPORARY WATER MAINPART 1 - GENERAL1.1 DESCRIPTION

- A. Work Included: Furnish, install and test all fused high density polyethylene (HDPE) temporary water pipe, pipe fittings and services 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. Cleaning, Testing, and Disinfection is specified in Specification Section 02675.

1.2 PROJECT CONDITIONS

- A. The work includes the installation of a temporary water main in order to by-pass an existing water distribution system main that is to be rehabilitated or removed and replaced. The temporary water main will provide potable water service to the existing customers in the project area.
- B. The water distribution system experiences water pressures of approximately 60 psi in this area of the distribution system.
- C. The Contractor shall obtain approval from the local Fire Department for the proposed plan prior to proceeding.
- D. The Contractor shall coordinate with the Water Department before making the connection of the temporary water main to the existing water distribution system.
- E. Temporary water mains shall not be installed or in operation between October 15 and April 15.

1.3 SUBMITTALS

- A. Temporary Bypass Plans shall be submitted to Engineer for review and approval prior to installation. Bypass plans shall include and consider the following:
 - 1. Proposed schedule for installing, testing, disinfecting, operating, and removing the temporary bypass.
 - 2. All components of the bypass shall be for potable water transmission and distribution with a minimum pressure rating of 150 psi. All plastic pipe or hose shall be designated or certified for potable/residential water use and must meet NSF/ANSI Standard 61 Certification.
 - 3. Details of the materials, size, and location of temporary facilities including bypass mains, valves, connections, laterals, services, and fire hydrants.
 - 4. Bypass mains shall be supplied by at least two connections to the existing system either via an existing hydrant or a direct connection to an underground main.
 - 5. Bypass mains shall be sized as required by the local Fire Department when supplying water for fire protection to temporary hydrants. Temporary hydrants shall be located in the same approximate location as existing hydrants that have been placed out of service and bagged and tagged "Hydrant Out of Service".

- The number of hydrants on the temporary bypass shall be greater than or equal to the number of existing hydrants that are placed out of service.
6. Minimum size of bypass mains that do not supply water for fire protection is 2-inches. All temporary services shall be greater than or equal to the diameter of the existing service.
 7. Bypass mains shall be laid outside of the traveled and access ways whenever possible and trenched when crossing roadways. Temporary mains shall be ramped when crossing driveways. All services shall be ramped or trenched.
 8. All plans shall include provision of twenty-four/seven contact information for operation and maintenance of the bypass system.
 9. Pressure testing and disinfection testing shall comply with the requirements the applicable AWWA Standards and of Section 02675 prior to placing temporary water main into service.
 10. All work shall be coordinated with Engineer, Water Department and the Fire Department and no construction activity shall commence without a minimum of 48 hours advance notice to each department.
 11. A backflow prevention device (approved by the Water Department) shall be installed at connections to the distribution system.
 12. Isolation valves shall be included in the bypass system at 500 foot intervals.
 13. Bypass pipe ends shall have blow-off taps to allow for flushing and water quality inspections.

1.4 QUALITY ASSURANCE

- A. Provide pipe and fittings manufactured by a single manufacturer.
- B. Pressure rating or pressure class of pipe as detailed herein.
- C. Standards:
 1. ASTM D 1248 Polyethylene Plastics Molding and Extrusion Materials.
 2. ASTM D 1505 Density of Plastics by the Density Gradient Technique.
 3. ASTM D 1693 Environmental Stress Cracking of Ethylene Plastics.
 4. ASTM D 4703 Preparation of Compression Molded Polyethylene Test Samples.
 5. ASTM D 1784 - Rigid Polyvinyl Chloride (PVC) Compounds and Chlorinated Polyvinyl Chloride (PVC) Compounds.
 6. ASTM D 2241 - PVC Pressure Rated Pipe (SDR Series).
 7. ASTM D 3139 - Joints for Plastic Pressure Pipes using Flexible Elastomeric Seals.
 8. NSF/ANSI 61 – Drinking Water System Components – Health Effects
- D. Acceptable Manufacturers:
 1. Ryerson & Son, Inc. "Mono-Line"
 2. Dupont, "Aldyl-D"
 3. Sheldon "Sclairpipe"
 4. Certainteed Yelomine PVC
 5. Or approved equal.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Polyethylene Pipe:
 - 1. The pipe shall be obtained by polymerization of no less than 85% ethylene and no less than 95% of total olefins by weight.
 - 2. The polyethylene resin shall be classified as a Type III, Class C, Category 3. Nominal density shall be 0.941 to 0.959.
 - 3. 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%.
 - 4. 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 1928 of not less than 40 hours.
 - 5. Pipe shall be homogeneous throughout and free of visible cracks, holes, foreign material, blisters, or other deleterious faults.
 - 6. Polyethylene fittings shall have the same pressure rating as the pipe itself.
 - 7. Adaptors: When applicable, provide adaptors for connecting polyethylene pipe to pipes constructed from other materials. All flanges shall have metal backing rings.
 - 8. Pipe pressure rating shall be 150 psi (SDR-11) minimum.
- B. Polyvinyl Chloride (PVC) Pipe:
 - 1. PVC pipe shall be made from Type 1, Grade 1, 2000 psi design stress, Class 12454-B formulation Polyvinyl Chloride.
 - 2. PVC formulation shall contain impact modifiers and ultraviolet inhibitors for use in above-ground temporary applications.
 - 3. Pipe pressure rating shall be 150 psi (SDR-18) minimum.
- C. Service Corporations: Provide corporation and service saddle for all services as required.
- D. Water Main Valves: Provide gate valves at the connection to the distribution system and every 500 feet of installed temporary water main.
- E. Provide Water Department approved backflow preventers at connections to distribution system.
- F. Water Department will provide and Contractor shall install flow meter.
- G. Hydrants: Provide temporary hydrants at the approximate location of existing hydrants.

2.2 FABRICATION

- A. Polyethylene Pipe:
 - 1. Thermal Butt-Fusion:
 - a. Join the pipe to itself, or to the polyethylene fittings or to the flange connections by means of thermal butt-fusion.
 - b. Have all fusion performed by personnel trained by the pipe supplier or other qualified persons, using tools approved by the pipe supplier.

- c. 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.
- d. Joint strength must be equal to that of the adjacent pipe.
2. Mechanical Connections: The mechanical connections of the polyethylene pipe to auxiliary equipment shall be in accordance with the pipe suppliers written instructions.
- B. Polyvinyl Chloride (PVC) Pipe:
 1. Fittings shall be supplied with Teflon coated "O"-ring to minimize assembly and disassembly effort required to install, remove and reinstall the system.
 2. Mechanical Connections: The mechanical connections of the PVC pipe to auxiliary equipment shall be in accordance with the pipe suppliers written instructions.
- C. Services:
 1. Services shall be polyethylene pipe or hose that are NSF/ANSI 61 Certified.
 2. Minimum services size shall be 3/4-inch. Larger services may be required for non-residential uses. Engineer shall determine minimum service size.

PART 3 - EXECUTION

3.1 INSTALLATION OF TEMPORARY MAIN

- A. Temporary water mains shall be placed in a manner that protects the pipeline from traffic, vandalism, etc. Pipeline shall be laid along edge of roadways or in curb lines whenever possible.
- B. Water mains shall be protected at all driveway entrances and curb cuts by the use of gravel, temporary pavement, or steel access ramps. In lieu of access ramps, in areas that will have new pavement, a shallow trench may be cut to allow the shallow burial of the temporary main. If trenching is used, trenches shall be sawcut, refilled with compacted gravel and repaved with trench pavement prior to final paving.
- C. Temporary mains for all streets shall consist of a 4" main placed on one side of the street and a minimum 2" main placed on the opposite side. Branches from the 4" main to the 2" main shall consist of 4" pipe.
- D. Temporary hydrants shall be placed at existing hydrant locations or no greater than a 500' spacing.
- E. Main line valves shall be provided at a maximum spacing of no greater than 500 feet.
- F. Temporary main shall be maintained in working order until such a time that all of the structures are being served by the new main. If the temporary main fails, the CONTRACTOR shall restore the main within 12 hours. No temporary water mains or temporary water services shall be installed or operated during freezing weather. Temporary pipes already in use shall be removed or drained and existing services restored when so directed by the ENGINEER or OWNER.

3.2 INSTALLATION OF SERVICES

- A. The Contractor shall provide written notices to all affected property owners a minimum of 24 hours prior to any disruption of water service as a result of the temporary by-pass.
- B. All services tapped to the temporary main will have a shutoff at the main to allow

- isolation of the individual service.
- C. Residential services may be back-fed through an external hose bib if available. If a hose bib is utilized, Owner shall shutoff the existing feed to the structure at the meter (or at the existing curb stop if access to meter is not available) to prevent back-feeding the old main and shall confirm that the connection properly services the entire structure.
 - D. Pressure reducing valves shall be installed at the hose-bib connection if distribution pressures are greater than 80 psi.
 - E. For services where no external hose bib or other connection is available or larger than residential flows are required, the Contractor shall excavate the existing building service and connect the service to the temporary main with the appropriate size piping.
 - F. For fire protection (sprinkler) services, the Contractor shall coordinate with the Building Owner and Fire Department for service size and sprinkler service connection requirements. Contractor shall not connect sprinkler services without express written permission of the Building Owner.
 - G. Temporary services shall be maintained in working order until such a time that all of the structures are being served by the new main. If a temporary service fails, the CONTRACTOR shall restore the main within 12 hours.

3.3 HYDRANTS

- A. When a hydrant is removed from service, a temporary hydrant shall be installed and maintained.
- B. Hydrants that are out of service during construction operations shall be bagged and clearly marked with a "HYDRANT OUT OF SERVICE" tag.

3.4 CLEANING AND TESTING

- A. Temporary water main shall be flushed, pressure tested and disinfected in accordance with Specification Section 02675 prior to being placed in service.

END OF SECTION

SECTION 02621POLYVINYL CHLORIDE (PVC) PRESSURE PIPEPART 1 - GENERAL1.1 DESCRIPTION

- A. Work Included: Furnish, install, and test all polyvinyl chloride (PVC) pipe and fittings of the sizes and types and in the locations shown on the Drawings and as specified herein.

1.2 QUALITY ASSURANCE

- A. Pressure rating or pressure class of pipe as shown on the Drawings or specified herein.
- B. Standards:
1. ASTM 1784 - Specification for Rigid Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated Poly(Vinyl Chloride) (CPVC) Compounds.
 2. NSF 14 - Plastics Piping System Components and Related Material.
 3. AWWA C900- Polyvinyl Chloride (PVC) Pressure Pipe, 4 in. Through 12 in., for Water Distribution.
 4. CSA B137.3 - Rigid Poly (Vinyl Chloride) (PVC) Pipe for Pressure Application.
 5. AWWA C605 for Underground Installation of Polyvinyl Chloride (PVC) Pressure Pipe and Fittings for Water.
 6. ASTM D3139 - Specification for Joints for Plastic Pressure Pipes Using Flexible Elastomeric Seals.
 7. ASTM F477 - Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe.
 8. UNI-B-3 - Polyvinyl Chloride (PVC) Pressure Pipe (Complying with AWWA Standard C-900).
 9. ASTM F1674 - Recommended Performance Specification for Joint Restraint Devices for Use with Polyvinyl Chloride (PVC) Pipe.
 10. AWWA M23 - PVC Pipe - Design and Installation
- C. Product Marking:
1. Each unit of PVC pipe shall be marked with the manufacturer's name, nominal pipe size and size base, PVC cell classification or material code, dimension ratio or standard dimension ratio, product type, pressure class, standard specification designation, production record code, and certification seals. Identification markings shall remain legible during normal handling, storage, and installation.
- D. Quality Assurance Testing
1. The Contractor shall submit the manufacturer's certification that all delivered materials comply with quality standards required by AWWA C900, Section 3.1; and AWWA C905, Section 4.0. The manufacturer's certification shall list the tests conducted and the standards applicable to that test.
 2. Pipe shall be third party tested to meet requirements of CSA B137.3 or equivalent.

- E. Warranty:
 - 1. The manufacturer shall provide a warranty against defects resulting from faulty workmanship or materials.

1.3 SUBMITTALS

- A. Submit shop drawings in accordance with the applicable section of Division 1 and the General Conditions of the Specifications.
- 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 manufacturers installation instructions and specifications for all fittings, couplings, adapters, saddles, etc.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. PVC Class Water Pipe:
 - 1. Pipe shall be by one manufacturer.
 - 2. Pipe shall be Iron Pipe Size (IPS) with SDR ratings as indicated in the pipe schedule.
 - 3. All PVC Pipe shall be cell classification 12454B (ASTM D1784), DR 21.
 - 4. Linear feet of each design and size shall be provided as shown on the drawings.
 - 5. Pipe shall be furnished with integral bell and factory beveled spigot.
 - 6. Pipe Lengths: Laying lengths of 20 feet, or as shown on the Drawings.
 - 7. Manufacturer:
 - a. Ipex
 - b. JM Eagle
 - c. Or equal
- B. Gaskets and Lubricants:
 - 1. Elastomeric gaskets shall be furnished by the PVC pipe manufacturer with each length of elastomeric-gasket bell-end pipe. Provide rubber gaskets in sufficient quantity to allow for loss.
 - 2. Gaskets and Lubricants intended for use with PVC pipe and couplings shall be made from materials that are compatible with the plastic material and with each other when used together. The material shall not support the growth of bacteria nor adversely affect the potable quality of the water that is to be transported.
 - 3. Provide nitrile gaskets for joints within 50 feet of buried petroleum product tanks or in other areas where contaminated soils are encountered.
- C. Joints:
 - 1. Provide couplings of the same quality as the pipe that will maintain tight joints when subjected to the same hydrostatic tests designated for the pipe.
 - 2. Adapters: When applicable, furnish and install adapters for connecting polyvinyl chloride pipe to pipes constructed from other material.
 - 3. Provide suitable adapters for connections to equipment and other piping systems.

- D. Restraint Devices:
1. Furnish and install restraint devices as required.
 2. Provide joint restraint manufactured for use with PVC pipe. Provide certification from PVC pipe manufacturer recommending use of proposed restraint devices on their pipe.
 3. Restraint devices for PVC pipe shall incorporate a series of machined serrations (not "as cast") on the inside diameter to provide positive restraint, exact fit and 360o contact and support of the pipe wall. Restraint devices shall be manufactured of high strength ductile iron, ASTM A536, Grade 65-45-12. Connecting bolts shall be of high strength, low alloy material in accordance with ANSI/AWWA C111/A21.11.
 4. The restraint devices shall not use wedges, set screws, or radial pads.
 5. All restraint devices shall carry a water working pressure rating equivalent to the full rated pressure of the PVC pipe they are installed on, with a minimum 2:1 safety factor in any nominal pipe size. In addition, they shall meet or exceed the requirements of ASTM F1674, Recommended Performance Specification for Joint Restraint Devices for Use with Polyvinyl Chloride (PVC) Pipe. Notarized certification from the manufacturer of the restraint device shall be provided with submittals.
 6. Restraint devices shall consist of a split restraint ring incorporating the serrations specified above.
 - a. For bell and spigot joints, the split restraint ring shall be installed on the spigot, connected to a solid back-up ring seated behind the bell. The solid back-up ring shall have a beveled leading edge to assure exact fit behind the pipe bell.
 7. Manufacturers:
 - a. For bell and spigot joints of PVC pipe: Uni-Flange Block Buster 1350, or equal.
- E. PVC fittings shall have the same pressure rating as the pipe itself for all pressurized pipeline applications.

2.2 PIPE SCHEDULE

PIPE IDENTIFICATION	DIA. (inches)	SDR	IPS/DIPS/CTS	WORKING PRESSURE RATING (PSI)
Low Pressure Sewers	1.5 , 2, 3, 4 (See Drawings)	21	IPS	200

PART 3 - EXECUTION

3.1 INSPECTION

- A. Carefully inspect all materials at the time of delivery and just prior to installation
- B. Carefully inspect all pipe and fittings for defects, such as weak structural components, that adversely affect the execution and quality of work. Also examine materials for deviations beyond allowable tolerances for pipe clearances.
- C. Immediately remove all rejected material from the construction site.

3.2 RECEIVING, STORAGE, AND HANDLING

- A. Receiving:
 - 1. Inspect the shipment of PVC prior to unloading for indications of the load shifting in transit, having been subjected to rough handling, or has broken packaging. If such indication exists, the Contractor should inspect each piece as it is unloaded. The Contractor is responsible for ensuring that there has been no damage or loss. Mark damaged material carefully, note damaged or missing items on the delivery receipt, and provide for further inspection by carrier or carrier's representative.
 - 2. Reorder any material that is needed to make up for missing or damaged items.
 - 3. Unload the pipe in full shipping units as shipped, using the appropriate mechanical equipment. Store pipe on level ground.
 - 4. Units of pipe should not be lifted with single cables or chains. The shipping unit frames or banding around units should not be used as lifting points. Use straps and spreaders looped under the load.
 - 5. If unloading by hand, the length behind the pipe being unloaded should be held in place with wooden chocks. Lighter pipes may be carefully handed down from the top of the load, but heavier pipes will require the use of ropes and skids. Individual lengths of pipe should not impact on each other as they are unloaded or stockpiled, especially in very cold weather.
- B. Storage:
 - 1. Store pipe on level ground.
 - 2. Pipe should be stored if possible in the shipping unit packages provided by the manufacturer. When unit packages are stacked, ensure that the weight of the upper unit does not cause deformation to pipe in the lower unit. Do not stack more than 2 shipping units high. The weight of the unit should be borne by the dunnage rather than the pipe. Supports should be evenly spaced to prevent pipe bending.
 - 3. In cold weather, where gaskets are supplied separately, they should not be stored outside on a job site unless they will be used immediately. The assembly of the joint will be easier in cold weather if the gaskets are stored at temperatures above 10°C (50°F).

3.3 INSTALLATION

- A. Jointing:
 - 1. The assembly of the gasketed joints should be performed as recommended by the pipe manufacturer. When gaskets are not factory installed, use only gaskets

- that are designed for and supplied with the pipe. Insert gaskets as recommended by the manufacturer.
2. Clear each pipe length, gasket, the bell and spigot, or coupling, and any fittings of all debris, grease, grit or before installing. Inspect the gasket, pipe spigot bevel, gasket groove, and sealing surfaces for damage or deformation; and do not use any components damaged or deformed.
 3. Lubricants should be applied as specified by the pipe manufacturer. Damage to the gaskets or the pipe may result from the use of unapproved lubricants. Use only lubricant supplied by the pipe manufacturer for use with gasketed PVC pipe in potable water systems.
 4. Provide and use coupling pullers, or bar and block, for jointing the pipe when required.
 5. Ensure correct concentric alignment of pipe prior to joining. Shove home each length of pipe against the pipe previously laid and hold securely in position.
 6. Do not pull or cramp joints.
 7. If joints are to be assembled in cold-weather conditions, factory-installed gaskets may be removed and taken to a heated truck cab or shelter to restore the gasket's flexibility prior to joint assembly. Not all factory-installed gaskets are field removable. Gasket removal shall only be permitted with the consent of the pipe manufacturer and the Engineer.
 8. For joining PVC to fittings, use gaskets recommended by PVC manufacturer.
- B. Joining to Ductile Iron Fittings:
1. Cutting:
 - a. Use a hand saw or pipe cutter with blades (not rollers).
 - b. Examine all cut ends for possible cracks caused by cutting.
 - c. The cut shall be square, and provide a smooth end at a right angle to the longitudinal axis of the pipe. Pipe spigot ends shall be deburred, beveled, and re-marked with insertion line as required.
 2. Cleaning:
 - a. Clean immediately before assembly. Factory-installed gaskets should not be removed for cleaning.
 3. Assembly:
 - a. Follow PVC pipe manufacturer's instructions for assembly to ductile iron fittings.
- C. Pipe joint deflection:
1. Push on joints:
 - a. Limit maximum joint deflection to Manufacturers recommendations. 2.5° for 12-inch diameter.
- D. 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 pull out.
 - c. Provide wyes for all connections.

- E. Testing
 - 1. Leak Test
 - a. Refer to Section 02755 for sewer main testing.

END OF SECTION

SECTION 02622POLYVINYL CHLORIDE (PVC) NON-PRESSURE PIPEPART 1 - GENERAL1.1 DESCRIPTION

- A. Work Included:
 - 1. Provide and install PVC non-pressure pipe and fittings of the size(s) and type(s) and in the location(s) shown on the Drawings and as specified herein.
- B. Related Work Specified Elsewhere: (When Applicable)
 - 1. Excavation and backfill, dewatering, pavement, borrow and bedding material, and cleaning and testing requirements are specified in the appropriate sections of this division.

1.2 QUALITY ASSURANCE

- A. Manufacturers:
 - 1. Certain-Teed.
 - 2. J-M Manufacturing.
 - 3. Or equivalent.

1.3 SUBMITTALS TO THE ENGINEER

- A. Submit shop drawings in accordance with 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 other documents as specified in the appropriate Sections of this Division.

1.4 DELIVERY STORAGE AND HANDLING

- 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 and damage
 - 2. Deviations beyond allowable tolerances for joint dimensions.
 - 3. Removal of debris and foreign matter.
- D. Examine area and structures to receive piping for:
 - 1. Defects, such as weak structural components that adversely affect the execution and quality of work.
 - 2. Deviations beyond allowable tolerance for pipe clearances.
- E. All materials and methods not meeting the requirements of the Contract Documents will be rejected.
- F. Immediately remove all rejected materials from the project site.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Pipe and Fittings:

1. The polyvinyl chloride pipe and fittings, including those required for stubs, shall conform to ASTM standard specification for PVC Sewer Pipe and Fittings, Designation D 3034 (SDR 35) (4" to 15"), F679 (18" to 27"), or F1760-01 (for recycled pipe, all diameters).
2. Straight pipe shall be furnished in lengths of not more than 14 feet.
3. Saddles will not be allowed.

B. Joints:

1. Joints for the polyvinyl chloride pipe shall be push-on joints using factory installed elastomeric ring gaskets.
2. The gaskets shall be securely fixed into place by the manufacturer so that they cannot be dislodged during joint assembly.
3. The gaskets shall be of a composition and texture which is resistant to common ingredients of sewage and industrial wastes, including oils and ground water, and which will endure permanently under the conditions of the proposed use.
4. The joints shall conform to ASTM Specifications for Joints for Drain and Sewer Plastic Pipes using Flexible Elastomeric Seals, Designation D3212-76.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Inspection:

1. Each pipe unit shall be inspected before being installed. No single piece of pipe shall be laid unless it is generally straight.
2. The centerline of the pipe shall not deviate from a straight line drawn between the centers of the openings at the ends of the pipe by more than 1/16 inch per foot of length.
3. If a piece of pipe fails to meet this requirement for straightness it shall be rejected and removed from the site.
4. Any pipe unit or fitting discovered to be defective either before or after installation shall be removed and replaced with a sound unit.

B. Jointing:

1. All pipe and fittings shall be cleared of all debris, dirt, etc., before being installed and shall be kept clean until accepted in the completed work.
2. Pipe and fittings shall be installed to the lines and grades indicated on the drawings or as required by the Engineer. Care shall be taken to insure true alignments and gradients.
3. All joint surfaces shall be cleaned. Immediately before jointing the pipe, the bell or groove shall be lubricated in accordance with the manufacturer's recommendation.
4. Each pipe unit shall then be carefully pushed into place without damage to pipe or gasket. Suitable devices shall be used to force the pipe units together so that they will fit with a minimum open recess inside and outside and have tightly

sealed joints. Care shall be taken not to use such force as to wedge apart and split the bell or groove ends.

5. Joints shall not be "pulled" or "cramped" unless permitted by the Engineer.

C. Service Connections:

1. All service connections to new pipe shall utilize a wye fitting.
2. All service connections must enter the top half of the mainline pipe.
3. Service connections shall be 6-inch, minimum, unless otherwise noted.
4. Contractor shall provide all necessary fittings, adapters and couplings to connect the service to the sewer main.
5. Service laterals shall be placed at 2% slope, unless otherwise noted. If 2% slope is not available, notify the Engineer.
6. Contractor shall maintain the trench for sufficient time for the Engineer to inspect the work. Contractor shall provide 3 working day notice to the Engineer.

D. Pipe Deflection:

1. Pipe provided under this specification shall be installed so there is no more than a maximum deflection of 5.0 percent. Such deflection shall be computed by multiplying the amount of deflection (normal diameter less minimum diameter when measured) by 100 and dividing by the nominal diameter of the pipe.
2. The Contractor shall wait a minimum of 30 days after completion of a section of sewer, including placement and compaction of backfill, before measuring the amount of deflection by pulling a specially designed gage assembly through the completed section. The gage assembly shall be in accordance with the recommendations of the pipe manufacturer and be acceptable to the Engineer.
3. Should the installed pipe fail to meet this requirement, the Contractor shall do all work to correct the problem as the Engineer may require without additional compensation.

E. Testing:

1. Clean and test pipe in accordance with appropriate sections of this division.

END OF SECTION

SECTION 02626COPPER SERVICE PIPE & FITTINGS
(BURIED APPLICATIONS)PART 1 - GENERAL1.1 DESCRIPTION

- A. Work Included: Furnish and install copper pipe of the type and size and in the locations shown on the Drawings and as specified herein.
- B. Related Work Specified Elsewhere:
 - 1. Pipe and Pipe Fittings - General is specified in Division 15.
 - 2. Excavation, Bedding and Backfill are specified in this Division.

1.2 QUALITY ASSURANCE

- A. Seamless copper water tube, ASTM B88.

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 manufacturers installation instructions and specifications for all fittings, couplings, adapters, saddles, etc.

PART 2 - PRODUCTS2.1 MATERIALS

- A. Pipe use:
 - 1. Domestic Water (buried exterior).
 - a. Type K, soft annealed.
- B. Fittings:
 - 1. Buried Fittings: "Lead free" compression fittings in compliance with NSF 61 Annex G and Safe Drinking Water Act Section 1417 with BUNA-N gasket. 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.
 - 2. Acceptable manufacturer: Mueller Co., Decatur, IL. or Equal

PART 3 - EXECUTION3.1 INSTALLATION

- A. Jointing
 - 1. Flared Joints (if specified)
 - a. Ream on file the pipe to remove burrs.
 - b. Slip fitting over end of pipe to be flared.
 - c. Expand tube using flaring tools.
 - d. Inspect for cracks, splits or other damages and replace if necessary.

- e. Squarely seat the flared end on fitting and tighten nuts.
 2. Packed on compression joints
 - a. Cut pipe squarely.
 - b. Ream or file pipe to remove burrs.
 - c. Seat pipe in fittings and tighten nut.
 3. Adapters: Use as required to connect to existing services.
- B. Bending Pipe**
1. Bend pipe by the method and to the radius to comply with the manufacturer's recommendations.
 2. Bend pipe with suitable tools to provide smooth bend free of any cracks or buckles.
 3. Provide "goose neck" in new services as shown on Drawings.

END OF SECTION

SECTION 02628HIGH DENSITY POLYETHYLENE PIPE AND FITTINGSPART 1 - GENERAL1.1 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. The Contractor shall have installed over 10,000 LF of HDPE low pressure sewers.
- C. 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 (oF), 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.
- D. Acceptable Pipe and Fitting Supplier/Manufacturers:
1. PolyPipe, Inc. "PW Pipe"
 2. KWH Pipe, "Sclairpipe"
 3. Performance Pipe
 4. "Isco-Pipe"
 5. "Poly-Cam"
 6. "Friatec"
 7. Vari-Tech "Performance Pipe"
 8. Independent Pipe Products, Inc.
 9. 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 - PRODUCTS2.1 MATERIALS

- A. Pipes shall be Iron Pipe Size (IPS) 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.
- 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/CTS	WORKING PRESSURE RATING (PSI)	DE-BEAD REQUIRED INSIDE PIPE
Low Pressure Sewers	1.5 , 2, 3, 4 (See Drawings)	11	IPS	200	No
Water Services	1, 2	11	CTS	160	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, epoxy coated ductile iron retainer gland ring, gasket, and long tee-bolts, and rubber gasket.
 - 5. Provide stainless steel stiffeners as necessary.
- B. 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.
- C. 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 Type 316 Stainless Steel.
 - 5. Coupling transition end shall be Male NPT.
 - 6. IPS or DIPS to match required pipe size.
- D. 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. 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.

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. 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/service testing and Section 02755 for sewer main testing.

END OF SECTION

SECTION 02640VALVES & SPECIALTIES – GENERALPART 1 - GENERAL1.1 DESCRIPTION

- A. Work Included: Furnish, install, support, and test valves, cocks, and stops, when applicable, (hereinafter referred to as "valves") in the location(s) and of the size(s) and quantities shown on the Drawings and/or as specified herein.

1.2 QUALITY ASSURANCE

- A. Provide valves of proven reliability manufactured by reputable manufacturers.
- B. Acceptable manufacturers are listed in each section of this Division. Substitute or "or-equal" valves will be allowed only when indicated.

1.3 SUBMITTALS

- A. Provide shop drawings in accordance with the requirements of the General Conditions, Section 01340 and as specified herein. Shop drawings shall contain the following information at a minimum:
 - 1. Completed Submittal Certification Form.
 - 2. Certified shop drawings.
 - 3. Manufacturer's literature and illustrations for all equipment to be installed to supplement certified shop drawing information.
 - 4. Short-term and long-term storage requirements.
 - 5. Shop preparation and shop coatings.
- B. Provide Operation and Maintenance Manuals in accordance with the requirements of Section 01340.

1.4 DELIVERY AND HANDLING

- A. Shipping:
 - 1. Prepare valves and accessories for shipment as required for complete protection.
 - 2. Seal valve ends to prevent entry of foreign matter into valve body.
 - 3. Box, crate, completely enclose, and protect valves and accessories from accumulations of foreign matter.
- B. Storage:
 - 1. Store valves and accessories in an area on the construction site protected from weather, moisture, or possible damage.
 - 2. Do not store valves or accessories directly on the ground.
- C. Handling: Handle valves and accessories to prevent damage of any nature to the interior and the exterior surfaces.

1.5 INSPECTION

- A. Carefully inspect all materials for:
 - 1. Defects in workmanship and materials.
 - 2. Removal of debris and foreign material in valve openings and seats.

3. Proper functioning of all operating mechanisms.
4. Tightness of all nuts and bolts.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Materials are specified in appropriate Sections in this Division.
- B. The specifications direct attention to certain required features of the valves and gates but do not purport to cover all details entering into their design and construction. Nevertheless, the Contractor shall furnish the valves and gates complete in all details and ready for operation for the intended purpose.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install valves and accessories in strict accordance with manufacturer's instructions and recommendations, as shown on the Drawings and/or as specified herein. Allow sufficient room for maintenance, removal and proper operation. All valves shall be located and oriented to permit easy access to the valve operator, and to avoid interferences.
- B. Carefully erect all valves and support them in their respective positions free from distortion and strain.
- C. Independently support all valves connected to pumps and equipment, and in piping systems that cannot support valves.
- D. Repair any scratches, marks and other types of surface damage etc. with original coating as supplied by the factory.
- E. All valves shall be installed in a manner that will provide for proper clearances and ease of operation.
- F. Check and adjust all valves and accessories for smooth operation.

3.2 TESTING

- A. The Contractor shall test all valves and gates in the presence of the Engineer to demonstrate that each valve complies with specified requirements and allowable leakage rates.
- B. The contractor shall test all valves visually for leaks and proper operation under pressure. The contractor shall also test the valves to ensure proper valve function and actuation.
- C. Valves may either be tested while testing pipelines, or as a separate step.
- D. Air and vacuum relief valves shall be examined as the associated pipe is being filled to verify venting and seating is fully functional. The Contractor shall set, verify, and record set pressures for all relief and regulating valves. Self-contained automatic valves shall be tested at both maximum and minimum operating ranges, and reset upon completion of test to the design value.
- E. The contractor shall take care not to overpressure any valve and appurtenances during testing.

3.3 RETESTING

A. If the equipment does not successfully pass the tests listed above, the Manufacturer/Contractor shall repair the equipment and perform the tests again until passing the tests successfully. If any deficiencies are revealed during any test, such deficiencies shall be corrected and the tests shall be re-conducted at no additional cost to the Owner.

3.4 CLEANING

A. All items, including but not limited to all valves and valve interiors, shall be thoroughly cleaned prior to installation, testing, and final acceptance. All dirt, debris, and other foreign materials shall be removed.

END OF SECTION

SECTION 02641GATE VALVESPART 1 - GENERAL1.1 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.

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 - PRODUCTS2.1 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 18-8 (304 SS), ASTM F593, GP1
 - 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 shall be stainless steel.
8. Operation
- a. Buried valves – 2-inch square nut, cast iron, ASTM A126, C1B or ductile iron, ASTM A536. Provide a sufficient of tee-handle valve wrenches for operation valves of various depths.
 - b. Opening Direction – counterclockwise (open left)
9. Water working pressure: 250 psi
10. Standards - valves shall meet or exceed , latest edition.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install valves with stem position vertical.
- B. Valve box vertical and centered over operating nut.
- C. Valve box supported during backfilling and maintained vertical.
- D. Install and test in accordance with AWWA C500 and 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.
- C. Acceptable Manufacturers:
 - 1. Ford Meter Box Company Inc.
 - 2. A. Y. MacDonald Manufacturing Company
 - 3. Mueller Company
 - 4. 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 manufacturers product data and installation instructions.

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 372, NSF 61 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 shall have AWWA standard thread (a.k.a. Mueller or "CC" thread).
- D. Outlet shall be copper pipe packed joint (CPPJ) or approved restrained grip joint
- E. Working pressure of 300 psi shall be required.
- F. Valve shall open right.

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 Meter Box Company
 - 2. A.Y. MacDonald
 - 3. Mueller Company
 - 4. 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 manufacturers product data and installation instructions.

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 372, NSF 61 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 pipe packed joint (CPPJ) type or approved restrained grip joint.
- D. Working pressure of 300 psi shall be required.
- E. Valve shall open right.

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 02644HYDRANT ASSEMBLIESPART 1 - GENERAL1.1 DESCRIPTION

- A. Work Included: Furnish and install hydrant assemblies of the type(s) and size (s) and in the locations (s) shown on the Drawings and as specified herein.
- B. Hydrant Assemblies consist of:
 - 1. Hydrant anchoring tee, swivel tee or standard tee, as required.
 - 2. 6 inch gate valve and valve box.
 - 3. 6 inch hydrant branch piping.
 - 4. Hydrant.
 - 5. Drainage material.
 - 6. Thrust blocking and joint bracing.
- C. Related Work Specified Elsewhere:
 - 1. Excavation and backfill, pavement, dewatering, borrow and bedding are specified in this Division.

1.2 QUALITY ASSURANCE

- A. Hydrants shall conform to AWWA C502 and all hydrants shall be from one manufacturer.
- B. Gate valves shall conform to AWWA C509 (Resilient-Seated Gate Valves for Water Supply).
- C. Acceptable Manufacturers:
 - 1. Mueller Company, Decatur, Illinois.
 - 2. 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 all hydrant assemblies meet or exceed the requirements of these Specifications.
- C. Submit manufacturers installation instructions and specifications for all hydrant assemblies.

PART 2 - PRODUCTS2.1 MATERIALS

- A. Fire Hydrants:
 - 1. Dry barrel type with a 5 inch minimum valve opening.
 - 2. Two (2) 2-1/2 inch hose connections and one (1) 4-1/2 inch pumper connection.
 - a. 2-1/2 inch outlets: 60o V threads, 7-1/2 threads to the inch, external threads 3-1/16 inches, O.D. National Standard threads.
 - b. 4-1/2 inch outlet: 4 threads to the inch, external threads 5-3/4 inches, O.D. National Standard threads.

- c. Supply adapters if existing fire fighting equipment does not match the threads specified above.
3. 150 pounds working pressure and 300 pounds hydrostatic test pressure.
4. Working parts shall be bronze and open clockwise unless otherwise specified.
5. Designed with standpipe breaking ring or breakable sections.
6. Supply one (1) collision repair kit for every twenty-five (25) hydrants installed.
7. Caps shall be attached to hydrant body by chains.
8. Hydrants shall be self-draining type.
- B. Gate Valves: Waterworks type non-rising stem AWWA valve as specified in the appropriate section of this Division.
- C. Valve Boxes:
 1. Cast iron, minimum thickness 3/10 inch with the word "WATER" cast in covers.
 2. Be of such length as required without full extensions.
 3. As specified in this Division.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install hydrants as shown in the details and using manufacturer's written instructions.
- B. No hydrant assembly shall be backfilled until approved by the Engineer.
- C. Provide drainage material and thrust blocks as shown.
- D. Provide barrel extensions as required for hydrant to be installed at proper grade.
- E. Provide finish paint on all exposed surfaces. Color shall meet Owner's requirements as approved by the Engineer.

3.2 CLEANING

- A. Clean all hydrants of concrete, etc. and repaint as necessary to the satisfaction of the Engineer.

END OF SECTION

SECTION 02645CURB BOXESPART 1 - GENERAL1.1 DESCRIPTION

- A. Work Included: Furnish and install curb 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 curb boxes shall be manufactured by one manufacturer.
- B. Qualifications of Manufacturer: Products have proven reliable in similar installations over a reasonable number of years.
- C. Acceptable Manufacturers:
 - 1. Quality Water Products.
 - 2. Mueller Co.
 - 3. Hayes Manufacturing Co.
 - 4. 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 curb boxes meet or exceed the requirements of these Specifications.
- C. Submit manufacturers installation instructions and specifications for all curb boxes.

PART 2 - PRODUCTS2.1 MATERIALS AND FABRICATION

- A. Cast iron base piece, steel upper, cast iron lid, and threaded bronze plug with pentagon nut (Rope Thread).
- B. Extension type and arch pattern base with 1/2" diameter stainless steel minimum, 30" stationary rod.

PART 3 - EXECUTION3.1 INSTALLATION

- A. Install as shown on the Drawings and/or as requested by the Engineer.
 - 1. When installation is complete no pressure shall be exerted by the curb box on either the curb stop or the service pipe.

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. 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 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 "Sewer" cast in cover for low pressure sewer valves and the word "Water" cast in cover for water valves.
- C. Belled Base Section.

PART 3 - EXECUTION3.1 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 main nor on the valve.
 - 2. Be of such length as required without full extension. Minimum lap 6 inches.

END OF SECTION

SECTION 02647SEWER SERVICE LATERAL COMPONENTSPART 1 - GENERAL1.1 DESCRIPTION

- A. Work Included: Furnish and install sanitary sewer lateral components 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. Each valve type shall be manufactured by one manufacturer.
- B. Qualifications of Manufacturer: Products have proven reliable in similar installations over a minimum of 5 of years.
- C. Accepted Manufacturers:
1. Environmental One

PART 2 - PRODUCTS2.1 MATERIALS

- A. Corporation Stop Assembly
1. Full port 2-piece stainless steel 1-1/4-inch ball valve. Corporation valve shall be cast 316-stainless steel, full port with locking handle and blow out proof stem with PTFE seats and gaskets. All valve handles and operating hardware and pipe nipples shall be 304-stainless steel. The corporation valve shall be rated for 150 psi service. Stainless steel 1-1/4-inch male iron pipe threaded "close nipple". Compression fitting of male iron pipe by plain end iron pipe compression adapter.
- B. Curb Stop/Check Valve Assembly
1. Combination curb stop/check valve assembly shall be 304-stainless steel and have a two-piece cast 304-stainless steel housing. The stainless steel check valve shall be integral with the curb stop valve. The check valve will provide a full-ported 1-1/4-inch passageway and shall introduce minimal friction loss at maximum rated flow. The flapper hinge design shall provide a maximum degree of freedom and ensure seating at low back pressure. Flapper and hinge assembly shall be fully serviceable in the field. The curb stop shall be pressure-tight in both directions. The ball valve actuator shall include position stop features at the fully opened and closed positions. The curb stop/check valve assembly shall be rated for a working pressure of 235 psi.
- C. Fittings and Adapters
1. All plastic compression fittings are to be molded from polypropylene and shall be tested for resistance to aging, pressure rating, tensile strength, and flexural strength. All components shall incorporate compression fitting connections for easy, reliable installation of piping. The fittings shall be rated for 150 psi service.

2. All plastic fitting components are to be in compliance with applicable ASTM standards.
3. All pipe connections shall be made using compression fitting connections including a Buna-N 'O'-ring for sealing to the outside diameter of the pipe. A split-collet locking device shall be integrated into all pipe connection fittings to securely restrain the pipe from hydraulic pressure and external loading caused by shifting and settling.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install at locations shown on the Drawings and as specified in accordance with manufacturer's instructions.
- B. Assemble the compression fittings/adapters according to the fitting manufacturer's recommendations.

END OF SECTION

SECTION 02648TAPPING SLEEVES & VALVESPART 1 - GENERAL1.1 DESCRIPTION

- A. Work Included: Furnish and 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.

1.2 QUALITY ASSURANCE

- A. Tapping Valves: Shall meet the requirements of Section 02641. Valves shall be mechanical joint inlet and outlet.
- B. Tapping Sleeves: Shall be full circumferential seal, heavy duty all stainless steel sleeve with triangular sidebar lugs and removeable stainless steel bolts.
- C. Acceptable Manufacturers:
1. Romac Industries, Inc.
 2. JCM Industries
 3. Smith-Blair
 4. Ford Meter Box Company
 5. Or approved 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 manufacturers product data and installation instructions.

PART 2 - PRODUCTS2.1 MATERIALS

- A. Valves: Shall be resilient wedge gate valve with mechanical 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 cast iron, ductile iron, PVC or AC as applicable.
 2. NSF-61 certified. (Not required if not potable water application)
 3. Shell & Sidebar lugs – heavy gauge type 304 or 304L stainless steel, full GMAW and GTAW welds, full chemical passivation of all welds for corrosion resistance.
 4. Outlet – Full type 304 stainless steel outlet, mechanical joint (AWWA C-111/ANSI 21.11) to mate with standard mechanical joint gate valve.
 5. Test Plug – provide 3/4" test plug in outlet neck to allow pressure testing of sleeve before tapping.
 6. Nuts and Bolts – Type 304 stainless steel, coated to prevent galling.
 7. Working pressure: 4"–12" @ 250 psi, 14"–24" @ 200 psi, 26"–30" @ 150 psi.
- 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.

- E. Acceptable Manufacturers:
 - 1. Romac SST III -MJ.
 - 2. JCM Model 439.
 - 3. Smith-Blair Model 665 w/ MJ outlet.
 - 4. Ford FTSS w/ MJ outlet.
 - 5. Or approved equivalent.

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.
 - 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. Confirm that the valve is in proper alignment by checking the distance between flange faces on all sides is equal.
 - 4. Support shall be provided under the sleeve and valve during the tapping operation.
 - 5. Pressure test the tapping sleeve before installing the tap.
 - 6. Thrust blocks shall be provided under and behind all tapping sleeves.
 - 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 5-years of experience installing similar sized pressurized taps.

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 trace wire with access points as described herein to be used for locating non-metallic pipe with an electronic pipe locator after installation.

1.2 QUALITY ASSURANCE

- A. Manufacturer shall submit shop drawings for approval.

PART 2 - PRODUCTS2.1 MATERIALS

- A. Tracer wire to be ten (10) gauge minimum copper clad steel (CCS) wire with thermoplastic insulation recommended for direct burial. Wire connectors to be 3M DBR, Copperhead Snakebite, or approved equal and shall be watertight and provide electrical continuity.
- B. Tracer wire color shall be green for all wastewater construction and blue for drinking water construction.

PART 3 - EXECUTION3.1 GENERAL REQUIREMENTS

- A. Tracer wire shall be installed on all HDPE Low Pressure Sewers (LPS) and services. The wire shall be installed in such a manner as to be able to properly trace all LPS without loss or deterioration of signal or without the transmitted signal migrating off the tracer wire.
- B. Tracer wire shall be installed in the same trench for trench installation and inside casing if cased pipe installation for all nonmetallic pipelines. It shall be secured to the pipe as required to insure 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 cleanout manhole and service valve boxes.
- C. At all valve box connections trace wire shall be installed inside the valve box with tracer wire clips to hold the tracer wire to one side to avoid interference when valve wrench is used. Tracer wire clips shall be Vait Products Gate Valve Box Tracer Wire Clips or approved equal.
- D. 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. Except for approved spliced-in connections, tracer wire shall be continuous and without splices from manhole to manhole.
- E. Sewer

1. At all cleanout manholes, 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 zinc anode and is to be buried at the same elevations as the LPS or HDPE water services.
 2. Spliced connections between the main line tracer wire and branch connection tracer wire shall only be allowed at LPS tees and wyes. The branch connection tracer wire shall be a single tracer wire properly spliced to the main line tracer wire.
- F. Water Services:
1. At all curb stops, a minimum of 6 feet of tracer wire shall be extended beyond the end of the water service pipe, coiled and secured for future connections. The end of the tracer wire shall be spliced to the wire of a six pound zinc anode and is to be buried at the same elevations as the water service pipe.
 2. Spliced connections between the water service tracer wire and branch connection tracer wire shall only be allowed at water service tees. The branch connection tracer wire shall be a single tracer wire properly spliced to the main line tracer wire.

3.2 TESTING REQUIREMENTS

- A. Contractor shall perform a continuity test on all tracer wire in the presence of the Engineer or the Engineers' representative. If the tracer wire is found to be not continuous after testing, Contractor shall repair or replace the failed segment of the wire.

END OF SECTION

SECTION 02650BURIED UTILITY MARKINGSPART 1 - GENERAL1.1 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, 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 - PRODUCTS2.1 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 02665COMBINATION VALVESPART 1 - GENERAL1.1 DESCRIPTION

- A. Work Included: Furnish, install and test combination (air and vacuum release) valves of the size(s) and the type (s) and in the location(s) shown on the Drawings and specified herein.
- B. Related Work Specified Elsewhere: "Valves and Specialties - General" is specified in this Division.

1.2 QUALITY ASSURANCE

- A. All combination valves, for the same service, shall be manufactured by one manufacturer.
- B. Acceptable Manufacturers:
 - 1. A.R.I. Flow Control Accessories
 - 2. Dezurik/APCO
 - 3. Crispin Valve
 - 4. Or equivalent.
- C. Manufacturer shall submit shop drawings for approval.
 - 1. Shop drawings shall show combination valve and accessories as required.
 - 2. Orifice sizing calculations.
 - 3. Furnish installation manuals, instruction operation and maintenance manuals covering the function and operation of the valve.
 - 4. Submit manufacturer's "Certification of Conformance" that valve and other piping appurtenances meet or exceed the requirements of these Specifications.

PART 2 - PRODUCTS2.1 MATERIALS

- A. General:
 - 1. All valves shall be suitable for the intended services.
 - 2. Valve sizing shall be as recommended by the manufacturer to suit the pressure and flow condition of each application.
 - 3. The valve manufacturer shall furnish installation and maintenance manuals with each valve.
- B. Sewage Service:
 - 1. Combination (air and vacuum release) Valve.
 - a. Combination valve consisting of one air release and one vacuum valve within the same valve body.
 - b. Shall be designed to operate (open) while pressurized, allowing entrained air to escape through the air release orifice. After entrained air escapes through the air release orifice, the valve orifice shall be closed by a plunger mounted on a float energized compound lever mechanism to

- prevent sewage media from escaping. The valve shall allow air to enter the pipeline during draining of the line.
- c. Designed for the pressure of main service and hydrostatically tested at the factory.
 - d. Shall be specially adapted for use with raw sewage.
 - e. The valve body shall be capable of being back-flushed with water.
 - f. Valve body and covers shall be 316 stainless steel.
 - g. Float, pins and plunger shall be 316 stainless steel.
 - h. Flow lever material shall be 316 stainless steel or brass.
 - i. The seat/needle material shall be Acrylonitrile-Butadiene (NBR).
 - j. Shall include back flush attachments and appurtenances.
 - k. Furnish with 2-inch NPT inlet shutoff valve; 1-inch NPT blow off valve as indicated on the Drawings.
 - l. Orifice size shall be as recommended by manufacturer and withstand pressures up to 150 psi.
 - m. The coating/paint shall be 4G0 - 3 mils minimum of blue enamel on exterior or equivalent coating/paint and with standard (SP10) surface prep.
 - n. Valve shall be capable of withstanding 200 psi line pressure.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install valves in accordance with manufacturer's instructions and recommendations and as shown on the Drawings.
- B. Install all valves in the vertical position and allow sufficient clearance around valve for proper maintenance and removal.
- C. Inlet piping and valves to the combination valves shall be brass.
- D. The exhaust lines from the combination valves shall terminate in down turned position.

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 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.

1.3 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 - EXECUTION3.1 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.

CLEANING, TESTING AND DISINFECTION OF WATER MAINS

- 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.

3.2 FLUSHING

- A. All new water mains, and existing water mains that have been drained and cut-into for making connections, shall be thoroughly flushed prior to pressure or 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	Hydrant Outlets Size (in.)
4	120	15/16	1	2-1/2
6	2650	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.

3.3 AIR REMOVAL

- A. Following flushing, and before applying the specified test pressure, air shall be completely expelled from the mains, valves, and hydrants. After all air has been expelled, the air blowoffs can be closed, and the test pressure applied.

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. Be of at least 2-hour duration.
 2. Be not less than 1.25 times the expected system working pressure at the highest point along the test section.
 3. Not exceed main or thrust-restraint design pressures.
 4. Not vary by more than + 5 psi for the duration of the test.
 5. 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.
 6. 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 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

- 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.

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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 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.

3.7 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.

3.8 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.

3.9 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.

3.10 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.

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- 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 02713WOOD FENCEPART 1 - GENERAL1.1 DESCRIPTION

A. Work Included:

1. Furnish all materials and install wood fence of the type and size and in the location as shown on the drawings and specified herein.
2. Rough hardware, such as nails, bolts, screws and gate hardware as required to install fence, except as otherwise specified herein.

1.2 QUALITY ASSURANCE

A. All lumber except as otherwise specified herein shall:

1. Be new, dressed 4 sides (S4S), clean and free from warping and other defects.
2. Have a moisture content not exceeding 15 percent when delivered to the project.
3. Be in accordance with the grading rules of the Manufacturers' Association under whose jurisdiction the specie of lumber is produced.

1.3 SUBMITTALS TO THE ENGINEER

- A. Submit complete shop drawings in accordance with the requirements of the General Conditions and Supplementary Conditions.

PART 2 - PRODUCTS2.1 FENCE MATERIALS

A. Posts:

1. Nominal 6 inch by 6 inch gate posts by height as shown on the Drawings - No. 1 Douglas Fir.
2. Nominal 4 inch by 4 inch intermediate and corner posts by height as shown on the Drawings - No. 1 Douglas Fir.

B. Back Rails:

1. Nominal 2 inch by 4 inch top, middle and bottom rail, by 8 foot 0 inch in length maximum - No. 1 Douglas Fir.

C. Pickets:

1. Nominal 1 inch by 4 inch by height as shown on Drawings - No. 1 Douglas Fir.

D. Design:

1. Picket configuration shall be shadow board. Gate shall be flush boards butted, exposed to view.

E. Rough Hardware:

1. Nails - 7d common, galvanized. 2 nails at each back rail per picket.
2. Bolts - galvanized, size and length as shown on the Drawings.
3. Hinges - Carbon steel (black) - strap configuration.
4. Latch set - Latch set shall be thumb piece, carbon steel (black) with padlock.

2.2 LUMBER TREATMENTS

A. Preservative Treatment:

1. All wood fence materials embedded in concrete shall be pressure preservative-treated.
2. All other wood fence materials shall be treated by brush-coating.
3. Pressure Treatment - Wolman salts with paintable type carrier. The minimum retention shall be 0.35 pounds of preservative per cubic foot of wood. Standard process shall conform to FS TT-W-573. The treating plant shall furnish a notarized certificate that all pertinent details of these specifications have been met.
4. Brush Treatment - Penta, Cuprinol, Woodlife, or approved equal, applied in two heavy coats, prior to installation of lumber, on all surfaces.

2.3 STORAGE OF MATERIALS

- ### A. Store all materials in an elevated dry location, protected by waterproof coverings.

PART 3 - EXECUTION

3.1 ERECTION OF WOOD FENCE

- A. Erection and complete installation shall be by the General Contractor.
- B. All fencing shall be erected plumb level and true to line.
- C. Just prior to the completion of all work under this section, inspect all portions of the work, accompanied by the Engineer, and make any required adjustments or corrections to the work.

END OF SECTION

SECTION 02751SEWER FLOW CONTROLPART 1 - GENERAL1.1 DESCRIPTION

- A. Work Included: During the installation, replacement, rehabilitation and/or testing of sanitary sewer lines and sanitary sewer manholes via open-cut or trenchless approach, the Contractor shall maintain and control flow around the pipe segment(s) or structure(s) that are temporarily out of service. Existing sewer services shall remain live at all times during the progress of the Work. All temporary pumping equipment shall meet the requirements outlined in local noise regulations.
- B. Additional Requirements Specified Elsewhere:
 - 1. Summary of Work: Section 01010
 - 2. Submittals: Section 01340
 - 3. Final Sewer Testing: Section 02755

1.2 SUBMITTALS

- A. In accordance with the requirements of Section 01340. Additional specific information required is listed below.
 - 1. Proposed schedule, sequence of construction, duration of activities and description of sewer control methods to be utilized for each element of the project.
 - 2. Technical data (including capacity and fuel tank size) of any portable temporary pumping equipment to be used during normal Contractor work hours.
 - 3. Supplemental information required under Section 01515 for sewer flow control which extends beyond Contractor work hours.

PART 2 - PRODUCTS – NOT APPLICABLEPART 3 - EXECUTION3.1 COORDINATION OF WORK

- A. Provide all labor and equipment necessary to coordinate work of this section and maintain communications.
- B. Notify all personnel, including but not limited to the Owner, Engineer, and Utility Companies seven days in advance of any temporary bypass pumping work. The Owner will identify personnel to be notified in addition to those identified by the Contractor.
- C. Contractor shall coordinate temporary bypass pumping operations with the Owner and Engineer on a daily basis.

3.2 PERFORMANCE

- A. General
 - 1. The Contractor shall install and test all sewer flow control methods to the satisfaction of the Owner and Engineer prior to proceeding with the Work.

2. The Contractor shall be solely responsible for clean-up, repair, property damage costs and claims resulting from failure of the diversion system.
- B. Plugging or Blocking:
1. Insert plug at a manhole upstream of line to be inspected and tested.
 2. Plug shall be so designed that all or any portion of the sewage flows can be released.
 3. Flows shall be shut off or substantially reduced during line testing.
- C. Pumping and Bypassing:
1. When required, supply the necessary pumps, conduits and other equipment (including standby equipment) to divert the flow of sewage around the line in which work is being performed.
 2. Furnish the necessary labor and 24-hour supervision to set up, test and operate the pumping and bypassing system.
 3. Any temporary pumps, piping, fuel storage, or other appurtenances associated with the portable temporary pumping equipment shall be either located above the 100-year flood elevation or protected against flotation or other damage which would be caused by a flood event.

END OF SECTION

SECTION 02755FINAL SEWER TESTINGPART 1 - GENERAL1.1 DESCRIPTION

A. Work Included:

1. Final sewer testing work includes the performance of testing and inspecting each and every length of sewer pipe, pipe joints and each item of appurtenant construction.
2. Perform testing at a time acceptable to the Engineer, which may be during the construction operations, after completion of a substantial and convenient section of the work, or after the completion of all pipe laying operations.
3. Provide all labor, pumps, pipe, connections, gages, measuring devices and all other necessary apparatus to conduct tests.

B. Related Work Specified Elsewhere (When Applicable):

1. Excavation, backfill, dewatering, pipe, pipe fittings and manholes are specified in the appropriate Sections in this Division.
2. Manhole testing is specified in Section 02601 - Manholes, Covers and Frames.

PART 2 - PRODUCTS

Not Applicable

PART 3 - EXECUTION3.1 PERFORMANCE

A. General:

1. All sewers, manholes, and appurtenant work, in order to be eligible for acceptance by the Engineer, shall be subjected to tests that will determine the degree of watertightness and horizontal and vertical alignment.
2. Thoroughly clean and/or flush all sewer lines to be tested, in a manner and to the extent acceptable to the Engineer, prior to initiating test procedures.
3. Perform all tests and inspections in the presence of the Engineer and the plumbing or building inspector in accordance with the requirements of the local and state plumbing codes.
4. Perform testing by test patterns determined by or acceptable to the Engineer.
5. Remedial Work:
 - a. Perform all work necessary to correct deficiencies discovered as a result of testing and/or inspections.
 - b. Completely retest all portions of the original construction on which remedial work has been performed.
 - c. Perform all remedial work and retesting in a manner and at a time acceptable to by the Engineer at no additional cost to the Owner.

B. Line Acceptance Tests (Gravity sewers with no active service connections):

1. Test all gravity sewer lines with no active service connections for leakage by conducting a low pressure air test.
2. Equipment:
 - a. Pneumatic plugs shall have a sealing length equal to or greater than the diameter of the pipe to be inspected.
 - b. Pneumatic plugs shall resist internal test pressures without requiring external bracing or blocking.
 - c. All air used shall pass through a single central panel.
 - d. Connect 3 individual hoses:
 - i. From the control panel to the pneumatic plugs for inflation.
 - ii. From the control panel to the sealed sewer line for introducing the low pressure air.
 - iii. From the sealed sewer line to the control panel for continually monitoring the air pressure rise in the sealed line.
3. Testing Pneumatic Plugs:
 - a. Seal test all pneumatic plugs prior to using them in the actual test.
 - b. Lay one length of pipe on the ground and seal both ends with the pneumatic plugs to be tested.
 - c. Pressurize the sealed pipe to 5 psig.
 - d. The pneumatic plugs are acceptable if they remain in place without bracing.
4. Testing Sewer Pipeline:
 - a. After the sewer pipe has been cleaned and the pneumatic plugs checked, place the plugs in the sewer line at each manhole and inflate them.
 - b. Introduce low pressure air into the sealed sewer pipeline until the air pressure reaches 4 psig greater than the average groundwater pressure.
 - c. Allow a minimum of 2 minutes for the air pressure to stabilize to a minimum of 3.5 psig greater than the groundwater pressure. Groundwater is assumed to be at ground surface unless the Contractor can prove by otherwise by test pitting.
 - d. After the stabilization period, disconnect the air hose from the control panel to the air supply.
 - e. The pipeline will be acceptable if the pressure decrease is not greater than 1/2 psig in the time stated in the following table for the length of pipe being tested:

<u>Pipe Diameter</u> (inches)	<u>Time (Min.) for Length of Pipe</u>			
	<u>0-100 ft</u>	<u>101-200 ft</u>	<u>201-300 ft</u>	<u>301-400 ft</u>
4	2.0	2.0	2.0	2.0
6	3.0	3.0	3.0	3.0
8	4.0	4.0	4.0	5.0
10	5.0	5.0	6.0	8.0
12	5.5	5.5	8.5	11.5
15	7.0	8.5	13.0	17.0

<u>Pipe Diameter</u> (inches)	<u>Time (Min.) for Length of Pipe</u>			
	<u>0-100 ft</u>	<u>101-200 ft</u>	<u>201-300 ft</u>	<u>301-400 ft</u>
18	8.5	12.0	19.0	25.0
21	10.0	17.5	26.0	35.0
24	11.5	23.0	34.0	45.5
27 and larger	14.5	29	43.0	58.0

5. Test Results:
 - a. If the installation fails the low pressure air test, determine the source of leakage.
 - b. Repair or replace all defective materials and/or workmanship and repeat low pressure air test at no additional cost to the Owner.
- C. Line Acceptance Tests (Gravity sewers with active services):
 1. Test all new gravity sewer lines with active services by conducting a low-pressure air test on all joints using a packer after all services have been connected or capped at the property line and all trenches backfilled but before the surface course of permanent pavement is installed.
 2. Equipment:
 - a. Closed-circuit television system.
 - b. Testing devices (packer):
 - i. Capable of isolating individual joints by creating a sealed void space around the joint being tested.
 - ii. Constructed such that low pressure air can be admitted into the void area.
 - iii. Shall contain a pressure gauge accurate to one tenth (0.1) psi in-line with the feed line to monitor the void pressure.
 - iv. Capable of performing in sewer lines where flows do not exceed 1/4 of the pipe diameter without resorting to any method of flow control.
 3. Testing Sewer Pipeline Joints:
 - a. Test all joints except those with visible infiltration.
 - b. Procedure:
 - i. Pull television camera through sewer line in front of the packer.
 - ii. Position the packer on each joint to be tested.
 - iii. Inflate the sleeves on each end of the packer.
 - iv. Apply four (4.0) psi pressure above the existing hydrostatic pressure on the outside of the joint to the void area created around the inside perimeter of the joint.
 - v. Shut off the supply of air once the pressure has stabilized at the required amount.
 - vi. Monitor the void pressure for thirty (30) seconds.
 - vii. Repair the joint if the pressure drops more than one half (1/2) psi in the thirty (30) seconds.

- c. Water or chemical pressure testing may be used in lieu of air testing subject to review and approval by the Engineer.
 - d. Re-clean and re-inspect all lines not approved by the Engineer at no additional cost to the Owner.
 - e. Repairing of Joints:
 - i. When a joint fails the pressure test, excavate and repair the failed joint. Repairing joints with chemical grout will not be permitted.
 - f. The Engineer may request checking of the testing equipment for accuracy.
 - i. Perform standard air test on a clean continuous section of pipe.
 - ii. Repair the equipment if the void pressure drops.
 - g. Testing Operation Inspection:
 - i. Reset each joint, as specified herein, prior to acceptance and final payment for joint testing. Retest all joints that fail until the test requirements are met.
 - h. The contractor will supply a black and white photograph of every joint that fails the pressure test.
- D. Alignment Tests (Gravity Sewers):
- 1. Perform tests for the correctness of horizontal and vertical alignment on each and every length of gravity sewer pipeline between manholes.
 - 2. Alignment tests to be conducted after all pipe has been installed and backfilled.
 - 3. The observation test shall be conducted after all upstream work has been completed and the pipeline cleaned of debris.
 - 4. Notify the Engineer at least 24 hours in advance of the proposed observation testing.
 - 5. Introduce water into the sewer lines to be tested from the upstream manhole prior to the observation test but no more than 24 hours in advance of the test.
 - 6. Beam a source of light, acceptable to the Engineer, through the pipeline from both ends and the Engineer will directly observe the light in the downstream, and/or upstream manhole of each test section.
 - 7. The length of pipe between manholes, diameter of pipe and amount of light observed in the manhole at the end of each pipe section will determine acceptance of the alignment test by the Engineer.
 - 8. The amount of vertical and horizontal deflection shall not be greater than the ASTM allowance and (manufacturer's recommendations) for the pipe being tested.
 - 9. No standing water shall be allowed. The presence of standing water shall be cause for rejection of that pipe (including manhole) section.
 - 10. Improper alignment will be corrected by re-excavation and resetting of pipe at no additional cost to the Owner.
- E. Pipe Deflection: (Gravity Sewers)
- 1. Pipe provided under this specification shall be installed so there is no more than a maximum deflection of 5.0 percent. Such deflection shall be computed by multiplying the amount of deflection (normal diameter less minimum diameter when measured) by 100 and dividing by the nominal diameter of the pipe.
 - 2. The Contractor shall wait a minimum of 30 days after completion of a section of sewer, including placement and compaction of backfill, before measuring the

amount of deflection by pulling a specially designed gage assembly through the completed section. The gage assembly shall be in accordance with the recommendations of the pipe manufacturer and be acceptable to the Engineer.

3. Should the installed pipe fail to meet this requirement, the Contractor shall do all work to correct the problem as the Engineer may require without additional compensation.
- F. Television Inspection Tests (Gravity Sewers)
1. Where television inspection testing is required, test procedures shall be in compliance with the requirements outlined in Specification Section 02753.
 2. No standing water shall be allowed. The presence of standing water may be cause for rejection of that pipe.
 3. Any standing water, detectable leaks, improper joints or any other unacceptable feature detected by the television inspection will be corrected by re-excavation and resetting pipe at no additional cost to the Owner.
- G. Inspection of Appurtenant Installations:
1. Completely inspect, at a time determined by the Engineer, all manholes and inlets to ascertain their compliance with the Drawings and Specifications.
 2. Provide access to each manhole and inlet and check the following characteristics:
 - a. Shape and finish of invert channels,
 - b. Watertightness and finish of masonry structures,
 - c. Location, type, and attachment of stops,
 - d. Elevation and attachment of frames, covers, and openings,
 - e. Pattern and machining of covers, and
 - f. Drop connection arrangements.
- H. Testing Pressure Sewers:
1. The section of pipe to be tested shall be filled with water of approved quality, and all air shall be expelled from the pipe. If blowoffs are not available at high points for releasing air, the Contractor shall make the necessary excavations backfilling and taps at such points and shall plug said holes after completion of the test.
 2. The section under test shall be maintained full of water for a period of 24 hours prior to the combined pressure and leakage test being applied.
 3. Perform pressure and leakage test at 1-½ times the maximum system pressure or 100 psi whichever is greater (based on the elevation of the lowest point of the section under test and corrected to the gage location). Test duration shall be two hours.
 4. While maintaining this pressure, the Contractor shall make a leakage test by metering the flow of water into the pipe. Leakage, if any, shall be equal to or less than the amounts as determined by Section 4.2 of AWWA C 600.

$$L = \frac{SD\sqrt{P}}{148,000}$$

L = allowable leakage in gallons per hour

S = length of pipe tested, in feet

D = nominal diameter of pipe, in inches

P = average test pressure, in pounds per square inch

5. In addition to meeting the leakage testing above, all joints within chambers and all flanged joints shall have no visible leakage.
 6. If the section fails to pass the pressure and leakage test, the Contractor shall do everything necessary to locate, uncover, and repair or replace the defective pipe, fitting, or joint, all at his own expense and without extension of time for completion of the work. Additional tests and repairs shall be made until the section passes the specified test.
- I. Manhole Leakage Testing:
1. Specified in the "Manholes, Covers and Frames" Section in Division 2.

END OF SECTION

DIVISION 3
Concrete

SECTION 03300ACAST-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 finishing, curing, modifications and repairs

1.2 PRODUCTS INSTALLED BUT FURNISHED UNDER OTHER SECTIONS

- A. Pipe Sleeves: Section 15092 - Pipe Sleeves and Seals

1.3 RELATED SECTIONS

- A. Section 01340 - Submittals
- B. Section 01400 - Quality Control
- C. Division 15 - Pipes
- D. Section 15092 - Pipe Sleeves and Seals

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 306.1 - Standard Specification for Cold Weather Concreting
- E. ACI 306R – Guide to Cold Weather Concreting
- F. ACI 308.1/308.1M - Specification for Curing Concrete
- G. ACI 318/318M - Building Code Requirements for Structural Concrete and Commentary
- H. ACI 347R - Guide to Formwork for Concrete
- I. ACI 355.2 – Qualification of Post-Installed Mechanical Anchors in Concrete & Commentary
- J. ACI 355.4/355.4M – Qualification of Post-Installed Adhesive Anchors in Concrete and Commentary
- K. ACI SP-066 – ACI Detailing Manual
- L. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon-Steel

Bars for Concrete Reinforcement

- M. ASTM C33/C33M - Standard Specification for Concrete Aggregates
- N. ASTM C39/C39M - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens
- O. ASTM C40 – Standard Test Method for Organic Impurities in Fine Aggregates for Concrete
- P. ASTM C88 – Standard Test Method for Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate
- Q. ASTM C94/C94M - Standard Specification for Ready-Mixed Concrete
- R. ASTM C131/C131M – Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine
- S. ASTM C150/C150M - Standard Specification for Portland Cement
- T. ASTM C171 - Standard Specification for Sheet Materials for Curing Concrete
- U. ASTM C172 - Practice for Sampling Freshly Mixed Concrete
- V. ASTM C231 - Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method
- W. ASTM C260/C260M - Standard Specification for Air-Entraining Admixtures for Concrete
- X. ASTM C494/C494M - Standard Specification for Chemical Admixtures for Concrete
- Y. ASTM C535 – Standard Test Method for Resistance to Degradation of Large-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine
- Z. ASTM C618 - Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete
- AA. ASTM C881/C881M - Standard Specification for Epoxy-Resin-Base Bonding Systems for Concrete
- BB. ASTM C989/C989M - Standard Specification for Slag Cement for Use in Concrete and Mortars
- CC. ASTM C1059/C1059M - Standard Specification for Latex Agents for Bonding Fresh to Hardened Concrete
- DD. ASTM C1077 - Standard Practice for Agencies Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Testing Agency Evaluation
- EE. ASTM C1240 - Standard Specification for Silica Fume Used in Cementitious Mixtures
- FF. ASTM C1260 – Standard Test Method for Potential Alkali Reactivity of Aggregates (Mortar-Bar Method)
- GG. ASTM C1293 – Standard Test Method for Determination of Length Change of Concrete Due to Alkali-Silica Reaction
- HH. ASTM C1567 – Standard Test Method for Potential Alkali-Silica Reactivity of Combinations of Cementitious Materials and Aggregate (Accelerated Mortar-Bar Method)
- II. AWS D1.4/D1.4M – Structural Welding Code – Reinforcing Steel
- JJ. Concrete Reinforcing Steel Institute -10-MSP Manual of Standard Practice
- KK. Concrete Reinforcing Steel Institute - Placing Reinforcing Bars
- LL. 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. 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 in 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.

1.6 SUBMITTALS

- A. Submit shop drawings for concrete 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. Cover and clearances
 - 4. Pertinent reinforced concrete details with dimensions and elevations
- 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 with the previous 24 months.
- C. Submit product data and material safety data sheets for concrete accessories.
- D. Submit product data and material safety data sheets for form release agent.
- E. 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
- F. Submit product data for form ties.
- G. 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.
- H. 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.
- I. Submit product data and material safety data sheets for repair materials. Indicate the intended use and location for all products.
- J. Submit curing methods.
- K. Submit qualifications of flatwork finisher.
- L. 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	

- M. Independent Testing Laboratory will submit reports within 5 days of testing or inspection.
- N. 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; 3/4" x 3/4" minimum, maximum possible length.
- E. Form Ties:
 - 1. 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 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")
1-½ inch	-	-
1 inch	-	100
¾ inch	-	90-100
½ inch	100	-
3/8 inch	85-100	20-55
No. 4	10-30	0-10
No. 8	0-10	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")
 - 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%
- 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".

2.3 ACCESSORIES

- A. Epoxy bonding adhesive: Epoxy resin/portland cement moisture resistant bonding agent: Armatec 110 EpoCem by Sika Corporation, Corr-Bond by Euclid Chemical Company, Epobond by L&M Construction Chemicals, Inc. or equivalent.

2.4 CURING MATERIALS

- A. 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.
- B. Curing Blanket: ASTM C171. Cellulose fabric sheets with an impervious layer on one side. Konkure by Raven Industries, UltraCure by Sika Industries or equivalent.
- C. Curing Paper: ASTM C171, regular or white waterproof paper.

2.5 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. Arimatec 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.

2.6 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. 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. 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 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. Reshore as required.
- M. Form pressures increase with the use of concrete with High Range Water Reducers. Design forms accordingly.
- N. 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 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. Diamond drill bits shall not be permitted. Hammer drills shall be used.
 - H. 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.
 - I. 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.
 - J. 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.

3.3 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. Assure placement and proper location of all embedded items.
- D. Water: additional water added to the mix shall be carefully monitored
- E. 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.
- F. 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.
- G. 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.
- H. Do not place partially hardened concrete. Re-tempering is not permitted.
- I. 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.
- J. 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.
- K. 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
- L. Thoroughly moisten subgrade materials prior to placing slabs on grade.
- M. 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.

3.4 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.
- 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. 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. 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.
 7. 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
- D. 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.

3.5 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.

3.6 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.
- 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.

3.7 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.

3.8 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 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).

END OF SECTION

DIVISION 11
Equipment

SECTION 11305SUBMERSIBLE GRINDER PUMP STATIONPART 1 - GENERAL1.1 DESCRIPTION

A. Work Included:

1. Furnish a new complete simplex or duplex submersible grinder pump station. The grinder pump and control/alarm panel shall be factory-tested. Components of the station shall include: submersible grinder pump(s), basin or tank, check valves, anti-siphon valves, a control panel, level control system, all necessary wiring, flexible discharge hose, and shut off valve.
2. The grinder pump manufacturer's factories shall be ISO 9000 certified.
3. The entire pumping system including, but not limited to the pumps, basin/tank, controls and appurtenances shall be furnished by a single manufacturer or supplier.
4. Acceptable manufacturer of the grinder pump is Environment One (E-One).

B. Work Specified Elsewhere:

1. Excavation, Bedding, Backfill, and Temporary Dewatering are specified in Division 2.

1.2 QUALITY ASSURANCE

- A. All pumping equipment shall be designed, constructed, installed and tested in accordance with the best practice and methods and the standards of the Hydraulic Institute.
- B. The grinder pump stations shall conform to requirements for materials, installation, and equipment approvals of state, local, Underwriters Laboratories, Inc., NEC, NEMA, ASTM, NSF and other applicable codes.
- C. Acceptable Manufacturer is Environmental One (E/One).
- D. Manufacturer factory-trained representative must be located within 100 miles of the City of Portsmouth, NH.
- E. The completely assembled and wired grinder pump station in its tank shall be listed by Underwriters Laboratories, Inc.
- F. The grinder pumps shall bear the National Sanitation Foundation seal.
- G. The Contractor shall have installed a minimum of ten E/One grinder pump stations.
- H. The Contractor shall attend a four-hour installation training by a manufacturer trained representative to be hosted at facilities of the Owner.

1.3 DELIVERY AND STORAGE

- A. All grinder pump units shall be delivered to the job site, completely (100%) assembled, except where partial disassembly is required by transportation regulations or for protection of components. The grinder pump stations shall have been factory tested and shall be ready for installation. Each grinder pump unit shall be individually mounted on wooden pallets

1.4 SUBMITTALS TO THE ENGINEER

- A. In accordance with the requirements specified in Section 01340. Submit such shop drawings, manufacturer's literature, short-term and long-term storage requirements, buoyancy calculations and operations and maintenance manuals.
- B. Submit the following information for all pumps specified:
 - 1. Manufacturer's rating curves showing the following pump characteristics for each unit of flow:
 - a. Total dynamic head.
 - b. Brake horsepower.
 - c. Efficiency.
 - d. Required net positive suction head.
 - e. Allowable suction lift.
 - 2. Literature, layout drawings and typical specification describing pumping equipment, showing all important details of construction and dimensions.
 - 3. Maintenance instructions shall be furnished to indicate operation, assembly, disassembly and troubleshooting.
 - 4. Copies of each grinder pump's factory tests.
 - 5. Proof of five years of experience design and manufacture of grinder pump units of identical size and mechanically similar to the specified units, which have been in successful operation at no less than five hundred low pressure sewer system installations.

1.5 WARRANTY

- A. The grinder pump manufacturer shall provide a parts and labor warranty on the complete station and accessories for a period of sixty (60) months after notice of property owner's acceptance, but no greater than sixty-three (63) months after receipt of shipment. Any defects found during the warranty period will be reported to the Manufacturer by the property owner. The Warrantee shall be a 100 percent on-site warrantee. Warranty shall be provided by the Manufacturer without any pass-through warrantees. Repair will be made free of charge and be made on-site by an authorized service provider within 24-hours of notice given to the manufacturer by the property owner.
- B. Manufacturer shall provide, at no additional cost, up to three days of four hour training opportunities by the Manufacturer factory-trained representative for licensed installer permitted to perform work in the Town. These classes shall include training on proper installation methods required by this warranty.

PART 2 - PRODUCT

2.1 GENERAL

- A. The three acceptable models of the submersible grinder pump station are:
 - 1. Simplex grinder pump station – model DH071 for single family houses and small commercial buildings.
 - 2. Simplex grinder pump station – model DH151 for multi-family homes and smaller commercial buildings.
 - 3. Duplex grinder pump station – model DH152 for larger commercial buildings.

- B. Corrosion Protection: All materials exposed to wastewater shall have inherent corrosion resistance or protection: i.e., cast iron, HDPE, stainless steel, PVC.

2.2 PUMP

- A. Grinder pumps shall be specifically designed and intended for service in pressure sewer systems. The pumps shall be progressive cavity with a single mechanical seal. All the equipment specified herein is intended to be engineered equipment for macerating and pumping material in normal domestic wastewater.
- B. The grinder pump shall operate on a 240 volt, single phase, 60 Hertz electrical system.
- C. Duty Points:
 - 1. The pump(s) shall be capable of delivering 15 GPM against a rated total dynamic head of 0 feet (0 PSIG), 11 GPM against a rated total dynamic head of 92 feet (40 PSIG), and 7.8 GPM against a rated total dynamic head of 185 feet (80 PSIG). The pump(s) must also be capable of operating at negative total dynamic head without overloading the motor(s). Under no conditions shall in-line piping or valving be allowed to create a false apparent head. The pump shall be capable of intermittent operation (3-minute minimum) at any head.
- D. Maximum pump speed: 1,725 RPM
- E. Pump shall be a maximum of 1 horsepower, 240-V, single phase.
- F. Pump Schedule:
 - 1. The Contractor shall furnish and install the submersible grinder pump stations as per Table 1 at the end of this Section.

2.3 TANK

- A. The tank shall be constructed of high-density polyethylene of either an extrusion grade or injection molding grade selected for environmental stress cracking resistance.
- B. The tank's wet well shall have a minimum nominal capacity of 70 gallons for model DH071 and a minimum nominal capacity of 150 gallons for models DH151 and DH152.
- C. The tank's corrugated sections are to be made of a double wall construction with the internal wall being generally smooth to promote scouring. Corrugations of outside wall are to be of minimum amplitude of 1 ½-inch to provide necessary transverse stiffness. Any incidental sections of a single wall construction are to be a minimum 0.250 inch thick. All seams created during tank construction are to be thermally welded and factory tested for leak tightness. Tank wall and bottom must withstand the pressure exerted by saturated soil loading at maximum burial depth. All station components must function normally when exposed to maximum external soil and hydrostatic pressure. The tank shall be furnished with one EPDM grommet fitting to accept a 4.50-inch OD DWV pipe.
- D. The tank shall have two lifting eyes complete with polypropylene lift-out harness connected to its top housing to facilitate easy core removal when necessary.

- E. The dry well shall be an integral extension of the wet well assembly and include a lockable cover assembly providing low profile mounting and water-tight capability.
1. The dry well design and construction shall facilitate field adjustment of station height in increments of 4-inch or less without the use of any adhesives or sealants requiring cure time. The station shall have all necessary penetrations molded in and factory sealed. No field penetrations shall be acceptable.
 2. All discharge piping shall be constructed of 304- Series Stainless Steel. The discharge shall terminate outside the accessway bulkhead with a stainless steel, 1 1/4-inch female NPT fitting. The discharge piping shall include a stainless-steel ball valve rated for 235 psi WOG; PVC ball valves or brass ball/gate valves will not be accepted. The bulkhead penetration shall be factory installed and warranted by the manufacturer to be watertight.
 3. The drywell shall include a single NEMA 6P electrical quick disconnect (EQD) for all power and control functions, factory installed with accessway penetrations warranted by the manufacturer to be watertight. The EQD will be supplied with a minimum of 32-feet, 25-feet of useable electrical supply cable (ESC) outside the station, to connect to the alarm panel. The (ESC) shall be installed in the basin by the manufacturer. Field assembly of the ESC into the basin is not acceptable because of potential workmanship issues. The EQD requires no tools for assembly, seals against water before the electrical connection is made, and includes radial seals to assure watertight seal regardless of tightening torque. Plug-type connections of the power cable onto the pump housing will not be acceptable due to the potential for leaks and electrical shorts. The quick disconnect shall also be capable of mating with a standby generator to control the pump. No separate control panel shall be required. A junction box shall not be permitted in the accessway. The accessway shall also include an integral 2-inch vent to prevent sewage gases from accumulating in the tank.

2.4 CONTROL/ALARM PANEL

- A. Each grinder pump shall include a factory assembled and tested NEMA 4X, UL508 Listed "Sentry Protect Plus" alarm panel in a thermoplastic polyester enclosure.
1. The control/alarm panel shall be provided by the same supplier as the pumping system.
 2. The control/alarm panels shall include a red alarm light, H-O-A switch or manual switch, audible alarm with push to silence switch, and pump run light. The enclosure shall be wall-mounted type with exterior mounting tabs and sized to house all the required components and allow adequate space for testing and maintenance as necessary.
 3. The panel shall contain one 15-amp single pole circuit breaker for the alarm circuit and one 15-amp double pole circuit breaker per core for the power circuit. The panel shall contain a push-to-run feature, an internal run indicator, and a complete alarm circuit. All circuit boards in the alarm panel are to be protected with a conformal coating on both sides and the AC power circuit shall include an auto resetting fuse.

4. The NEMA 4X enclosure shall be manufactured of thermoplastic polyester to ensure corrosion resistance. The enclosure shall include a hinged, lockable cover with padlock, preventing access to electrical components, and creating a secured safety front to allow access only to authorized personnel. The enclosure shall not exceed 12.5" W x 16" H x 7.5" D.
5. The pumps shall operate by level control that monitoring the pressure changes in an integral air column connected to a pressure switch. The air column shall be integrally molded from a thermoplastic elastomer suitable for use in wastewater and with excellent impact resistance. The air column shall have only a single connection between the water level being monitored and the pressure switch. Any connections are to be sealed radially with redundant O-rings. The level detection device shall have no moving parts in direct contact with the wastewater and shall be an integral to the pump core assembly in a single, readily exchanged unit. Depressing the push to run button must operate the pump even with the level sensor housing removed from the pump. The level controls shall require no routine maintenance and shall not foul in wastewater.
6. Control/alarm panel shall include one set of dry contacts to enable connection of additional remote alarms and one set of 120 VAC powered contacts to permit connection of redundant alarms.
7. The alarm panel shall include a gasketed type, 4-pole, 20 amp, 250 VAC generator receptacle with a spring-loaded, gasketed cover suitably mounted to provide access for connection of an external generator while maintaining a NEMA 4X rating. A manual transfer switch shall be provided, which manually switches from AC power to generator power. Power shall be provided to the alarm panel through the generator receptacle whenever power is present at the receptacle, allowing the audible and visual alarms to function normally in generator mode. When power is no longer applied to the generator receptacle, the panel is automatically switched back to the AC Mains power. No manual switching within the panel enclosure is necessary to switch.
8. Trouble indication shuts down the pump temporarily in the event of an unacceptable operating condition, including: brownout conditions with the electrical power supply; system over-pressure condition such as with a closed valve; run-dry operation of the pump
9. All necessary motor starting controls shall be located in the cast iron enclosure of the core unit secured by stainless steel fasteners. Locating motor starting controls in a plastic enclosure is not acceptable. Wastewater level sensing controls shall be housed in a separate enclosure from motor starting controls. Level sensor housing must be sealed via a radial type seal; solvents or glues are not acceptable. Level sensing control housing must be integrally attached to pump assembly so that it may be removed from the station with the pump and in such a way as to minimize the potential for the accumulation of grease and debris accumulation, etc. Level sensing housing must be a high-impact thermoplastic copolymer over-molded with a thermo plastic elastomer. The use of PVC for the level sensing housing is not acceptable.

10. Controls shall be accomplished by monitoring the pressure changes in an integral air column connected to a pressure switch. The air column shall be integrally molded from a thermoplastic elastomer suitable for use in wastewater and with excellent impact resistance. The air column shall have only a single connection between the water level being monitored and the pressure switch. Any connections are to be sealed radially with redundant O-rings. The level detection device shall have no moving parts in direct contact with the wastewater and shall be an integral to the pump core assembly in a single, readily exchanged unit. Depressing the push to run button must operate the pump even with the level sensor housing removed from the pump.
11. All fasteners throughout the assembly shall be 300 Series stainless steel. High-level sensing will be accomplished in the manner detailed above by a separate air column sensor and pressure switch of the same type. Closure of the high-level sensing device will energize an alarm circuit as well as a redundant pump-on circuit. For increased reliability, pump ON/OFF and high-level alarm functions shall not be controlled by the same switch. Float switches of any kind, including float trees, will not be accepted due to the periodic need to maintain (rinsing, cleaning) such devices and their tendency to malfunction because of incorrect wiring, tangling, grease buildup, and mechanical cord fatigue. To assure reliable operation of the pressure switches, each core shall be equipped with a factory installed equalizer diaphragm that compensates for any atmospheric pressure or temperature changes. Tube or piping runs outside of the station tank or into the tank mounted junction boxes providing pressure switch equalization will not be permitted due to their susceptibility to condensation, kinking, pinching, and insect infestation. The grinder pump will be furnished with a 6 conductor 14-gauge, type SJOW cable, pre-wired and watertight to meet UL requirements with a FACTORY INSTALLED NEMA 6P EQD half attached to it.

2.5 OTHER COMPONENTS

- A. The grinder pump station shall include an integral check valve on the discharge piping. The factory installed check valve shall be a gravity operated, flapper-type integral check valve built into the stainless-steel discharge piping. The check valve will provide a full-ported passageway when open and shall introduce a friction loss of less than 6 inches of water at maximum rated flow. Moving parts will be made of a 300 series stainless steel and fabric reinforced synthetic elastomer to ensure corrosion resistance, dimensional stability, and fatigue strength. A nonmetallic hinge shall be an integral part of the flapper assembly providing a maximum degree of freedom to assure seating even at a very low backpressure. The valve body shall be an injection molded part made of an engineered thermoplastic resin. The working pressure of the valve shall be at least 235 psi. Ball type check valves are unacceptable due to their limited sealing capacity in slurry applications.

- B. The grinder pump station shall include an anti-siphon valve on the discharge piping. The factory-installed, gravity-operated, flapper-type integral anti-siphon valve shall be built into the stainless-steel discharge piping. Moving parts will be made of 300 series stainless steel and fabric-reinforced synthetic elastomer to ensure corrosion resistance, dimensional stability, and fatigue strength. A nonmetallic hinge shall be an integral part of the flapper assembly, providing a maximum degree of freedom to ensure proper operation even at a very low pressure. The valve body shall be injection-molded from an engineered thermoplastic resin. Holes or ports in the discharge piping are not acceptable anti-siphon devices, due to their tendency to clog from the solids in the slurry being pumped. Anti-siphon port diameter shall be no less than 60% of the inside diameter of the pump discharge piping.
- C. Discharge piping shall be factory installed and shall be 304 stainless steel or high-pressure hose specifically designed for use in pressure sewers. A four-foot long flexible connector shall also be supplied as part of the outdoor grinder pump assembly. The connector shall be 1-1/4 inch, IPS, SDR 11 HDPE piping. Each end shall have a 304 stainless steel, multi-level mechanical transition piece hydraulically compressed onto the polyethylene pipe. The tank side shall be 1-1/4-inch male NPT threads and the street side shall be a 1-1/4-inch x 1-1/2-inch compression coupling suitable for either 1-1/2 inch SDR-26 or SDR 11 HDPE pipe. The transition fittings shall be designed so that as the internal pressure within the pipe increases, the sealing surface area on the barb increases. Under zero internal pressure the compression strain and tensional strain created by the compression of the multi-level barbs is greater than the stresses created by the relaxation and/or thermo expansion and contraction. The entire assembly shall be rated for 160 Psi working pressure.
- D. The Contractor shall provide a uniform, structural ballast containment around the entire circumference of the base of grinder pump station in a manner to avoid point loads or uneven support to any part of the grinder pump station.
- E. All maintenance tasks for the grinder pump station must be possible without entry of the grinder pump station (as required by OSHA 1910.146 permit required confined spaces). "Entry means the action by which a person passes through an opening into a permit-required confined space. Entry includes ensuing work activities in that space and is considered to have occurred as soon as any part of the entrant's body breaks the plane of an opening into the space."
- F. Grinder pump core units shall have two lifting eyes complete with polypropylene lift-out harness connected to its top housing to facilitate easy core removal when necessary.
- G. All mechanical connections must provide easy disconnect accessibility for core unit removal and installation.
- H. All electrical connections shall provide easy disconnect accessibility for core unit removal and installation or other manufacturer approved methods.
- I. The grinder pump shall be furnished with a 32-foot length of 6 conductor 12-gauge, type SJOW cable, pre-wired and watertight with NEMA 6P electrical quick disconnect to meet UL requirements. There shall be no junction box required in the station.

PART 3 - EXECUTION

3.1 FACTORY TEST

- A. Each grinder pump shall be submerged and operated for five minutes (minimum). Included in this procedure will be the testing of all ancillary components such as, the anti-siphon valve, check valve, discharge line, level sensors, and each unit's dedicated controls. All factory tests shall incorporate each of the above listed items. The actual controls, which will be installed in the field, shall be particular to the tested pump only. A common set of in-basin components and controls for all the pumps will not be acceptable. Certified test results shall be supplied showing the operation of each grinder pump at two different points on its curve, with the maximum pressure no less than 80 psi. All completed stations shall be factory leak tested to assure the integrity of all joints, seams and penetrations. All necessary penetrations such as inlets, discharge fittings and cable connectors shall be included in this test along with their respective sealing means (grommets, gaskets, etc.).

3.2 INSTALLATION

- A. Earth excavation and backfill are specified under Section 02200 but are also to be done as a part of the work under this section, including any necessary sheeting and bracing.
1. The Contractor shall be responsible for handling ground water to provide a firm, dry subgrade for the structure, and shall guard against flotation or other damage resulting from general water or flooding.
 2. The grinder pump stations shall not be set into the excavation until the installation procedures and excavation have been approved by the Engineer.
 3. Remove packing material. User instructions **MUST** be given to each Property Owner. Hardware supplied with the unit, if required, will be used at installation. The basin will be supplied with a standard 4" inlet grommet (4.50" OD) for connecting the incoming sewer line. Appropriate inlet piping must be used. The basin may not be dropped, rolled or laid on its side for any reason.
 4. Installation shall be accomplished so that 1 inch to 4 inches of accessway, below the bottom of the lid, extends above the finished grade line. The finished grade shall slope away from the unit. The diameter of the excavated hole must be large enough to allow for the concrete anchor.
 5. A 6-inch (minimum) layer of naturally rounded aggregate, clean and free flowing, with particle size of not less than 1/8" or more than 3/4" shall be used as bedding material under each unit.
 6. A concrete anti-flotation collar, sized and provided by the manufacturer, shall be required and shall be pre-cast to the grinder pump or poured in place. Each grinder pump station with its pre-cast anti-flotation collar shall have a minimum of three lifting eyes for loading and unloading purposes.
 7. If the concrete is poured in place, the unit shall be leveled, and filled with water, to the bottom of the inlet, to help prevent the unit from shifting while the concrete is being poured. The concrete must be manually vibrated to ensure there are no voids. If it is necessary to pour the concrete to a level higher than the inlet piping, an 8" sleeve is required over the inlet prior to the concrete being poured.

8. The Contractor will provide and install a 4-foot piece of 4-inch SDR 35 PVC pipe with water tight cap, to stub-out the inlet for the submersible grinder stations, as depicted on the Contract Drawings. Contractor shall furnish and install necessary fittings or adapters to connect 4-inch SDR 35 PVC pipe to existing sewer service lateral.
9. E/One requires that an E/One Uni-Lateral assembly (E/One part number NB0184PXX or NC0193GXX) or E/One Redundant Check Valve (E/One part number PC0051GXX) as specified in Section 02647 to be installed in the pipe lateral outside the home between the pump discharge and the street main on all installations.
10. The electrical enclosure shall be furnished, installed, and wired to the grinder pump station by the Contractor. An alarm device is required on every installation, there shall be no exception". It will be the responsibility of the Contractor and the Engineer to coordinate with the individual property owner(s) to determine the optimum location for the alarm panel.
11. The Contractor shall mount the alarm device in a conspicuous location, as per national and local codes. The alarm panel will be connected to the grinder pump station by a length of 6-conductor type TC cable as shown on the contract drawings. The power and alarm circuits must be on separate power circuits. The grinder pump stations will be provided with 25 feet of useable, electrical supply cable to connect the station to the alarm panel. This cable shall be supplied with a Factory Installed EQD half to connect to the mating EQD half on the core. Contractor shall be responsible for all electrical connections to existing property electrical systems for a complete operable pumping system.
12. All wiring, workmanship and schematic wiring diagrams shall be in compliance with applicable standards and specifications set forth by the National Electrical Code (NEC).

3.3 START-UP TESTING:

- A. Manufacturer's representative shall be present for start-up testing.
- B. The Contractor shall provide the necessary means to successfully start and operate the grinder pumps, including convenient access to a minimum 300 gallons of water for DH071 model and a minimum of 400 gallons of water for models DH151 and DH152 model, 240v power supply and a minimum of one worker to facilitate and coordinate start-up of grinder pump station.
- C. Contractor shall notify the Manufacturer's representative when the grinder pump station is ready for inspection. Following notification, the Manufacturer's representative shall coordinate with the Contractor, Engineer, and property owner to establish a date and time for start-up. The Manufacturer's representative will be responsible for the satisfactory installation and operation of the pressure sewer system.
- D. Deficiencies found during inspection shall be reported to the Contractor by proper inspection report form and letter. It shall be responsibility of the Contractor to correct said deficiencies and reschedule a follow up inspection. Repeat inspections may be subject to additional charges for labor and travel per visit over and above the initial inspection at no additional cost to the Owner.

- E. Proper start-up by pump manufacturer representative shall consist of the following procedure:
1. Thorough inspection of installation and wiring to make sure there are no installation errors.
 2. Fill the tank with water with the H/O/A switch in the off position. When the audible alarm sounds the switch should be turned to automatic and the pump will evacuate the station and the alarm will turn off.
 3. When the pump turns off, the pump manufacturer representative should briefly turn the pump into Hand to operate the pumps manually.
 4. Complete a Manufacturer's start-up report for the property owner. The start-up report should be done digitally and contain pump serial #, voltage, running current, photographs confirming proper installation and operation at the time of start-up and any other pertinent information. The property owner shall receive a copy of the Manufacturer's start-up report via email from manufacturer representative.
 5. Complete manufacturer's online "Installation Checklist" for each grinder pump station.
 6. Complete manufacturer's online "Startup Checklist" for each grinder pump station.

**TABLE 1
SUBMERSIBLE GRINDER PUMP STATION SCHEDULE**

ADDRESS	STATION STYLE	LOCATION	E/ONE MODEL NO.	Electrical Service Length (LF)
33 Cliff Road	Outdoor	Front of Home	DH071	25
44 Cliff Road	Outdoor	Rear of Home	DH071	25
45 Cliff Road	Outdoor	Rear of Home	DH071	25
71 Cliff Road	Outdoor	Right of Home	DH071	43
89 Cliff Road	Outdoor	Rear of Home	DH071	25
96 Cliff Road	Outdoor	Front of Home	DH071	25
131 Cliff Road	Outdoor	Rear of Home	DH071	25
698 Sagamore Avenue	Outdoor	Rear of Home	DH071	25
713 Sagamore Avenue	Outdoor	Rear of Home	DH071	25
714 Sagamore Avenue	Outdoor	Front of Home	DH071	25
716 Sagamore Avenue	Outdoor	Rear of Home	DH071	25
749 Sagamore Avenue	Outdoor	Front of Home	DH071	25
766 Sagamore Avenue	Outdoor	Left of Home	DH071	25
792, 794, 796 Sagamore Avenue	Outdoor	Right of Home	DH151	25
910 Sagamore Avenue	Outdoor	Rear of Home	DH071	25
911 Sagamore Avenue	Outdoor	Right of Home	DH071	25
912 Sagamore Avenue	Outdoor	Front of Home	DH071	25
913 Sagamore Avenue	Outdoor	Right of Home	DH071	25
915 Sagamore Avenue	Outdoor	Front of Home	DH071	43
960 Sagamore Avenue	Outdoor	Right of Home	DH152	25
1145 Sagamore Avenue	Outdoor	Left of Home	DH152	25
1149 Sagamore Avenue	Outdoor	Left of Home	DH071	25
1150 Sagamore Avenue	Outdoor	Front of Home	DH071	25
1155 Sagamore Avenue	Outdoor	Right of Home	DH071	25
1167 Sagamore Avenue	Outdoor	Front of Home	DH071	25
2 Sagamore Grove	Outdoor	Rear of Home	DH071	25
3 Sagamore Grove	Outdoor	Left of Home	DH071	25
5 Sagamore Grove	Outdoor	Front of Home	DH071	25
6 Sagamore Grove	Outdoor	Left of Home	DH071	25
11 Sagamore Grove	Outdoor	Left of Home	DH071	25
7 Shaw Road	Outdoor	Rear of Home	DH071	25
14 Shaw Road	Outdoor	Left of Home	DH071	25
17 Shaw Road	Outdoor	Front of Home	DH071	25
24 Shaw Road	Outdoor	Front of Home	DH071	25
27 Shaw Road	Outdoor	Left of Home	DH071	43
36 Shaw Road	Outdoor	Front of Home	DH071	25
16 Walker Bungalow Road	Outdoor	Rear of Home	DH071	43
40 Walker Bungalow Road	Outdoor	Rear of Home	DH071	25
58 Walker Bungalow Road	Outdoor	Rear of Home	DH071	25

ADDRESS	STATION STYLE	LOCATION	E/ONE MODEL NO.	Electrical Service Length (LF)
72 Walker Bungalow Road	Outdoor	Right of Home	DH071	25
86 Walker Bungalow Road	Outdoor	Front of Home	DH071	25
93 Walker Bungalow Road	Outdoor	Left of Home	DH071	25
137 Walker Bungalow Road	Outdoor	Rear of Home	DH071	25
140 Walker Bungalow Road	Outdoor	Right of Home	DH071	25
147 Walker Bungalow Road	Outdoor	Left of Home	DH071	25
159 Walker Bungalow Road	Outdoor	Front of Home	DH071	25
171 Walker Bungalow Road	Outdoor	Right of Home	DH071	25
184 Walker Bungalow Road	Outdoor	Right of Home	DH071	25
189 Walker Bungalow Road	Outdoor	Front of Home	DH071	25
201 Walker Bungalow Road	Outdoor	Rear of Home	DH071	25
209 Walker Bungalow Road	Outdoor	Front of Home	DH071	25
212 Walker Bungalow Road	Outdoor	Rear of Home	DH071	25
220 Walker Bungalow Road	Outdoor	Front of Home	DH071	25
238 Walker Bungalow Road	Outdoor	Front of Home	DH071	43
241 Walker Bungalow Road	Outdoor	Front of Home	DH071	25
251 Walker Bungalow Road	Outdoor	Rear of Home	DH071	25
260 Walker Bungalow Road	Outdoor	Right of Home	DH071	25
272 Walker Bungalow Road	Outdoor	Rear of Home	DH071	25
284 Walker Bungalow Road	Outdoor	Rear of Home	DH071	25
290 Walker Bungalow Road	Outdoor	Rear of Home	DH071	25
74 Wentworth House Road	Outdoor	Front of Home	DH071	25
187, 189 Wentworth House Rd	Outdoor	Rear of Home	DH152	43
191 Wentworth House Road	Outdoor	Front of Home	DH152	68

END OF SECTION

DIVISION 15
Mechanical

SECTION 15050PIPE & PIPE FITTINGS – GENERALPART 1 - GENERAL1.1 DESCRIPTION

- A. Work Included: Furnish, install, support, and test pipe and pipe fittings 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 (When Applicable):
 - 1. Excavation and backfill are specified in Division 2.
 - 2. Piping, sleeves, hangers, and supports are specified in the appropriate Sections in Division 15.
 - 3. Pipe materials are specified in the appropriate sections of Division 2 and/or Division 15.
- C. Other Trades: Cooperate with all other trades whose work is to be coordinated with piping work.

1.2 REFERENCES

- A. American National Standards Institute (ANSI)
 - 1. ANSI B31.1 – Power Piping
 - 2. ANSI B31.3 – Process Piping
 - 3. ANSI B31.4 – Liquid Transportation Systems for Hydrocarbons,
Liquid Petroleum Gas, Anhydrous Ammonia, and Alcohol.
 - 4. ANSI B31.5 – Refrigeration Piping
 - 5. ANSI B31.9 – Building Services Piping
 - 6. ANSI B31.8 – Gas Transmission and Distribution Piping Systems

1.3 SUBMITTALS

- A. Submit shop drawings in accordance with Section 01340 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 other documents as specified in the appropriate Sections of this Division.
- D. Computerized calculations with supporting and backup documentation will be acceptable.
- E. The design of the pipe support system shall include analyzing the system piping and service conditions to develop a detailed support system, specific to the piping material, pipe joints, valves and piping appurtenances.
- F. The support system design shall include the criteria for each piping system.
- G. The piping system analysis and design shall conform to ANSI B31.
- H. The support system shall be designed for dead weight and dynamic analysis, including system thermal effects, pressure thrusts and seismic forces. Refer to paragraph 1.4 Seismic Control for seismic requirements.
- I. Each piping system shall be presented in an isometric graphic and shall show the resolved and resultant force and moment systems as well as all recommended hangers,

supports, anchors, restraints and expansion/flexible joints.

- J. Submit complete layouts, schedules, and location plans for all piping systems.
- K. Submit complete piping drawings for each piping submittal indicating type of hanger and/or support, location, magnitude of load transmitted to the structure and type of anchor, guide and other pipe supporting appurtenances including structural fasteners.
- L. Submittal shall include catalog cut for each different type of pipe hanger or support indicating the materials of construction, dimensions and range of pipe sizes for which that hanger is suitable. Where standard hangers and/or supports are not suitable, submit detailed drawings showing materials and details of construction for each type of special anchor and/or support.
- M. Summary of Contractor selected related components including joints, class, valves, appurtenances, etc., and commercial supports and piping materials.
- N. Coordinate piping support arrangements to eliminate interference with similar systems to be installed under HVAC, Plumbing, Fire Protection and Electrical; to account for structural expansion joints and to maintain access for both personnel and for removal of equipment.
- O. After the work is installed, but before it is filled for start-up and testing, the support system design engineer shall inspect the work and certify its complete adequacy. Each system shall be inspected and certified in the same way. Submit a report, including all field modifications and all certificates.

1.4 DELIVERY, STORAGE AND HANDLING

- A. Exercise care during loading, transporting, unloading, and handling to prevent damage of any nature to interior and exterior surfaces of pipe and fittings.
- B. Do not drop pipe and fittings.
- C. Store materials on the project site in enclosures or under protective coverings in accordance with manufacturer's recommendations and as required by the Engineer.
- D. Assure that materials are kept clean and dry.
- E. Do not store materials directly on the ground.
- F. Follow manufacturer's specific instructions, recommendations and requirements.
- G. Store in a manner to protect items with epoxy shop coatings from exposure to UV light which can cause chalking of the epoxy. Length of acceptable exposure prior to providing UV protective measures shall be in accordance with coating manufacturer's recommendations. This includes protection from UV light after installation while awaiting covering or filling of tanks, or prior to field painting for items scheduled to be top coated as specified in Section 09900.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Materials are specified in the applicable sections in this Division.

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 and damage.
 - 2. Deviations beyond allowable tolerances for joint dimensions.
 - 3. Removal of debris and foreign matter.
 - D. Examine areas and structures to receive piping 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.
 - E. All materials and methods not meeting the requirements of this Contract will be rejected.
 - F. Immediately remove all rejected materials from the project site.
 - G. Start work only when conditions are corrected to the satisfaction of the Engineer.

3.2 INSTALLATION

- A. General:
 - 1. Install all pipe and fittings in strict accordance with the manufacturer's instructions and recommendations and as specified herein.
 - 2. Install all pipes and fittings in accordance with the lines and grades shown on the Drawings and as required for a complete installation.
 - 3. Install adapters, acceptable to the Engineer, when connecting pipes constructed from different materials.
 - 4. Support all piping not being installed in trenches in accordance with the "Pipe Hangers & Supports" Section in Division 15.
- B. Installation in Trenches:
 - 1. Firmly support the pipe and fittings on bedding material as shown on the Drawings and as specified in the appropriate Sections of these Specifications.
 - 2. Do not permanently support the pipe or fittings on saddles, blocking stones, or any material which does not provide firm and uniform bearing along the outside length of the pipe.
 - 3. Thoroughly compact the material under the pipe to obtain a substantial unyielding bed shaped to fully support the pipe.
 - 4. Excavate suitable holes for the joints so that only the barrel of the pipe receives bearing pressure from the supporting material after placement.
 - 5. Lay each pipe length so it forms a close joint with the adjoining length and bring the inverts to the required grade.
 - 6. Set the pipe true to line and grade.
 - 7. Do not drive the pipe down to grade by striking it with a shovel handle, timber, rammer, or any other unyielding object.
 - 8. Immediately after making a joint, fill the holes for the joints with bedding material, and compact.
 - 9. When each pipe length has been properly set, place and compact enough of the bedding material between the pipe and the sides of the trench to hold the pipe in correct alignment.

10. After filling the sides of the trench, place and lightly tamp bedding material to complete the bedding as shown on the Drawings.
 11. Take all necessary precautions to prevent floatation of the pipe in the trench.
 12. Bedding and backfill for all pipe materials shall be as specified in Section 02200, Earthwork, and as shown on the Drawings.
- C. Temporary Plugs:
1. When pipe installation work in trenches is not in progress, close the open ends of the pipe with temporary watertight plugs.
 2. If water is in the trench when work is resumed, do not remove plugs until all danger of water entering the pipe is eliminated.
 3. Do not use the pipelines as conductors for trench drainage during construction.

3.3 CLEANING AND TESTING

- A. Cleaning & Testing Piping - General:
1. 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.
 2. When the installation is complete, test all pipelines in the presence of the Engineer and the plumbing or building inspector 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. When requested by the Engineer or local plumbing inspector, building gravity drains shall be tested prior to backfilling or concealing. All other piping must be tested after backfilling.
 3. Equipment: Supply all labor, equipment, materials, taps, gauges, and pumps required to conduct the tests.
 4. Retesting: Perform all retesting required by the Engineer at no additional cost to the Owner.
- B. Building Interior or Exposed Sewer System: Clean and test in accordance with the "Plumbing General" Section in Division 15.
- C. Outside Sewer Lines (CLASS II): CLASS II pipe testing shall be performed in accordance with Section 02755.

3.4 PIPE SCHEDULE

TAG	DESCRIPTION	LOCATION	SIZE	MATERIAL	JOINT SYSTEM	PRESSURE TEST CLASS	DELEGATED PE DESIGN OF PIPE SUPPORTS ⁽¹⁾	DELTA OPER. PRESS. (PSI)	DELTA OPER. TEMP. (degF)
<u>PIPE SCHEDULE PART 1:</u>									
PART 1 OF THIS PIPE SCHEDULE APPLIES TO ALL PIPING EXCEPT FOR PLUMBING AND MECHANICAL PIPING. REFER TO PART 2 AT THE END OF THIS TABLE FOR PLUMBING/MECHANICAL PIPING SCHEDULE.									
S	SEWER	BURIED	<30"	SDR 35 PVC	PUSH-ON	CLASS II	N/A	-	-
<u>PIPE SCHEDULE PART 2:</u>									
PART 2 OF THIS PIPE SCHEDULE APPLIES TO PIPING SHOWN ON PLUMBING, MECHANICAL, AND CIVIL DRAWINGS. FOR PROCESS PIPING, REFER TO PART 1 OF THIS TABLE.									
NOTE 1: WASTE PIPING (W) CHANGES TO SANITARY PIPING (S) DOWNSTREAM OF WHERE A TOILET CONNECTS.									
S/SX	SANITARY	ALL	ALL	SEE SPEC SECTION 15401			NO	-	-
V/VX	SANITARY VENT	ALL	ALL	SEE SPEC SECTION 15401			NO	-	-

END OF SECTION

SECTION 15051POLYVINYL CHLORIDE (PVC) DRAINAGE PIPEPART 1 - GENERAL1.1 DESCRIPTION

- A. Work Included: Furnish and install PVC drainage pipe and fittings 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: "Pipe & Pipe Fittings - General" is specified in this Division.

1.2 QUALITY ASSURANCE

- A. Standards:
 - 1. Pipe and fittings (interior) shall conform to ASTM D-2665.
 - 2. Pipe and fittings (exterior) shall conform to ASTM D-3034.
 - 3. Solvent cement shall meet the requirements of ASTM D-2564.
 - 4. Shall have NSF seal of approval.
- B. Acceptable Manufacturers:
 - 1. Charlotte Pipe and Foundry Co.
 - 2. Harvel
 - 3. Cabot
 - 4. Or approved equal.

PART 2 - PRODUCTS2.1 MATERIALS

- A. Pipe Outside Buildings:
 - 1. Pipe and Fittings:
 - a. Virgin Type I, Grade I, or Type I, Grade 2 or as shown on the Drawings.
 - b. Pipe and Fittings: Gasketed style utilizing twin gasket coupling or single gasket bell and spigot type.
 - c. Pipe Lengths: Laying length of 20 feet minimum.
- B. Piping Inside Building:
 - 1. Pipe and Fittings:
 - a. Solvent weld type with drainage type fittings.
 - b. Type I, Grade I, or Type I, Grade 2 or as shown on the Drawings.
 - 2. Joints:
 - a. Solvent weld using approved pipe manufacturer's solvent.
 - b. Couplings: Same schedule as pipe.
- C. Adaptors: When applicable, provide adaptors for connecting PVC to pipe constructed from other materials.

PART 3 - PART 3 - EXECUTION3.1 INSTALLATION

- A. Jointing:

1. Clear each pipe length, coupling and fitting of all debris and dirt before installing.
 2. Provide and use coupling pullers for joining the pipe.
 3. Shove home each length of pipe against the pipe previously laid and hold securely in position.
 4. Do not pull or cramp joints.
- B. Fabrication:
1. Cutting:
 - a. Use a hand saw or pipe cutter with blades (not rollers).
 - b. Examine all cut ends for possible cracks caused by cutting.
 2. Connecting:
 - a. Solvent weld connections as recommended by the manufacturer.
 - b. Connect pipe and fittings only when temperature is above the minimum recommended by the manufacturer.
 - c. Threaded adapters shall be connected only with plastic male into metal female.

END OF SECTION

SECTION 15088COUPLINGS & CONNECTORSPART 1 - GENERAL1.1 DESCRIPTION

- A. Work Included: Furnish and install couplings and connectors of the type(s) and size(s) in the location(s) shown on the Drawings and as specified herein.
- B. Related Work Specified Elsewhere: "Pipe & Pipe Fittings - General" is specified in this Division.

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.

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 Couplings (When Applicable):
 - 1. Exposed Couplings (When Applicable):
 - a. Steel middle ring,
 - b. Two steel follower rings,
 - c. Two wedge-section gaskets,
 - d. Sufficient steel bolts to properly compress the gaskets,
 - e. Acceptable Manufacturers:
 - i. Smith-Blair – Style 411
 - ii. Romac – Style 400
 - iii. Baker Hughes (GE Company) – Style 38
 - iv. Or equal
 - 2. Buried Couplings (When Applicable):
 - a. Cast iron or epoxy coated steel middle rings with pipe stops removed,
 - b. Two malleable iron or epoxy coated steel follower rings with ribbed construction,
 - c. Two wedge-section gaskets,
 - d. Sufficient AWWA C-111 or galvanized steel nuts and bolts to properly compress the gaskets,
 - e. Acceptable Manufacturers:
 - i. Smith Blair – Style 411
 - ii. Romac – Style 501

- iii. Or equal.
- C. Split Type Couplings (When Applicable):
 - 1. Constructed from malleable or ductile iron.
 - 2. For use with grooved or shouldered end pipe with minimum wall thickness as required so as not to weaken pipe.
 - 3. Cast in two segments for 3/4 inch through 14 inch pipe sizes, four segments for 15 inch through 24 inch pipe sizes, and six segments for pipe sizes over 24 inch.
 - 4. Coating: Enamel.
 - 5. Bolts: Carbon steel.
 - 6. All gaskets shall be Manufacturers Standard or as required for intended service with respect to fluid, temperature and pressure.
 - 7. Acceptable Manufacturers:
 - a. Victaulic Company of America, Style 77 for IPS Pipe, Style 31 for Ductile Iron Pipe.
 - b. Star Pipe Products,
 - c. Or equal.
 - 8. Buried Sleeve Type:
 - a. Constructed from cast iron.
 - b. Bolts: ASTM A588 steel or galvanized steel.
 - c. Acceptable Manufacturers:
 - i. Dresser Manufacturing Co. - Style 127 locking type for cast iron, ductile iron, asbestos cement and steel pipes with diameters of 3 inches through 12 inches,
 - ii. Smith Blair
 - iii. Or equal.
 - 9. Split Type:
 - a. Constructed from malleable or ductile iron.
 - b. For use with grooved or shouldered end pipe.
 - c. Coating: Enamel.
 - d. Acceptable Manufacturers:
 - i. Victaulic Company of America - Style 741 for IPS pipe, or Style 341 for Ductile Iron Pipe, for pipe diameters of 2 inches through 12 inches,
 - ii. Victaulic Company of America - Style 742 for IPS pipe, or Style 342 for Ductile Iron Pipe, for pipe diameters of 14 inches through 16 inches,
 - iii. Star Pipe Products,
 - iv. Or equal.
- D. Flexible Joints:
 - 1. Expansion Joints (Liquid Service):
 - a. Materials shall be capable of withstanding the temperature, pressure and type of material in the pipeline.
 - b. Shall be the filled arch type that will prevent sediment build up for all sludge, sewage, and other lines with similar service.
 - c. Supplied with control rods to restrict elongation and compression.

- d. Metal retaining rings shall be split and beveled galvanized steel for placement against the flange of the expansion joint.
2. Deflection Joints:
 - a. Joints designed to permit a nominal maximum deflection of 15 degrees in all directions from the axis of the adjacent pipe length, will prevent pulling apart, and will remain watertight at any angle of deflection under 15 degrees.
 - b. Material to be manufactured from a composition material suitable for exposure to the liquid, pressure and temperature to be contained within the pipe.
 - c. Supplied with control rods as required.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Sleeve Type Couplings (When Applicable):
 1. Thoroughly clean pipe ends for a distance of 8 inches from the ends prior to installing couplings, and use soapy water as a gasket lubricant.
 2. Slip a follower ring and gasket (in that order) over each pipe and place the middle ring centered over the joint.
 3. Insert the other pipe length into the middle ring the proper distance.
 4. Press the gaskets and followers evenly and firmly into the middle ring flares.
 5. Insert the bolts, finger tighten and progressively tighten diametrically opposite nuts uniformly around the adapter with a torque wrench applying the torque recommended by the manufacturer.
 6. Insert and tighten the tapered threaded lock pins.
 7. Insert the nuts and bolts for the flange, finger tighten and progressively tighten diametrically opposite bolts uniformly around the flange to the torque recommended by the manufacturer.
- B. Split Type Flange Adapters (When Applicable): Install in the same manner as Split Type Couplings.
- C. Buried Cast Iron Couplings, Adapters and Connectors (When Applicable): Thoroughly coat all exterior surfaces, including nuts and bolts, after assembly and inspection by the Engineer with a heavy-bodied bituminous mastic as approved by the Engineer.
- D. Buried Epoxy Coated Steel Couplings: Thoroughly coat all exterior surfaces, including nuts and bolts after assembly and inspection by the Engineer with a coal tar approved by the Engineer. Prior to coating, roughen the epoxy with emory paper and follow with a solvent cleaner (aeromatic similar to xylol). Dry film thickness of the coal tar is to be 12-16 mils.
- E. Install thrust rods, supports, and other provisions to properly support pipe weight and axial equipment loads.
- F. All interior sleeve type couplings shall be restrained with tie rods when used on pressurized lines. All buried couplings on pressure lines shall be restrained (solid sleeve) type.

END OF SECTION

SECTION 15092PIPE SLEEVES & SEALSPART 1 - GENERAL1.1 DESCRIPTION

- A. Work Included: Furnish and install wall sleeves and seals of the type(s) and sizes(s) and in the location(s) on private properties as shown on the Drawings and specified herein.
- B. Related Work Specified Elsewhere:
 - 1. Pipe and Pipe Fittings - General is specified in Section 15050
 - 2. Plumbing - General is specified in Section 15400.

1.2 QUALITY ASSURANCE

- A. Provide and install all sleeves of the types specified herein, as shown on the Drawings and as directed by the Engineer.
- B. Provide sleeves that are airtight, gastight or watertight as required.

PART 2 - PRODUCTS2.1 TYPES AND LOCATIONS

- A. General
 - 1. Refer to details on Drawings.
- B. Penetrations Through Existing Construction:
 - 1. Interior masonry, drywall, or wood partition - Air to Air:
 - a. Cleanly cut brick or block as required. Grout sleeve into place using non-shrink grout.
 - b. Cleanly cut wood frames partitions as required. Set sleeve into position and secure.
 - c. Sleeves to be as required for New Construction - Interior masonry, drywall, or wood partition - Air to Air.
 - d. Holes bored with equipment leaving a smooth hole in masonry walls less than 1/2 inch larger than the pipe will not require a sleeve, unless otherwise specified.
 - e. Minimum 1/4 inch annular space between cored opening or sleeve and pipe or insulation.
 - f. Firmly pack with oakum and seal both ends with polyurethane sealant.
 - g. Install split cover plates in all finished areas. Both sides of wall if required. Plates shall be chrome finished, suitably sized to fit pipe in question and cover opening.
 - 2. Interior Concrete Partitions - Air to Air:
 - a. Core smooth-walled opening with coring machine. Grout sleeve into place using non-shrink grout.
 - b. Sleeves to be as required for "New Construction - Interior Concrete Partitions - Air to Air".

- c. Holes cored with equipment leaving a smooth hole, less than 1/2 inch larger than the pipe will not require a sleeve, unless otherwise specified.
 - d. Minimum 1/4 inch annular space between cored opening or sleeve and pipe or insulation.
 - e. Firmly pack with oakum and seal both ends with polyurethane sealant, per Section 07900 for standard penetrations.
3. Interior Concrete Partitions - Air to Air:
 - a. Same as "Exterior Concrete Wall".
 4. Interior Concrete Partitions - Air to Air (Unclassified to Classified):
 - a. Same as "Concrete Tank Wall".
 5. Concrete Exterior Walls - Air to Ground:
 - a. Core smooth-walled opening with coring machine. Grout smooth any irregularities in opening.
 - b. Size of cored opening as required by seal manufacturer.
 - c. Seal with rubber link compression seal.
 6. Concrete Tank Walls - Liquid Containing Structures to Air or Ground:
 - a. Core smooth-walled opening with coring machine. Grout smooth any irregularities in opening.
 - b. Size of cored opening as required by seal manufacturer.
 - c. Seal with two, back to back rubber link compression seals.
 7. Foundation Walls Below Grade (Frost Walls) - Ground to Ground:
 - a. Core smooth-walled opening with coring machine. Grout sleeve into place using non-shrink grout.
 - b. Sleeves to be as required for "New Construction - Foundation Walls Below Grade (Frost Walls) - Ground to Ground".
 - c. Holes cored with equipment leaving a smooth hole, less than 1-inch larger than the pipe will not require a sleeve, unless otherwise specified.
 - d. Minimum 1/2 inch annular space between cored opening or sleeve and pipe or insulation.
 - e. Firmly pack with oakum and seal both ends with polyurethane sealant, per Section 07900 for standard penetrations.
 8. Other conditions shall be installed as reviewed and accepted by the Engineer.
- C. Pipe openings in and penetrations through precast concrete structures shall be as specified in Division 2.
- D. Rubber Link Compression Seals:
1. Acceptable Manufacturers:
 - a. Link Seal
 - b. Flexicraft
 - c. Or equivalent.
 2. Multi-rubber link type with pressure plates, bolts, nuts and sealing element providing a leak proof seal. Model numbers provided below are based on Link Seal and are to establish type and level of quality.
 3. General Service (Model C):
 - a. Glass Reinforced Nylon Pressure Plate.
 - b. Carbon steel zinc-dichromate nut and bolt.
 - c. Sealing element: EPDM rubber.

- d. Temperature Rating: -40°F to 250°F.
- 4. Corrosive Service: (Model S-316):
 - a. Use in the following locations: Sludge tanks, scum tanks, digesters, wetwells, manholes, dewatering rooms, headworks rooms, exterior tanks, chemical rooms, as shown on the Drawings.
 - b. Glass Reinforced Nylon Pressure Plate.
 - c. Bolt and nut, 18-8 stainless steel.
 - d. Sealing element: EPDM rubber.
 - e. Temperature Rating: -40°F to 250°F.
- 5. Potable/Clean Water Service (Model S61)
 - a. Blue reinforced Nylon polymer pressure plates.
 - b. 316 stainless steel nuts and bolts.
 - c. Sealing element: Black EPDM NSF 61 certified.
 - d. Temperature Rating: -40° to 250° F.
 - e. Certified to NSF/ANSI standard 61.
- 6. High Temperature Service (Model T)
 - a. Steel zinc dichromate pressure plates.
 - b. Carbon steel with zinc dichromate finish nuts and bolts.
 - c. Sealing element: Silicone.
 - d. Temperature Rating: -67° to 400° F.
- 7. Refer to details on Process Drawings.
- E. Wall Plates: Provide split type cast iron or brass wall plates on pipes penetrating walls in finished spaces such as labs and offices. Refer to details on Process Drawings.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Existing Construction:
 - 1. The location will be reviewed and accepted by the Engineer prior to coring or cutting hole.
 - 2. For concrete, holes shall be located to avoid the reinforcing steel when possible.
 - 3. Patch all damaged work as required to maintain a neat and clean appearance.
- B. Rubber Link Compression Seals: Install as required and in strict accordance with the manufacturer's instructions and recommendations.

END OF SECTION

SECTION 15400PLUMBING – GENERALPART 1 - GENERAL1.1 DESCRIPTION

- A. Description: Perform the following items of work required to complete the work of this Section, as shown on the DRAWINGS and specified herein:
1. All labor, materials, equipment and transportation shall be provided as required to modify the existing waste piping within the three listed properties to route the waste to the new point foundation penetration where indicated on the drawings. The piping within the building shall be field routed in an unobtrusive manner.
- B. Work Included: The plumbing work shall include, but not be limited to the following (when applicable):
1. Building sanitary waste and vents and sanitary building drain systems to the point outside the building indicated on the drawings.
- C. Related Work Specified Elsewhere (When Applicable)
1. Project cleaning is specified in Division 1.
 2. Excavation and backfill is specified in Division 2.
 3. Concrete is specified in Division 3.
 4. Caulking and flashing are specified in Division 7.
 5. Painting is specified in Division 9.
 6. Pipe Sleeves and Seals are specified in Section 15092.
 7. Piping, pipe fittings, and accessories are specified in the appropriate Sections of this Division.
- D. Drawings and Measurements:
1. The Drawings show the general arrangement, direction, and sizes of pipes. They are not intended to show every offset, valve, and fitting, and every structural difficulty that may be encountered.
 2. All measurements shall be verified at the job site.

1.2 QUALITY ASSURANCE

- A. Materials and Workmanship: All materials and workmanship shall be suitable for the respective work and the type of service encountered.
- B. Equipment: All equipment shall be constructed to operate safely without water hammer and undue wear.
- C. Local Codes: Perform all work in accordance with applicable state and local plumbing codes, except where requirements of this Contract are more stringent.
- D. Permits: Arrange for all permits, inspections, and tests required by codes at no additional cost to the Owner.
- E. Standards: When standards are referred to, the latest issue shall apply.

1.3 JOB CONDITIONS

- A. Scheduling Work: Install and test all plumbing to be cast into or buried under

concrete floor slabs prior to the placement of concrete.

1.4 SUBMITTALS

- A. Prior to ordering fixtures, equipment and appurtenances, submit shop drawings in accordance with the General Conditions of the Construction Contract.
- B. Submit to the Engineer: Copies of manufacturer's installation, maintenance and operating instructions including parts lists for all equipment furnished as specified in the General Conditions of the Construction Contract.
- C. Submit a list of local supply houses for replacement parts for all equipment furnished.

1.5 DELIVERY, STORAGE & HANDLING

- A. Exercise care during loading, transporting, unloading and handling to prevent damage of any nature to interior and exterior surfaces of equipment, fixtures, pipe and fittings.
- B. Do not drop equipment and fixtures.
- C. Store materials on the project site in enclosures or under protective coverings.
- D. Assure that all materials are kept clean and dry.
- E. Do not store materials directly on the ground.
- F. Exercise care so as not to damage, crack, mar finish and to prevent damage of any nature to fixtures.
- G. Remove damaged fixtures from project and replace at no additional cost to the Owner.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Provide materials that are new, suitable for intended use, and of type, style, and quality specified and as shown on the Drawings.
- B. Provide pipe, fittings, and devices that meet requirements of local plumbing codes and be in accordance with applicable ASTM, ANSI, and Commercial Standard (CS) standards.

2.2 BOLTS, ANCHOR BOLTS AND NUTS

- A. Furnish all necessary bolts, anchor bolts, nuts, washers, lock washers or locking nuts, plates and bolt sleeves in accordance herewith. Anchor bolts shall have suitable washers, lock washers and, where so required, their nuts shall be hexagonal.
- B. All bolts, anchor bolts, nuts, washers, lock washers, plates, and bolt sleeves shall be galvanized unless otherwise indicated below or specified elsewhere.
 - 1. Galvanized steel in accordance with Division 5 unless otherwise indicated below or specified elsewhere.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install all plumbing and piping systems in a neat workmanlike manner.
- B. Lines and Grades:
 - 1. Unless otherwise shown on the Drawings, install all piping parallel to the building walls wherever possible.

2. Install all piping to accurate lines and grades.
- C. Supports: Provide pipe hangers and supports as specified in the International Plumbing Code.
- D. Do not install piping through, directly over, or in front of electrical switchgears and power panels.
- E. Caulk the spaces between the pipe and walls, ceilings, and floors gas-tight where shown on the Drawings.
- F. Pitch:
 1. Pitch sanitary and drainage piping 1/4 inch per foot, and never less than 1/8 inch per foot for piping 4" or larger with prior approval by the administrative authority.

3.2 TESTING

- A. When the installation is complete, test all pipelines in the presence of the Engineer and the Plumbing or Building Inspector in accordance with the requirements of the local and state plumbing codes, at no additional cost to the Owner. Provide all necessary equipment and utilities.
- B. Test underground piping prior to backfilling.
- C. Separately test portions of piping which will be concealed before completion.
- D. Procedure:
 1. Soil, Vent, Waste and Drain Piping:
 - a. Plug all outlets and fill pipes with water to above the level of the connection to existing.
 - b. The piping shall hold this water for a period of 30 minutes without showing a drop in water level.
- E. Repairs:
 1. Should leaks be found, repair as required even to the extent of disassembling and remaking the joints or replacing sections of pipe.
 2. Caulking of threads or the use of chemical compounds to correct leaks will not be permitted.
 3. Replace defective pipe and fittings and repeat tests until the testing results are approved by the Engineer.

END OF SECTION

SECTION 15401PLUMBING, PIPING AND SPECIALTIESPART 1 - GENERAL1.1 DESCRIPTION

- A. Work Included: Furnish and install a complete piping system including all required specialties and appurtenances as indicated on the Drawings and as herein specified.
- B. Related Work Specified Elsewhere:
 - 1. "Polyvinyl Chloride (PVC) Drainage Pipe" is specified in Section 15051.
 - 2. "Plumbing General" is specified in Section 15400.

PART 2 - PRODUCTS2.1 MATERIALS

- A. Pipe and Fittings:
 - 1. Sanitary Waste and Vent:
 - a. Below Floor Slabs: Service weight cast iron soil pipe and fittings, bell and spigot with "push-on" gaskets.
 - b. Above ground building lines (to match existing):
 - i. Service weight cast iron no hub soil pipe and fittings.
 - ii. Or Schedule 40 polyvinyl chloride "DWV" pipe and solvent cement socket type drainage fittings (when permitted by local codes).
- B. Drainage and Pipe Specialties:
 - 1. Acceptable Manufacturers:
 - a. Zurn.
 - b. Josam.
 - c. J.R. Smith.
 - d. Or approved equal.
 - 2. Cleanouts:
 - a. End Cleanouts: Cast iron body, ABS tapered thread plug. Equal to Zurn Z-1440.

PART 3 - PART 3 - EXECUTION3.1 INSTALLATION

- A. Provide offsets in all piping to place in proper position and avoid work of other trades.
- B. Where plastic piping joins metal piping, threaded adapters shall be installed only with plastic male into metal female.

END OF SECTION

DIVISION 16
Electrical

SECTION 16000ELECTRICAL - PUMP STATIONSPART 1 - GENERAL1.1 DESCRIPTION

- A. Provide all labor, materials, equipment, operations, methods and procedures as specifically noted herein these specifications and as indicated in the Contract Documents, together with all items necessary for or incidental to the completion of the work.
- B. All systems or additions to existing systems indicated in the Contract Documents shall mean all necessary supervision, labor, equipment and materials required to provide complete, properly functioning systems.
- C. All systems shall be adjusted, tested, inspected and turned over to the Owner in perfect working order.
- D. The words "provide", "supply", "supply and install", "install", "furnish" or "furnish and install", as used in DIVISION 16 or as indicated on the Drawings related to DIVISION 16 shall mean a complete and properly functioning Electrical installation performed by the Contractor.
- E. References:
 - 1. Refer to each individual drawing within the Contract Documents in order to coordinate material and equipment locations and electrical requirements.
 - 2. Applicable portions of DIVISION 0 and DIVISION 1 are part of DIVISION 16. Refer to these sections for additional information on bidding requirements, general requirements, Section 01800 for equipment start-up, and product substitution.
- F. Work Specified Herein:
 - 1. Visit and examine the project site and become familiar with all existing conditions pertinent to the work to be performed thereon. No additional compensation will be allowed for failure to be so informed.
 - 2. The following scope of work is a brief generalization of the type and extent of the work specified under DIVISION 16. Detailed requirements are indicated on the Drawings and in related sections of the Specifications. The work specified under DIVISION 16 includes, but is not necessarily limited to the following:
 - a. The work specified under Division 16 is inclusive of the electrical work for this project as indicated on the Drawings and in related sections of the Specifications.
 - b. Provide Electrical Service and Distribution System as indicated on the "Single-Line Diagram", related drawings and schedules, and as specified herein.

- c. Contractor shall be responsible for obtaining temporary power to conduct work as required. Temporary power may be obtained from the local power company or by a temporary generator as required in order to maintain continuous operation of the pump station during the schedule of the construction period. The generator and all required fuel are to be supplied by the electrical contractor.
- G. The work shall also include, but not be limited to, the furnishing and installing of the following:
 - 1. Underground electrical service to the pumping station building and electrical equipment.
 - 2. Raceways and fittings.
 - 3. Wires and cables.
 - 4. Service distribution equipment.
 - 5. Miscellaneous electrical distribution equipment.
 - 6. Grounding system.
 - 7. Power and control wiring between standby generator and service distribution equipment.
 - 8. Metering and service disconnect equipment.
 - 9. Underground power and control wiring to submersible pumps.
 - 10. Power conduit, wiring and equipment for connections to a portable generator as indicated on the Drawings.
 - 11. Complete demolition of existing systems as shown on the drawings for all complete removals and disconnections, removals, relocations, and installations.
 - 12. All required electrical work for the proposed pump station building as shown on the drawings.
- H. Make all required connections to the pumping station and for the electric service and utilities at the pump station building.
- I. Removals and Relocations:
 - 1. Examine the existing site, structure(s) and installation(s) for the work of all trades which will influence the cost of the work under DIVISION 16. This work shall include removals and relocations relating to the work of all trades which may interfere with, disturb or complicate the performance of the work under DIVISION 16; and relating to the work involving systems, equipment and related service lines which shall continue to be utilized as part of the finished project.
 - 2. Provide all associated labor, material and costs to include all removals, relocations, and reconnections herein specified, necessary or required to provide operation and coordination of the combined new and existing systems and equipment.
 - 3. Demolition:
 - a. Disconnect and remove existing equipment, devices, boxes, conduit, and associated electrical equipment as shown on the contract drawings.

- b. Any demolition or relocation work performed which results in unused openings in control panels, instrument panels, control stations, pull or junction boxes, etc., which are to remain, shall be plugged by appropriate means such that it maintains the integrity of the NEMA classification of the area, as defined on Drawing E-1.
 - c. Any demolition or relocation which results in unused openings shall be sealed.
 - d. The work of this Contract involves demolition work. Review all Contract Documents and coordinate with all disciplines for a complete understanding of this demolition work. Provide all new work required to modify these changes along with all requirements for installation of the new work, as shown on the Contract Drawings.
 - e. There are areas where the demolition shall require that existing equipment such as pullboxes, conduit, and wiring, and associated devices be disconnected, removed, or relocated in order for the new equipment to be constructed and installed. In most cases, the detail of these existing conditions has not been shown. This Contractor will be responsible for performing all work necessary to demolish all devices associated with equipment in their entirety for the noted and intended demolition. The Contractor shall visit the site locations and become familiar with the areas where this work is to be performed. Any concerns or issues regarding this work need to be addressed and submitted to the Engineer for clarification prior to submission of the final bid price for the work of this Contract. All costs associated with this work are the responsibility of this Contractor and shall be included as part of the overall costs for the electrical work of this project. No additional costs shall be allowed by this Contractor for any demolition work.
 - f. Disconnect and remove all abandoned conduits, wiring, boxes, equipment, controls, hangers, etc., shown or not shown, which are located within the area of construction under this contract.
- J. Request for Information:
- 1. When there is a conflict or coordination issue, or if additional information is necessary for the contractor to proceed with the intended work, a Request of Information (RFI) form shall be submitted through the General Contractor to the Engineer. The specific issue shall be described in the RFI and shall be sent to the engineer for review and a response provided in an appropriate time period. RFI form shall be available via the General Contractor through the Engineer. This process shall be used as part of the work of this contract. Products FURNISHED but not installed under this section.

1.2 QUALITY ASSURANCE

- A. In general, the workmanship of the electrical installation shall be as described in the N.E.C.A. Electrical Design Guidelines. All methods of construction, details of workmanship, etc., that are not specifically described therein or indicated in the Contract Documents, shall be subject to the control and no exceptions to the Engineer.

- B. Equipment and materials shall be of the quality and manufacture indicated in their respective description within the specifications.
- C. Work determined by the Engineer to be unsatisfactory according to industry standards shall be redone at the Contractor's expense, with no additional compensation.
- D. Safety and care of equipment and electrical installations to remain the responsibility of the subcontractor until final acceptance by owner. Any cost associated due to damages or loss prior to owner acceptance to be covered by subcontractor.

1.3 SUBMITTALS TO THE ENGINEER

- A. Submit Shop Drawings, O&M Documentation, and manufacturer certificates in accordance with Section 01340. The requirements below are in addition to the standards therein.
- B. Submittals required under this section include, but are not limited to the following for each of the locations specified:
 - 1. Conduit
 - 2. Wiring and Cables
 - 3. Main circuit breaker
 - 4. Meter socket
 - 5. Lightning arrestor and line surge protection
 - 6. Portable Generator connections
 - 7. Mounting hardware and materials
 - 8. Electrical distribution equipment
 - 9. Miscellaneous electrical equipment
 - 10. Pullboxes
 - 11. Expansion fittings
 - 12. Motor starting equipment as required for the installation
 - 13. Conduit seal fittings
 - 14. Equipment test results
 - 15. Conduit Layout Plans
 - 16. Submit all other equipment as required by the Contract
- C. Operations and Maintenance Manual
 - 1. Requirements
 - a. Provide a complete bill of material for each piece of equipment.
 - b. Provide a preventative maintenance section for all applicable equipment including recommended schedule and spare parts.
 - c. Panels which require customized schematics shall be updated with changes made in the field and submitted on 11" x 17" size drawings. Also internal and front elevation drawings shall be included identifying all equipment.
 - d. All equipment shall include a troubleshooting section with common symptoms and recommended solutions.
- D. Submittals:
 - 1. Shop Drawings Shall Consist Of:
 - a. Project name and location.
 - b. Contractor's name.

- c. Index Sheet - Listing the equipment being submitted utilizing equipment designations, or symbols, indicated on the Contract Documents together with the proposed manufacturer, style/ type and catalog number.
 - d. Manufacturer's scale or dimensioned drawings along with standard catalog "cut" sheets.
 - e. Equipment ratings, service clearances and configuration.
 - f. Listing of accessories to be furnished.
 - g. Single-line and schematic diagrams where applicable.
 - h. Refer to related sections of the specifications for special shop drawing requirements for individual equipment types.
2. Provide samples of such items as lighting fixtures and wiring devices upon request of the Engineer.
 3. Standard manufacturer's catalog cut sheets are acceptable; however, they shall be modified to indicate equipment and options to be provided for this project. Any listed equipment, options, or features which are not to be provided shall be properly indicated in the submittal. Failure to properly indicate project-specific equipment, options, and features will result in the submittal being returned without being reviewed.
 4. Submit test results as listed in Section 3.4

1.4 PRODUCT HANDLING

- A. All materials shall be shipped, stored, handled and installed in such a manner as not to degrade quality, serviceability, or appearance.
- B. Electrical equipment shall at all times during construction be adequately protected against mechanical injury or damage by water. Electrical equipment shall not be stored out of doors. Electrical equipment shall be stored in dry permanent shelters. If any apparatus has been damaged, such damage shall be repaired at no additional cost. If any apparatus has been subject to possible injury by water, it shall be thoroughly dried out and put through such special tests as directed by the Engineer, or shall be replaced at no additional cost to the Owner.

1.5 DESIGN CRITERIA

- A. Service and Metering
 1. The project site location has existing utility company services for power and telephone. There will be no requirements for the scope of work which will impact these existing services. Therefore, there will be no need for coordination and contact with the respective utility company regarding any shutdowns, energizations, modifications, or interface with the present services which shall effect the work of this contract.
- B. Service and Metering
 1. The power company serving this project is Eversource. The service representative this project is as follows:
 2. Contact telephone number: 1-800-362-7764
 3. Service will be obtained at 200A, 60 Hertz, from an existing pole-mounted service transformer located at the site, as shown on the drawings.

4. Extend new secondary service conduit and wires from the existing service riser pole and service transformer to the new generator building as shown on the drawings. Installation of conduits and supports per local utility requirements. Provide number and size of conduits per local utility requirements.
 5. Furnish and install the meter socket per power company requirements.
 6. Coordinate all shutdowns and activations of the services with the power company as part of this work.
 7. Provide all demolition and removals of existing secondary electrical service conduit and cables at the existing service riser pole and at the existing pumping station and as shown in the Contract Drawings.
 8. Provide all service disconnections and re-energizations required by the Power Company during the work of this contract and include these costs as part of the work of this contract as part of the allowance establish for this electrical service work.
- C. Codes, Inspection and Fees
1. All material and installation shall be in accordance with the latest edition of the National Electrical Code and the codes and ordinances of the Town or City of which the work is being performed.
 2. Pay all fees required for permits and inspections. All power utilization fees incurred prior to owner's acceptance to be paid by subcontractor.
- D. Tests and Settings
1. Test all systems furnished under DIVISION 16, ELECTRICAL and repair or replace all defective work.

PART 2 - PRODUCTS

2.1 GENERAL

- A. Materials and equipment used shall be Underwriters Laboratories, Inc. listed.

2.2 RACEWAYS AND FITTINGS

- A. Rigid steel conduit shall be hot dipped galvanized as manufactured by Republic Steel Corp., Allied Tube and Conduit Corp., Wheeling Pittsburg Steel Corp., or equal.
- B. Conduit hubs shall be as manufactured by Myers Electric Products, Inc., Raco Div., Appleton Electric Co., or equal.
- C. PVC coated rigid steel conduit as manufactured by Rob-Roy "Plasti-Bond", Ocal, or equal.
- D. PVC Schedule 80 shall be extra heavy wall and UL Listed for the use intended. Acceptable Manufacturers: Carlon, Rob-Roy, or equal.
- E. Aluminum conduit shall be rigid, heavy wall aluminum. Acceptable manufacturers: Anaconda, Kaiser, VAW, or equal.
- F. Electrical Metallic Tubing (EMT) shall be constructed of electro-galvanized steel. EMT fittings shall be interlocking compression type of cadmium-plated malleable iron or zinc coated steel, or stainless steel. No die cast, set screw and indenter type fittings shall be used. Acceptable manufactures are Allied, Wheatland or equal.

G. Flexible Metal Conduit

1. Flexible Metal Conduit shall be constructed of one continuous length of U. L. Approved electro-galvanized, spirally wound steel strip with interlocking convolutions and interior surfaces free from burrs and sharp edges.
2. Flexible metal conduit shall be "liquid-tight" with PVC jacket. Acceptable Manufacturers: Alflex - a division of Southwire, Electri-Flex, Thomas & Betts - a division of ABB, or equivalent.
3. Flexible metal conduit installed in hazardous, NEMA 7, Class I Div 1 areas shall be UL Listed, and shall have a bronze or stainless-steel braid covering over a flexible brass inner core. Packing shall be woven cotton braid impregnated with asphalt. Acceptable manufacturer: Crouse-Hinds - a division of Eaton, Killark, Thomas & Betts - a division of ABB -XP Series, or equal.

2.3 WIRES AND CABLE

- A. Wires and cables shall be of annealed, 98 percent conductivity, soft drawn copper. All conductors installed below grade shall be XHHW stranded. All conductors #8 and larger shall be XHHW.
- B. Power wiring shall be 600V, Type XHHW. Type XHHW shall be cross linked polyethylene, as manufactured by Pirelli Cable Corp., Collyer Insulated Wire Company, The Okonite Company, or equal.
- C. Control wiring shall be 600V, Type THHW/THHN No. 14 AWG stranded. Type THHW/THWN shall be cross linked polyethylene, as manufactured by the Pirelli Cable Corp., Collyer Insulated Wire Company, The Okonite Company or equal.
- D. Signal wiring shall be 600V, individual shielded twisted pair, No. 16 AWG stranded with polyethylene jacket. Provide Belden Catalog No. 8719, Alpha Wire & Cable, or equal.
- E. Ground wires shall be THW and color-coded green.
- F. Variable frequency drive (VFD) motor supply cables shall be provided where indicated on Drawings. VFD cables shall be four (4) conductor tinned stranded copper, with cross-linked polyethylene insulation, overall foil (100% coverage) / tinned copper braid (85% coverage) shields, No. 12 AWG tinned copper drain wire, and outer PVC jacket. Cables shall conform to UL specification for 1000 Volt flexible motor supply cable. Acceptable Manufacturers: Belden, Olflex, or equal.
- G. Ethernet wiring shall be Category 6, 4-pair 24 AWG solid bare copper conductor, unshielded, FEP insulated, plenum rated. Acceptable manufacturers shall be Belden, Omni, or equal.
- H. Wire markers shall be "OMNI GRIP" as manufactured by W.H. Brady Company, or equal.
- I. All wires and cables specified and installed underground shall be U.L. Listed and Labeled for underground use for all installations.
- J. Nonmetallic-Sheathed Cable. Shall be a factory assembly of two or more insulated conductors enclosed within an overall nonmetallic jacket. Copper conductors shall be annealed copper, with bare ground. Conductor insulation shall be 90°C-rated 600V polyvinyl chloride (PVC), nylon jacketed, as manufactured by Southwire Company, Encore Wire or equal.

2.4 METERING SOCKET AND METERING CABINET

- A. Meter socket shall be of the type as recommended by the power company.
- B. Metering cabinet shall be of the type as recommended by the power company.
- C. Acceptable manufactures are Milbank, Square D, or equal.

2.5 GROUND ROD

- A. 10 foot long by 3/4 inch diameter copper clad steel ground rods shall be provided, arranged and installed as shown on the drawings. Provide all required Cadwelds, grounding clamps and hardware as required for a complete installation per NEC and as shown on the drawings.
- B. Acceptable manufacturers are Erico, AB Chance Co., or equal.

2.6 LIGHTNING AND SURGE PROTECTION

- A. Lightning and surge protection units shall be Square D Model Number SDSA 3650, three phase for 600 VAC phase-to-ground voltage.
- B. Lightning and surge protection units shall be Square D Model Number SDSA 1175, single phase for 250 VAC phase-to-ground voltage.

2.7 WIRING DEVICES

- A. Receptacles shall be duplex, 20 Ampere, industrial grade and shall be ground fault type. Outdoor receptacles shall be provided with weatherproof, while in use type covers.
- B. Light switches shall be rated 20 Ampere, single pole type.
- C. Duplex receptacles shall be duplex, 20 ampere, industrial grade type.
- D. Covers shall be stainless steel gasketed for exposed or concealed inside locations and weatherproof while in use covers for outdoor locations.
- E. Provide 20A, 125V ENR Series dead front interlocked circuit breaking receptacles as shown on drawings. Refer to contract drawings for additional information. Crouse-Hinds Cat# ENR21201.
- F. Acceptable manufacturers are Cooper, Hubbell, or equal.

2.8 EXPANSION FITTINGS

- A. Expansion fittings shall be watertight expansion type, designed to compensate for conduit movement. Expansion fittings shall be provided to allow movement of 4 inches in both directions for a total of 8 inches. Fittings shall have flexible copper braid bonding jumpers, neoprene sleeve and stainless-steel bands. Acceptable Manufacturer: O.Z./Gedney Type EX, Thomas & Betts, or equal.

2.9 PULLBOXES AND JUNCTION BOXES

- A. Junction boxes shall be cast malleable iron or aluminum type and gasketed type FS series with hubs.
- B. Pullboxes other than explosion proof shall be seamless weld type, galvanized with flush type screw-on covers and no hinges or side clamps all around. Use Myers hubs for conduit termination and entry into pullboxes. Acceptable manufactures are Rittal, Hoffman, or equal.

- C. Explosion-proof pullboxes shall be NEMA 4/7, Class I, Division 1, Group C & D or NEMA 4/7, Class I, Division 2, Group C and D for hazardous rated areas. Provide conduit sealing fittings inside and outside of explosion proof areas for all conduits per NEC. Acceptable manufactures are Appleton, Crouse Hinds, or equal.
- D. Boxes for concealed work shall be used only for concealed installations.

2.10 MOUNTING SUPPORTS AND HARDWARE

- A. Provide 316 stainless steel uni-strut and 4" channel angle supports and stainless-steel mounting plates as shown and required for equipment mounting. All legs for stanchion mounting structures shall be channel angle support, no exceptions.
- B. All bolts, washers and mounting hardware shall also be 316 stainless steel for the entire installation.
- C. Acceptable manufactures are B-Line Systems, Inc., Thomas & Betts-Super Strut, Unistrut, or equal.

2.11 LINK SEAL

- A. Furnish and install link seal fittings at all areas of buildings and structures both above and below grade for conduit entry. Refer to the contract drawings for additional requirements.
- B. Acceptable manufactures are Innerlynx, Crouse Hinds, or equal.

2.12 DISCONNECT SWITCHES

- A. Furnish and install heavy duty type lockable disconnect switches as shown on the drawings. Switch NEMA ratings shall be as required and noted on the drawings. Ampacity shall be noted on the drawings and as required by NEC.
- B. Disconnect switches, indicated on the drawing to be used for motors controlled by variable frequency drives shall be 4 pole type switches. The fourth pole shall be wired directly to the control circuit, in series with the safety e-stop, in order to lock-out and immediately shutdown the drive control circuit. The auxiliary 4th pole shall open prior to any of the other three power poles and shall be specifically designed for proper use with VFD type load circuits. The Contractor shall be responsible for providing a separate control conduit for required wiring from the VFD to the disconnect switch.
- C. Acceptable manufactures are Square D, Cutler Hammer, or equal.
- D. Disconnect switches shall have side mounted handle operators that are lockable in both the on and off position.
- E. Disconnect switch shall lock out and immediately shutdown the drive control circuit. The auxiliary 4th pole shall open prior to any of the other three power poles and shall be specifically designed for proper use with VFD type load circuits. The Contractor shall be responsible for providing a separate control conduit for required wiring from the VFD to the disconnect switch.
- F. Acceptable manufactures are Square D, Cutler Hammer, or equal.

2.13 MOTOR CONNECTIONS

- A. Provide all required flexible conduit liquid tight or explosion proof to meet the NEMA rating as noted on the drawings. Limit lengths to 24" or less. Moved to cable section.

2.14 PHASE FAILURE RELAYS

- A. Provide phase failure relays when three phase power and equipment is present. Phase failure relays shall be three-phase, three-wire rated for use at the voltage indicated on the drawings. When the relay is in an energized condition, a loss of power or a phase unbalance of more than 10% and/or phase reversal shall cause the output relay to de-energize, returning NO contacts to their passive state. The relay shall automatically reset when the correct conditions are re-established. Phase failure relays shall be equipped with a built-in 0.2 second time delay to prevent nuisance tripping. Phase failure relays shall be open-type to be mounted within motor starter compartments. Relays shall be Cutler-Hammer Type P or equivalent.

2.15 RELAYS

- A. Industrial Control Relays - Relays provided with 10 Ampere contact rating shall be Square D, Class 8501 type X or equal. Relays with 30 Ampere contact rating shall be Square D, Class 8501, type C or equal.
- B. Pilot Duty Relays - General purpose relays shall be IDEC RH Series, 10A contact rating, 4 Form "C" contacts or equal, provided with internal indicating light. Pilot duty control isolating relays for PLC inputs and outputs shall be suitable for the application and shall be submitted with no exceptions by Engineer.
- C. Relays shall be electrically operated with 120 Volt coils except as noted otherwise on the Drawings. Contacts shall be rated 600 Volt, 10 Ampere.
- D. Interposing relays used for telemetry inputs or other low current inputs shall be Potter and Brumfield type KHAU-17A16 - 120 Volt, or equal.
- E. Timing Relays:
 - 1. Delay timing relays shall be general purpose, solid state type rated for use at 120 Volts. Contacts shall be rated 5 Amperes (minimum). Minimum time range shall be adjustable from 1 second to 1 minute. Time delay relays shall be IDEC RTE or equal.

2.16 TERMINAL STRIPS

- A. Terminal strips shall be supplied to make all power and control connections. All terminals shall be numbered and clearly marked for easy identification. Acceptable manufacturers are Allen Bradley, Phoenix Contact, or Equal.

2.17 WIRE IDENTIFICATION

- A. All individual conductors shall be identified using unique numerical tags corresponding to conductor designations indicated on approved shop drawings of schematic diagrams for all terminations. This includes all process- and non-process-related wiring done as part of the work, such as fire alarm panels. Conductors shall be clearly identified at each terminal block, equipment connection and junction. Markings shall utilize the equipment designation and terminal block number in the device higher upstream in the system hierarchy.
- B. For Conductors No. 6 and smaller, color coding shall correspond to the color of the conductor insulation. For color coding of wire larger than No. 6, use self-adhesive, wrap-around type markers. These markers shall be used at all panelboards, junction boxes, disconnect switches, circuit breakers, etc.

2.18 CONDUIT SEALS

- A. Provide Class I, Div. 1, Groups C & D conduit seals as required by the N.E.C. and as shown on the Drawings or required by the NEC.
- B. Provide Class I, Div. 2, Groups C & D conduit seals as required by the N.E.C. and as shown on the Drawings or required by the NEC.
- C. Acceptable manufacturers: Appleton, Killark, O-Z/Gedney, or equal.

2.19 DRY-TYPE TRANSFORMERS

- A. Furnish and install dry-type transformers with ratings as shown on the drawings.
- B. Transformers shall be of the energy efficient type and shall be ventilated type only.
- C. Acceptable manufactures: Cutler-Hammer, Square D, Siemens, or equal.

2.20 LIGHTING PANELBOARD

- A. Provide panelboard with main circuit breakers center mounted separate from the feeder breakers sized as shown on the drawings. Panelboard shall have bolt on breakers and copper busses rated as shown on the drawings but shall not be less than 10,000 ampere RMS symmetrical. Provide circuit breakers as noted on the drawings.
- B. Acceptable manufactures are Square D, Cutler Hammer, General Electric, equal.

2.21 BRANCH CIRCUIT BREAKERS

- A. Provide 20 Ampere, 120 Volt circuit breakers where indicated on drawings.
- B. Circuit breakers shall be thermal magnetic and maintain the UL Listing of the equipment being installed. Interrupting short circuit rating shall be equivalent or exceed to equipment housing device.
- C. There are several locations where branch circuit power shall be required to be extended to serve new or existing equipment. The contractor shall be responsible to add additional circuit breakers to this existing equipment and shall meet or exceed all ratings of this equipment.
- D. Where these devices are not available or replaceable the following shall be included as an alternate means of installation:
 - 1. Panelboard Installation - If not available then a 4 circuit sub panel shall be installed and tapped by the tap rule of NEC and installed adjacent to the existing panelboard in order to meet this requirement.

2. Installed within existing Pump Control Panel - If not clearly enough room to add then install a DIN mounted breaker adjacent within interwiring to existing breakers.
- E. The contractor shall carry the higher cost installation in the final bid price if determination of this requirement cannot be identified.

2.22 CABLE SEALS

- A. Conduit sealing bushings to seal the ends of conduits entering enclosures from below grade shall be OZ Gedney Co., Type CSB Series or equal.

2.23 ELECTRICAL HAND HOLES

- A. Electrical hand holes shall be Composolite as manufactured by Strongwell Corporation or equivalent. Precast concrete hand holes as detailed on the Drawings shall also be acceptable. Hand holes shall be sized per the N.E.C. according to number and sizes of entering conduits. All hand holes shall be rated for H2O wheel loading. Separate hand holes and conduit systems shall be provided for power, control, and instrumentation systems.

2.24 FINAL AS-BUILT RECORD DRAWINGS

- A. During the ongoing construction the contractor shall maintain a clean set of full size drawings for markup. The drawings shall be red lined and marked up with all appropriately noted changes noting the as-built condition. Upon completion of the project the set of as-built markups shall be provided to the Engineer for final AutoCAD revisions.

2.25 COMPLETE ELECTRICAL DISTRIBUTION EQUIPMENT SUPPLIER

- A. All electrical distribution equipment submitted for this project shall be by a single equipment manufacturer. Multiple suppliers of this equipment shall not be acceptable. The following manufactures shall be acceptable:
 1. Square D Company
 2. Cutler-Hammer
 3. Siemens
 4. GE(ABB)
 5. E/ONE

PART 3 - INSTALLATION

3.1 RACEWAYS AND FITTINGS

- A. Unless otherwise indicated on the Drawings, install all wiring in the following applicable raceway system:
 1. Wiring above 600 volts in indoor dry locations (NEMA 12): Heavywall aluminum conduit or cable tray (indoor only). Galvanized heavy duty rigid steel conduit with no exceptions by the Engineer.
 2. Wiring 600 volts or less in dry concealed locations (NEMA 12): Galvanized electrical metallic tubing (for raceway sizes up to and including 2" trade size) or galvanized rigid heavy wall steel conduit. Only to be used in above ceiling spaces or within block walls or stud walls.

3. Wiring 600 volts or less in outdoor, above grade locations (NEMA 4X): PVC coated galvanized rigid heavy wall steel conduit with no exceptions by the Engineer.
4. Wiring 600 volts or less in indoor wet locations (NEMA 4X): Rigid heavy wall aluminum conduit. Galvanized rigid heavy wall steel conduit with no exceptions by the Engineer.
5. Wiring 600 volts or less in indoor or outdoor corrosive chemical areas use PVC-coated rigid steel conduit.
6. Wiring 600 volts or less in hazardous locations (NEMA 7 or 9): Galvanized rigid heavy wall steel conduit, PVC galvanized rigid steel conduit, or rigid heavy wall aluminum conduit based on requirements listed previously in this section.
7. Underground Raceways
 - a. All underground raceways shall be Schedule 80 extra heavy wall PVC conduit except for signal conduit raceways which shall be rigid steel conduit.
 - b. Refer to drawings for specific concrete encasement duct bank details and requirements. All underground duct banks shall be completely concrete encased. Schedule 40 PVC allowed for conduit runs other than Signal conduits.
- B. Where conduit extends out from underground or enters a structure/building or utility pole, it shall be installed as galvanized rigid steel conduit. This shall remain galvanized rigid steel to its final destination.
- C. Where conduits are installed concealed within or below concrete slab within the generator building and extend up through the slab galvanized rigid steel conduit sweeps shall be installed at all locations and shall remain galvanized rigid steel conduit for all exposed areas.
- D. Armored metal clad cable (MC) shall be allowed to be used for receptacles and switches which may be installed within studded walls. EMT shall also be allowed to be used in this application also.
- E. MC cable whips no longer than 3 feet only can be used for drop feeds to light fixtures up in attic area.
- F. No wire shall be pulled until the raceway system is complete in all details.
- G. The ends of all raceways shall be tightly capped to exclude dust and moisture during the construction period. Caps shall be of a UL Listed type specifically used for this purpose. Rags, papers, etc. shall not be used.
- H. Raceways terminating in gasketed enclosures shall be terminated with conduit hubs.
- I. Raceways installed underground shall be encased in concrete and laid on trenches on mats of bank gravel or sand not less than six inch thick and well graded.
- J. Provide long radius rigid steel conduit sweeps at entrances to equipment from underground.
- K. Provide conduit expansion fittings as required. Install per manufacturers recommendation.

3.2 WIRES AND CABLES

- A. All conductors shall be carefully handled to avoid kinks or damage to insulation.
- B. Alarm wires shall be uniquely identified at each end with wire markers. A typed list of the numbers used and their function (alarm served) shall be submitted to the Engineer by the Contractor.
- C. All 600 Volt wire insulation shall be tested with a megohm meter after installation. Tests shall be made at not less than 500 Volts. A written test report of the results shall be submitted to the Engineer by the Contractor.
- D. After installation of service conductors seal conduits in pump station with duct seal.
- E. Grouping of Conductors
 - 1. Contractor may group certain wiring with the approval of the Engineer, as follows.
 - a. Power 120V may be grouped with power 120V
 - b. Control 120V may be grouped with control 120V
 - c. Control 24V may be grouped with control 24V
 - d. Instrumentation may be grouped with instrumentation
 - e. Specialty wiring may be grouped with like systems
 - f. Power wiring at 480V shall not be grouped
 - g. Fire alarm system wiring shall not be grouped with other systems

The installation shall be installed in accordance with all requirements of the NEC (including wire ampacity derating factors), manufacturer's requirements, and the Engineer. Excessive grouping which interferes with functionality and reliability will not be allowed. The wiring configuration as shown on the drawings is the baseline requirement for the work.

- F. Nonmetallic-Sheathed Cable shall be installed in accordance with the latest edition of the NEC. Nonmetallic-Sheathed cable shall be supported and secured by staples, straps or similar fittings designed and installed so as not to damage the cable, at intervals not exceeding 4 ½ “and within 12” of every cable entry. Connectors shall be listed for use with Nonmetallic-Sheathed cable.

3.3 GROUNDING

- A. Provide grounding conductors from ground electrodes to equipment as shown on the Drawings.
- B. Do not use conduit as the ground and/or bonding conductor.
- C. Bond ground terminal of receptacles to outlet boxes with #12 AWG green insulated wire.
- D. Ground conduit system and neutral conductor of wiring system with a connection at the main electrical service breaker.
- E. The grounding network shall be connected to metallic water piping system, at two or more locations, with stranded copper, AWG, Green Insulated Conductor of the same size as grounding electrode conductor shown on the drawings or required by the National Electrical Code (NEC).
- F. Make connections to ground rods with an exothermic welding process. Mechanical connections may be made at equipment only.

- G. Ensure that a ground loop is not formed between equipment ground in electrical conduit and grounding electrode conductors directly connected to ground electrodes.
- H. Group and bond ground wires to panel boxes, light fixtures, receptacles, etc., not to system neutral.
- I. Make connection to water pipe with a suitable ground clamp or lug connection. If flanged pipes are encountered, make connection with lug bolted to flange connections.
- J. Bond and ground all conduit systems.

3.4 EQUIPMENT

- A. The inside of all equipment and enclosures shall be checked for tools and vacuumed cleaned of any debris.
- B. The Contractor shall be responsible to ensure that all connections to motors, distribution equipment, and control panels are tightened to manufactures recommendations.

3.5 TESTS

- A. The entire grounding network resistance to be meggered and certified results recorded and submitted with no exceptions to the Engineer. Resistance shall not exceed 25 Ohms.
- B. Branch circuits shall be tested during installation for continuity and identification and shall pass operational tests to determine that all circuits perform the function for which they are designed.
- C. Adjust all settings on protective equipment and verify, check and establish with the power company that the secondary voltage is within 2% of rated voltage.
- D. Test and set all motor circuit protectors, motor overload heaters to the nameplate horsepower of the equipment; and all circuit breaker settings in all electrical equipment shall be tested and verified operational.
- E. Three phase panelboard's line currents shall be balanced to within 10% of each other.
- F. For all feeder wiring rated 600 volts or less, provide 1,000 volt "Megger" insulation test prior to energizing feeders. Use a motor-driven megger for all tests. Test voltage shall be applied until readings reach a constant value, and until three (3) equal readings, each one (1) minute apart, are obtained. Minimum megger reading shall be 45 megohms for feeder conductors. Document test results and submit to engineer. There shall be no exceptions taken by the Engineer before conductors are to be energized. See attached table at end of this section for recording data and submission to the Engineer.
- G. Three phase motors shall be checked for rotation and, if necessary, reverse the connections at the starter. Single phase and DC motors at motor connection box.

END OF SECTION

APPENDIX A
Borings

Report of Findings

19-0968

March 2, 2021

Geotechnical Exploration & Reporting Services

Proposed Sagamore Avenue
Sewer Extension
Portsmouth, New Hampshire

Prepared For:
Wright-Pierce
Attention: Rebecca Saucier, P.E.
250 Commercial Street
Suite 4014
Manchester, NH 03101

Prepared By:
S. W. Cole Engineering, Inc.
10 Centre Road
Somersworth, NH 03878
T: (603) 692-0088



- *Geotechnical Engineering*
- *Construction Materials Testing and Special Inspections*
- *GeoEnvironmental Services*
- *Test Boring Explorations*

www.swcole.com

19-0968

March 2, 2021

Wright-Pierce
Attention: Rebecca Saucier, P.E.
250 Commercial Street
Suite 4014
Manchester, NH 03101

Subject: Report of Findings
Geotechnical Exploration & Reporting Services
Proposed Sagamore Avenue Sewer Extension
Portsmouth, New Hampshire

Dear Rebecca:

In accordance with our Proposal, dated July 12, 2019 and our Contract Addendum dated October 16, 2020, we have performed subsurface explorations for the subject project. This report summarizes our findings and its contents are subject to the limitations set forth in Appendix A.

INTRODUCTION

The purpose of our services was to obtain subsurface information at the site and report the findings. Our scope of services included subsurface explorations, laboratory testing, and preparation of this report.

We understand the proposed sewer extension project will be along Sagamore Avenue (Route 1A) from about 500 feet north of Cliff Road to about 700 feet south of Wentworth Road (Route 1B), excluding the bridge over Sagamore Creek. Work will also be along Wentworth Road from Sagamore Avenue to the Portsmouth/Rye Town Line. Work will also be on side roads off Sagamore Avenue including Sagamore Grove, Cliff Road, Shaw Road, Walker Bungalow Road, and a gravel-surface no name road on the west side of Sagamore Avenue and north of Sagamore Creek. The total length of alignment is about 7,000 linear feet. The new sewer line will likely be placed at depths of about 5 feet.

EXPLORATIONS AND SUBSURFACE CONDITIONS

Test Borings and test probes were made at the site by S. W. Cole Explorations, LLC in three mobilizations in September 2019, January 2021, and February 2021. The exploration locations were selected and established in the field by S. W. Cole Engineering, Inc. (S.W.COLE). The exploration locations are shown on the boring location plan attached in Appendix B. Logs of the explorations are attached in Appendix C.

Soil samples obtained from the explorations were returned to our laboratory for further classification and testing. Moisture content test results are noted on the logs. The results of three grain size analysis test are attached in Appendix D.

CLOSURE


It has been a pleasure to be of assistance to you with this phase of your project. We look forward to working with you during the construction phase of the project.

Sincerely,

S. W. Cole Engineering, Inc.

Antonio J. Santiago, E.I.T.

Geotechnical Engineer



Digitally signed by
Chad Michaud
DN: cn=Chad Michaud,
o=S. W. Cole
Engineering, Inc., ou,
email=cmichaud@swc
ole.com, c=US
Date: 2021.03.02
16:58:11 -0500

Chad B. Michaud, P.E.

Principal Geotechnical Engineer

AJS:cbm

APPENDIX A

Limitations

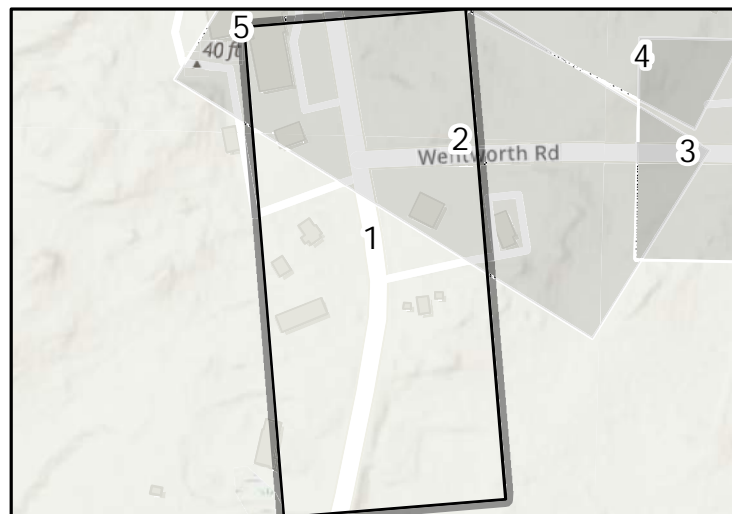
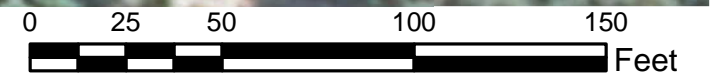
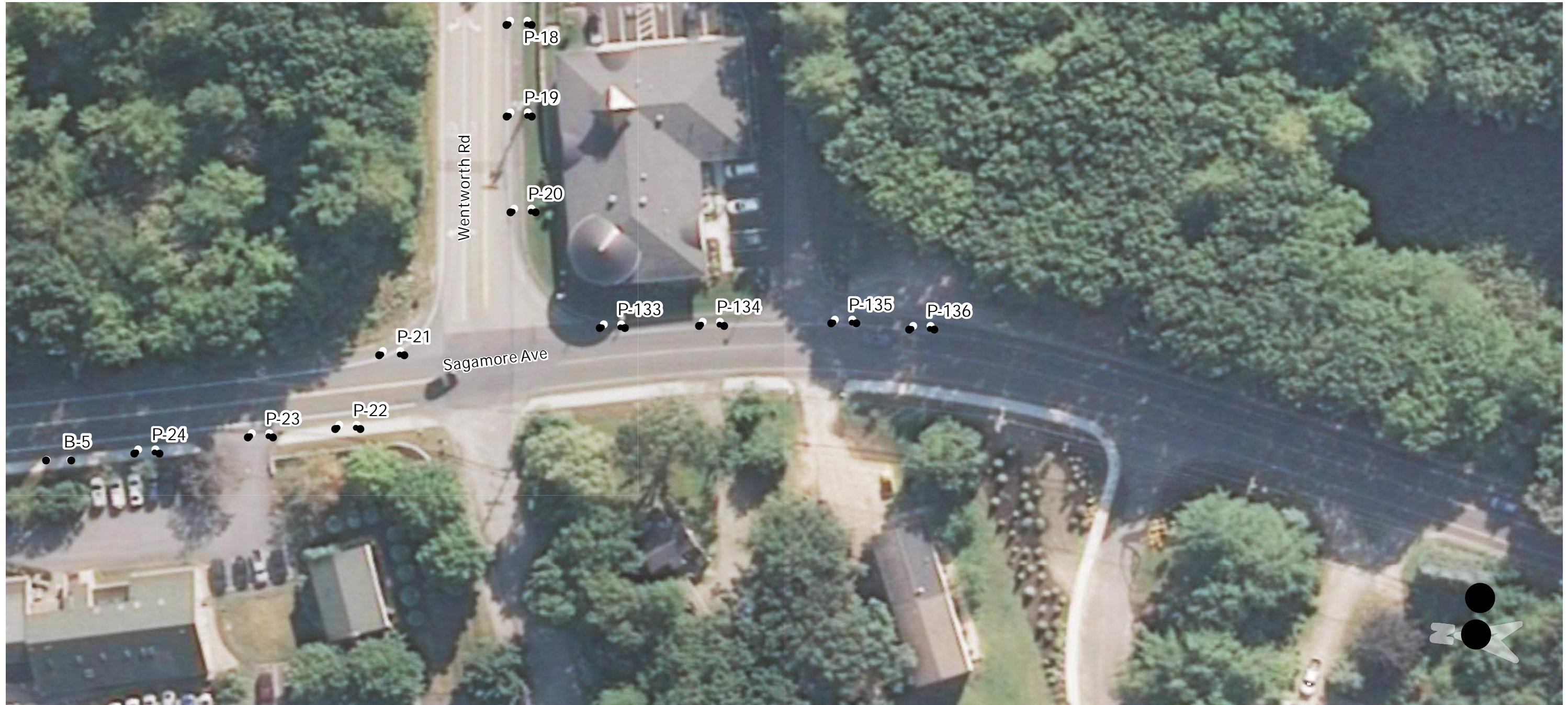
This letter has been prepared for the exclusive use of Wright-Pierce for specific application to the proposed Sagamore Avenue Sewer Extension in Portsmouth, New Hampshire. S. W. Cole Engineering, Inc. (S.W.COLE) has endeavored to conduct our services in accordance with generally accepted soil and foundation engineering practices. No warranty, expressed or implied, is made.

The analyses performed during this investigation are based in part upon the data obtained from subsurface explorations made at the site. Variations in subsurface conditions may occur between explorations and may not become evident until construction.

S.W.COLE's scope of services has not included the investigation, detection, or prevention of any Biological Pollutants at the project site or in any existing or proposed structure at the site. The term "Biological Pollutants" includes, but is not limited to, molds, fungi, spores, bacteria, and viruses, and the byproducts of any such biological organisms.

APPENDIX B

Figures



LEGEND

- APPROXIMATE BORING LOCATION
- APPROXIMATE PROBE LOCATION

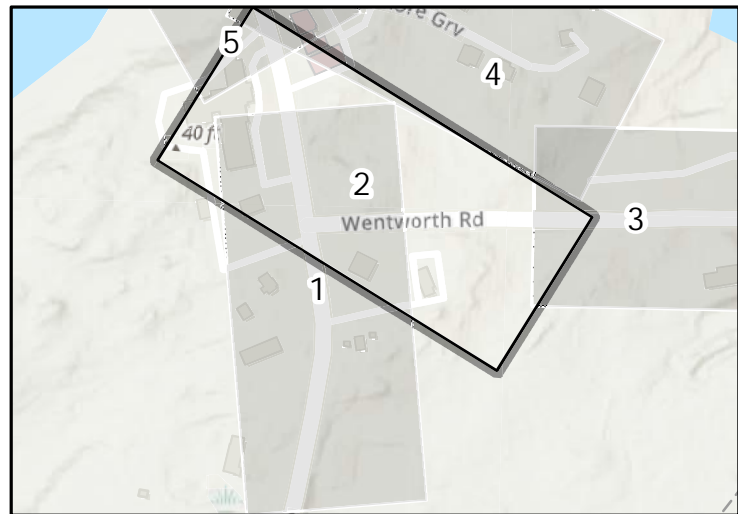
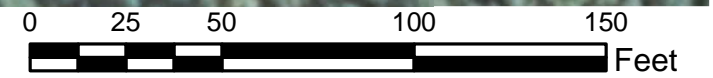
NOTES:

1. EXPLORATION LOCATION PLAN PREPARED FROM NEW HAMPSHIRE ORTHOIMAGERY ENTITLED "COASTAL_2017_1FT_RGB".
2. THE BORING LOCATIONS WERE LOCATED IN THE FIELD BY GPS SURVEY BY S. W. COLE ENGINEERING, INC. USING A MAPPING GRADE TRIMBLE GPS RECEIVER.
3. THIS PLAN SHOULD BE USED IN CONJUNCTION WITH THE ASSOCIATED S. W. COLE ENGINEERING, INC. GEOTECHNICAL REPORT.
4. THE PURPOSE OF THIS PLAN IS ONLY TO DEPICT THE LOCATION OF THE EXPLORATIONS IN RELATION TO THE EXISTING CONDITIONS AND IS NOT TO BE USED FOR CONSTRUCTION.



WRIGHT-PIERCE
EXPLORATION LOCATION PLAN
 PROPOSED SAGAMORE AVENUE SEWER EXTENSION
 PORTSMOUTH, NEW HAMPSHIRE

Job No.	19-0968	Scale	1" = 50'
Date:	03/02/2021	Sheet	1 of 14



LEGEND

- APPROXIMATE BORING LOCATION
- APPROXIMATE PROBE LOCATION

NOTES:

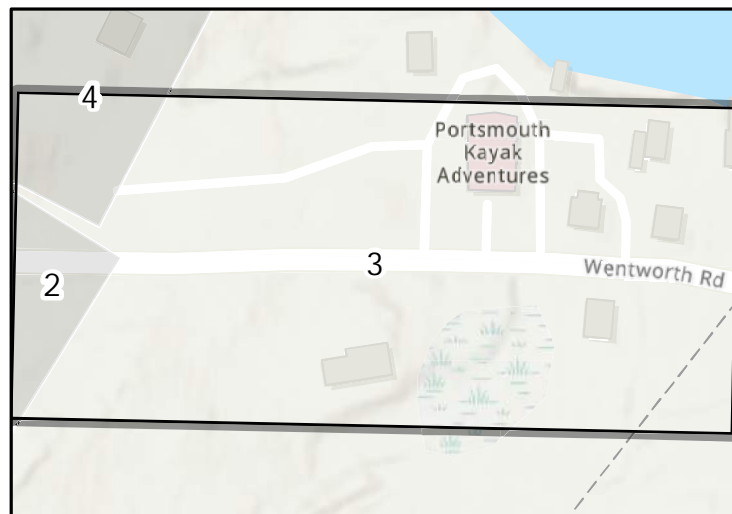
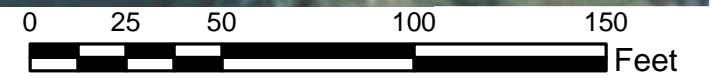
1. EXPLORATION LOCATION PLAN PREPARED FROM NEW HAMPSHIRE ORTHOIMAGERY ENTITLED "COASTAL_2017_1FT_RGB".
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WRIGHT-PIERCE
EXPLORATION LOCATION PLAN
 PROPOSED SAGAMORE AVENUE SEWER EXTENSION
 PORTSMOUTH, NEW HAMPSHIRE

Job No.	19-0968	Scale	1" = 50'
Date:	03/02/2021	Sheet	2 of 14

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LEGEND

- , APPROXIMATE BORING LOCATION
- , APPROXIMATE PROBE LOCATION

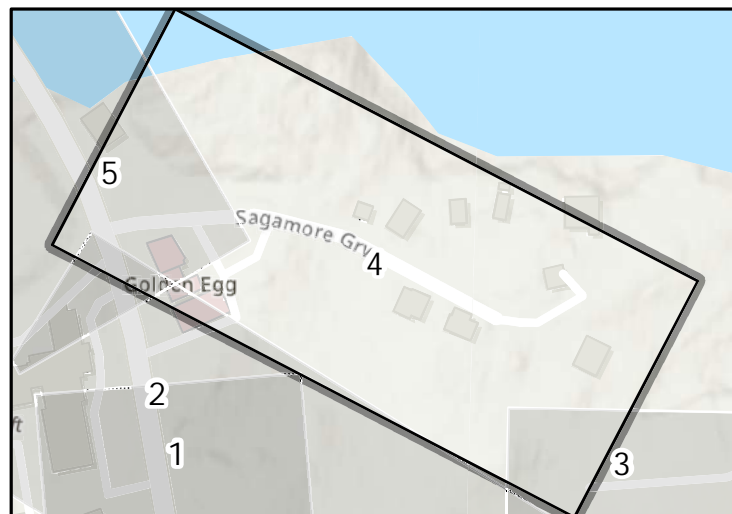
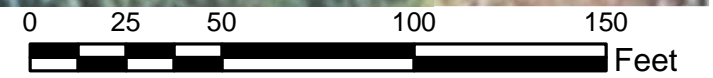
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 PROPOSED SAGAMORE AVENUE SEWER EXTENSION
 PORTSMOUTH, NEW HAMPSHIRE

Job No. 19-0968	Scale 1" = 50'
Date: 03/02/2021	Sheet 3 of 14



LEGEND

- APPROXIMATE BORING LOCATION
- APPROXIMATE PROBE LOCATION

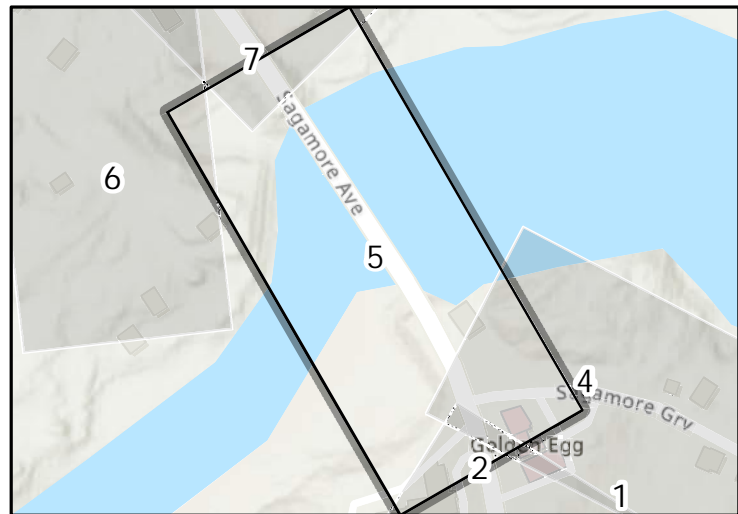
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 PORTSMOUTH, NEW HAMPSHIRE

Job No.	19-0968	Scale	1" = 50'
Date:	03/02/2021	Sheet	4 of 14

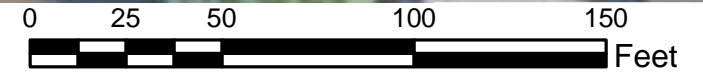


LEGEND

- APPROXIMATE BORING LOCATION
- APPROXIMATE PROBE LOCATION

NOTES:

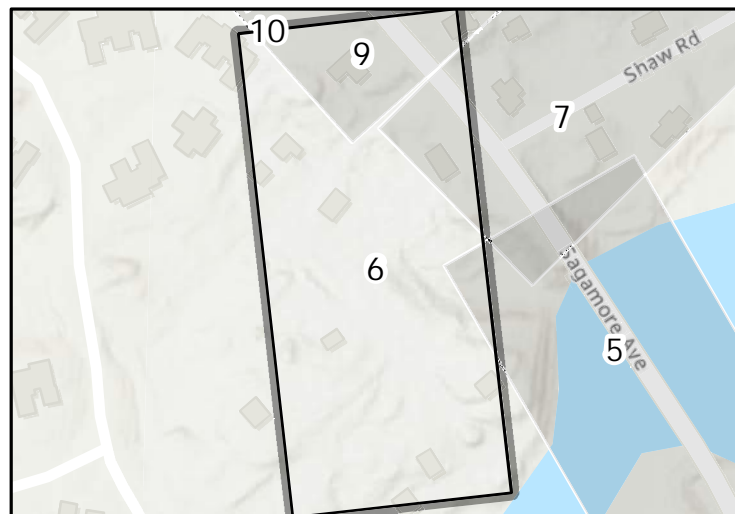
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 PORTSMOUTH, NEW HAMPSHIRE

Job No.	19-0968	Scale	1" = 50'
Date:	03/02/2021	Sheet	5 of 14

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LEGEND

- , APPROXIMATE BORING LOCATION
- , APPROXIMATE PROBE LOCATION

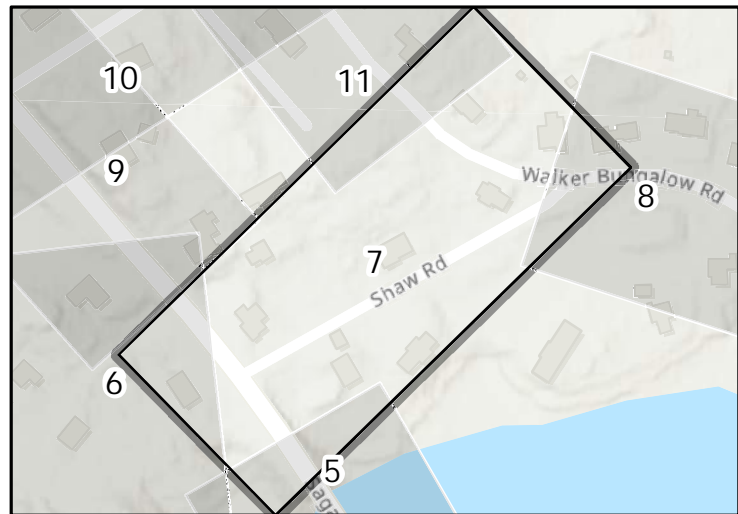
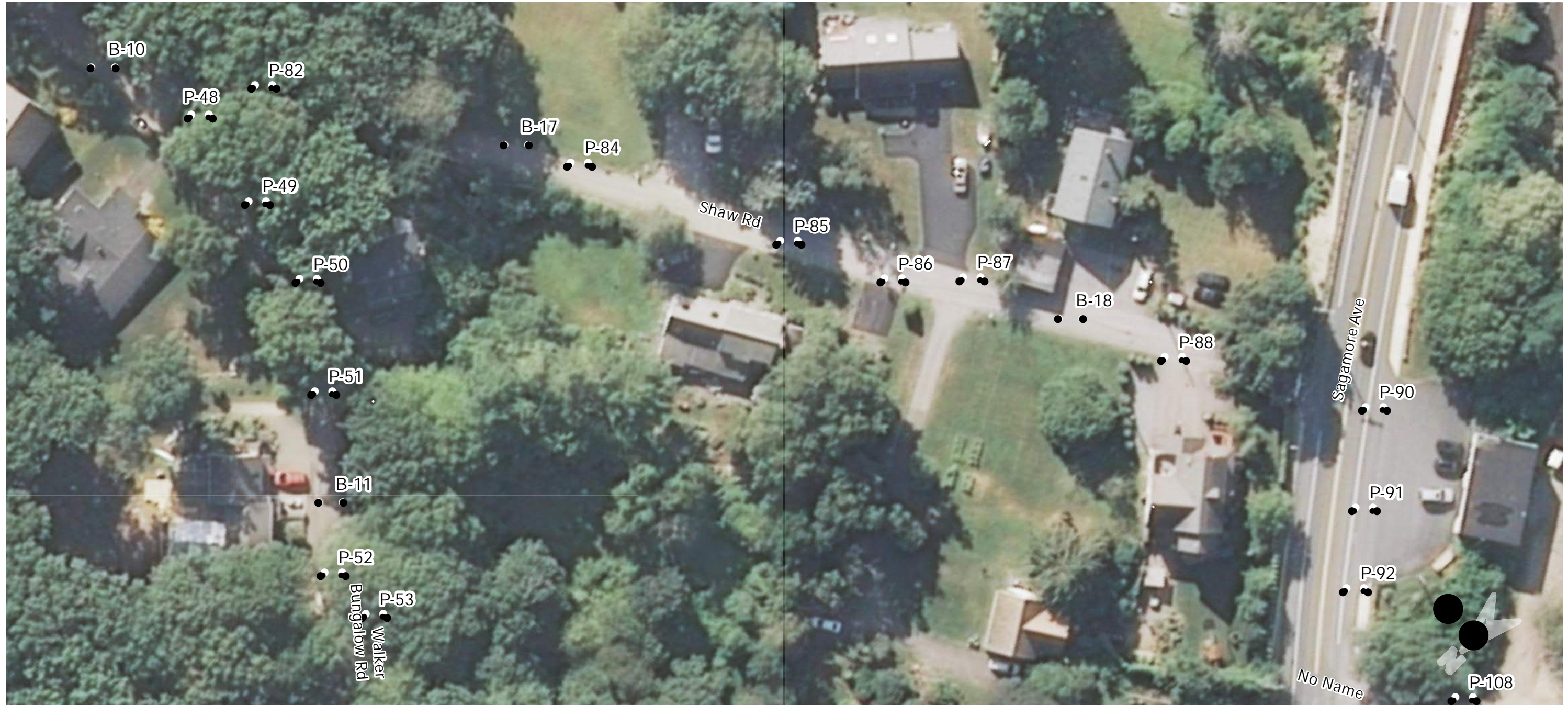
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 PORTSMOUTH, NEW HAMPSHIRE

Job No.	19-0968	Scale	1" = 50'
Date:	03/02/2021	Sheet	6 of 14



LEGEND

- , APPROXIMATE BORING LOCATION
- ● APPROXIMATE PROBE LOCATION

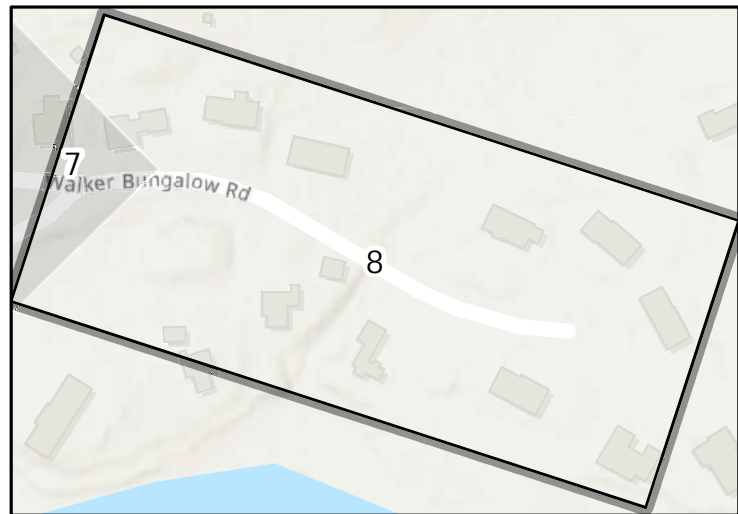
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 PORTSMOUTH, NEW HAMPSHIRE

Job No.	19-0968	Scale	1" = 50'
Date:	03/02/2021	Sheet	7 of 14



LEGEND

- APPROXIMATE BORING LOCATION
- APPROXIMATE PROBE LOCATION

NOTES:

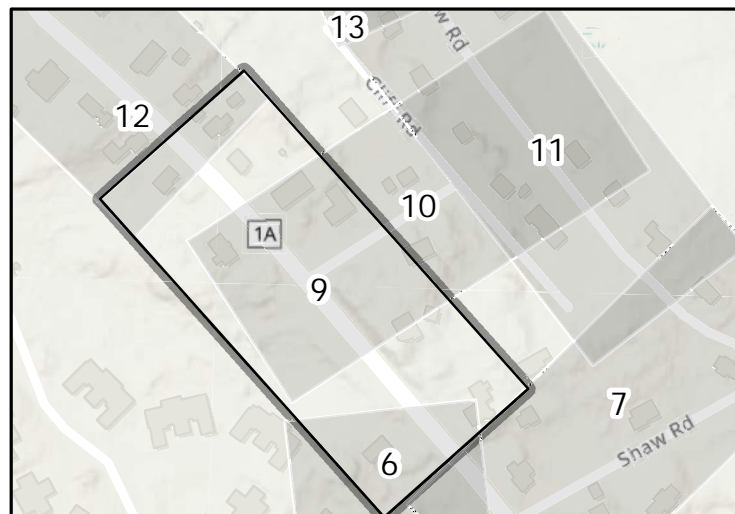
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Job No.	19-0968	Scale	1" = 50'
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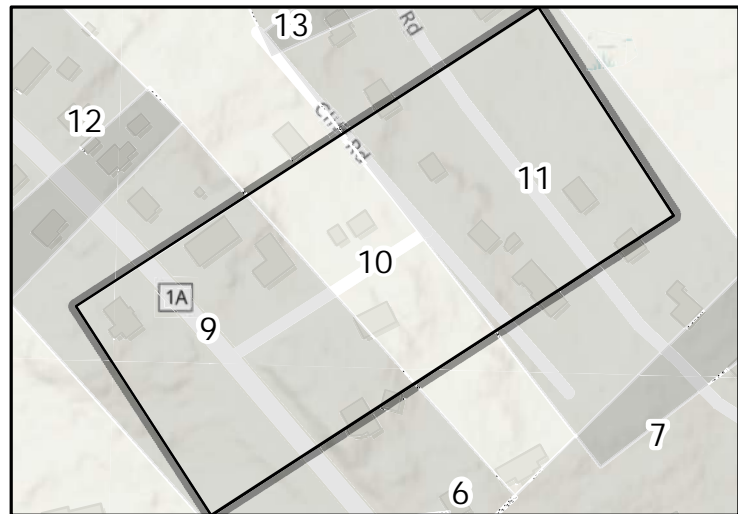
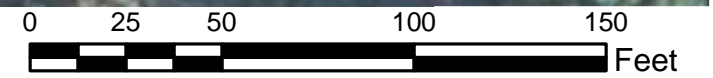
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 PORTSMOUTH, NEW HAMPSHIRE

Job No.	19-0968	Scale	1" = 50'
Date:	03/02/2021	Sheet	9 of 14



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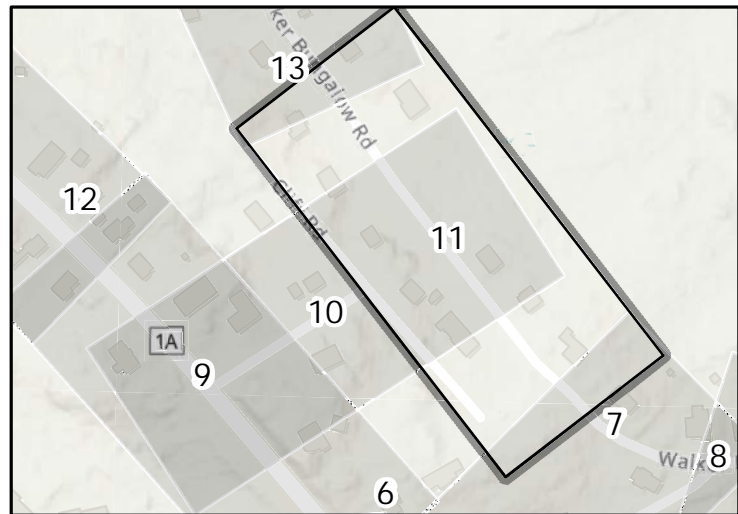
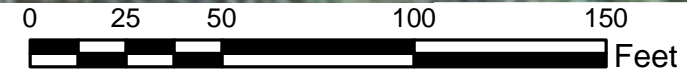
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Job No.	19-0968	Scale	1" = 50'
Date:	03/02/2021	Sheet	10 of 14

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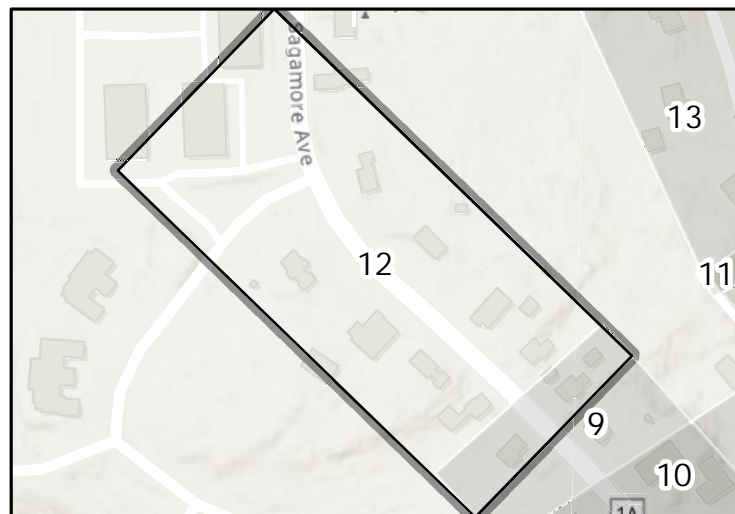
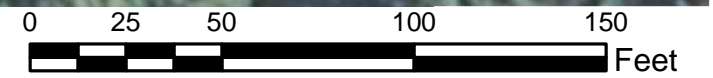
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Job No.	19-0968	Scale	1" = 50'
Date:	03/02/2021	Sheet	11 of 14

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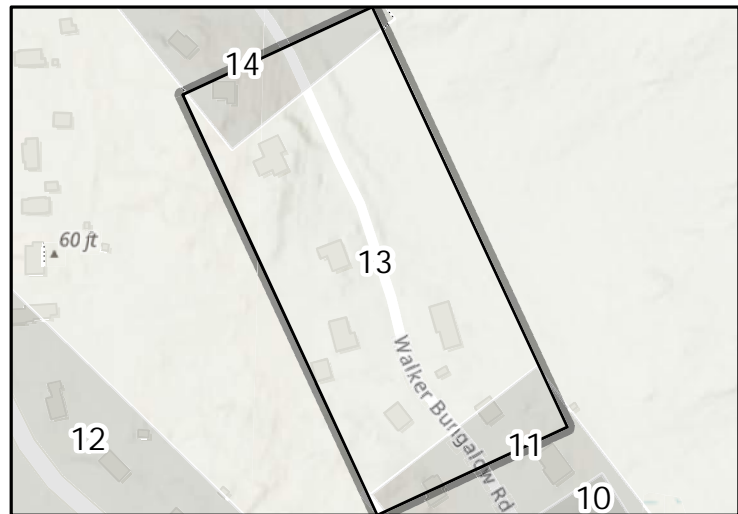
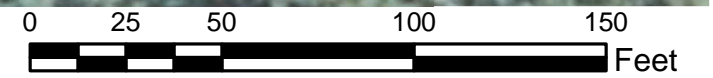
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Job No.	19-0968	Scale	1" = 50'
Date:	03/02/2021	Sheet	12 of 14



LEGEND

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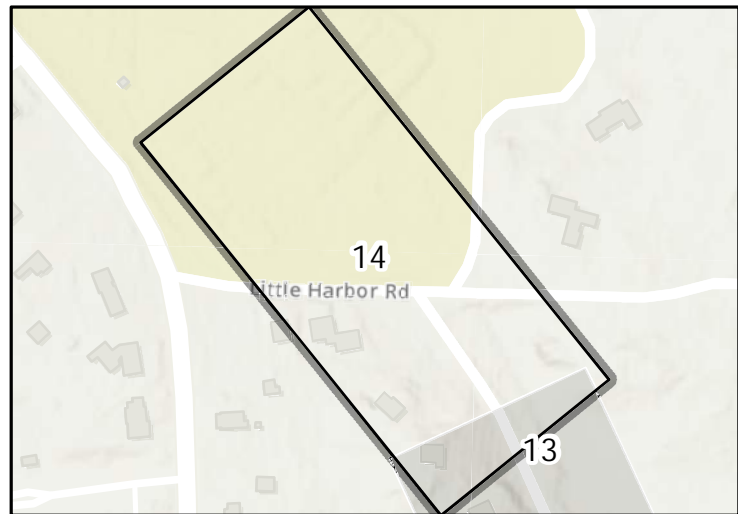
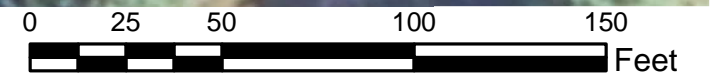
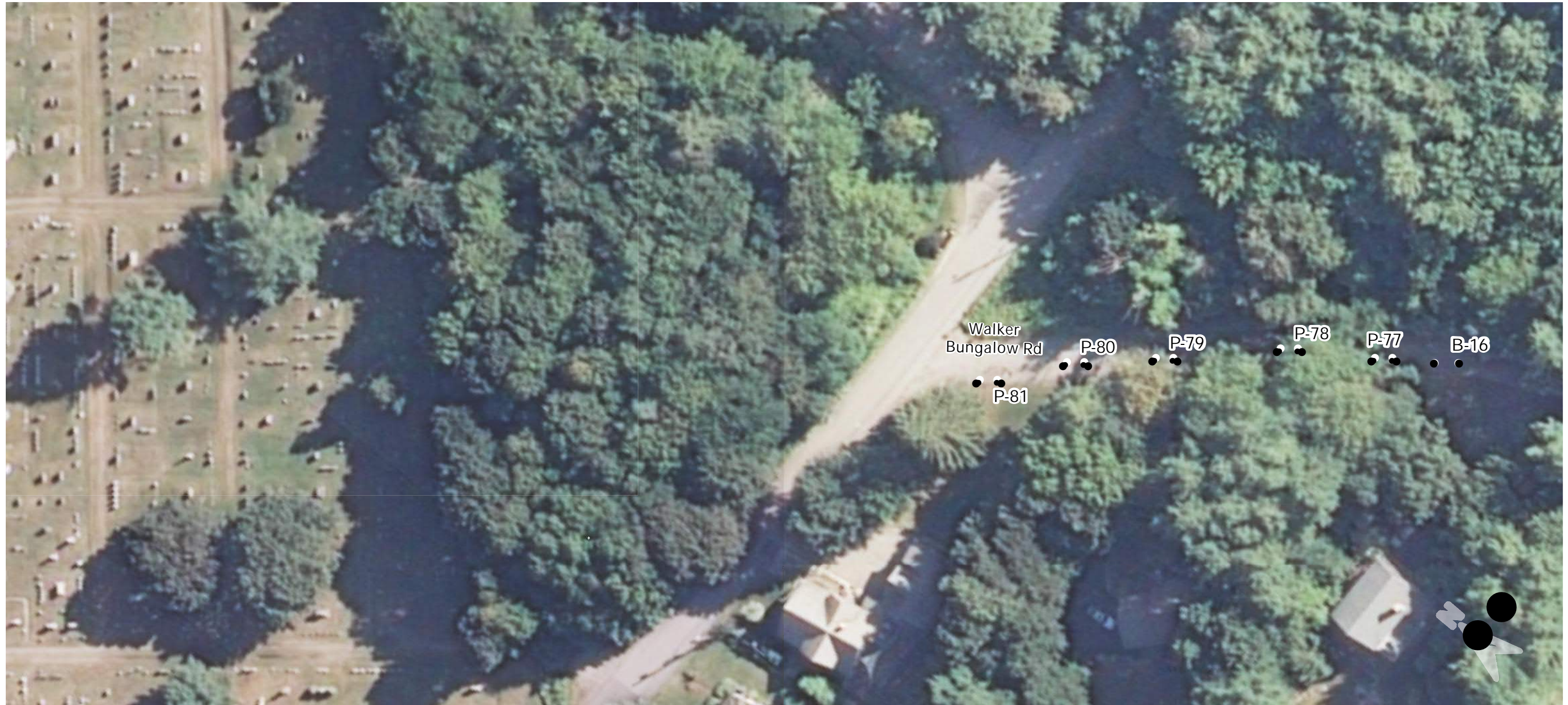
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Job No.	19-0968	Scale	1" = 50'
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LEGEND

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Job No.	19-0968	Scale	1" = 50'
Date:	03/02/2021	Sheet	14 of 14

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APPENDIX C

Exploration Logs and Key



BORING LOG

BORING NO.: B-5
SHEET: 1 of 1
PROJECT NO.: 19-0968
DATE START: 9/25/2019
DATE FINISH: 9/25/2019

CLIENT: Wright-Pierce
PROJECT: Sagamore Avenue Sewer Extension Project
LOCATION: Sagamore Ave, Portsmouth, New Hampshire

Drilling Information

LOCATION: See Exploration Location Plan **ELEVATION (FT):** N/A **TOTAL DEPTH (FT):** 9.0 **LOGGED BY:** Antonio Santiago
DRILLING CO.: S. W. Cole Explorations, LLC **DRILLER:** Corey Culligan **DRILLING METHOD:** Solid Stem Auger
RIG TYPE: Truck Mounted Diedrich D-50 **AUGER ID/OD:** N/A / 4 1/2 in **SAMPLER:** Standard Split-Spoon
HAMMER TYPE: Automatic / N/A **HAMMER WEIGHT (lbs):** 140 **CASING ID/OD:** N/A / N/A **CORE BARREL:** N/A
HAMMER EFFICIENCY FACTOR: _____ **HAMMER DROP (inch):** 30
WATER LEVEL DEPTHS (ft): No free water observed.

GENERAL NOTES:

KEY TO NOTES AND SYMBOLS: Water Level
 ▽ At time of Drilling D = Split Spoon Sample Pen. = Penetration Length WOR = Weight of Rods S_v = Field Vane Shear Strength, kips/sq.ft.
 ▽ At Completion of Drilling U = Thin Walled Tube Sample Rec. = Recovery Length WOH = Weight of Hammer q_u = Unconfined Compressive Strength, kips/sq.ft.
 ▽ After Drilling R = Rock Core Sample bpf = Blows per Foot RQD = Rock Quality Designation Ø = Friction Angle (Estimated)
 V = Field Vane Shear mpf = Minute per Foot PID = Photoionization Detector N/A = Not Applicable

Elev. (ft)	Depth (ft)	Casing Pen. (bpf)	SAMPLE INFORMATION					Graphic Log	Sample Description & Classification	H ₂ O Depth	Remarks
			Sample No.	Type	Depth (ft)	Pen./ Rec. (in)	Blow Count or RQD				
									6 inches Asphalt Pavement		
			1D		0.5-2.5	24/16		11-20-17-23	0.5	Dense to medium dense, brown gravelly SAND some silt (FILL)	
			2D		2.5-4.5	24/18		16-14-12-12			
									4.0	Medium dense, tan sandy SILT some gravel	
	5		3D		5-7	24/15		13-10-6-7			
								w = 18.4 %			
			4D		7-9	24/24		10-8-9-10			

Bottom of Exploration at 9.0 feet

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING NO.: B-5

BORING / WELL 19-0968.GPJ SWCE TEMPLATE.GDT 1/28/21



BORING LOG

BORING NO.: B-6
SHEET: 1 of 1
PROJECT NO.: 19-0968
DATE START: 9/25/2019
DATE FINISH: 9/25/2019

CLIENT: Wright-Pierce
PROJECT: Sagamore Avenue Sewer Extension Project
LOCATION: Sagamore Ave, Portsmouth, New Hampshire

Drilling Information

LOCATION: See Exploration Location Plan **ELEVATION (FT):** N/A **TOTAL DEPTH (FT):** 10.0 **LOGGED BY:** Antonio Santiago
DRILLING CO.: S. W. Cole Explorations, LLC **DRILLER:** Corey Culligan **DRILLING METHOD:** Solid Stem Auger
RIG TYPE: Truck Mounted Diedrich D-50 **AUGER ID/OD:** N/A / 4 1/2 in **SAMPLER:** Standard Split-Spoon
HAMMER TYPE: Automatic / N/A **HAMMER WEIGHT (lbs):** 140 **CASING ID/OD:** N/A / N/A **CORE BARREL:** N/A
HAMMER EFFICIENCY FACTOR: _____ **HAMMER DROP (inch):** 30
WATER LEVEL DEPTHS (ft): No free water observed.

GENERAL NOTES:

KEY TO NOTES AND SYMBOLS:
Water Level
At time of Drilling
At Completion of Drilling
After Drilling

D = Split Spoon Sample Pen. = Penetration Length WOR = Weight of Rods S_v = Field Vane Shear Strength, kips/sq.ft.
U = Thin Walled Tube Sample Rec. = Recovery Length WOH = Weight of Hammer q_u = Unconfined Compressive Strength, kips/sq.ft.
R = Rock Core Sample bpf = Blows per Foot RQD = Rock Quality Designation Ø = Friction Angle (Estimated)
V = Field Vane Shear mpf = Minute per Foot PID = Photoionization Detector N/A = Not Applicable

Elev. (ft)	Depth (ft)	Casing Pen. (bpf)	SAMPLE INFORMATION					Graphic Log	Sample Description & Classification	H ₂ O Depth	Remarks
			Sample No.	Type	Depth (ft)	Pen./ Rec. (in)	Blow Count or RQD				
								7 1/2 inches Asphalt Pavement			
			1D		0.6-2.6	24/14	10-10-12-14	0.6 Medium dense, brown gravelly SAND some silt (FILL)			
			2D		2.6-4.6	24/12	10-10-4-6				
	5		3D		5-7	24/12	2-4-6-8				
			4D		7-9	24/8	8-11-8-12				

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Bottom of Exploration at 10.0 feet

BORING NO.: B-6

BORING / WELL 19-0968.GPJ SWCE TEMPLATE.GDT 1/28/21



BORING LOG

BORING NO.: B-8
SHEET: 1 of 1
PROJECT NO.: 19-0968
DATE START: 9/23/2019
DATE FINISH: 9/23/2019

CLIENT: Wright-Pierce
PROJECT: Sagamore Avenue Sewer Extension Project
LOCATION: Sagamore Ave, Portsmouth, New Hampshire

Drilling Information

LOCATION: See Exploration Location Plan **ELEVATION (FT):** N/A **TOTAL DEPTH (FT):** 4.9 **LOGGED BY:** Antonio Santiago
DRILLING CO.: S. W. Cole Explorations, LLC **DRILLER:** Corey Culligan **DRILLING METHOD:** Solid Stem Auger
RIG TYPE: Truck Mounted Diedrich D-50 **AUGER ID/OD:** N/A / 4 1/2 in **SAMPLER:** Standard Split-Spoon
HAMMER TYPE: Automatic / N/A **HAMMER WEIGHT (lbs):** 140 **CASING ID/OD:** N/A /N/A **CORE BARREL:** N/A
HAMMER EFFICIENCY FACTOR: _____ **HAMMER DROP (inch):** 30
WATER LEVEL DEPTHS (ft): No free water observed.

GENERAL NOTES:

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∇ After Drilling R = Rock Core Sample bpf = Blows per Foot RQD = Rock Quality Designation Ø = Friction Angle (Estimated)
∇ After Drilling V = Field Vane Shear mpf = Minute per Foot PID = Photoionization Detector N/A = Not Applicable

Elev. (ft)	Depth (ft)	Casing Pen. (bpf)	SAMPLE INFORMATION					Graphic Log	Sample Description & Classification	H ₂ O Depth	Remarks
			Sample No.	Type	Depth (ft)	Pen./ Rec. (in)	Blow Count or RQD				
			1D		0.4-2.4	24/8	12-7-3-2		4 1/2 Asphalt Pavement		
								0.4	Medium dense, brown silty SAND some gravel (FILL)		
			2D		2.4-3.8	17/6	10-17-50/5"		Medium dense, brown gravelly silty SAND (TILL)		
								2.3			

Auger Refusal at 4.9 feet
 Probable bedrock or boulder

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING NO.: B-8

BORING / WELL 19-0968.GPJ SWCE TEMPLATE.GDT 1/28/21



BORING LOG

BORING NO.: B-9
SHEET: 1 of 1
PROJECT NO.: 19-0968
DATE START: 9/27/2019
DATE FINISH: 9/27/2019

CLIENT: Wright-Pierce
PROJECT: Sagamore Avenue Sewer Extension Project
LOCATION: Sagamore Ave, Portsmouth, New Hampshire

Drilling Information

LOCATION: See Exploration Location Plan **ELEVATION (FT):** N/A **TOTAL DEPTH (FT):** 11.0 **LOGGED BY:** Antonio Santiago
DRILLING CO.: S. W. Cole Explorations, LLC **DRILLER:** Corey Culligan **DRILLING METHOD:** Solid Stem Auger
RIG TYPE: Truck Mounted Diedrich D-50 **AUGER ID/OD:** N/A / 4 1/2 in **SAMPLER:** Standard Split-Spoon
HAMMER TYPE: Automatic / N/A **HAMMER WEIGHT (lbs):** 140 **CASING ID/OD:** N/A / N/A **CORE BARREL:** N/A
HAMMER EFFICIENCY FACTOR: _____ **HAMMER DROP (inch):** 30
WATER LEVEL DEPTHS (ft): No free water observed.

GENERAL NOTES:

KEY TO NOTES AND SYMBOLS:
Water Level D = Split Spoon Sample Pen. = Penetration Length WOR = Weight of Rods S_v = Field Vane Shear Strength, kips/sq.ft.
▽ At time of Drilling U = Thin Walled Tube Sample Rec. = Recovery Length WOH = Weight of Hammer q_u = Unconfined Compressive Strength, kips/sq.ft.
▼ At Completion of Drilling R = Rock Core Sample bpf = Blows per Foot RQD = Rock Quality Designation Ø = Friction Angle (Estimated)
▽ After Drilling V = Field Vane Shear mpf = Minute per Foot PID = Photoionization Detector N/A = Not Applicable

Elev. (ft)	Depth (ft)	Casing Pen. (bpf)	SAMPLE INFORMATION					Graphic Log	Sample Description & Classification	H ₂ O Depth	Remarks
			Sample No.	Type	Depth (ft)	Pen./ Rec. (in)	Blow Count or RQD				
								6 inches Asphalt Pavement			
			1D		0.5-2.5	24/16	11-6-4-4	0.5	Medium dense, brown silty SAND some gravel (FILL)		
			2D		2.5-4.5	24/20	2-2-1-1	1.5	Very loose, gray sandy SILT trace gravel		
	5		3D		5-7	24/4	WOH				
			4D		7-9	24/3	WOH				
	10		5D		9-11	24/12	9-8-17-40	9.0	Medium dense, brown gravelly silty SAND (TILL)		

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Bottom of Exploration at 11.0 feet

BORING NO.: B-9

BORING / WELL: 19-0968.GPJ SWCE TEMPLATE.GDT 1/28/21



BORING LOG

BORING NO.: B-10
SHEET: 1 of 1
PROJECT NO.: 19-0968
DATE START: 9/27/2019
DATE FINISH: 9/27/2019

CLIENT: Wright-Pierce
PROJECT: Sagamore Avenue Sewer Extension Project
LOCATION: Sagamore Ave, Portsmouth, New Hampshire

Drilling Information

LOCATION: See Exploration Location Plan **ELEVATION (FT):** N/A **TOTAL DEPTH (FT):** 9.0 **LOGGED BY:** Antonio Santiago
DRILLING CO.: S. W. Cole Explorations, LLC **DRILLER:** Corey Culligan **DRILLING METHOD:** Solid Stem Auger
RIG TYPE: Truck Mounted Diedrich D-50 **AUGER ID/OD:** N/A / 4 1/2 in **SAMPLER:** Standard Split-Spoon
HAMMER TYPE: Automatic / N/A **HAMMER WEIGHT (lbs):** 140 **CASING ID/OD:** N/A /N/A **CORE BARREL:** N/A
HAMMER EFFICIENCY FACTOR: _____ **HAMMER DROP (inch):** 30
WATER LEVEL DEPTHS (ft): ∇ 8 ft Soil saturated below 8 feet.

GENERAL NOTES:

KEY TO NOTES AND SYMBOLS:
∇ Water Level
∇ At time of Drilling
∇ At Completion of Drilling
∇ After Drilling
D = Split Spoon Sample
U = Thin Walled Tube Sample
R = Rock Core Sample
V = Field Vane Shear
Pen. = Penetration Length
Rec. = Recovery Length
bpf = Blows per Foot
mpf = Minute per Foot
WOR = Weight of Rods
WOH = Weight of Hammer
RQD = Rock Quality Designation
PID = Photoionization Detector
S_v = Field Vane Shear Strength, kips/sq.ft.
q_u = Unconfined Compressive Strength, kips/sq.ft.
Ø = Friction Angle (Estimated)
N/A = Not Applicable

Elev. (ft)	Depth (ft)	Casing Pen. (bpf)	SAMPLE INFORMATION					Graphic Log	Sample Description & Classification	H ₂ O Depth	Remarks
			Sample No.	Type	Depth (ft)	Pen./ Rec. (in)	Blow Count or RQD				
								5 1/2 inches Asphalt Pavement			
			1D		0.5-2.5	24/16	7-6-5-3	0.5	Medium dense, brown gravelly SAND some silt with reclaimed asphalt (FILL)		
			2D		2.5-4.5	24/20	4-4-9-8	3.0	Medium dense, brown silty fine to medium SAND with frequent silt layers		
	5		3D		5-7	24/24	6-5-5-4				
			4D		7-9	24/24	9-10-13-14				
Bottom of Exploration at 9.0 feet											

BORING / WELL 19-0968 GPJ SWCE TEMPLATE GDT 1/28/21

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING NO.: B-10



BORING LOG

BORING NO.: B-11
SHEET: 1 of 1
PROJECT NO.: 19-0968
DATE START: 1/19/2021
DATE FINISH: 1/19/2021

CLIENT: Wright-Pierce
PROJECT: Sagamore Avenue Sewer Extension Project
LOCATION: Sagamore Ave, Portsmouth, New Hampshire

Drilling Information

LOCATION: See Exploration Location Plan **ELEVATION (FT):** N/A **TOTAL DEPTH (FT):** 4.0 **LOGGED BY:** Antonio Santiago
DRILLING CO.: S. W. Cole Explorations, LLC **DRILLER:** Sam Shaw **DRILLING METHOD:** Solid Stem Auger
RIG TYPE: Track Mounted Mobile Drill B-53 **AUGER ID/OD:** N/A / 4 1/2 in **SAMPLER:** Standard Split-Spoon
HAMMER TYPE: Automatic / N/A **HAMMER WEIGHT (lbs):** 140 **CASING ID/OD:** N/A / N/A **CORE BARREL:** N/A
HAMMER EFFICIENCY FACTOR: _____ **HAMMER DROP (inch):** 30
WATER LEVEL DEPTHS (ft): No free water observed.

GENERAL NOTES:

KEY TO NOTES AND SYMBOLS:
Water Level
 ▽ At time of Drilling D = Split Spoon Sample Pen. = Penetration Length WOR = Weight of Rods S_v = Field Vane Shear Strength, kips/sq.ft.
 ▾ At Completion of Drilling U = Thin Walled Tube Sample Rec. = Recovery Length WOH = Weight of Hammer q_u = Unconfined Compressive Strength, kips/sq.ft.
 ▿ After Drilling R = Rock Core Sample bpf = Blows per Foot RQD = Rock Quality Designation Ø = Friction Angle (Estimated)
 V = Field Vane Shear mpf = Minute per Foot PID = Photoionization Detector N/A = Not Applicable

Elev. (ft)	Depth (ft)	Casing Pen. (bpf)	SAMPLE INFORMATION					Graphic Log	Sample Description & Classification	H ₂ O Depth	Remarks
			Sample No.	Type	Depth (ft)	Pen./ Rec. (in)	Blow Count or RQD				
			1D		0.3-2.3	24/5	21-16-7-4		4 inches Asphalt Pavement		
			2D		2.3-3.3	12/4	14-50		0.3 Medium dense, dark brown gravelly SAND some silt (FILL)		

Auger Refusal at 4.0 feet
 Probable bedrock or boulder

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING NO.: B-11

BORING / WELL 19-0968.GPJ SWCE TEMPLATE.GDT 1/28/21



BORING LOG

BORING NO.: B-12
SHEET: 1 of 1
PROJECT NO.: 19-0968
DATE START: 9/26/2019
DATE FINISH: 9/26/2019

CLIENT: Wright-Pierce
PROJECT: Sagamore Avenue Sewer Extension Project
LOCATION: Sagamore Ave, Portsmouth, New Hampshire

Drilling Information

LOCATION: See Exploration Location Plan **ELEVATION (FT):** N/A **TOTAL DEPTH (FT):** 6.6 **LOGGED BY:** Antonio Santiago
DRILLING CO.: S. W. Cole Explorations, LLC **DRILLER:** Corey Culligan **DRILLING METHOD:** Solid Stem Auger
RIG TYPE: Truck Mounted Diedrich D-50 **AUGER ID/OD:** N/A / 4 1/2 in **SAMPLER:** Standard Split-Spoon
HAMMER TYPE: Automatic / N/A **HAMMER WEIGHT (lbs):** 140 **CASING ID/OD:** N/A /N/A **CORE BARREL:** N/A
HAMMER EFFICIENCY FACTOR: _____ **HAMMER DROP (inch):** 30
WATER LEVEL DEPTHS (ft): No free water observed.

GENERAL NOTES:

KEY TO NOTES AND SYMBOLS:
Water Level
At time of Drilling
At Completion of Drilling
After Drilling
D = Split Spoon Sample Pen. = Penetration Length WOR = Weight of Rods S_v = Field Vane Shear Strength, kips/sq.ft.
U = Thin Walled Tube Sample Rec. = Recovery Length WOH = Weight of Hammer q_u = Unconfined Compressive Strength, kips/sq.ft.
R = Rock Core Sample bpf = Blows per Foot RQD = Rock Quality Designation Ø = Friction Angle (Estimated)
V = Field Vane Shear mpf = Minute per Foot PID = Photoionization Detector N/A = Not Applicable

Elev. (ft)	Depth (ft)	Casing Pen. (bpf)	SAMPLE INFORMATION					Graphic Log	Sample Description & Classification	H ₂ O Depth	Remarks
			Sample No.	Type	Depth (ft)	Pen./ Rec. (in)	Blow Count or RQD				
			1D		0.4-2.4	24/3	11-15-8-6		4 1/2 inches Asphalt Pavement		
			2D		2.4-4.4	24/6	6-6-17-7		0.3 Medium dense to dense, dark brown gravelly SAND some silt with reclaimed asphalt (FILL)		
	5		3D		5-6.7	20/8	7-13-26-50/2"				

Auger Refusal at 6.6 feet
Probable bedrock or boulder

BORING / WELL: 19-0968.GPJ SWCE TEMPLATE.GDT 1/28/21

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING NO.: B-12



BORING LOG

BORING NO.: B-13
SHEET: 1 of 1
PROJECT NO.: 19-0968
DATE START: 9/26/2019
DATE FINISH: 9/26/2019

CLIENT: Wright-Pierce
PROJECT: Sagamore Avenue Sewer Extension Project
LOCATION: Sagamore Ave, Portsmouth, New Hampshire

Drilling Information

LOCATION: See Exploration Location Plan **ELEVATION (FT):** N/A **TOTAL DEPTH (FT):** 9.0 **LOGGED BY:** Antonio Santiago
DRILLING CO.: S. W. Cole Explorations, LLC **DRILLER:** Corey Culligan **DRILLING METHOD:** Solid Stem Auger
RIG TYPE: Truck Mounted Diedrich D-50 **AUGER ID/OD:** N/A / 4 1/2 in **SAMPLER:** Standard Split-Spoon
HAMMER TYPE: Automatic / N/A **HAMMER WEIGHT (lbs):** 140 **CASING ID/OD:** N/A / N/A **CORE BARREL:** N/A
HAMMER EFFICIENCY FACTOR: _____ **HAMMER DROP (inch):** 30
WATER LEVEL DEPTHS (ft): No free water observed.

GENERAL NOTES:

KEY TO NOTES AND SYMBOLS:
Water Level
At time of Drilling
At Completion of Drilling
After Drilling
D = Split Spoon Sample
U = Thin Walled Tube Sample
R = Rock Core Sample
V = Field Vane Shear
Pen. = Penetration Length
Rec. = Recovery Length
bpf = Blows per Foot
mpf = Minute per Foot
WOR = Weight of Rods
WOH = Weight of Hammer
RQD = Rock Quality Designation
PID = Photoionization Detector
S_v = Field Vane Shear Strength, kips/sq.ft.
q_u = Unconfined Compressive Strength, kips/sq.ft.
Ø = Friction Angle (Estimated)
N/A = Not Applicable

Elev. (ft)	Depth (ft)	Casing Pen. (bpf)	SAMPLE INFORMATION					Graphic Log	Sample Description & Classification	H ₂ O Depth	Remarks
			Sample No.	Type	Depth (ft)	Pen./ Rec. (in)	Blow Count or RQD				
			1D		0.3-2.3	24/16	15-17-11-8		4 inches Asphalt Pavement		
								0.3	Medium dense, brown gravelly SAND some silt (FILL)		
								1.5	Reclaimed Asphalt Pavement		
			2D		2.3-4.3	24/3	16-9-7-7	2.0	Medium dense, brown silty SAND some gravel		
	5		3D		5-7	24/14	2-2-2-6	5.0	Loose, dark gray silty fine to medium SAND		
			4D		7-9	24/10	6-7-15-14	7.5	Medium dense, brown gravelly silty SAND (TILL)		
Bottom of Exploration at 9.0 feet											

BORING / WELL 19-0968.GPJ SWCE TEMPLATE.GDT 1/28/21

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING NO.: B-13



BORING LOG

BORING NO.: B-14
SHEET: 1 of 1
PROJECT NO.: 19-0968
DATE START: 9/26/2019
DATE FINISH: 9/26/2019

CLIENT: Wright-Pierce
PROJECT: Sagamore Avenue Sewer Extension Project
LOCATION: Sagamore Ave, Portsmouth, New Hampshire

Drilling Information

LOCATION: See Exploration Location Plan **ELEVATION (FT):** N/A **TOTAL DEPTH (FT):** 8.1 **LOGGED BY:** Antonio Santiago
DRILLING CO.: S. W. Cole Explorations, LLC **DRILLER:** Corey Culligan **DRILLING METHOD:** Solid Stem Auger
RIG TYPE: Truck Mounted Diedrich D-50 **AUGER ID/OD:** N/A / 4 1/2 in **SAMPLER:** Standard Split-Spoon
HAMMER TYPE: Automatic / N/A **HAMMER WEIGHT (lbs):** 140 **CASING ID/OD:** N/A /N/A **CORE BARREL:** N/A
HAMMER EFFICIENCY FACTOR: _____ **HAMMER DROP (inch):** 30
WATER LEVEL DEPTHS (ft): ∇ 7 ft Soil saturated below 7 feet.

GENERAL NOTES:

KEY TO NOTES AND SYMBOLS:
∇ Water Level
∇ At time of Drilling
∇ At Completion of Drilling
∇ After Drilling
D = Split Spoon Sample
U = Thin Walled Tube Sample
R = Rock Core Sample
V = Field Vane Shear
Pen. = Penetration Length
Rec. = Recovery Length
bpf = Blows per Foot
mpf = Minute per Foot
WOR = Weight of Rods
WOH = Weight of Hammer
RQD = Rock Quality Designation
PID = Photoionization Detector
S_v = Field Vane Shear Strength, kips/sq.ft.
q_u = Unconfined Compressive Strength, kips/sq.ft.
Ø = Friction Angle (Estimated)
N/A = Not Applicable

Elev. (ft)	Depth (ft)	Casing Pen. (bpf)	SAMPLE INFORMATION					Graphic Log	Sample Description & Classification	H ₂ O Depth	Remarks
			Sample No.	Type	Depth (ft)	Pen./ Rec. (in)	Blow Count or RQD				
			1D		0.5-2.5	24/12	10-10-6-6		6 inches Asphalt Pavement		
								0.5	Medium dense, brown gravelly SAND some silt (FILL)		
			2D		2.5-4.5	24/10	3-5-5-5		Reclaimed Asphalt Pavement		
								2.5	Medium dense, brown fine to medium SAND and SILT some gravel		
	5		3D		5-7	24/20	6-6-7-8		Medium dense, brown silty SAND some gravel		
			4D		7-8.1	13/8	19-17-50/1"				
Split Spoon Refusal at 8.1 feet Probable bedrock or boulder											

BORING / WELL 19-0968.GPJ SWCE TEMPLATE.GDT 1/28/21

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING NO.: B-14



BORING LOG

BORING NO.: B-15
SHEET: 1 of 1
PROJECT NO.: 19-0968
DATE START: 9/24/2019
DATE FINISH: 9/24/2019

CLIENT: Wright-Pierce
PROJECT: Sagamore Avenue Sewer Extension Project
LOCATION: Sagamore Ave, Portsmouth, New Hampshire

Drilling Information

LOCATION: See Exploration Location Plan **ELEVATION (FT):** N/A **TOTAL DEPTH (FT):** 4.4 **LOGGED BY:** Antonio Santiago
DRILLING CO.: S. W. Cole Explorations, LLC **DRILLER:** Corey Culligan **DRILLING METHOD:** Solid Stem Auger
RIG TYPE: Truck Mounted Diedrich D-50 **AUGER ID/OD:** N/A / 4 1/2 in **SAMPLER:** Standard Split-Spoon
HAMMER TYPE: Automatic / N/A **HAMMER WEIGHT (lbs):** 140 **CASING ID/OD:** N/A /N/A **CORE BARREL:** N/A
HAMMER EFFICIENCY FACTOR: _____ **HAMMER DROP (inch):** 30
WATER LEVEL DEPTHS (ft): No free water observed.

GENERAL NOTES:

KEY TO NOTES AND SYMBOLS:
Water Level
At time of Drilling
At Completion of Drilling
After Drilling
D = Split Spoon Sample Pen. = Penetration Length WOR = Weight of Rods S_v = Field Vane Shear Strength, kips/sq.ft.
U = Thin Walled Tube Sample Rec. = Recovery Length WOH = Weight of Hammer q_u = Unconfined Compressive Strength, kips/sq.ft.
R = Rock Core Sample bpf = Blows per Foot RQD = Rock Quality Designation Ø = Friction Angle (Estimated)
V = Field Vane Shear mpf = Minute per Foot PID = Photoionization Detector N/A = Not Applicable

Elev. (ft)	Depth (ft)	Casing Pen. (bpf)	SAMPLE INFORMATION					Graphic Log	Sample Description & Classification	H ₂ O Depth	Remarks
			Sample No.	Type	Depth (ft)	Pen./ Rec. (in)	Blow Count or RQD				
			1D		0.4-2.4	24/12	16-13-8-7		4 3/4 inches Asphalt Pavement		
			2D		2.4-4.2	22/10	13-10-14-50/4"	0.4	Medium dense, brown gravelly SAND trace silt (FILL)		

Auger Refusal at 4.4 feet
Probable bedrock or boulder

BORING / WELL 19-0968.GPJ SWCE TEMPLATE.GDT 1/28/21

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING NO.: B-15



BORING LOG

BORING NO.: B-16
SHEET: 1 of 1
PROJECT NO.: 19-0968
DATE START: 9/23/2019
DATE FINISH: 9/23/2019

CLIENT: Wright-Pierce
PROJECT: Sagamore Avenue Sewer Extension Project
LOCATION: Sagamore Ave, Portsmouth, New Hampshire

Drilling Information

LOCATION: See Exploration Location Plan **ELEVATION (FT):** N/A **TOTAL DEPTH (FT):** 9.0 **LOGGED BY:** Antonio Santiago
DRILLING CO.: S. W. Cole Explorations, LLC **DRILLER:** Corey Culligan **DRILLING METHOD:** Solid Stem Auger
RIG TYPE: Truck Mounted Diedrich D-50 **AUGER ID/OD:** N/A / 4 1/2 in **SAMPLER:** Standard Split-Spoon
HAMMER TYPE: Automatic / N/A **HAMMER WEIGHT (lbs):** 140 **CASING ID/OD:** N/A / N/A **CORE BARREL:** N/A
HAMMER EFFICIENCY FACTOR: _____ **HAMMER DROP (inch):** 30
WATER LEVEL DEPTHS (ft): No free water observed.

GENERAL NOTES:

KEY TO NOTES AND SYMBOLS: Water Level
 ▽ At time of Drilling D = Split Spoon Sample Pen. = Penetration Length WOR = Weight of Rods S_v = Field Vane Shear Strength, kips/sq.ft.
 ▽ At Completion of Drilling U = Thin Walled Tube Sample Rec. = Recovery Length WOH = Weight of Hammer q_u = Unconfined Compressive Strength, kips/sq.ft.
 ▽ After Drilling R = Rock Core Sample bpf = Blows per Foot RQD = Rock Quality Designation Ø = Friction Angle (Estimated)
 V = Field Vane Shear mpf = Minute per Foot PID = Photoionization Detector N/A = Not Applicable

Elev. (ft)	Depth (ft)	Casing Pen. (bpf)	SAMPLE INFORMATION					Graphic Log	Sample Description & Classification	H ₂ O Depth	Remarks
			Sample No.	Type	Depth (ft)	Pen./ Rec. (in)	Blow Count or RQD				
			1D		0.5-2.5	24/18	8-10-10-5		5 1/2 inches Asphalt Pavement		
								0.5	Medium dense, brown gravelly SAND trace silt (FILL)		
								1.5	Reclaimed Asphalt Pavement		
			2D		2.5-4.5	24/6	3-3-8-6		Medium dense, brown gravelly silty SAND		
							w = 10.2 %				
	5		3D		5-7	24/12	5-8-16-18				
			4D		7-9	24/16	9-6-5-6				
								8.0	Medium dense, tan fine SAND and SILT		

Bottom of Exploration at 9.0 feet

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING NO.: B-16



BORING LOG

BORING NO.: B-17
SHEET: 1 of 1
PROJECT NO.: 19-0968
DATE START: 9/27/2019
DATE FINISH: 9/27/2019

CLIENT: Wright-Pierce
PROJECT: Sagamore Avenue Sewer Extension Project
LOCATION: Sagamore Ave, Portsmouth, New Hampshire

Drilling Information

LOCATION: See Exploration Location Plan **ELEVATION (FT):** N/A **TOTAL DEPTH (FT):** 9.0 **LOGGED BY:** Antonio Santiago
DRILLING CO.: S. W. Cole Explorations, LLC **DRILLER:** Corey Culligan **DRILLING METHOD:** Solid Stem Auger
RIG TYPE: Truck Mounted Diedrich D-50 **AUGER ID/OD:** N/A / 4 1/2 in **SAMPLER:** Standard Split-Spoon
HAMMER TYPE: Automatic / N/A **HAMMER WEIGHT (lbs):** 140 **CASING ID/OD:** N/A / N/A **CORE BARREL:** N/A
HAMMER EFFICIENCY FACTOR: _____ **HAMMER DROP (inch):** 30
WATER LEVEL DEPTHS (ft): No free water observed.

GENERAL NOTES:

KEY TO NOTES AND SYMBOLS:
 Water Level: At time of Drilling At Completion of Drilling After Drilling
 D = Split Spoon Sample U = Thin Walled Tube Sample R = Rock Core Sample V = Field Vane Shear
 Pen. = Penetration Length Rec. = Recovery Length bpf = Blows per Foot mpf = Minute per Foot
 WOR = Weight of Rods WOH = Weight of Hammer RQD = Rock Quality Designation PID = Photoionization Detector
 S_v = Field Vane Shear Strength, kips/sq.ft. q_u = Unconfined Compressive Strength, kips/sq.ft. Ø = Friction Angle (Estimated) N/A = Not Applicable

Elev. (ft)	Depth (ft)	Casing Pen. (bpf)	SAMPLE INFORMATION					Graphic Log	Sample Description & Classification	H ₂ O Depth	Remarks
			Sample No.	Type	Depth (ft)	Pen./ Rec. (in)	Blow Count or RQD				
			1D		0.3-2.3	24/4	4-3-5-5		0.3	3 inches Asphalt Pavement Loose, brown gravelly SAND some silt with asphalt (FILL)	
			2D		2.3-4.3	24/16	4-2-2-3		2.5	Loose, brown silty fine to medium SAND	
	5		3D		5-7	24/4	3-6-7-5		5.0	Medium dense, brown gravelly silty SAND	
			4D		7-9	24/24	6-5-5-4		7.0	Medium dense, brown fine SAND and SILT	
Bottom of Exploration at 9.0 feet											

BORING / WELL 19-0968 GPJ SWCE TEMPLATE GDT 1/28/21

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING NO.: B-17



BORING LOG

BORING NO.: B-18
SHEET: 1 of 1
PROJECT NO.: 19-0968
DATE START: 9/27/2019
DATE FINISH: 9/27/2019

CLIENT: Wright-Pierce
PROJECT: Sagamore Avenue Sewer Extension Project
LOCATION: Sagamore Ave, Portsmouth, New Hampshire

Drilling Information

LOCATION: See Exploration Location Plan **ELEVATION (FT):** N/A **TOTAL DEPTH (FT):** 9.0 **LOGGED BY:** Antonio Santiago
DRILLING CO.: S. W. Cole Explorations, LLC **DRILLER:** Corey Culligan **DRILLING METHOD:** Solid Stem Auger
RIG TYPE: Truck Mounted Diedrich D-50 **AUGER ID/OD:** N/A / 4 1/2 in **SAMPLER:** Standard Split-Spoon
HAMMER TYPE: Automatic / N/A **HAMMER WEIGHT (lbs):** 140 **CASING ID/OD:** N/A /N/A **CORE BARREL:** N/A
HAMMER EFFICIENCY FACTOR: _____ **HAMMER DROP (inch):** 30
WATER LEVEL DEPTHS (ft): No free water observed.

GENERAL NOTES:

KEY TO NOTES AND SYMBOLS: Water Level
 ▽ At time of Drilling D = Split Spoon Sample Pen. = Penetration Length WOR = Weight of Rods S_v = Field Vane Shear Strength, kips/sq.ft.
 ▽ At Completion of Drilling U = Thin Walled Tube Sample Rec. = Recovery Length WOH = Weight of Hammer q_u = Unconfined Compressive Strength, kips/sq.ft.
 ▽ After Drilling R = Rock Core Sample bpf = Blows per Foot RQD = Rock Quality Designation Ø = Friction Angle (Estimated)
 V = Field Vane Shear mpf = Minute per Foot PID = Photoionization Detector N/A = Not Applicable

Elev. (ft)	Depth (ft)	Casing Pen. (bpf)	SAMPLE INFORMATION					Graphic Log	Sample Description & Classification	H ₂ O Depth	Remarks
			Sample No.	Type	Depth (ft)	Pen./ Rec. (in)	Blow Count or RQD				
								5 1/2 inches Asphalt Pavement			
			1D		0.5-2.5	24/8	13-10-5-2	0.5	Medium dense, brown gravelly SAND some silt (FILL)		
			2D		2.5-4.5	24/18	3-3-4-9	3.0	Loose, tan fine sandy SILT		
	5		3D		5-7	24/20	5-6-7-10	5.2	Medium dense, brown silty fine SAND		
			4D		7-9	24/24	7-5-5-12				
Bottom of Exploration at 9.0 feet											

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING NO.: B-18



BORING LOG

BORING NO.: B-19
SHEET: 1 of 1
PROJECT NO.: 19-0968
DATE START: 9/25/2019
DATE FINISH: 9/25/2019

CLIENT: Wright-Pierce
PROJECT: Sagamore Avenue Sewer Extension Project
LOCATION: Sagamore Ave, Portsmouth, New Hampshire

Drilling Information

LOCATION: See Exploration Location Plan **ELEVATION (FT):** N/A **TOTAL DEPTH (FT):** 4.8 **LOGGED BY:** Antonio Santiago
DRILLING CO.: S. W. Cole Explorations, LLC **DRILLER:** Corey Culligan **DRILLING METHOD:** Solid Stem Auger
RIG TYPE: Truck Mounted Diedrich D-50 **AUGER ID/OD:** N/A / 4 1/2 in **SAMPLER:** Standard Split-Spoon
HAMMER TYPE: Automatic / N/A **HAMMER WEIGHT (lbs):** 140 **CASING ID/OD:** N/A /N/A **CORE BARREL:** N/A
HAMMER EFFICIENCY FACTOR: _____ **HAMMER DROP (inch):** 30
WATER LEVEL DEPTHS (ft): No free water observed.

GENERAL NOTES:

KEY TO NOTES AND SYMBOLS:
Water Level
At time of Drilling
At Completion of Drilling
After Drilling
D = Split Spoon Sample Pen. = Penetration Length WOR = Weight of Rods S_v = Field Vane Shear Strength, kips/sq.ft.
U = Thin Walled Tube Sample Rec. = Recovery Length WOH = Weight of Hammer q_u = Unconfined Compressive Strength, kips/sq.ft.
R = Rock Core Sample bpf = Blows per Foot RQD = Rock Quality Designation Ø = Friction Angle (Estimated)
V = Field Vane Shear mpf = Minute per Foot PID = Photoionization Detector N/A = Not Applicable

Elev. (ft)	Depth (ft)	Casing Pen. (bpf)	SAMPLE INFORMATION					Graphic Log	Sample Description & Classification	H ₂ O Depth	Remarks
			Sample No.	Type	Depth (ft)	Pen./ Rec. (in)	Blow Count or RQD				
			1D		0.6-2.6	24/12	10-33-40-36		7 1/2 inches Asphalt Pavement		
			2D		2.6-4.6	24/18	15-28-28-24	w = 4.2 %	0.6 Very dense, brown silty SAND and GRAVEL		

Auger Refusal at 4.8 feet
Probable bedrock or boulder

BORING / WELL: 19-0968.GPJ SWCE TEMPLATE.GDT 1/28/21

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING NO.: B-19



BORING LOG

BORING NO.: B-20
SHEET: 1 of 1
PROJECT NO.: 19-0968
DATE START: 9/25/2019
DATE FINISH: 9/25/2019

CLIENT: Wright-Pierce
PROJECT: Sagamore Avenue Sewer Extension Project
LOCATION: Sagamore Ave, Portsmouth, New Hampshire

Drilling Information

LOCATION: See Exploration Location Plan **ELEVATION (FT):** N/A **TOTAL DEPTH (FT):** 5.7 **LOGGED BY:** Antonio Santiago
DRILLING CO.: S. W. Cole Explorations, LLC **DRILLER:** Corey Culligan **DRILLING METHOD:** Solid Stem Auger
RIG TYPE: Truck Mounted Diedrich D-50 **AUGER ID/OD:** N/A / 4 1/2 in **SAMPLER:** Standard Split-Spoon
HAMMER TYPE: Automatic / N/A **HAMMER WEIGHT (lbs):** 140 **CASING ID/OD:** N/A / N/A **CORE BARREL:** N/A
HAMMER EFFICIENCY FACTOR: _____ **HAMMER DROP (inch):** 30
WATER LEVEL DEPTHS (ft): No free water observed.

GENERAL NOTES:

KEY TO NOTES AND SYMBOLS: Water Level
 ▽ At time of Drilling D = Split Spoon Sample Pen. = Penetration Length WOR = Weight of Rods S_v = Field Vane Shear Strength, kips/sq.ft.
 ▽ At Completion of Drilling U = Thin Walled Tube Sample Rec. = Recovery Length WOH = Weight of Hammer q_u = Unconfined Compressive Strength, kips/sq.ft.
 ▽ After Drilling R = Rock Core Sample bpf = Blows per Foot RQD = Rock Quality Designation Ø = Friction Angle (Estimated)
 V = Field Vane Shear mpf = Minute per Foot PID = Photoionization Detector N/A = Not Applicable

Elev. (ft)	Depth (ft)	Casing Pen. (bpf)	SAMPLE INFORMATION					Graphic Log	Sample Description & Classification	H ₂ O Depth	Remarks
			Sample No.	Type	Depth (ft)	Pen./ Rec. (in)	Blow Count or RQD				
			1D		0.5-2.5	24/16	16-12-8-8		6 1/2 inches Asphalt Pavement		
								0.5	Medium dense, brown gravelly SAND some silt (FILL)		
			2D		2.5-4.5	24/14	13-12-16-12		2.0	Medium dense, brown silty SAND some gravel (FILL)	
								4.2	3 inches Asphalt Pavement		
								4.5	Medium dense, brown gravelly SAND some silt (FILL)		
	5		3D		5-5.8	9/4	11-50/3"				

Split Spoon Refusal at 5.7 feet
 Probable bedrock or boulder

BORING / WELL 19-0968.GPJ SWCE TEMPLATE.GDT 1/28/21

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING NO.: B-20



BORING LOG

BORING NO.: B-22
SHEET: 1 of 1
PROJECT NO.: 19-0968
DATE START: 9/25/2019
DATE FINISH: 9/25/2019

CLIENT: Wright-Pierce
PROJECT: Sagamore Avenue Sewer Extension Project
LOCATION: Sagamore Ave, Portsmouth, New Hampshire

Drilling Information

LOCATION: See Exploration Location Plan **ELEVATION (FT):** N/A **TOTAL DEPTH (FT):** 3.0 **LOGGED BY:** Antonio Santiago
DRILLING CO.: S. W. Cole Explorations, LLC **DRILLER:** Corey Culligan **DRILLING METHOD:** Solid Stem Auger
RIG TYPE: Truck Mounted Diedrich D-50 **AUGER ID/OD:** N/A / 4 1/2 in **SAMPLER:** Standard Split-Spoon
HAMMER TYPE: Automatic / N/A **HAMMER WEIGHT (lbs):** 140 **CASING ID/OD:** N/A / N/A **CORE BARREL:** N/A
HAMMER EFFICIENCY FACTOR: _____ **HAMMER DROP (inch):** 30
WATER LEVEL DEPTHS (ft): No free water observed.

GENERAL NOTES:

KEY TO NOTES AND SYMBOLS:
Water Level
At time of Drilling
At Completion of Drilling
After Drilling
D = Split Spoon Sample Pen. = Penetration Length WOR = Weight of Rods S_v = Field Vane Shear Strength, kips/sq.ft.
U = Thin Walled Tube Sample Rec. = Recovery Length WOH = Weight of Hammer q_u = Unconfined Compressive Strength, kips/sq.ft.
R = Rock Core Sample bpf = Blows per Foot RQD = Rock Quality Designation Ø = Friction Angle (Estimated)
V = Field Vane Shear mpf = Minute per Foot PID = Photoionization Detector N/A = Not Applicable

Elev. (ft)	Depth (ft)	Casing Pen. (bpf)	SAMPLE INFORMATION					Graphic Log	Sample Description & Classification	H ₂ O Depth	Remarks
			Sample No.	Type	Depth (ft)	Pen./ Rec. (in)	Blow Count or RQD				
			1D		0.8-2.6	21/12	16-17-62-50/3"		9 3/4 inches Asphalt Pavement		
								0.8	Dense, dark brown gravelly silty SAND (FILL)		

Auger Refusal at 3.0 feet
Probable bedrock or boulder

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING NO.: B-22

BORING / WELL 19-0968.GPJ SWCE TEMPLATE.GDT 1/28/21



BORING LOG

BORING NO.: B-23
SHEET: 1 of 1
PROJECT NO.: 19-0968
DATE START: 9/24/2019
DATE FINISH: 9/24/2019

CLIENT: Wright-Pierce
PROJECT: Sagamore Avenue Sewer Extension Project
LOCATION: Sagamore Ave, Portsmouth, New Hampshire

Drilling Information

LOCATION: See Exploration Location Plan **ELEVATION (FT):** N/A **TOTAL DEPTH (FT):** 0.9 **LOGGED BY:** Antonio Santiago
DRILLING CO.: S. W. Cole Explorations, LLC **DRILLER:** Corey Culligan **DRILLING METHOD:** Solid Stem Auger
RIG TYPE: Truck Mounted Diedrich D-50 **AUGER ID/OD:** N/A / 4 1/2 in **SAMPLER:** Standard Split-Spoon
HAMMER TYPE: Automatic / N/A **HAMMER WEIGHT (lbs):** 140 **CASING ID/OD:** N/A / N/A **CORE BARREL:** N/A
HAMMER EFFICIENCY FACTOR: _____ **HAMMER DROP (inch):** 30
WATER LEVEL DEPTHS (ft): No free water observed.

GENERAL NOTES:

KEY TO NOTES AND SYMBOLS:
Water Level
At time of Drilling
At Completion of Drilling
After Drilling
D = Split Spoon Sample
U = Thin Walled Tube Sample
R = Rock Core Sample
V = Field Vane Shear
Pen. = Penetration Length
Rec. = Recovery Length
bpf = Blows per Foot
mpf = Minute per Foot
WOR = Weight of Rods
WOH = Weight of Hammer
RQD = Rock Quality Designation
PID = Photoionization Detector
S_v = Field Vane Shear Strength, kips/sq.ft.
q_u = Unconfined Compressive Strength, kips/sq.ft.
Ø = Friction Angle (Estimated)
N/A = Not Applicable

Elev. (ft)	Depth (ft)	Casing Pen. (bpf)	SAMPLE INFORMATION					Graphic Log	Sample Description & Classification	H ₂ O Depth	Remarks
			Sample No.	Type	Depth (ft)	Pen./ Rec. (in)	Blow Count or RQD				
			1D	X	0.3-0.9	7/7	20-50/1"		3 inches Asphalt Pavement		
								0.3	Brown, gravelly SAND some silt (FILL)		

Auger Refusal at 0.9 feet
Probable bedrock or boulder

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING NO.: B-23

BORING / WELL 19-0968.GPJ SWCE TEMPLATE.GDT 1/28/21



BORING LOG

BORING NO.: B-24
SHEET: 1 of 1
PROJECT NO.: 19-0968
DATE START: 9/24/2019
DATE FINISH: 9/24/2019

CLIENT: Wright-Pierce
PROJECT: Sagamore Avenue Sewer Extension Project
LOCATION: Sagamore Ave, Portsmouth, New Hampshire

Drilling Information

LOCATION: See Exploration Location Plan **ELEVATION (FT):** N/A **TOTAL DEPTH (FT):** 9.0 **LOGGED BY:** Antonio Santiago
DRILLING CO.: S. W. Cole Explorations, LLC **DRILLER:** Corey Culligan **DRILLING METHOD:** Solid Stem Auger
RIG TYPE: Truck Mounted Diedrich D-50 **AUGER ID/OD:** N/A / 4 1/2 in **SAMPLER:** Standard Split-Spoon
HAMMER TYPE: Automatic / N/A **HAMMER WEIGHT (lbs):** 140 **CASING ID/OD:** N/A / N/A **CORE BARREL:** N/A
HAMMER EFFICIENCY FACTOR: _____ **HAMMER DROP (inch):** 30
WATER LEVEL DEPTHS (ft): No free water observed.

GENERAL NOTES:

KEY TO NOTES AND SYMBOLS:
Water Level
At time of Drilling
At Completion of Drilling
After Drilling
D = Split Spoon Sample Pen. = Penetration Length WOR = Weight of Rods S_v = Field Vane Shear Strength, kips/sq.ft.
U = Thin Walled Tube Sample Rec. = Recovery Length WOH = Weight of Hammer q_u = Unconfined Compressive Strength, kips/sq.ft.
R = Rock Core Sample bpf = Blows per Foot RQD = Rock Quality Designation Ø = Friction Angle (Estimated)
V = Field Vane Shear mpf = Minute per Foot PID = Photoionization Detector N/A = Not Applicable

Elev. (ft)	Depth (ft)	Casing Pen. (bpf)	SAMPLE INFORMATION					Graphic Log	Sample Description & Classification	H ₂ O Depth	Remarks
			Sample No.	Type	Depth (ft)	Pen./ Rec. (in)	Blow Count or RQD				
			1D		0.4-2.4	24/8	10-10-5-3		4 3/4 inches Asphalt Pavement		
			2D		2.4-4.4	24/0	1/24		0.4 Medium dense to very loose, brown gravelly SAND some silt with possible voids (FILL)		
	5		3D		5-7	24/10	WOH-2-2-7				
			4D		7-9	24/12	7-4-4-10				

Auger Refusal at 9.0 feet
Probable bedrock or boulder

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING NO.: B-24

BORING / WELL 19-0968.GPJ SWCE TEMPLATE.GDT 1/28/21



BORING LOG

BORING NO.: B-26
SHEET: 1 of 1
PROJECT NO.: 19-0968
DATE START: 1/20/2021
DATE FINISH: 1/20/2021

CLIENT: Wright-Pierce
PROJECT: Sagamore Avenue Sewer Extension Project
LOCATION: Sagamore Ave, Portsmouth, New Hampshire

Drilling Information

LOCATION: See Exploration Location Plan **ELEVATION (FT):** N/A **TOTAL DEPTH (FT):** 9.0 **LOGGED BY:** Antonio Santiago
DRILLING CO.: S. W. Cole Explorations, LLC **DRILLER:** Sam Shaw **DRILLING METHOD:** Solid Stem Auger
RIG TYPE: Track Mounted Mobile Drill B-53 **AUGER ID/OD:** N/A / 4 1/2 in **SAMPLER:** Standard Split-Spoon
HAMMER TYPE: Automatic / N/A **HAMMER WEIGHT (lbs):** 140 **CASING ID/OD:** N/A / N/A **CORE BARREL:** N/A
HAMMER EFFICIENCY FACTOR: _____ **HAMMER DROP (inch):** 30
WATER LEVEL DEPTHS (ft): No free water observed.

GENERAL NOTES: _____

KEY TO NOTES AND SYMBOLS:
Water Level
 ▽ At time of Drilling D = Split Spoon Sample Pen. = Penetration Length WOR = Weight of Rods S_v = Field Vane Shear Strength, kips/sq.ft.
 ▽ At Completion of Drilling U = Thin Walled Tube Sample Rec. = Recovery Length WOH = Weight of Hammer q_u = Unconfined Compressive Strength, kips/sq.ft.
 ▽ After Drilling R = Rock Core Sample bpf = Blows per Foot RQD = Rock Quality Designation Ø = Friction Angle (Estimated)
 V = Field Vane Shear mpf = Minute per Foot PID = Photoionization Detector N/A = Not Applicable

Elev. (ft)	Depth (ft)	Casing Pen. (bpf)	SAMPLE INFORMATION					Graphic Log	Sample Description & Classification	H ₂ O Depth	Remarks									
			Sample No.	Type	Depth (ft)	Pen./ Rec. (in)	Blow Count or RQD					Field / Lab Test Data								
			1D		0-2	24/14		24-21-19-15												
			2D		2-4	24/20		10-7-8-17		2.0										
			3D		5-7	24/18		25-26-29-34												

Auger Refusal at 9.0 feet
 Probable bedrock or boulder

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING NO.: B-26

BORING / WELL 19-0968.GPJ SWCE TEMPLATE.GDT 1/28/21



PROBE DATA

PROJECT: Sagamore Avenue Sewer Extension Project PROJECT NO: 19-0968
 CLIENT: Wright-Pierce DATE: See Below
 LOCATION: Portsmouth NH S.W.COLE REP: A. Santiago

PROBE NUMBER	DATE	ROADWAY	PROBE DEPTH (FT) ¹	DRILLER
P-1	1/20/2021	Wentworth Rd.	10.0	JL
P-2	1/20/2021	Wentworth Rd.	10.0	JL
P-3	1/20/2021	Wentworth Rd.	5.5	JL
P-4	1/20/2021	Wentworth Rd.	3.0	JL
P-5	1/20/2021	Wentworth Rd.	5.5	JL
P-5A	1/20/2021	Wentworth Rd.	10.0	JL
P-6	1/20/2021	Wentworth Rd.	7.0	JL
P-7	1/20/2021	Wentworth Rd.	4.5	JL
P-8	1/20/2021	Wentworth Rd.	6.0	JL
P-9	1/20/2021	Wentworth Rd.	8.0	JL
P-10	1/20/2021	Wentworth Rd.	3.0	JL
P-10A	1/20/2021	Wentworth Rd.	1.0	JL
P-11	1/20/2021	Wentworth Rd.	4.5	JL
P-12	1/20/2021	Wentworth Rd.	6.5	JL
P-13	1/20/2021	Wentworth Rd.	10.0	JL
P-14	1/20/2021	Wentworth Rd.	9.5	JL
P-15	1/20/2021	Wentworth Rd.	6.0	JL
P-15A	1/20/2021	Wentworth Rd.	4.0	JL
P-16	1/20/2021	Wentworth Rd.	0.5	JL
P-17	1/20/2021	Wentworth Rd.	4.5	JL
P-18	1/20/2021	Wentworth Rd.	6.5	JL
P-19	1/20/2021	Wentworth Rd.	6.0	JL
P-20	1/20/2021	Wentworth Rd.	5.0	JL

1. Test probes were extended to 10 feet unless a refusal surface was encountered at shallower depth.



PROBE DATA

PROJECT: Sagamore Avenue Sewer Extension Project PROJECT NO: 19-0968
 CLIENT: Wright-Pierce DATE: See Below
 LOCATION: Portsmouth NH S.W.COLE REP: A. Santiago

PROBE NUMBER	DATE	ROADWAY	PROBE DEPTH (FT) ¹	DRILLER
P-21	9/25/2019	Sagamore Ave.	4.5	CJC
P-22	9/25/2019	Sagamore Ave.	5.2	CJC
P-23	9/25/2019	Sagamore Ave.	7.2	CJC
P-24	9/25/2019	Sagamore Ave.	2.6	CJC
P-25	9/25/2019	Sagamore Ave.	10.0	CJC
P-26	9/25/2019	Sagamore Ave.	7.1	CJC
P-27	9/25/2019	Sagamore Ave.	3.0	CJC
P-28	9/25/2019	Sagamore Ave.	10.0	CJC
P-29	9/25/2019	Sagamore Ave.	3.5	CJC
P-30	9/23/2019	Sagamore Grv.	10.0	CJC
P-31	9/23/2019	Sagamore Grv.	2.5	CJC
P-32	Did not drill due to underground storage tank in road			
P-33	9/23/2019	Sagamore Grv.	6.4	CJC
P-34	9/23/2019	Sagamore Grv.	5.6	CJC
P-35	9/23/2019	Sagamore Grv.	6.3	CJC
P-36	9/23/2019	Sagamore Grv.	5.0	CJC
P-37	9/23/2019	Sagamore Grv.	6.5	CJC
P-38	1/19/2021	Walker Bungalow Rd.	10.0	SDS
P-39	1/19/2021	Walker Bungalow Rd.	4.0	SDS
P-40	1/19/2021	Walker Bungalow Rd.	2.0	SDS
P-41	1/19/2021	Walker Bungalow Rd.	10.0	SDS
P-42	1/19/2021	Walker Bungalow Rd.	10.0	SDS
P-43	9/27/2019	Walker Bungalow Rd.	10.0	CJC
P-44	9/27/2019	Walker Bungalow Rd.	2.0	CJC
P-45	9/27/2019	Walker Bungalow Rd.	10.0	CJC

1. Test probes were extended to 10 feet unless a refusal surface was encountered at shallower depth.



PROBE DATA

PROJECT: Sagamore Avenue Sewer Extension Project PROJECT NO: 19-0968
 CLIENT: Wright-Pierce DATE: See Below
 LOCATION: Portsmouth NH S.W. COLE REP: A. Santiago

PROBE NUMBER	DATE	ROADWAY	PROBE DEPTH (FT) ¹	DRILLER
P-46	9/27/2019	Walker Bungalow Rd.	2.0	CJC
P-47	9/27/2019	Walker Bungalow Rd.	10.0	CJC
P-48	9/26/2019	Walker Bungalow Rd.	10.0	CJC
P-49	9/26/2019	Walker Bungalow Rd.	10.0	CJC
P-50	9/26/2019	Walker Bungalow Rd.	10.0	CJC
P-51	1/19/2021	Walker Bungalow Rd.	3.0	SDS
P-52	1/19/2021	Walker Bungalow Rd.	4.0	SDS
P-53	9/26/2019	Walker Bungalow Rd.	6.5	CJC
P-54	9/26/2019	Walker Bungalow Rd.	9.0	CJC
P-55	9/26/2019	Walker Bungalow Rd.	6.0	CJC
P-56	9/26/2019	Walker Bungalow Rd.	10.0	CJC
P-57	9/26/2019	Walker Bungalow Rd.	5.0	CJC
P-58	9/26/2019	Walker Bungalow Rd.	1.2	CJC
P-59	9/26/2019	Walker Bungalow Rd.	3.0	CJC
P-60	9/26/2019	Walker Bungalow Rd.	2.6	CJC
P-61	9/26/2019	Walker Bungalow Rd.	10.0	CJC
P-62	9/26/2019	Walker Bungalow Rd.	10.0	CJC
P-63	9/26/2019	Walker Bungalow Rd.	10.0	CJC
P-64	9/26/2019	Walker Bungalow Rd.	2.3	CJC
P-65	9/26/2019	Walker Bungalow Rd.	2.6	CJC
P-66	9/26/2019	Walker Bungalow Rd.	2.6	CJC
P-67	9/26/2019	Walker Bungalow Rd.	10.0	CJC
P-68	9/26/2019	Walker Bungalow Rd.	10.0	CJC
P-69	9/24/2019	Walker Bungalow Rd.	10.0	CJC
P-70	9/26/2019	Walker Bungalow Rd.	10.0	CJC

1. Test probes were extended to 10 feet unless a refusal surface was encountered at shallower depth.



PROBE DATA

PROJECT: Sagamore Avenue Sewer Extension Project PROJECT NO: 19-0968
 CLIENT: Wright-Pierce DATE: See Below
 LOCATION: Portsmouth NH S.W. COLE REP: A. Santiago

PROBE NUMBER	DATE	ROADWAY	PROBE DEPTH (FT) ¹	DRILLER
P-71	9/24/2019	Walker Bungalow Rd.	8.4	CJC
P-72	9/24/2019	Walker Bungalow Rd.	7.1	CJC
P-73	9/24/2019	Walker Bungalow Rd.	5.5	CJC
P-74	9/24/2019	Walker Bungalow Rd.	10.0	CJC
P-75	9/24/2019	Walker Bungalow Rd.	7.5	CJC
P-76	9/24/2019	Walker Bungalow Rd.	10.0	CJC
P-77	9/23/2019	Walker Bungalow Rd.	7.8	CJC
P-78	9/23/2019	Walker Bungalow Rd.	10.0	CJC
P-79	9/23/2019	Walker Bungalow Rd.	10.0	CJC
P-80	9/23/2019	Walker Bungalow Rd.	10.0	CJC
P-81	9/23/2019	Walker Bungalow Rd.	10.0	CJC
P-82	9/27/2019	Shaw Rd.	5.6	CJC
P-83	Did Not Drill - Overhead Power			
P-84	9/27/2019	Shaw Rd.	10.0	CJC
P-85	Did Not Drill - Overhead Power			
P-86	9/27/2019	Shaw Rd.	6.0	CJC
P-87	9/27/2019	Shaw Rd.	1.6	CJC
P-88	9/27/2019	Shaw Rd.	5.5	CJC
P-89	9/27/2019	Shaw Rd.	6.5	CJC
P-90	9/25/2019	Sagamore Ave.	2.5	CJC
P-91	9/25/2019	Sagamore Ave.	2.5	CJC
P-92	9/25/2019	Sagamore Ave.	1.0	CJC
P-93	9/25/2019	Sagamore Ave.	2.0	CJC
P-94	9/25/2019	Sagamore Ave.	2.0	CJC
P-95	9/25/2019	Sagamore Ave.	1.2	CJC

1. Test probes were extended to 10 feet unless a refusal surface was encountered at shallower depth.



PROBE DATA

PROJECT: Sagamore Avenue Sewer Extension Project PROJECT NO: 19-0968
 CLIENT: Wright-Pierce DATE: See Below
 LOCATION: Portsmouth NH S.W. COLE REP: A. Santiago

PROBE NUMBER	DATE	ROADWAY	PROBE DEPTH (FT) ¹	DRILLER
P-96	9/25/2019	Sagamore Ave.	3.0	CJC
P-97	9/25/2019	Sagamore Ave.	2.0	CJC
P-98	9/25/2019	Sagamore Ave.	6.0	CJC
P-99	9/25/2019	Sagamore Ave.	5.0	CJC
P-100	9/25/2019	Sagamore Ave.	2.9	CJC
P-101	9/25/2019	Sagamore Ave.	1.6	CJC
P-102	9/25/2019	Sagamore Ave.	4.8	CJC
P-103	9/25/2019	Sagamore Ave.	7.4	CJC
P-104	9/25/2019	Sagamore Ave.	6.5	CJC
P-105	9/25/2019	Sagamore Ave.	1.5	CJC
P-106	9/25/2019	Sagamore Ave.	3.5	CJC
P-107	9/25/2019	Sagamore Ave.	3.0	CJC
P-108	2/24/2021	Sagamore Ave. (gravel)	4.2	JKL
P-109	2/24/2021	Sagamore Ave. (gravel)	5.2	JKL
P-110	2/24/2021	Sagamore Ave. (gravel)	10.0	JKL
P-111	9/24/2019	Cliff Rd.	2.0	CJC
P-112	9/24/2019	Cliff Rd.	1.5	CJC
P-113	9/24/2019	Cliff Rd.	2.2	CJC
P-114	9/24/2019	Cliff Rd.	6.0	CJC
P-115	9/24/2019	Cliff Rd.	1.5	CJC
P-116	9/24/2019	Cliff Rd.	2.6	CJC
P-117	9/24/2019	Cliff Rd.	2.5	CJC
P-118	9/24/2019	Cliff Rd.	2.5	CJC
P-119	9/24/2019	Cliff Rd.	5.0	CJC
P-120	9/24/2019	Cliff Rd.	5.5	CJC
P-121	9/24/2019	Cliff Rd.	6.5	CJC

1. Test probes were extended to 10 feet unless a refusal surface was encountered at shallower depth.



PROBE DATA

PROJECT: Sagamore Avenue Sewer Extension Project PROJECT NO: 19-0968
 CLIENT: Wright-Pierce DATE: See Below
 LOCATION: Portsmouth NH S.W. COLE REP: A. Santiago

PROBE NUMBER	DATE	ROADWAY	PROBE DEPTH (FT) ¹	DRILLER
P-122	1/20/2021	Sagamore Ave. (gravel)	3.0	SDS
P-123	1/20/2021	Sagamore Ave. (gravel)	2.0	SDS
P-124	1/20/2021	Sagamore Ave. (gravel)	6.0	SDS
P-125	1/20/2021	Sagamore Ave. (gravel)	5.0	SDS
P-126	1/20/2021	Sagamore Ave. (gravel)	2.9	SDS
P-127	1/20/2021	Sagamore Ave. (gravel)	1.6	SDS
P-128	1/20/2021	Sagamore Ave. (gravel)	4.8	SDS
P-129	1/20/2021	Sagamore Ave. (gravel)	7.4	SDS
P-130	1/20/2021	Sagamore Ave. (gravel)	6.5	SDS
P-131	1/19/2021	Sagamore Ave. (gravel)	1.5	SDS
P-132	1/19/2021	Sagamore Ave. (gravel)	3.5	SDS
P-133	2/24/2021	Sagamore Ave.	10.0	JKL
P-134	2/24/2021	Sagamore Ave.	10.0	JKL
P-135	2/24/2021	Sagamore Ave.	5.0	JKL
P-136	2/24/2021	Sagamore Ave.	6.4	JKL

1. Test probes were extended to 10 feet unless a refusal surface was encountered at shallower depth.



KEY TO NOTES & SYMBOLS

Test Boring and Test Pit Explorations

Stratification lines represent the approximate boundary between soil types and the transition may be gradual.

Key to Symbols Used:

w	-	water content, percent (dry weight basis)
q _u	-	unconfined compressive strength, kips/sq. ft. - laboratory test
S _v	-	field vane shear strength, kips/sq. ft.
L _v	-	lab vane shear strength, kips/sq. ft.
q _p	-	unconfined compressive strength, kips/sq. ft. – pocket penetrometer test
O	-	organic content, percent (dry weight basis)
W _L	-	liquid limit - Atterberg test
W _P	-	plastic limit - Atterberg test
WOH	-	advance by weight of hammer
WOM	-	advance by weight of man
WOR	-	advance by weight of rods
HYD	-	advance by force of hydraulic piston on drill
RQD	-	Rock Quality Designator - an index of the quality of a rock mass.
γ _T	-	total soil weight
γ _B	-	buoyant soil weight

Description of Proportions:

Trace:	0 to 5%
Some:	5 to 12%
“Y”	12 to 35%
And	35+%
With	Undifferentiated

Description of Stratified Soils

Parting:	0 to 1/16” thickness
Seam:	1/16” to 1/2” thickness
Layer:	½” to 12” thickness
Varved:	Alternating seams or layers
Occasional:	one or less per foot of thickness
Frequent:	more than one per foot of thickness

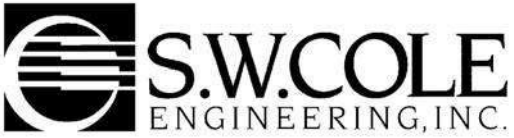
REFUSAL: Test Boring Explorations - Refusal depth indicates that depth at which, in the drill foreman's opinion, sufficient resistance to the advance of the casing, auger, probe rod or sampler was encountered to render further advance impossible or impracticable by the procedures and equipment being used.

REFUSAL: Test Pit Explorations - Refusal depth indicates that depth at which sufficient resistance to the advance of the backhoe bucket was encountered to render further advance impossible or impracticable by the procedures and equipment being used.

Although refusal may indicate the encountering of the bedrock surface, it may indicate the striking of large cobbles, boulders, very dense or cemented soil, or other buried natural or man-made objects or it may indicate the encountering of a harder zone after penetrating a considerable depth through a weathered or disintegrated zone of the bedrock.

APPENDIX D

Laboratory Test Results



Report of Gradation

ASTM C-117 & C-136

Project Name PORTSMOUTH NH - SAGAMORE AVENUE SEWER EXTENSION -
 GEOTECHNICAL ENGINEERING SERVICES

Project Number 19-0968

Client WRIGHT-PIERCE

Lab ID 19239S

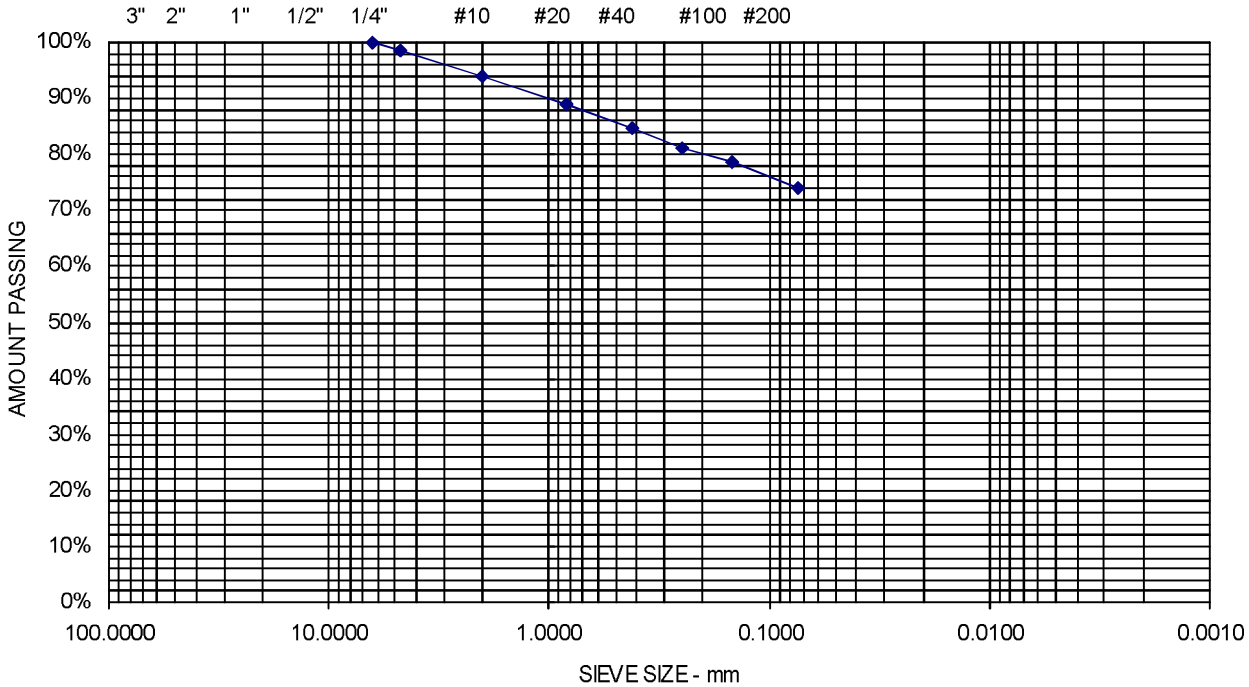
Date Received 12/18/2019

Date Completed 12/23/2019

Material Source B-5, 3D, 5-7'

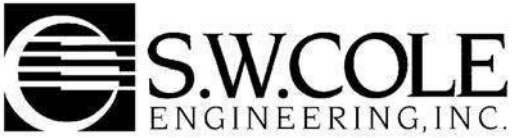
Tested By BRADLEY GERSCHWILER

<u>STANDARD DESIGNATION (mm/μm)</u>	<u>SIEVE SIZE</u>	<u>AMOUNT PASSING (%)</u>	
6.3 mm	1/4"	100	
4.75 mm	No. 4	99	1.5% Gravel
2.00 mm	No. 10	94	
850 μm	No. 20	89	
425 μm	No. 40	85	24.5% Sand
250 μm	No. 60	81	
150 μm	No. 100	79	
75 μm	No. 200	74.0	74% Fines



Comments: Moisture Content = 18.4%

Sheet



Report of Gradation

ASTM C-117 & C-136

Project Name PORTSMOUTH NH - SAGAMORE AVENUE SEWER EXTENSION -
GEOTECHNICAL ENGINEERING SERVICES

Project Number 19-0968

Client WRIGHT-PIERCE

Lab ID 19240S

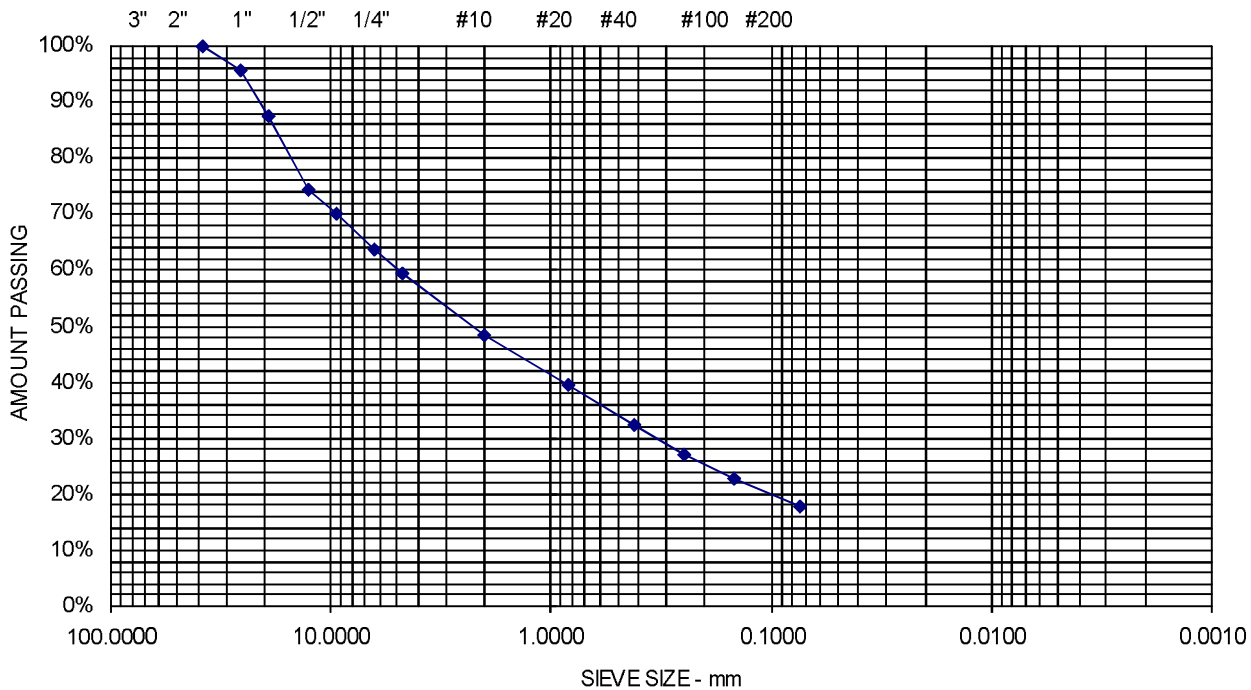
Date Received 12/18/2019

Date Completed 12/23/2019

Material Source B-19, 2D, 2.6-4.6'

Tested By BRADLEY GERSCHWILER

<u>STANDARD DESIGNATION (mm/μm)</u>	<u>SIEVE SIZE</u>	<u>AMOUNT PASSING (%)</u>	
38.1 mm	1-1/2"	100	
25.0 mm	1"	96	
19.0 mm	3/4"	87	
12.5 mm	1/2"	74	
9.5 mm	3/8"	70	
6.3 mm	1/4"	64	
4.75 mm	No. 4	59	40.7% Gravel
2.00 mm	No. 10	48	
850 μm	No. 20	40	
425 μm	No. 40	33	41.5% Sand
250 μm	No. 60	27	
150 μm	No. 100	23	
75 μm	No. 200	17.8	17.8% Fines



Comments: Moisture Content = 4.2%

Sheet

Project Name PORTSMOUTH NH - SAGAMORE AVENUE SEWER EXTENSION -
GEOTECHNICAL ENGINEERING SERVICES

Project Number 19-0968

Client WRIGHT-PIERCE

Lab ID 19241S

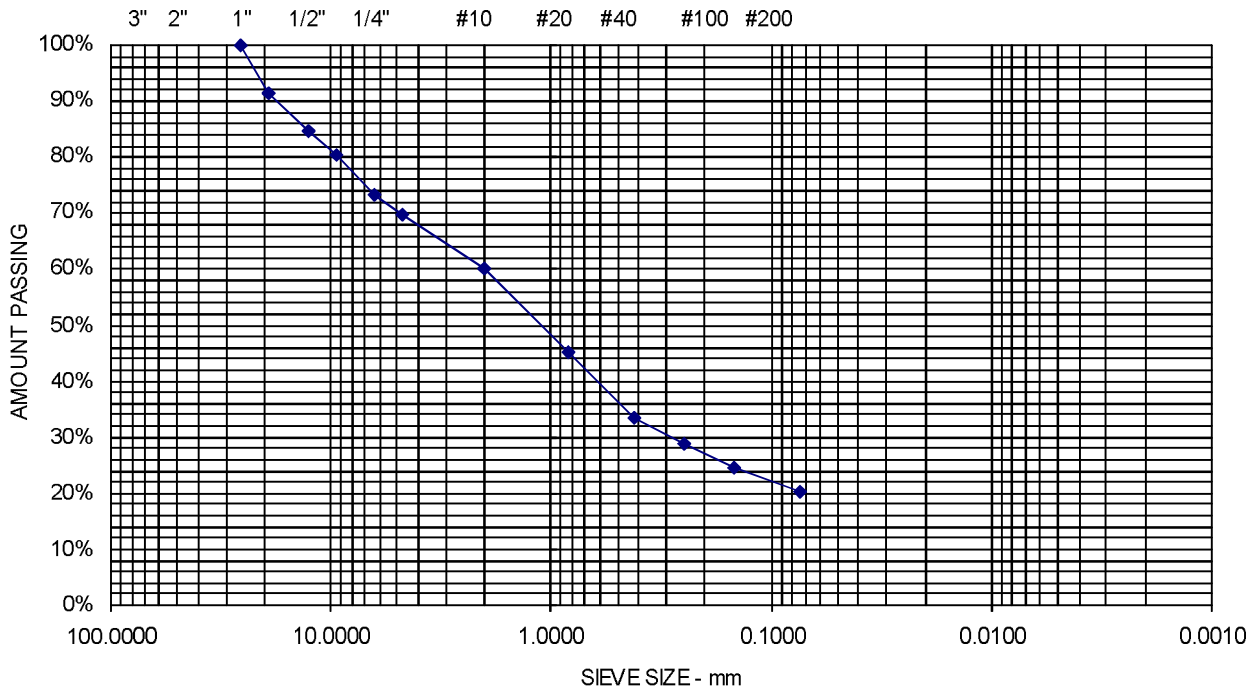
Date Received 12/18/2019

Date Completed 12/23/2019

Material Source B-16, 3D, 5-7'

Tested By BRADLEY GERSCHWILER

<u>STANDARD DESIGNATION (mm/μm)</u>	<u>SIEVE SIZE</u>	<u>AMOUNT PASSING (%)</u>	
25.0 mm	1"	100	
19.0 mm	3/4"	91	
12.5 mm	1/2"	85	
9.5 mm	3/8"	80	
6.3 mm	1/4"	73	
4.75 mm	No. 4	70	30.4% Gravel
2.00 mm	No. 10	60	
850 μm	No. 20	45	
425 μm	No. 40	33	49.2% Sand
250 μm	No. 60	29	
150 μm	No. 100	25	
75 μm	No. 200	20.4	20.4% Fines



Comments: Moisture Content = 10.2%

APPENDIX B
Blasting Regulations



CITY OF PORTSMOUTH
DEPARTMENT OF PUBLIC WORKS (DPW)
BLASTING RULES AND PROCEDURES

1.0 General:

All blasting work shall comply with the following regulations:

- City Ordinance, Chapter 5, Article VII: Section 5:702 Blasting Permit Required;
- State of New Hampshire Department of Transportation Standard Specifications for Road and Bridge Construction dated March 2016;
- Storage and Transportation of explosives shall be in accordance with State of New Hampshire Code of Administrative Rules: Chapter/Part Saf-C 1600.
In case of conflict, the more stringent regulation shall govern.

2.0 Insurance:

- 2.1 The blasting contractor shall procure and maintain \$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.
- 2.2 The Certificate shall name the City as an additional insured.

3.0 Blasting Permit Process:

- 3.1 The blasting contractor shall apply for a permit online through the City's permitting center at: <https://portsmouthnh.viewpointcloud.com> before commencing the pre-blast survey procedure.
- 3.2 At the time of application, the blasting contractor shall provide the following items:
- a) Plan showing location, extent and purpose of proposed blasting operations.
 - b) Project narrative describing scope of work, proposed dates of work, office phone number and twenty-four (24) hour cell phone number for the project manager on company letterhead.
 - c) Copy of valid New Hampshire License to Use, Purchase and Transport Explosives for the blasting company.
 - d) Copy of valid New Hampshire Certificate of Competency For Blasting Operations for each operator.
 - e) Copy of valid Insurance Certificate as required by Article VII, Section 5:702 and defined in Section 2.0.

f) Additional documentation required is noted below in Section 4.0.

4.0 Pre-Blast Condition Surveys:

- 4.1 Pre-blast surveys shall be performed as required in City Ordinance, Chapter 5, Article VII, Section 5:702, and the following procedures will apply.
- 4.2 The pre-blast condition survey shall consist of a written description of the interior and exterior condition of each of the structures examined. Descriptions shall locate any existing cracks, damage or other defects and shall include such information so as to make it possible to determine the effect, if any, of the construction operations on the defect. Where significant cracks or damage exist, or for defects too complicated to describe in words, photographs shall be taken. A good quality videotape survey with appropriate audio description of locations, and conditions, and defects can be used.
- 4.3 Pre-blast contractor shall send a pre-blast survey letter by certified mail to all abutters within a 500-foot radius of the blasting site, with copies of the letter sent also to:
- | | |
|--|---|
| Director of Public Works
680 Peverly Hill Road
Portsmouth, NH 03801 | City Manager
City Hall
1 Junkins Avenue
Portsmouth, NH 03801 |
| Fire Chief
170 Court Street
Portsmouth, NH 03801 | Chief of Police
3 Junkins Avenue
Portsmouth, NH 03801 |
| Zoning Officer
City Hall, Legal Dept.
1 Junkins Avenue
Portsmouth, NH 03801 | Chief Building Inspector
City Hall
1 Junkins Avenue
Portsmouth, NH 03801 |
| Environmental Planner
City Hall, Planning Dept.
1 Junkins Avenue
Portsmouth, NH 03801 | |
- 4.4 The pre-blast survey company shall make at least three attempts over a minimum 1-week period to contact a property owner before that property is listed as non-respondent.
- 4.5 Copies of the pre-blast condition survey shall be made available to the Department of Public Works and/or the property owner upon request. The blasting company shall maintain copies of all pre-blast survey records for a period of no less than one year from the completion of the blasting operations.
- 4.6 Before the issuance of a Blasting Permit, the blasting contractor shall submit to the Department of Public Works a list of all properties within the 500-foot radius of the blasting. The list shall include names and addresses, with tax map and lot numbers, of all abutters within the 500-

foot radius and the status of the survey (completed, refused or non-respondent).

5.0 Blasting Permit:

- 5.1 The blasting contractor shall upload all documents described in Sections 2, 3 and 4 of these procedures online through the City's permitting center at: <https://portsmouthnh.viewpointcloud.com>
- 5.2 The review process by City staff may take at least two (2) weeks.
- 5.3 A copy of the certified mail recipients of the blasting notification letter shall be submitted prior to issuance of the permit. Copies of the certified letter shall also be sent the City Manager, Director of Public Works, Chief of Police, Fire Chief, Zoning Officer, Chief Building Inspector and Environmental Planner, indicating when the blasting is scheduled to begin.
- 5.4 The permit will be approved and printed through the City's permitting center at: <https://portsmouthnh.viewpointcloud.com>
- 5.5 Effective July 1, 2017 a permit fee of \$100.00 will be charged.

6.0 Blasting Operations:

- 6.1 All blasting operations shall be conducted in accordance with State of New Hampshire Department of Transportation Standard Specifications dated March 2016.
- 6.2 All blasting operations shall require vibration measuring equipment meeting the following minimum requirements:
 - a) Measure, display, and provide a permanent record on a strip chart of particle velocity components.
 - b) Measure three mutually perpendicular components of particle velocity in directions vertical, radial, and perpendicular to the vibration source.
 - c) Have a velocity frequency response of 2 Hz to 150 Hz and be capable of measuring Peak Particle Velocity (PPV) of up to 250 mm/s (10 in/s)
 - d) All seismographs used shall display the date of the most recent calibration.
 - e) Calibration must have been performed within the last 12 months and must be performed to a standard traceable to the National Institute of Standards and Technology.
- 6.3 The blasting contractor shall maintain daily logs of all blasting activities. Those records, including seismic monitoring records shall be made available to the City of Portsmouth for a period of five years.

Please contact the following City staff member for questions:

Amy Chastain
Department of Public Works
amchastain@cityofportsmouth.com
Office phone: (603) 610-4344

APPENDIX C
Permits



SHORELAND PERMIT BY NOTIFICATION (PBN)

NOTIFICATION FORM

Water Division/Land Resources Management

Shoreland Program

Check the Status of your PBN



RSA/Rule: RSA 483-B/Env-Wq 1400

	Administrative Use Only	<input checked="" type="checkbox"/> PBN Accepted, Expires: 3/25/2026	Reviewer's Initials: REA
		<input type="checkbox"/> PBN Rejected	Admin's Initials: BH
		File No.: 2021-6674	Amount: 200.00
		Check No.: 199794	

This form requests authorization to excavate, fill, or construct new structures within the protected shoreland, which is 250 feet landward of the reference line of public waters, as regulated under RSA 483-B. Refer to the cover sheet to determine your eligibility to use this form in lieu of the standard Shoreland Permit Application. **Please note:** Notification packages missing required components will be rejected and the fee will not be returned.

SECTION 1 - PROPERTY OWNER (RSA 483-B:5-b; Env-Wq 1406.17)			
LAST NAME, FIRST NAME, M.I.: City of Portsmouth			
MAILING ADDRESS: 680 Peverly Hill Road	TOWN/ CITY: Portsmouth	STATE: NH	ZIP CODE: 03801
PHONE: 603-427-1530	EMAIL: tldesmarais@cityofportsmouth.com		
SECTION 2 - PROJECT LOCATION (RSA 483-B:5-b; Env-Wq 1406.17)			
ADDRESS: Sagamore Ave, Sagamore Grove, Wentworth House Road, Cliff Road, Walker Bungalow Road, and Shaw Road	TOWN/ CITY: Portsmouth	STATE: NH	ZIP CODE: 03801
WATERBODY NAME: Sagamore Creek	TAX MAP/ LOT: See Attached		
SECTION 3 - CONTRACTOR OR AGENT (Env-Wq 1406.17)			
LAST NAME, FIRST NAME, M.I.: Eckstrom, Britt - PE (Wright-Pierce)			
MAILING ADDRESS: 230 Commerce Way Suite 302	TOWN/ CITY: Portsmouth	STATE: NH	ZIP CODE: 03801
PHONE: 603-570-7126	EMAIL: britt.eckstrom@wright-pierce.com		
SECTION 4 - PROJECT DESCRIPTION (Env-Wq 1406.17)			
Provide a brief description of the proposed project including square footage of impacts and dimensions of new structures.			
The City of Portsmouth intends to extend public sewer to Sagamore Avenue, Sagamore Grove, Wentworth House Road, Shaw Road, Walker Bungalow Road, and Cliff Road. The proposed project involves installing low pressure sewer system within the roadways rights-of-way and individual sewer service to properties within the project area.			
Refer to Project Description included as Section 2.			
TOTAL SQUARE FEET OF IMPACT: 69,972 TOTAL SQUARE FEET OF NET CHANGE IN IMPERVIOUS AREA: 42			

shoreland@des.nh.gov or (603) 271-2147

NHDES Shoreland Program, 29 Hazen Drive, PO Box 95, Concord, NH 03302-0095

www.des.nh.gov

Total impact area is determined by the sum of all areas disturbed by excavation, fill, and construction. Examples include, but are not limited to: constructing new driveways, constructing new structures, removing or replacing structure foundations, grading, and installing a new septic system or well.

SECTION 5 - PBN CRITERIA (RSA 483-B:5-b; Env-Wq 1406.05)

Check one of the following project type criteria.

- 1. This project impacts less than 1,500 square feet in total, with a net increase in impervious area, if any, of no more than 900 square feet. *PBN Impact Limit: 1,500 square feet/ Fee: \$400.*
- 2. This project is proposed for the purpose of stormwater management improvements, erosion control, or environmental restoration or enhancement. *PBN Impact Limit: None/ Fee: \$200.*
- 3. The project is for the maintenance, repair, and improvement of public utilities, public roads, and public access facilities. *PBN Impact Limit: None/ Fee: \$400.*
- 4. The project consists of geotechnical borings, test wells, drinking water wells or is a site remediation project and meets the requirements of Env-Wq 1406.05. *PBN Impact Limit: None / Fee: \$400.*

SECTION 6 - FEE (RSA 483-B:5-b; Env-Wq 1406.16)

Consult Section 5 to determine fee. Make checks and money orders payable to "Treasurer - State of NH". Undated checks **cannot** be accepted. TOTAL FEE: \$200

SECTION 7 - PHOTOS (RSA 483-B:5-b; Env-Wq 1406.16)

Dated photographs of each area proposed to be impacted are required for all projects.

SECTION 8 - PLAN REQUIREMENTS (RSA 483-B:5-b; Env-Wq 1406.16)

Check YES or NO to all statements, and review the applicable plan requirements. If your plans do not include the information that is required, your notification will be rejected.

<input checked="" type="checkbox"/> YES	Required for all projects: A clear and detailed plan of work depicting, at a minimum, all impact areas, the <u>reference line</u> , and property lines. Plans that are not to scale must show all relevant dimensions and distances from the reference line and dimensions.	
<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	This project proposes an increase in <u>impervious</u> (i.e. non-permeable) area. Plans must include the dimensions and locations of all existing and proposed impervious surfaces on the lot that are within 250 feet of the reference line. Decks are typically considered impervious.	
<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	< 20%	This project proposes an increase in impervious area, and the total post-construction impervious area on the lot within 250 feet of the reference line will not exceed 20%.
<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	20 – 30%	This project proposes an increase in impervious area such that the total impervious area of the lot within 250 feet of the reference line will be greater than 20% but less than 30%. Plans must include a <u>stormwater management system</u> that will infiltrate increased stormwater runoff from development per <u>RSA 483-B:9, V(g)(2)</u> and in accordance with <u>Env-Wq 1500</u> .
<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	> 30%	This project proposes an increase in impervious area such that the total impervious area on the lot within 250 feet of the reference line will be greater than 30%. Plans must include a <u>stormwater management system</u> designed and certified by a professional engineer to account for all new development, and plans must demonstrate how the vegetation point score is met per <u>RSA 483-B:9, V(g)(1,3)</u> .
<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	This project proposes impacts within 50 feet of the reference line. Plans and photos must show each area of the <u>waterfront buffer</u> that will be impacted, including groundcover, and calculate the tree and sapling point scores in accordance with the <u>Vegetation Management Fact Sheet</u> .	

shoreland@des.nh.gov or (603) 271-2147

NHDES Shoreland Program, 29 Hazen Drive, PO Box 95, Concord, NH 03302-0095

www.des.nh.gov

<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	This project proposes impacts between 50 and 150 feet of the reference line. Plans must depict the 25% area of the woodland buffer to be designated and maintained as natural woodland. See the <u>Vegetation Management Fact Sheet</u> .
<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	This project proposes to install or expand an <u>accessory structure</u> , such as a patio or shed, within 50 feet of the reference line. All plans <i>must</i> demonstrate that the height, size, and setback limitations for accessory structures will be met. These limitations are described within the <u>Accessory Structure Fact Sheet</u> . The <u>shoreland frontage</u> on this lot is: linear feet. <input checked="" type="checkbox"/> N/A – There is no direct frontage on this lot.
<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	This project proposes a pervious (i.e. permeable) surface technology. Plans must include the location and type of the surface and a cross-section depicting the construction method, materials, and specifications as to how this surface will be maintained as a pervious technology. The notification must also include a maintenance plan describing how the surfaces will be maintained pervious.

SECTION 9 - CONDITIONS (Env-Wq 1406.20; RSA 483-B:9, V, (d))

Initial each of the required conditions below.

- TD 1. Erosion and siltation control measures shall: be installed prior to the start of work; be maintained throughout the project; and remain in place until all disturbed surfaces are stabilized.
- TD 2. Erosion and siltation controls shall be appropriate to the size and nature of the project and to the physical characteristics of the site, including slope, soil type, vegetative cover, and proximity to wetlands or surface waters.
- TD 3. No person undertaking any activity in the protected shoreland shall cause or contribute to, or allow the activity to cause or contribute to, any violations of the surface water quality standards established in Env-Ws 1700 or successor rules in Env-Wq 1700.
- TD 4. Any fill used shall be clean sand, gravel, rock, or other suitable material.
- TD 5. For any project where mechanized equipment will be used, orange construction fence shall: be installed prior to the start of work at the limits of the temporary impact area as shown on the plans approved as part of a permit or accepted as part of the permit by notification; be maintained throughout the project; and remain in place until all mechanized equipment has been removed from the site.

SECTION 10 - CERTIFICATIONS (Env-Wq 1406.18)

Initial each of the required certifications below.

- TD 1. The property owner shall sign the notification form below.
- TD 2. The signature(s) shall constitute certification that: the information provided is true, complete, and not misleading to the knowledge and belief of the signer; the signer understands that any permit by notification obtained based on false, incomplete, or misleading information is not valid; the project as proposed complies with the minimum standards established in RSA 483-B:9, V and will be constructed in strict accordance with the proposal; the signer accepts the responsibility for understanding and maintaining compliance with RSA 483-B and these rules; the signer understands that an accepted shoreland permit by notification shall not exempt the work proposed from other state, local, or federal approvals; the signer understands that incomplete notifications shall be rejected and the notification fee shall not be returned; and the signer is subject to the applicable penalties in RSA 641, *Falsification In Official Matters*.
- TD 3. The signature of the property owner certifies that the property owner has authorized the agent to act on the property owner's behalf for purposes of the notification. (Not Applicable)

SECTION 11 - REQUIRED SIGNATURE (RSA 483-B:5-b; Env-Wq 1406.18)

SIGNATURE (OWNER): 	PRINT NAME LEGIBLY: Terry Desmarais, P.E.	DATE: 3/18/21
--	---	---------------

shoreland@des.nh.gov or (603) 271-2147
 NHDES Shoreland Program, 29 Hazen Drive, PO Box 95, Concord, NH 03302-0095
www.des.nh.gov

SIGNATURE (AGENT, IF APPLICABLE): 	PRINT NAME LEGIBLY: Britt Eckstrom	DATE: 3/11/2021



THE STATE OF NEW HAMPSHIRE
DEPARTMENT OF TRANSPORTATION
EXCAVATION PERMIT
DISTRICT

PERMIT NO:
TOWN/CITY:
ROAD/ROUTE:
DATE:

- District 1, 641 Main St, Lancaster, NH 03584
District 2, 8 Eastman Hill Road, Enfield, NH 03748
District 3, 2 Sawmill Road, 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

I. Pursuant to Chapter 236:9-11 and/or 231:184-186, New Hampshire Revised Statues Annotated, 2007, and amendments thereto, permission is requested to disturb the pavement, shoulders and slopes within the right-of way

- 1) on the side of Route or Road
2) in the town of
3) for the purpose of
4) located (give distance to nearest crossroad and/or other local landmark and include sketch or plan)
5) during the period of dates between and

LOCATION/DESCRIPTION:

As shown on the attached plans, sketches, letters, and notes which shall be made a part of this permit. Construction shall be performed as shown on the attached plans, topographical, and description of work. Any variation shall require prior approval from the District Engineer.

This permit concerns only the type and manner of work to be performed in the New Hampshire Department of Transportation (NHDOT) ROW. NHDOT cannot and does not hereby grant permission to enter upon or utilize any privately owned land.

I/We, Contractor, and I/We, Owner, agree to conform to the

NHDOT Standard Specifications for Road and Bridge Construction (Standard Specifications), as revised, the following provisions, instructions and regulations in processing the work under this request, and to any additional instructions issued by the District Engineer or designee during the process of the work.

STATE LAW REQUIRES THAT "DIG SAFE" BE NOTIFIED 72 HOURS IN ADVANCE OF EXCAVATION. CONTACT DIG SAFE BY TELEPHONE: 1-888-344-7233.

THE DISTRICT OFFICE MUST BE NOTIFIED AT LEAST FORTY EIGHT (48) HOURS BEFORE PERFORMING ANY WORK. A COPY OF THIS PERMIT SHALL BE PRESENT AT THE WORK SITE AT ALL TIMES.

- 1. Photographs or videos in sufficient detail to show the existing condition of the area to be disturbed within the ROW shall be furnished to the District Engineer prior to the start of work. Photographs of all State underground structures shall be taken just prior to backfill and furnished to the District Engineer.
2. No work in the highway ROW shall be permitted during the following conditions:
a. Inclement weather.
b. The hours of darkness*.
c. Saturdays, Sundays or Holidays. **
d. During the period from November 15th to April 15th. **
* Work after dark may be permitted at the discretion of the District Engineer if adequate lighting is in place and is sufficient to protect the traveling public and workers.
** Work during these periods may be permitted at the discretion of the District Engineer.

- 3. Traffic must be maintained in accordance with the Manual on Uniform Traffic Control Devices (MUTCD), as revised during the performance of the work. Traffic shall be protected by suitable barricades, standard warning and advance warning signs, uniformed officers, as appropriate, and/or flaggers during performance of the work, and proper lighting at night. All signs shall be kept clean and in good repair.
- 4. Detour of state highway traffic requires prior approval by the District Engineer and shall be in accordance with an approved Traffic Control Plan.
- 5. All temporary yellow centerline overlay markers in place on two-way roadways prior to placement of full MUTCD standard pavement markings shall be removable. The temporary overlay markers shall be placed in pairs, separated by a lateral space of approximately three (3) inches, using a maximum spacing of eighty (80) feet. On sections of roadway with severe curvature, lesser spacing should be used so that at least three (3) pairs of markers are visible to approaching traffic at all times. Temporary overlay markers shall be removed following placement of standard pavement markings.
- 6. During the hours the job is inactive, a standby crew shall be available in case they are needed for the protection and maintenance of traffic. One or more telephone numbers, which will reach the standby crew, shall be furnished to the following people: local NHDOT District Dispatch, NHDOT Transportation Management Center, local police chief, local superintendent of public works or road agent (if the project is municipally owned), and the local NHDOT highway patrolman foreman.

The standby contact people will be: (List two)

NAME: _____

TEL# (DAY): _____

TEL# (NIGHT): _____

CELL#: _____

- 7. The Contractor shall be responsible for the acquisition of all other applicable permits and compliance with all local, state or federal rules, ordinances, and regulations.
- 8. The Contractor shall be responsible for the construction and maintenance of all necessary sediment and erosion control facilities required to protect storm water runoff.
- 9. In areas where the pavement is to be excavated, it shall be neatly and uniformly cut, with square edges by machine, at each side of all trenches. Every precaution shall be used to prevent undermining of the remaining pavement, utilizing sheeting as required, to prevent cave-in. Undermined areas inadvertently developed shall have the projecting pavement cut square and removed.
- 10. Excavation and handling of material shall be performed in a manner that will minimize trench width and the possibility of cave-ins. The pavement and base course materials are to be discarded. Excavation below subgrade is to be saved and used for backfill to prevent differential frost heaving. Any blasting required shall be cautiously performed to minimize disturbance beyond the trench limits. Overburden shall be removed prior to blasting. All blasting operations shall be performed in accordance with the Standard Specifications Section 203.
- 11. All backfill material in trenches and below base courses shall consist of excavated material suitable for backfill as defined in Standard Specifications, Section 603. All backfill shall be compacted at or near optimum moisture content, in layers not exceeding six (6) inches compacted thickness, using pneumatic tampers, vibratory compactors, or other approved means. The material shall be compacted to not less than ninety five (95) percent of maximum density as determined by AASHTO T99 (Standard Proctor Test). Water shall be uniformly applied during compaction in the amount necessary for proper compaction.

12. Within paved areas, crushed gravel, Standard Specifications Section 304, or approved equal to the existing gravel course, shall be placed in layers not exceeding six (6) inches compacted thickness, and thoroughly compacted. An approved bituminous plant mix, Standard Specifications Section 401, shall be placed the same day and carefully graded and rolled to the adjacent pavement grade, as a temporary patch. Just before completion of the project and after suitable exposure of temporary patches to traffic compaction, the pavement shall be sawn, as directed, on either side of the trench to provide a two (2) foot minimum overlap of the final patch on undisturbed material. Within the sawn limits, the existing pavement and temporary patch material shall be removed, the sawn edges tack coated, and the material replaced with an equal depth, but not less than four (4) inches, of hot bituminous concrete, placed as directed, and compacted to meet the existing pavement edge exactly. Finished pavement must replicate the original pavement design including normal crown, superelevations, and breaks in superelevated shoulders. Saw cuts for final patching shall be as directed by the District Engineer. In all cases, trench is to be flush with the existing pavement at the end of each working day.
13. Shoulders, other than paved, disturbed during the construction, shall be restored by providing a similar depth of crushed bank run gravel which shall be graded and compacted on a slope to match the cross slope of the existing roadway shoulder or as directed by the District Engineer.
14. In other areas, the present surface type shall be restored, by placing similar material, to a minimum depth and quality equal to or exceeding the existing depth before excavation. Reestablish existing grassland to equal what existed before excavation. Reestablish lawns to pre-construction condition, using a minimum of four (4) inches of loam, lime, fertilizer, similar seed, and mulch. The surface shall be reasonably smooth, free of stones larger than two (2) inches or debris, and be graded to drain. Existing topsoil removed from within the ROW shall only be reused within the DOT ROW and not as topsoil on properties beyond the ROW, or as otherwise approved by the District Engineer.
15. No trench shall be left open at night or over weekends. Suitable unrestricted ingress and egress to properties abutting the highway shall be maintained at all times. Two-way traffic shall be maintained at all times during nights, weekends, and holidays.
16. Any future surface distortion within the trench area, due to settlement or other causes attributable to the construction shall be corrected as required during construction and for a period of two (2) years following the acceptance of the project by NHDOT.
17. The roadway shall be cleared of all foreign material at the end of each working day or as directed by the District Engineer.
18. Equipment must be removed to a minimum distance of eight (8) feet from the edge of pavement during weekends, holidays, and periods of shutdown. The contractor shall provide MUTCD approved delineation of all non-active construction equipment left unattended within the roadway clear zone. Suitable barricades shall be erected to properly protect the work areas. Periodic maintenance of signs during periods of shutdown is required to restore blown over or missing signs, cones, and other traffic control devices. Routine NHDOT maintenance operations shall not be hindered by the Contractor's activities.
19. Pipe, equipment, and supplies shall not be stored within the NHDOT ROW without prior approval by the Engineer. Pipe or materials shall not be laid out ahead of construction.
20. Excavation dewatering shall not be pumped onto the State highway pavement. The Contractor may be required to plow, salt, and/or sand any portion of the State highway that becomes encumbered due to the Contractor's operations. NHDOT snow removal and maintenance operations shall not be impeded.
21. The District Engineer shall have the right to suspend any or all construction activities, which, in the District Engineer's opinion are unsafe to the traveling public.

22. Damage to existing drainage structures and systems shall be repaired in a manner approved by the District Engineer. Methods and materials utilized shall be subject to prior approval. Drainage structures or systems shall be cleaned of all material that has accumulated as a result of the work.
23. Damage resulting from work or detoured traffic to the roadway shall be repaired to the District Engineer's satisfaction.
24. If a highway sign or guardrail must be moved to allow construction of the facility, said sign and guardrail shall be reinstalled or replaced at the location of removal at the end of each work day or replaced by approved temporary devices pending permanent installation.
25. The District Engineer may inspect, test, or monitor any and all of the Contractor's activities within the highway ROW to insure compliance with this permit.
26. Following completion of the construction activities, the District Engineer or their agent will field review the work area for general conformance to Department standards for construction within the DOT ROW. Final acceptance may be reasonably withheld should the work not be completed in an acceptable manner and in accordance with the terms of this permit.
27. 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.
28. 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.
29. The Owner shall, upon project completion, submit a complete set of "as-built" drawings to the District Engineer.

II. I/We, the Contractor, agree to save harmless the State of New Hampshire from any and all claims arising from the construction, trench settlement, pavement damage or other deficiencies attributable to the said construction for a period of two (2) years following acceptance of the project by NHDOT.

I/We, the Contractor/Owner, agree to assume such additional cost as the State may incur by reason of failure to perform this work in the manner prescribed above and in accordance with said plans and specifications, and are familiar with the penalty imposed by Chapter 236, and amendments thereto.

I/We, the Contractor, agree to furnish prior to the start of work a continuing Surety Bond in the amount of \$_____ dollars guaranteeing the fulfillment of the provisions, instructions, and regulations prescribed herein, and any later instructions that may be issued by the District Engineer during the performance of the work. Following the acceptance of the project by NHDOT, the bond amount may be reduced to \$_____ dollars guaranteeing satisfactory maintenance of the disturbed areas for a period of two (2) years.

I/We, the contractor/Owner, certify that the property does not have any illicit or 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.

I/We, the Contractor, agree to reimburse the State of New Hampshire fully for the services of a State Inspector(s) when assigned to this project to insure compliance with the terms of this permit.

(PLEASE PRINT)

CONTRACTOR: _____
 STREET ADDRESS: _____
 CITY, STATE & ZIP: _____
 SIGNATURE: _____ TITLE: _____
 PRINTED NAME: _____ TEL. NO.: _____

III. I/We, the Owners, agree to save harmless the State of New Hampshire from any and all claims arising from the construction, maintenance, and operation of the said facility and its appurtenances and agree to obtain permits from the District Engineer before performing any future excavation for maintenance or renewal of the facility or appurtenances thereto within the ROW limits.

I/We, the Owners, agree to assume such additional cost as the State may incur due to the maintenance, operation, renewal, or extension of said facility or appurtenances thereto within the highway limits.

I/We, the Owners, understand and agree that this permit is for the right of construction, operation, and future maintenance of the said facility. Occupancy is by sufferance only, with the State reserving the right to require, in event of future alterations of the highway or highway ROW, certain alterations, relocations or complete removal of said facility.

I/We, the Owners, agree to perform required alterations, relocations or removal of said facility promptly and at our own expense upon notification by the State.

Where Applicable, in accordance with RSA 72:23, I(b), this agreement is made between the parties subject to the condition that the Owner/Operator shall pay all properly assessed real and personal property taxes. Failure of the Owner/Operator to pay duly assessed personal and real taxes when due shall be cause to terminate this agreement. In accordance with the requirements of RSA 72:23, I(b), the Owner/Operator shall be obligated to pay real and personal property taxes on structures or improvements added.

(PLEASE PRINT)

OWNER: _____
 STREET ADDRESS: _____
 TOWN/CITY, STATE & ZIP: _____
 SIGNATURE: _____ TITLE: _____
 PRINTED NAME: _____ TEL. NO.: _____
 24 HOUR CONTACT PERSON: _____ TEL. NO.: _____

IV. Permission for the above described construction, maintenance and operation is granted, subject to the instructions, regulations, conditions, and agreements above.

This permit does not abrogate the rights of abutting Owners.

WORK TO BEGIN: _____ WORK TO END: _____

DATE APPROVED: _____

APPROVED BY: _____
 DISTRICT ENGINEER, FOR DIRECTOR OF ADMINISTRATION,
 NH DEPARTMENT OF TRANSPORTATION

Permit No. _____

Before using permit, the *Contractor shall notify the District Office and Patrol Foreman:*

DISTRICT OFFICE TEL.: _____

PATROL FOREMAN NAME: _____

PATROL FOREMAN TELEPHONE: #: _____

DISTRIBUTION: District Office, Patrol Foreman, Utility Owners and Contractor

ADDITIONAL REQUIREMENTS

Additional Requirements Attached



State of New Hampshire – Department of Transportation
**ENVIRONMENTAL DOCUMENTATION
 CHECKLIST**

Excavation Permit, Encroachment Permit, and Driveway Permit Applicants are responsible for evaluating their project(s) for impacts to the environment and verifying compliance with all applicable laws, rules, and regulations. This checklist is intended to provide a summary of the environmental evaluation undertaken by the Applicant. In addition to completing this checklist, the Applicant is responsible for securing all necessary environmental permits and approvals. Issuance of the Excavation Permit, Encroachment Permit, or Driveway Permit is not an indication that the NH Department of Transportation (the Department) concurs with, or approves the environmental evaluation performed by the Applicant or the Applicant's designee(s). All Applicants must provide applicable information and documentation associated with this checklist prior to issuance of the excavation or encroachment permit for the Department's record.

- Disturbed Area (This includes, but may not be limited to any excavation and/or vegetation clearing)
- Provide total square footage of land disturbance:
 - Consult NHDES, and/or visit the link provided, to determine if your project will require an AOT permit (<https://www.surveymonkey.com/r/?sm=u5SDvBCP0R2ThzxF3f2E%2fQ%3d%3d>). Provide the Alteration of Terrain (AOT) Permit Number, if an AOT permit is required:
 - National Pollutant Discharge Elimination System (NPDES) Notice of Intent Tracking Number, if disturbing over 1 acre of land:
- Cultural and/or Historic Resources
- Work conducted within 25 feet of a cemetery will comply with RSA 289:3.
 - Work that impacts stone walls or other boundary markers will comply with RSA 472:6.
 - Provide the New Hampshire Department of Historic Resources (DHR), Request for Project Review (RPR) file number (<http://www.nh.gov/nhdhr/review/rpr.htm>) for projects that utilize any state or federal funds, or require a state or federal permits (i.e. wetlands permit):
- Endangered Species - Attach to this checklist documentation of concurrence, as applicable, from the following agencies/groups:
- NH Natural Heritage Bureau (NHB), Use the [NHB DataCheck Tool](https://www2.des.state.nh.us/nhb_datacheck/signin.aspx) (https://www2.des.state.nh.us/nhb_datacheck/signin.aspx) for online inquiries.
 - US Fish & Wildlife Service, Use the 'Information for Planning and Conservation' (IPaC) tool (<http://ecos.fws.gov/ipac/>) for online inquiries.
 - NH Fish & Game Department, as necessary should there be concerns identified through either the IPaC tool, or NHB review.
- Floodplains/Floodways - Attach to this checklist documentation of concurrence from the following:
- NH Office of Energy and Planning (OEP) Floodplain Management Program, for a project that encroaches on regulatory floodway; creates new obstructions in the 100 year floodplain; or alters any drainage patterns.
- Wetlands/Water Quality – Permits must be obtained for any project that impacts wetlands/areas under the jurisdiction of RSA 482-A. If your project impacts wetlands or other RSA 482-A jurisdictional areas, complete the following
- NH Department of Environmental Services (NHDES), Wetlands Permit number:
 - Army Corps of Engineers, Wetlands Permit number:
 - NHDES Shoreland Permit number:
- Contamination - Perform a [NHDES OneStop](http://www2.des.state.nh.us/gis/onestop/register.asp) Web GIS search (<http://www2.des.state.nh.us/gis/onestop/register.asp>) to identify any potential contamination and/or known remediation sites (active or closed) within 1,000 feet of the project, and/or impacts to known asbestos disposal sites (ADSs).
- NHDES site number(s):
- Invasive Plant Species – Activities that disturb invasive plants or their root systems must comply with Prohibited Invasive Plant Species Rules ([Agr 3800](#)), and the NHDOT manual 'Best Management Practices for Roadside Invasive Plants'.
- Provide a map/plan showing locations of known invasive plant populations within the project area.

I, the undersigned, take responsibility for the above reviews. To the best of my knowledge and ability, the information represented in this document is accurate, and in conformance with applicable rules and regulations at the time of submission.

Owner / Agent of Owner Signature _____

Date _____

APPENDIX D
Photos

Street Address	Page Number	Number of Photos
33 Cliff Road	1	5
44 Cliff Road	3	11
45 Cliff Road	5	22
71 Cliff Road	11	8
89 Cliff Road	14	6
96 Cliff Road	16	21
131 Cliff Road	22	8
607 Sagamore Avenue	24	9
695 Sagamore Avenue	27	8
698 Sagamore Avenue	29	8
713 Sagamore Avenue	31	8
714 Sagamore Avenue	33	8
716 Sagamore Avenue	35	8
749 Sagamore Avenue	37	13
766 Sagamore Avenue	41	11
792, 794, 796 Sagamore Avenue	44	16
910 Sagamore Avenue	48	10
911 Sagamore Avenue	51	11
912 Sagamore Avenue	54	12
913 Sagamore Avenue	57	12
915 Sagamore Avenue	60	11
960 Sagamore Avenue	63	17
1145 Sagamore Avenue	68	18
1149 Sagamore Avenue	73	9
1150 Sagamore Avenue	76	21
1155 Sagamore Avenue	82	4
2 Sagamore Grove	83	9
3 Sagamore Grove	86	9
4 Sagamore Grove	89	7
5 Sagamore Grove	91	10
6 Sagamore Grove	94	12
11 Sagamore Grove	97	8
7 Shaw Road	99	7

Street Address	Page Number	Number of Photos
14 Shaw Road	101	4
17 Shaw Road	102	4
24 Shaw Road	103	6
27 Shaw Road	105	10
36 Shaw Road	108	8
16 Walker Bungalow Road	110	12
40 Walker Bungalow Road	113	16
58 Walker Bungalow Road	117	7
72 Walker Bungalow Road	119	8
86 Walker Bungalow Road	121	3
93 Walker Bungalow Road	122	16
140 Walker Bungalow Road	126	11
147 Walker Bungalow Road	129	10
159 Walker Bungalow Road	132	7
171 Walker Bungalow Road	134	17
184 Walker Bungalow Road	138	6
189 Walker Bungalow Road	140	5
201 Walker Bungalow Road	142	15
209 Walker Bungalow Road	145	8
212 Walker Bungalow Road	147	13
220 Walker Bungalow Road	151	8
238 Walker Bungalow Road	153	12
241 Walker Bungalow Road	156	10
251 Walker Bungalow Road	159	17
260 Walker Bungalow Road	164	11
272 Walker Bungalow Road	167	11
290 Walker Bungalow Road	170	12
74 Wentworth Road	173	11
187 Wentworth House Road	176	7
189 Wentworth House Road	178	6

33 Cliff Road



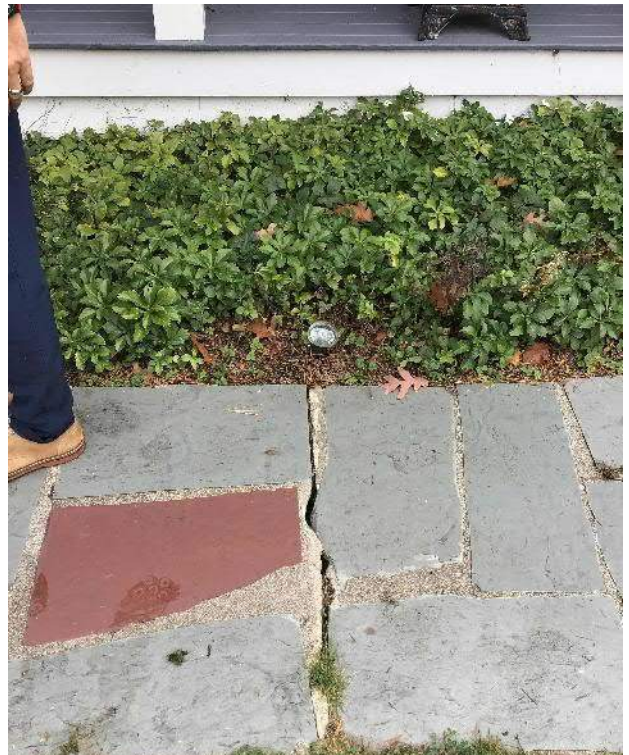
View of 33 Cliff Road from the road facing South.



View of approximate location of septic tank in the front yard facing Northeast.



View of approximate location of cap for septic tank adjacent to a concrete retaining wall facing Northeast.



View of approximate location of sewer lateral underneath stone walkway, facing Southeast.

33 Cliff Road (Cont.)



View of Siemens breaker box circuit breakers and schedule adjacent to breaker switches facing

44 Cliff Road



View of 44 Cliff Road from the road, facing North.



View of wooden fence crossing proposed sewer service path located in the backyard, facing East.



View of septic tank cap and approximate location of sewer lateral under wooden steps, facing Southeast.



View of breaker box #1 circuit breakers.

45 Cliff Road



View of 45 Cliff Road from the Walker Bungalow side of the property, facing Southwest.



View of tree and shrubs near proposed sewer service pathway along the asphalt driveway, facing West.



View of planters and hot tub near approximate septic tank location facing West.



View of approximate location of buried sewer lateral facing Northwest.

45 Cliff Road (Cont.)



View of potted plants, hot tub and steppingstones near existing septic tank location facing Northwest.



View of proposed sewer service pathway along the asphalt driveway towards Walker Bungalow Road, facing East.



View of storage shed next to the driveway; water service runs beneath the shed to the house, facing Southeast.

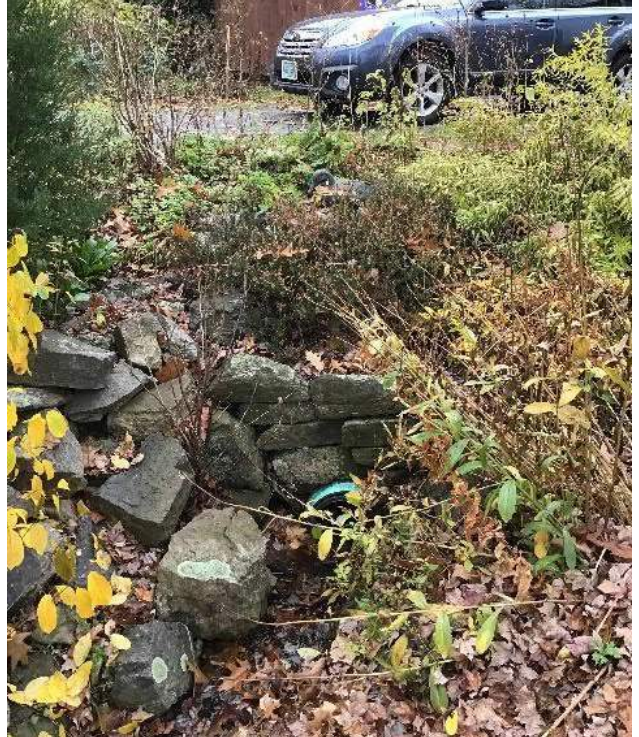


View of wetlands and drainage swale running along the road, facing North.

45 Cliff Road (Cont.)



View of drainage swale running along the proposed sewer service path and driveway.



View of culvert running underneath the asphalt driveway into the drainage swale, facing Southeast.



View of the top of the culvert facing Northwest.



View of approximate location of drainage pipe running underneath the asphalt driveway facing Southwest.

45 Cliff Road (Cont.)



View of drainage pipe continuing underneath the lawn towards the adjacent property facing Southeast.



View of shrubs and trees in a garden adjacent to the driveway and near the road, facing East.



View of asphalt apron and shrub adjacent to the entrance to the driveway facing Southeast.



View of exposed ledge in the East corner of the property near the road, facing West.

45 Cliff Road (Cont.)



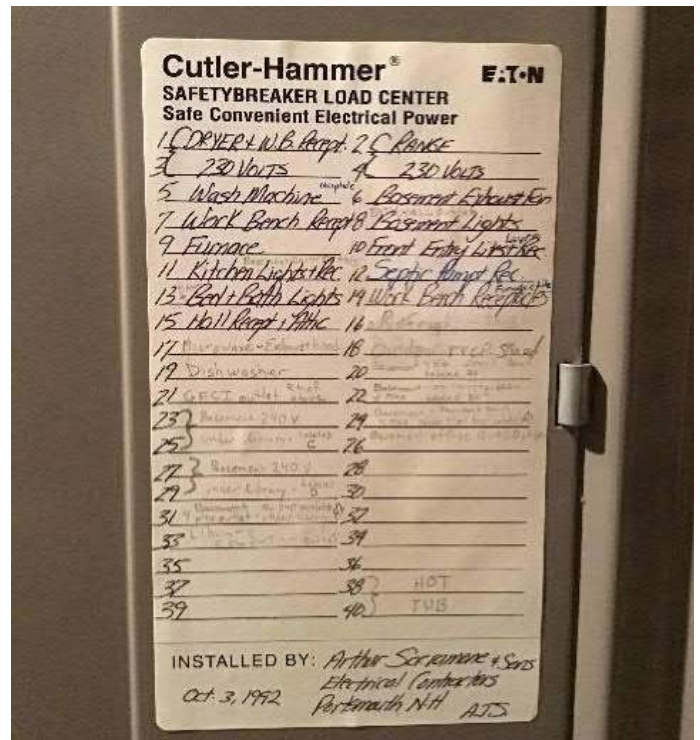
View of the breaker box located in a closet on the ground floor, facing Northwest.



View of the breaker box circuit breakers.



View of the main breaker switch and breaker box model information.

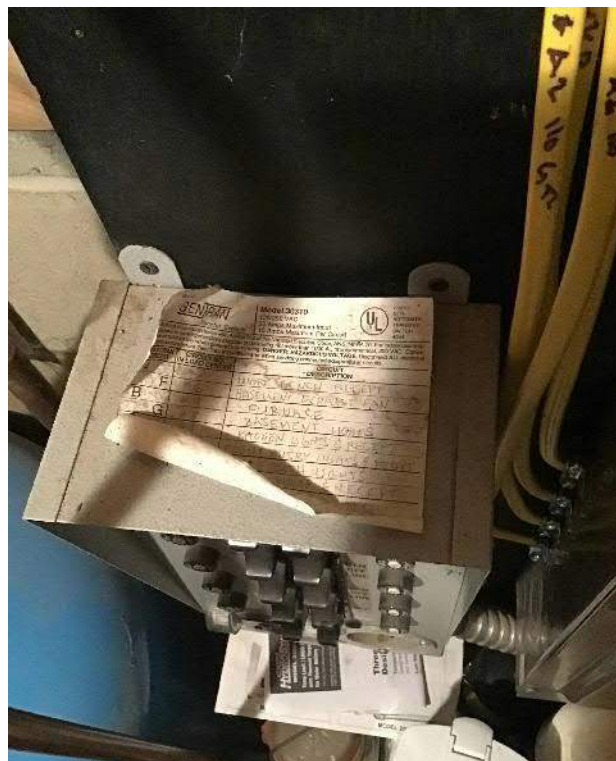


View of breaker box circuit breaker schedule on the inside of the panel cover.

45 Cliff Road (Cont.)



View of manual transfer switch front panel to the left of the breaker box.



View of the manual transfer switch schedule on top of the box.

71 Cliff Road



View of 71 Cliff Road from the road facing Northeast.



View of the asphalt driveway from the road facing North.



View of small shrub and proposed sewer service pathway facing Southwest.



View of approximate septic tank location and proposed sewer service pathway in the Northwest yard facing East.

89 Cliff Road



View of gravel path in the rear of the house and approximate location of the sewer lateral facing South.



View of wooden deck on the Southeast corner of the house, facing South.



View of septic leach field in the Northwest lawn near Cliff Road facing Southwest.



View of approximate location of the septic tank and pump station buried in the backyard, facing

89 Cliff Road (Cont.)



View of backyard and proposed sewer service path to Walker Bungalow Road facing Northeast.



View of Siemens breaker box circuit breakers and schedule adjacent to breaker switches.

96 Cliff Road



View of 96 Cliff Road from the other side of the road facing Southwest.



Source- City of Portsmouth – April 2015

View of 96 Cliff Road from the street facing Northwest.



View of the front yard looking towards the Northwest yard facing West.



View of the front yard and small retaining wall to the left facing East.

96 Cliff Road (Cont.)



View of the Northwest yard and stone landscaping up against the house facing Northeast.



View of stone patio and landscaping on top of approximate location of the septic tank facing Northwest.



View of approximate septic tank cap location within the shrubs facing Northwest.



View of wooden deck and stone patio covering the approximate sewer lateral location, facing East.

96 Cliff Road (Cont.)



View of approximate location of the pump station and leach field, facing Northwest.



View of the Southwest yard towards the road, facing Northeast.



View of exposed ledge in the back of the property, facing South.



View of the backyard from the Southwest yard, facing Northwest.

96 Cliff Road (Cont.)



View of the sewer lateral located in the basement exiting into the Southwest concrete foundation facing South.



View of exposed PVC sewer lateral exiting into the concrete foundation to the backyard facing Southwest.



View of the basement from the bulkhead stairs looking towards the breaker box in the East corner facing Southeast.



View of the bottom of the bulkhead stairs leading into the basement facing Northwest.

96 Cliff Road (Cont.)



View of breaker box #1 located in the East corner of the basement, facing Southeast.



View of breaker box #1 circuit breakers and schedule adjacent to breaker switches.

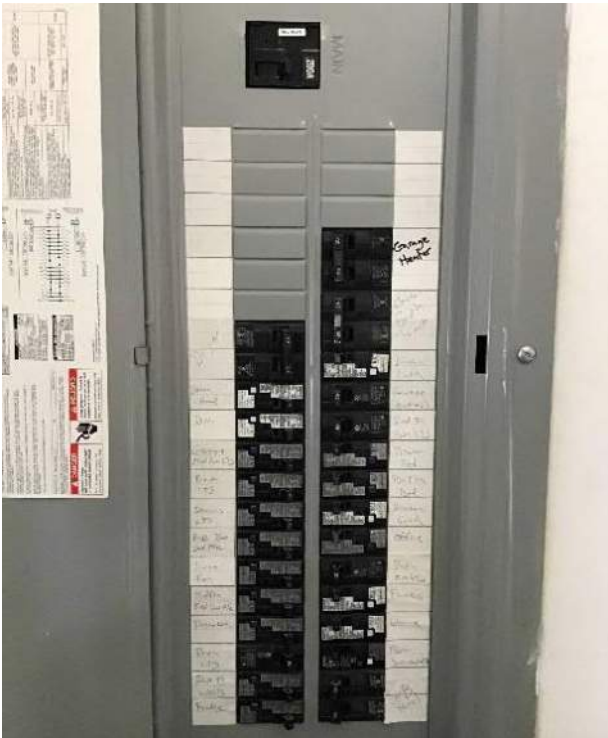


View of breaker box #1 model information and specifications.



View of breaker box #2 (Siemens) located on the wall of the garage, facing Southeast.

96 Cliff Road (Cont.)



View of breaker box #2 circuit breakers and schedule adjacent to breaker switches.

131 Cliff Road



View of 131 Cliff Road from Walker Bungalow Road Avenue facing Southwest.



View of the second septic tank with landscaping removed to clean out the tank, located on the Northeast side of the house facing Walker Bungalow Rd looking West.



View of the first septic tank and lateral exit with turf removed, located on the Southeast side of the house facing Southwest.

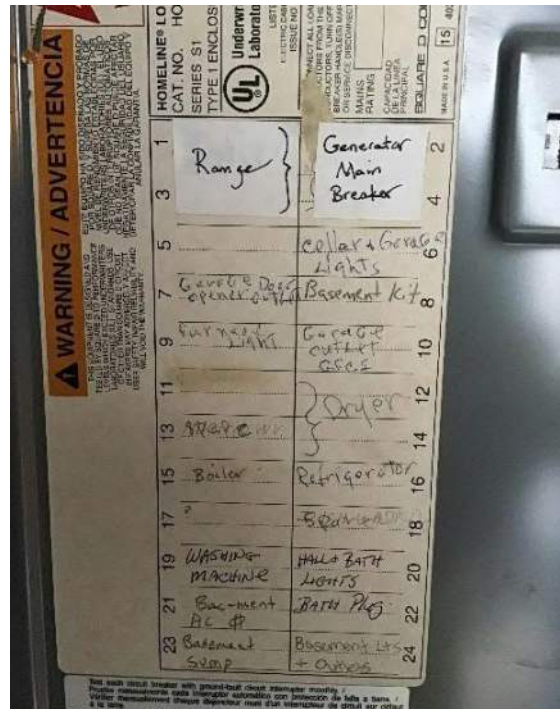


View of the first septic tank with turf removed to clean out the tank, located on the Southeast side of the house facing Northeast.

131 Cliff Road (Cont.)



View of the second septic tank with landscaping removed, located on the Northeast side of the house adjacent to the garage and driveway facing Northeast.



View of the circuit breaker schedule on the inside of the panel cover.



View of 100A breaker box open located on the Southeast wall of the garage facing Southeast.



View of breaker box model information and specifications.

607 Sagamore Avenue



Source: Google Maps - October 2018

View of 607 Sagamore Avenue and front yard from the road facing Southwest.



View of the proposed sewer service pathway towards the backyard, facing Southwest.



View of proposed sewer service path running towards the road from the backyard, facing Northeast.



View of basement bulkhead and approximate septic tank location denoted by a patch of dirt.

695 Sagamore Avenue



View of 695 Sagamore Avenue from the end of the driveway facing West.



View of the front yard and proposed sewer service pathway, facing West.



View of water service curb stop in the forefront; located next to proposed sewer, facing Southwest.



View of approximate location of buried septic tank facing Northeast.

695 Sagamore Avenue (Cont.)



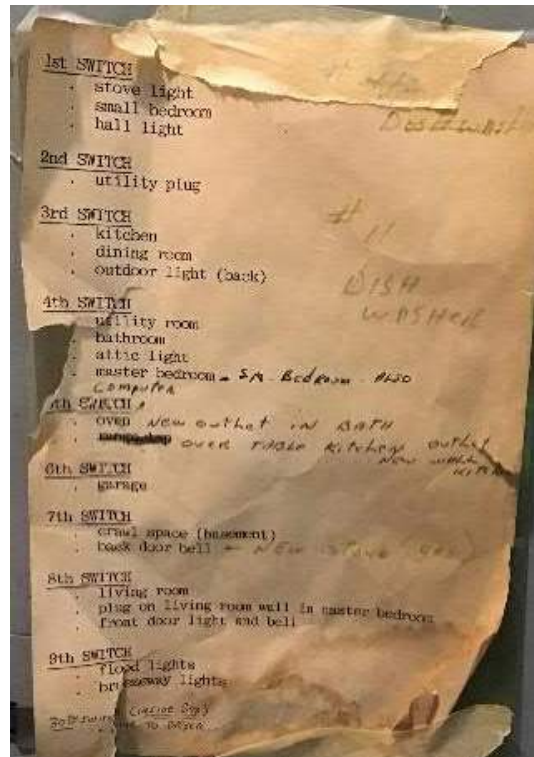
View of crawlspace access located next to the brick patio facing North.



View of the breaker box located in the bathroom facing East.



View of breaker box circuit breakers and model information at the top.



View of breaker box circuit breaker schedule on the inside of the panel cover.

698 Sagamore Avenue



Source: Google Maps - October 2018

View of 698 Sagamore Avenue and front yard from the road, facing East.



View of front yard and two large trees facing West.



View of shrubs and stones along the asphalt driveway and proposed sewer service pathway facing Southwest.

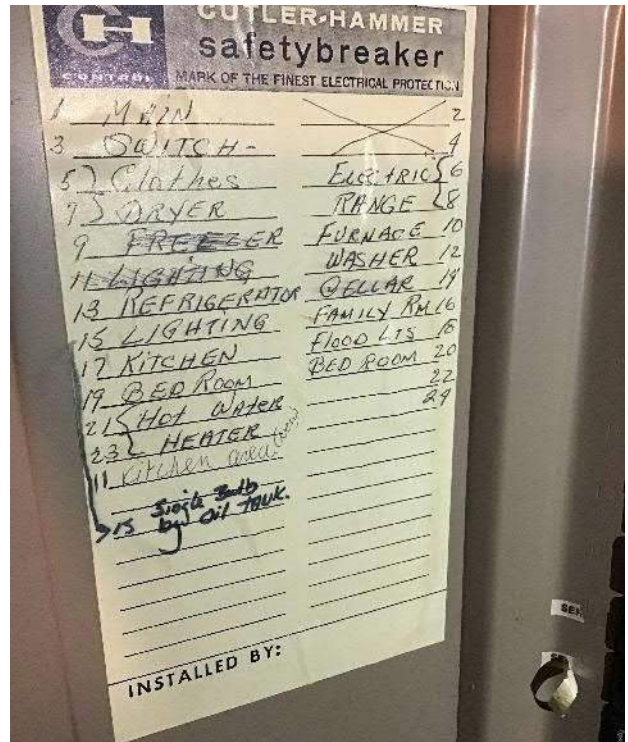


View of approximate location of buried septic tank and exposed ledge in the background facing Northwest.

698 Sagamore Avenue (Cont.)



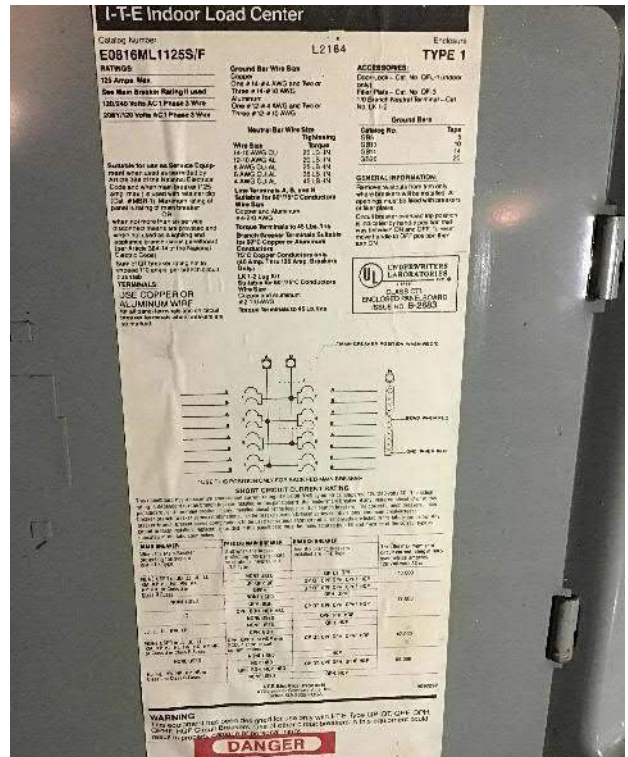
View of breaker box #1 circuit breakers with some schedule labels on the breaker switches.



View of breaker box #1 circuit breaker schedule on the inside of the panel cover.



View of breaker box #2 circuit breakers with some schedule labels on the breaker switches.



View of breaker box #2 model information and specifications.

713 Sagamore Avenue



Source: Google Maps – October 2018

View of 713 Sagamore Avenue from the road with trees and small retaining wall in the front, facing Southwest.



Source: Google Maps – October 2018

View of asphalt and crushed seashell driveway, the location of the proposed sewer service, facing South.



View of retaining wall from the back yard sloping up to the asphalt driveway facing North.



View of retaining wall and proposed sewer service pathway to the road, facing Northeast.

713 Sagamore Avenue (Cont.)



View of proposed sewer pathway through the back yard towards the road facing East.



View of the back of the property facing South



View of raised wooden porch and large planter box along the proposed sewer service pathway, facing Northeast.



View approximate sewer lateral location with septic tank cap in the foreground, facing Northeast.

714 Sagamore Avenue



View of 714 Avenue from the front yard facing Northeast.



View of small shrubs along the front of the house facing Northeast.



View of leach field and small shrubs along the foundation facing Northeast.



View of approximate septic tank location in the Southeast lawn facing Southeast.

714 Sagamore Avenue (Cont.)



View of two large trees in the front yard and proposed sewer service pathway facing West.



View of gutter splash block and crawlspace access under the front porch, facing Northwest.



View of the breaker box with the front panel cover open, facing Southeast.



View of Siemens breaker box circuit breakers and schedule adjacent to the breaker switches.

716 Sagamore Avenue



View of 716 Sagamore Avenue and front yard facing Southeast.



View of Southeast lawn looking towards Sagamore Avenue, facing Southwest.



View of the septic tank location denoted by a wooden bucket in the backyard, facing Southeast.



View of a shed in the back of the property, facing East.

716 Sagamore Avenue (Cont.)



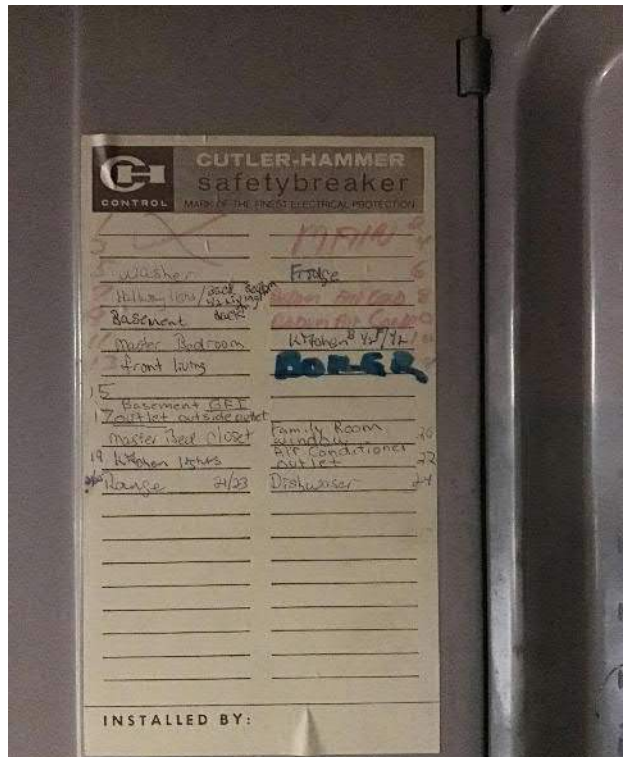
View of boat trailers and tarp structure in the North corner of the property, facing North.



View of small channel drain outside of the rear basement door facing West.



View of breaker box circuit breakers.



View of breaker box circuit breaker schedule on the inside of the panel cover.

749 Sagamore Avenue



View of 749 Sagamore Avenue and proposed sewer service pathway, facing Southwest.



View of asphalt sidewalk, hydrant, and utility pole Northwest of the driveway, facing Northwest.



View of utility pole adjacent to the asphalt driveway, facing South.



View of asphalt sidewalk and granite curb in the front yard crossing the proposed sewer, facing Southeast.

749 Sagamore Avenue (Cont.)



View of a tree, shrubs, and septic tank cap in the front yard, facing Northeast.



View of septic tank location and proposed sewer service pathway towards the road facing Northeast.



View of approximate buried sewer lateral location and pump station cap covered by a flowerpot facing Southwest.



View of small shrubs planted along an asphalt walkway adjacent to the pump station cap facing Southwest.

749 Sagamore Avenue (Cont.)



View of shrubs, trees, and exposed ledge on the East corner of the house facing South.



View of North lawn facing Northwest.

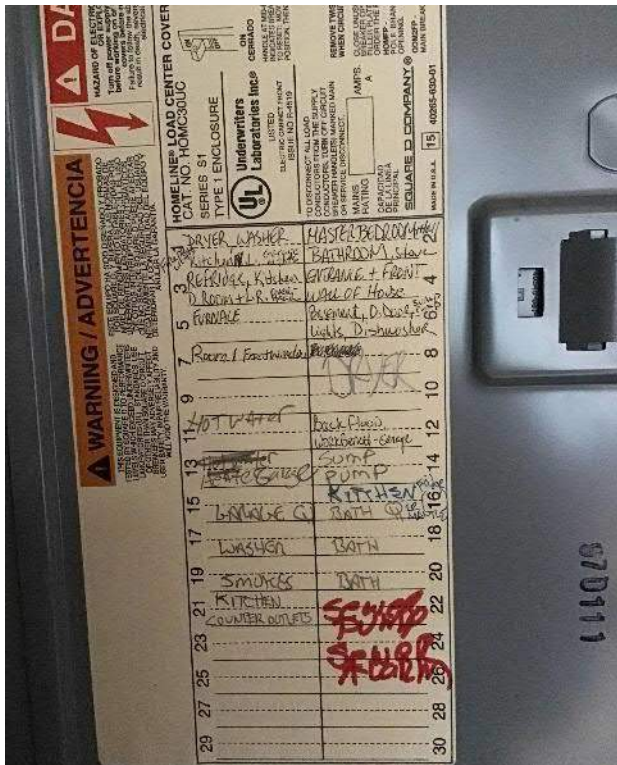


View of the breaker box located on the Southeast interior garage wall facing South.



View of breaker box circuit breakers.

749 Sagamore Avenue (Cont.)



View of breaker box circuit breaker schedule and model information on the inside of the panel cover.

766 Sagamore Avenue



View of 766 Sagamore Avenue asphalt driveway and garage from Cliff Road facing Northwest.



View of the Southeast yard and proposed sewer service pathway, facing West.



View of approximate septic tank location facing Southwest.



View of approximate buried sewer lateral location below the raised wooden porch, facing Northwest.

766 Sagamore Avenue (Cont.)



View of large maple trees along the road and near the proposed sewer service pathway, facing South.



View beneath the raised wooden porch and approximate location of the buried sewer lateral facing Southwest.



View of breaker box #1 located in the basement facing Southwest.



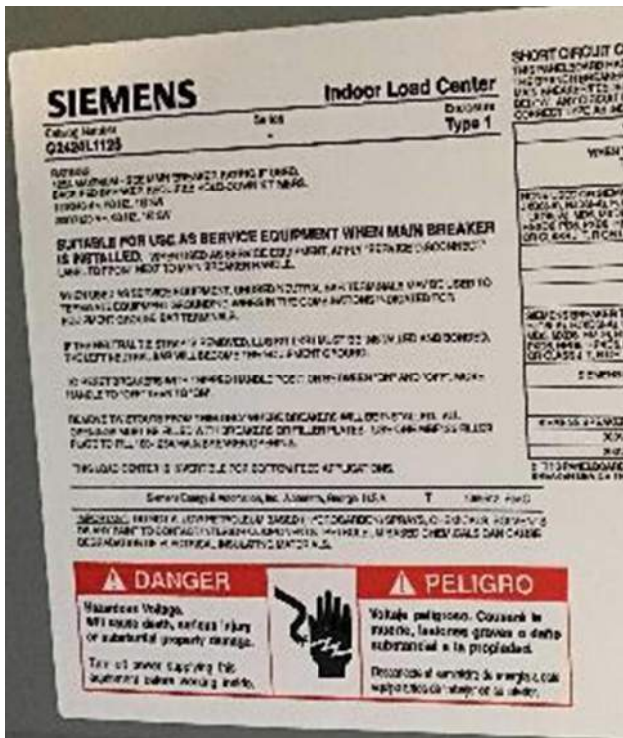
View of breaker box #1 circuit breakers and schedule adjacent to breaker switches.

766 Sagamore Avenue (Cont.)



View of breaker box #1 model information and specifications.

View of breaker box #2 located on the stairs to the basement, facing Northwest.



View of breaker box #2 model information and specifications. The Catalog Number reads: Q2424L1125

792, 794, 796 Sagamore Avenue



View of 792, 794, 796 Sagamore Avenue and asphalt parking lot from the road facing Northwest.



View of asphalt driveway sloping towards Sagamore Avenue facing Southeast.



View of asphalt parking lot along proposed sewer service path and small retaining wall facing Southwest.



View of Northwest yard and proposed sewer service path towards the road facing Southwest.

792, 794, 796 Sagamore Avenue (Cont.)



View of stone edging along the Northwest side of the building, facing South.



View of propane tank cover and stone ending around shrubs along the Northwest property line facing Northeast.



View of fencing around the backyard and shrubs surrounding septic tank caps facing Northeast.



View of septic tank location and five tank caps along the fence facing North

792, 794, 796 Sagamore Avenue (Cont.)



View of the leach field in the backyard facing Southeast.



View of raised porch, brick path, and doors to access utilities facing East.



View of two control panels on the side of a room with a door marked "Septic Controls" facing South.



View within the "Septic Controls" room facing Southeast.

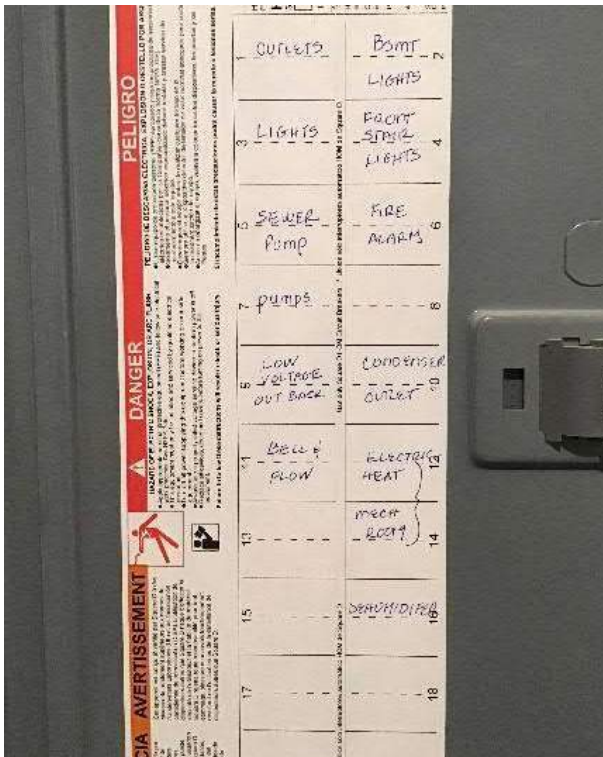
792, 794, 796 Sagamore Avenue (Cont.)



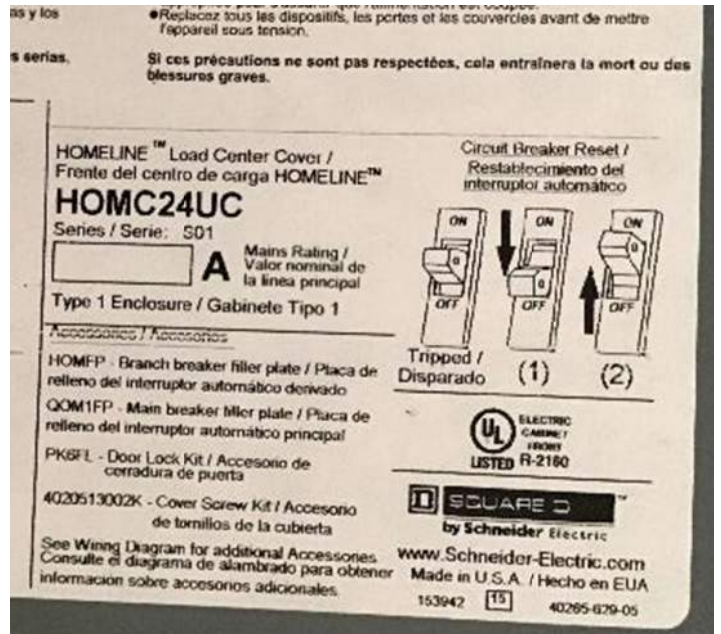
View of the breaker box and surrounding wall space located in a room on the South corner facing Northwest.



View of breaker box circuit breakers.



View of breaker box circuit breaker schedule and model information on the inside of the panel cover.



View of model information and specifications.

910 Sagamore Avenue



View of 910 Sagamore Avenue gravel driveway and shrubs located in the backyard facing Northeast.



View of proposed sewer service path through the backyard towards Sagamore Avenue facing Southwest.



View of rear porch and wooden stairs with shrubs located beneath, facing West.



View of the location of the buried septic tank denoted by a concrete circular cover, facing South.

910 Sagamore Avenue (Cont.)



View of the Northeast side of the house and basement door facing Northwest.



View of approximate location of the buried sewer lateral exiting the rear of the house facing Northwest.



View of approximate buried sewer lateral location and pebbles spread along the house facing Southwest.

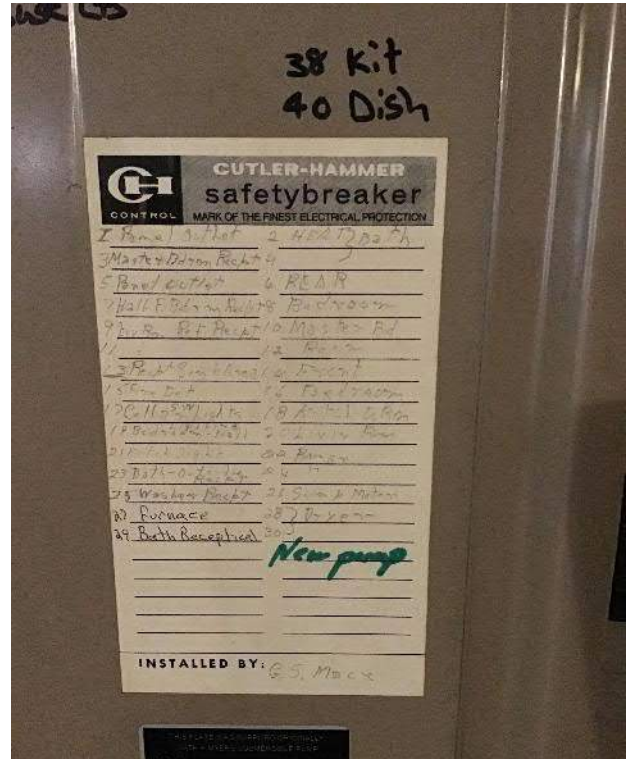


View of the breaker box and surrounding wall space facing Northeast.

910 Sagamore Avenue (Cont.)



View breaker box circuit breakers.



View of breaker box circuit breaker schedule on the inside of the panel cover.

911 Sagamore Avenue



View of 911 Sagamore Avenue from the end of the driveway, facing North.



View of asphalt driveway and granite curb along the edge adjacent to the front lawn facing Southwest.



View of shrubs, landscaping and proposed sewer service path along the driveway facing South.



View of evergreen trees in the front yard close to the dirt road, facing Northwest.

911 Sagamore Avenue (Cont.)



View of front yard and brick path leading to the front door, facing Southeast.



View of raised wooden deck and approximate location of the sewer lateral and septic tank underneath facing North.



View of brick path leading towards the backyard facing Northwest.



View of wooden stairs up to the deck and brick pathway continuing towards the backyard facing Northwest.

912 Sagamore Avenue



View of 912 Sagamore Avenue from the road facing East.



View of location of proposed sewer service facing Northeast.



View of large trees near proposed sewer service pathway towards the road facing West.



View of front yard landscaping and stone path facing East.

912 Sagamore Avenue (Cont.)



View of approximate septic tank location in the front yard, facing Southwest.



View of shrubs on top of approximate buried sewer lateral location facing Southeast.



View of utility pole nearby and front yard landscaping facing East.

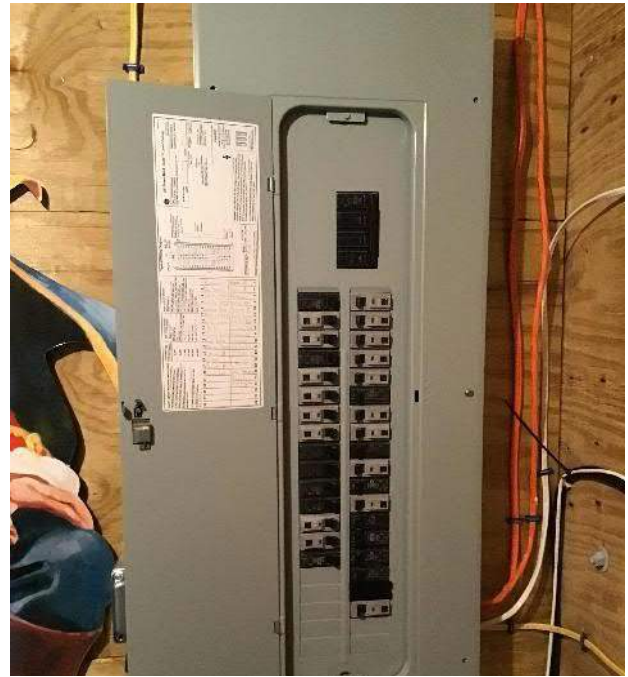


View of propane cover in the Northeast yard and view towards the backyard, facing Southeast.

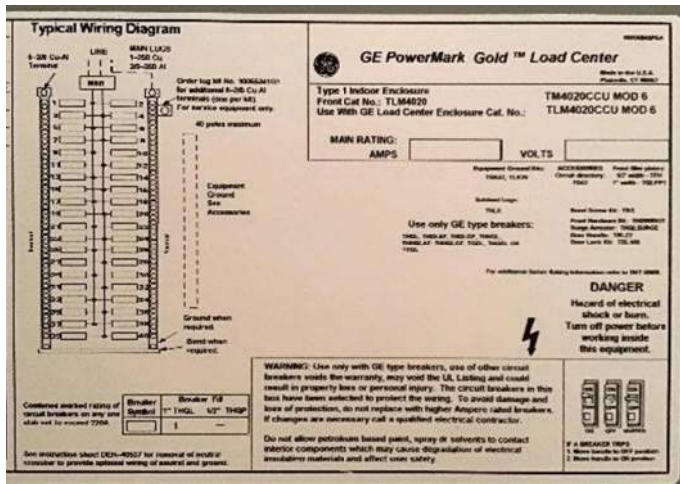
912 Sagamore Avenue (Cont.)



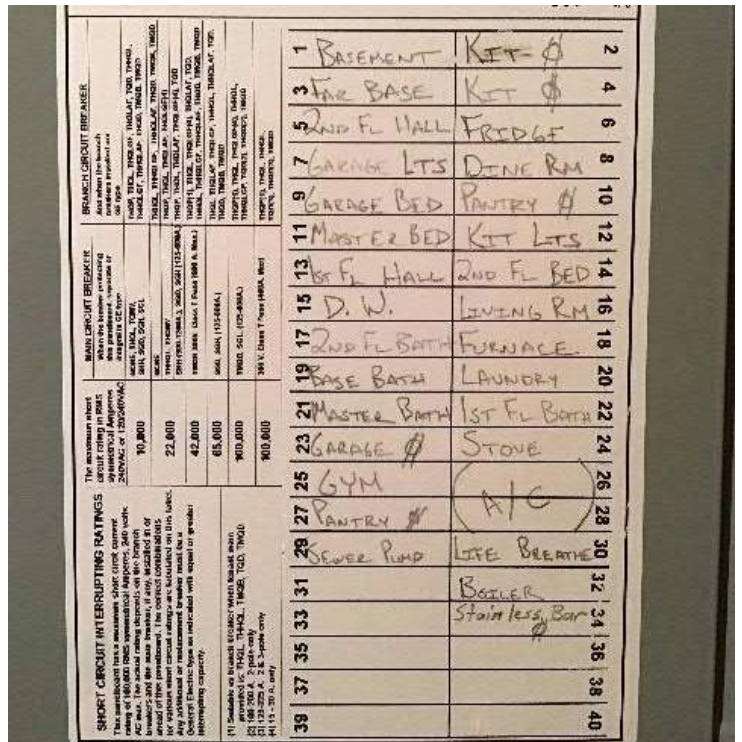
View of breaker box circuit breakers.



View of the breaker box and surrounding wall space facing Northwest.



View of breaker box model information and specifications.



View of breaker box circuit breaker schedule on the inside of the panel cover.

913 Sagamore Avenue



View of 913 Sagamore Avenue and trees located in the front yard facing South.



View of Sagamore Avenue and proposed sewer service path facing Northwest.



View of exposed ledge near the road and driveway facing Northwest.



View of small asphalt driveway out in the front of the house facing Northwest.

913 Sagamore Avenue (Cont.)



View of asphalt drive along the East yard facing Northeast.



View of paper birch trees in the front yard near proposed sewer service path facing East.



View of septic tank cap and tank located in the Northeast yard near the drive facing East.



View of underground electrical service and approximate buried sewer lateral location to the house facing Southwest.

915 Sagamore Avenue



Source: Google Maps – October 2018

View of 915 Sagamore Avenue and asphalt parking lot in the front facing Southwest.



View of proposed sewer service path along the front of the building facing Northwest.



View of Southeast yard adjacent to the parking lot facing South.



View of Southeast yard adjacent to the parking lot facing Southwest.

915 Sagamore Avenue (Cont.)



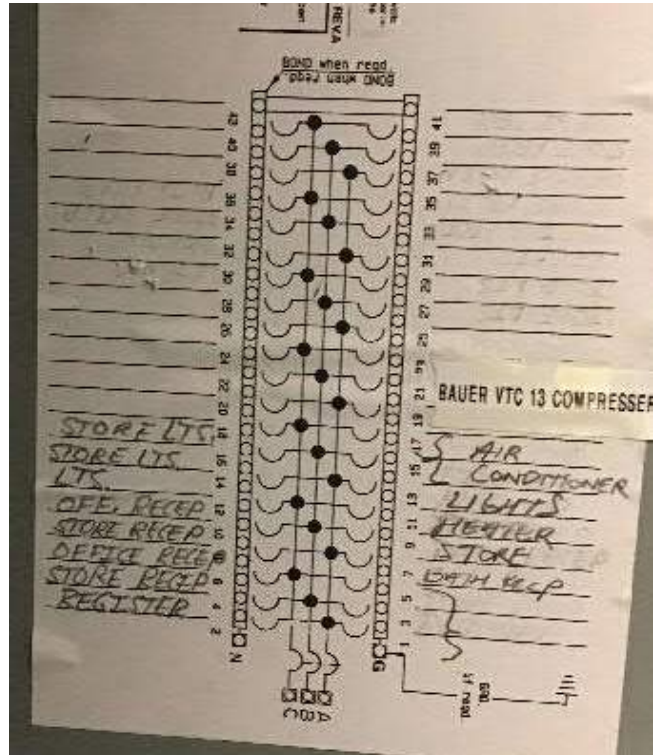
View of approximate location of the septic tank in the Southeast yard facing Southwest.



View of breaker box #1 and surrounded wall space located in a closet on the first floor facing Northwest.

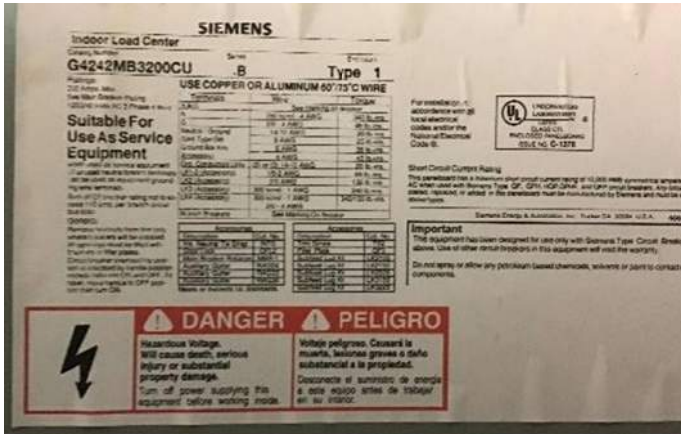


View of breaker box #1 circuit breakers.



View of breaker box #1 circuit breaker schedule on the inside of the panel cover.

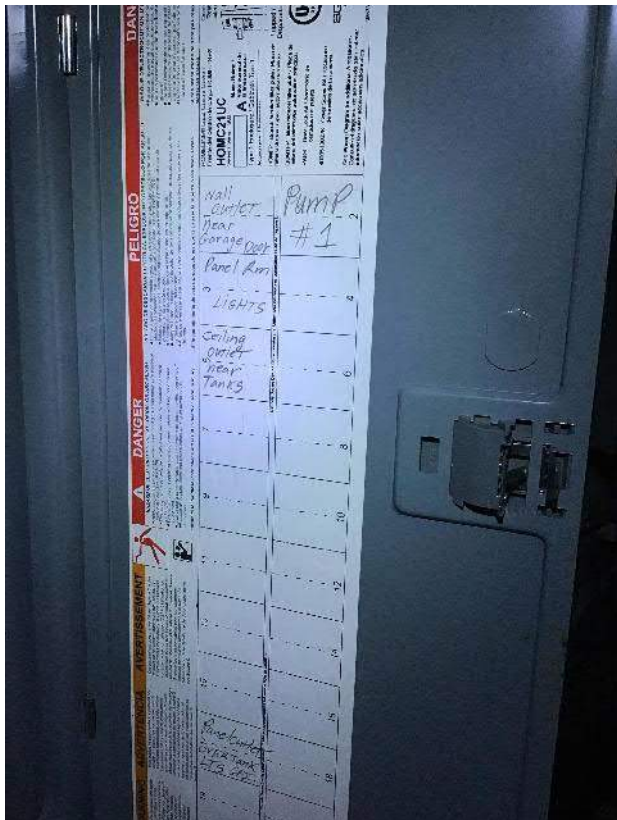
915 Sagamore Avenue (Cont.)



View of breaker box #1 model information and specifications.



View of breaker box #2 circuit breakers located in the basement facing Southwest.



View of breaker box #2 circuit breaker schedule on the inside of the panel cover.

960 Sagamore Avenue



View of 960 Sagamore Avenue from the road facing Northeast.



View of the rear gravel parking lot and approximate location of buried concrete tanks facing Southwest.



View of propane tank located in the woods behind the building facing Southeast.



View of HVAC ducts beneath the building facing Southwest.

960 Sagamore Avenue (Cont.)



View of PVC cleanout behind the building near shrubs and an AC unit facing West.



View of AC units and concrete retaining wall along the rear of the building facing Northwest.



View concrete retaining wall and wooden steps to access the basement door facing Southeast.



View of large crack and spalling in the concrete retaining wall facing Southwest.

960 Sagamore Avenue (Cont.)



View of crack in the concrete retaining wall due to overturning facing Southwest.



View of second crack in the concrete retaining wall due to overturning facing Southwest.

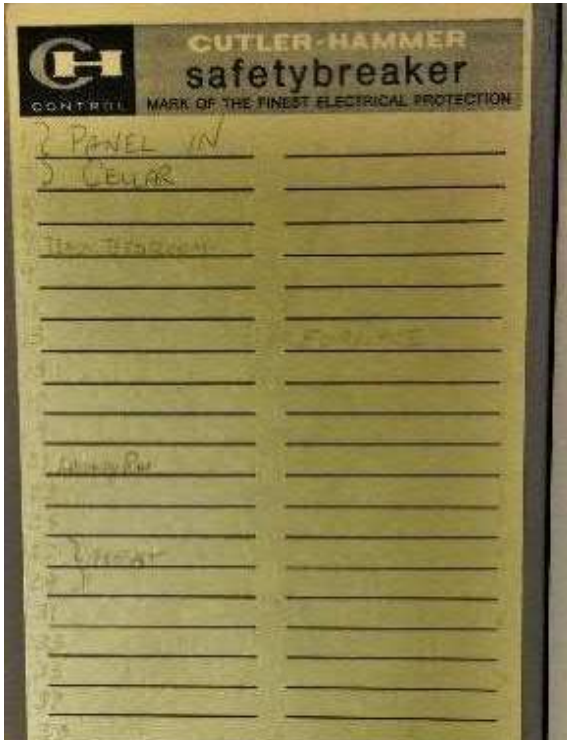


View of approximate existing sewer lateral location facing South.



View of breaker box #1 circuit breakers.

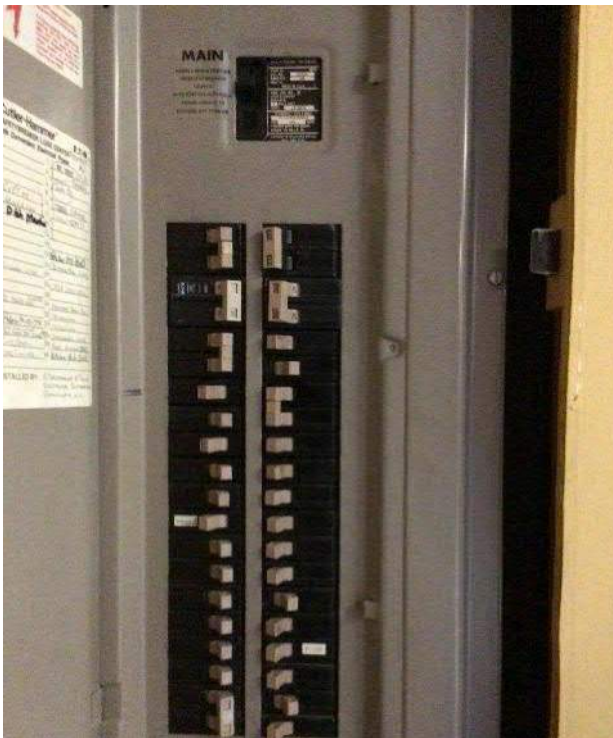
960 Sagamore Avenue (Cont.)



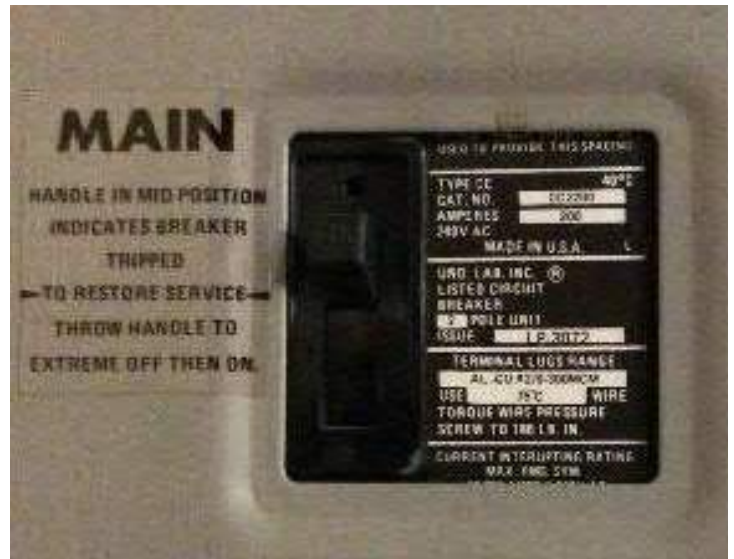
View of breaker box #1 circuit breaker schedule on the inside of the panel cover.



View of breaker box #2 and surrounding wall space facing Northeast.

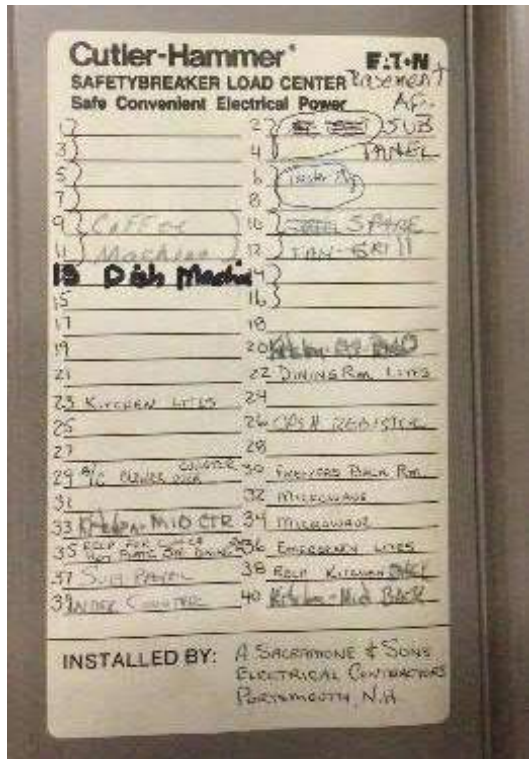


View of breaker box #3 circuit breakers.



View of breaker box #3 main breaker and model information and specifications.

960 Sagamore Avenue (Cont.)



View of breaker box #3 circuit breaker schedule on the inside of the panel cover.

1145 Sagamore Avenue



Source: Google Maps – October 2018

View of the 1145 property from Sagamore Avenue facing Southwest.



View of the proposed sewer service path through the asphalt parking lot towards Sagamore Avenue facing East.



View of the location of the septic tank and manholes in the North parking lot facing West.



View of the entrance to the crawlspace and air conditioning unit to the right standing in the North

1145 Sagamore Avenue (Cont.)



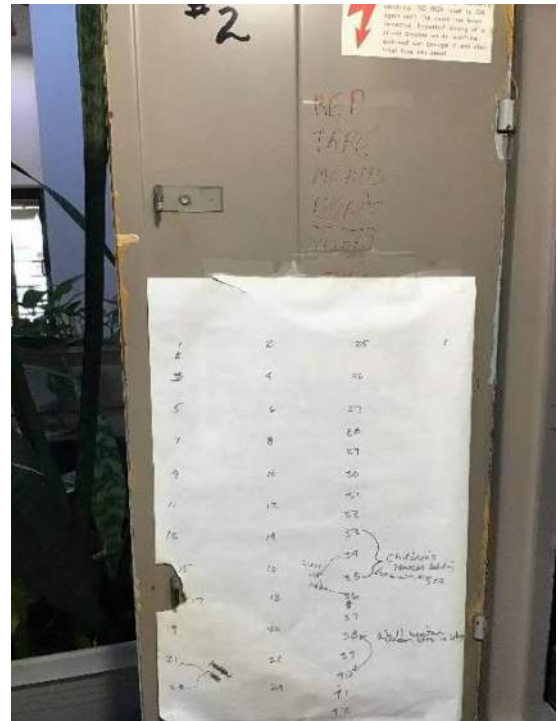
View of breaker box #1 panel and circuit breakers.



View inside of breaker box #1 panel cover with model number.



View of breaker box #2 circuit breakers located on the wall in the main lobby on the first floor.

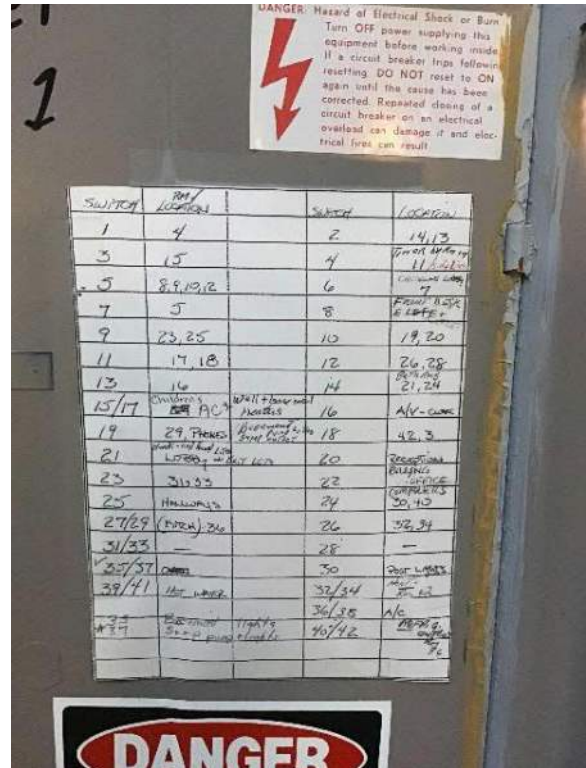


View inside breaker box #2 panel cover and panel schedule.

1145 Sagamore Avenue (Cont.)



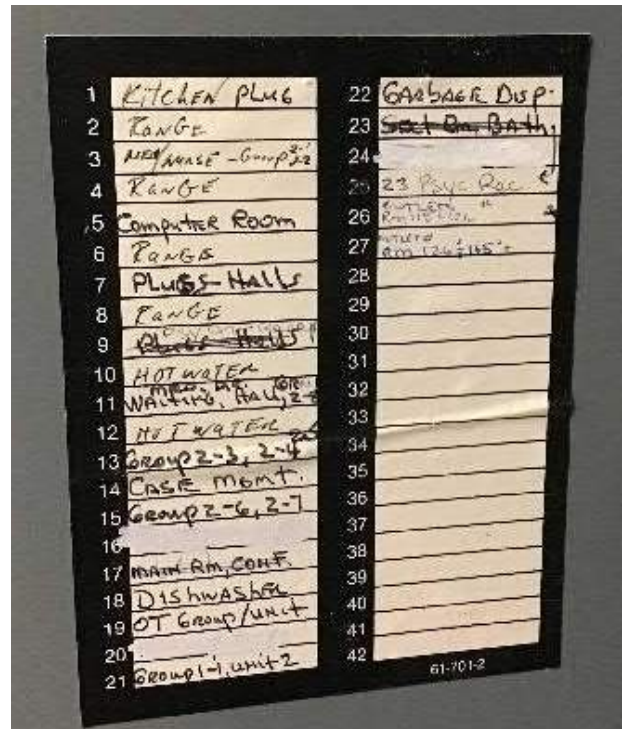
View of breaker box #3 circuit breakers.



View of breaker box #3 panel schedule.



View of breaker box #4 (Challenger) circuit breakers located near the Southwest exit from the building facing South

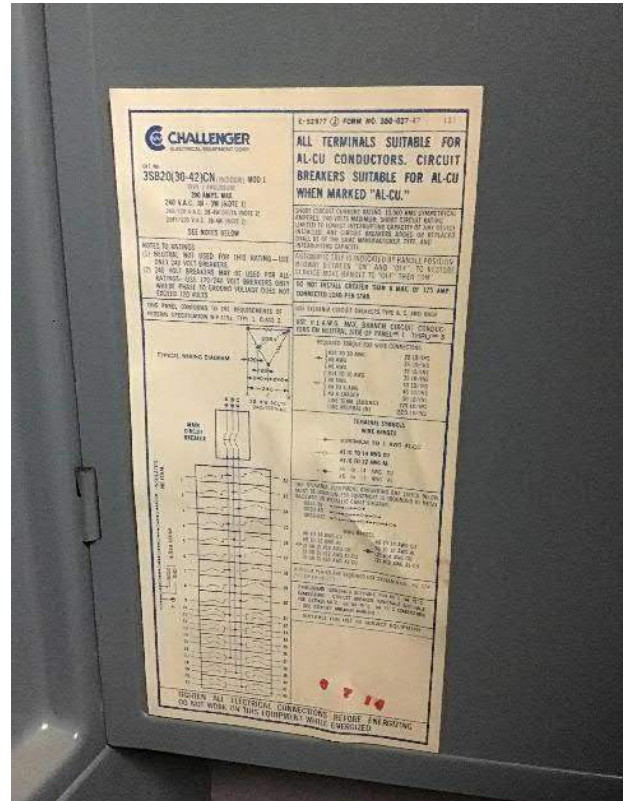


View inside breaker box #4 panel cover and panel schedule.

1145 Sagamore Avenue (Cont.)



View of 200A breaker box #5 circuit breakers and schedule located to the right of box #4.



View of breaker box #5 specifications and model number.



View of breaker box #5 schedule.



View of breaker box #4 and #5 on the right located in a closet near the Southwest exit from the building facing South.

1145 Sagamore Avenue (Cont.)



View of the Southwest exit and exterior location of breaker box #4 and #5 facing West



View of the Southwest exit and exterior location of breaker box #4 and #5 facing Northwest

1149 Sagamore Avenue



View of 1149 Sagamore Avenue and parking lot from the road facing Southwest



View of the septic tank and cover in the South yard of 1145 Sagamore Avenue facing North.



View of proposed sewer service path through the asphalt parking lot towards Sagamore Avenue facing Northeast.



View of shrubs and mulch against the North wall of the building on top of sewer lateral facing Southwest.

1149 Sagamore Avenue (Cont.)



View of breaker box #2 circuit breakers located on the wall in the first-floor main lobby.

1150 Sagamore Avenue



Source: Google Maps – October 2018

View of 1150 Sagamore Avenue from the road facing East.



View of West exterior wall and shrubs and landscaping facing East.



View of septic tank caps hidden within the shrubs on the West side of the building facing East.



View of septic tank caps hidden within the shrubs on the West side of the building facing North.

1150 Sagamore Avenue (Cont.)



View of holding tank caps within the shrubs on the West side of the building facing South.



View of proposed sewer service path towards Sagamore Avenue from existing septic tank caps facing West.



View of buried irrigation system on the Northwest corner of the building close to the intersection facing East.



View of West exterior foundation and location of the sewer lateral exiting the foundation towards Sagamore Ave. facing North.

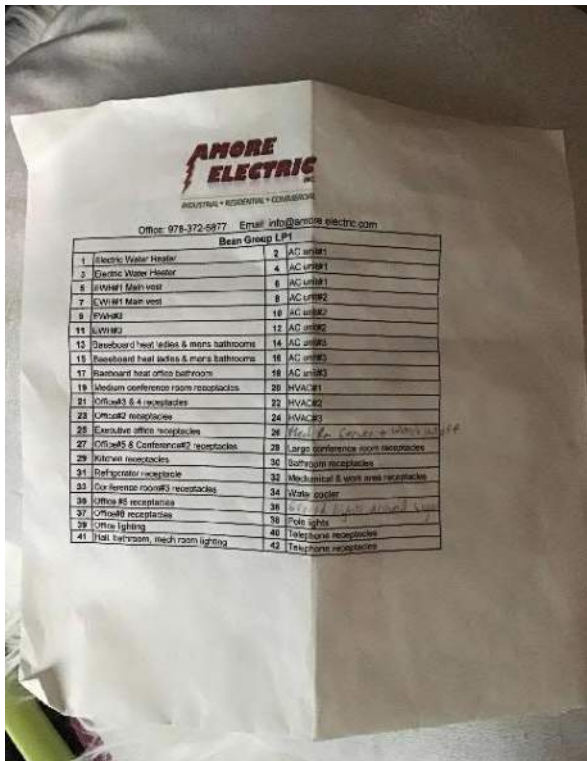
1150 Sagamore Avenue (Cont.)



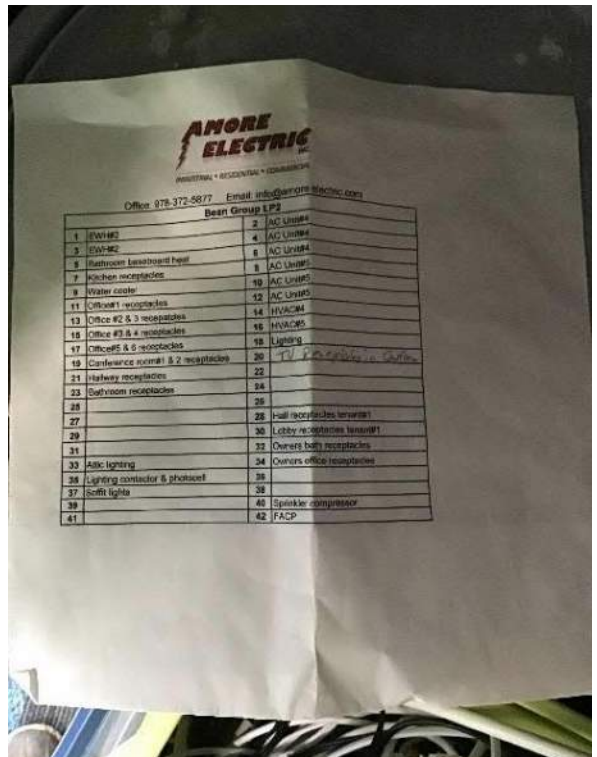
View of fire suppression system in a closet on the West section of the building facing Northwest.



View of fire suppression system in a closet on the West section of the building facing North.

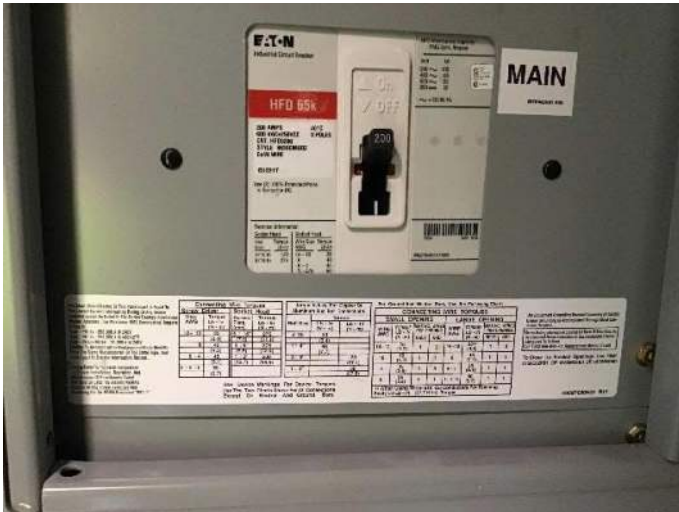


View of breaker box #1 schedule.



View of breaker box #2 schedule.

1150 Sagamore Avenue (Cont.)



View of breaker box #1 (Eaton) 200A main breaker and model information.



View of breaker box #2 (Eaton) 200A main breaker and model information.



View of 200A breaker box #1 breaker panel.



View of breaker box #1 on the left and #2 on the right, located in a closet on the West portion of the building closest to Sagamore Ave. facing Northwest.

1150 Sagamore Avenue (Cont.)



View of breaker box #1 exterior labels when closed.



View of breaker box #2 exterior labels when closed.



View of breaker box #3 labeled LP2-35 and LP2-36 left to right located in the same closed as boxes #1 and #2 facing North.

1155 Sagamore Avenue



View of 1155 Sagamore Avenue from the road facing East.



View of concrete walkway on the South side of the house facing Northeast.



View of septic leach field and backyard facing East.



View of sewer lateral exiting the concrete foundation and cleanout between a bench and bush facing North.

2 Sagamore Grove



View of 2 Sagamore Grove and exposed ledge facing North.



View of the gravel driveway and wooden fence along proposed sewer service path facing North.



View of proposed sewer service path in the West yard facing North.



View of large tree and wooden deck and fence on the West side of the house facing Southeast.

2 Sagamore Grove (Cont.)



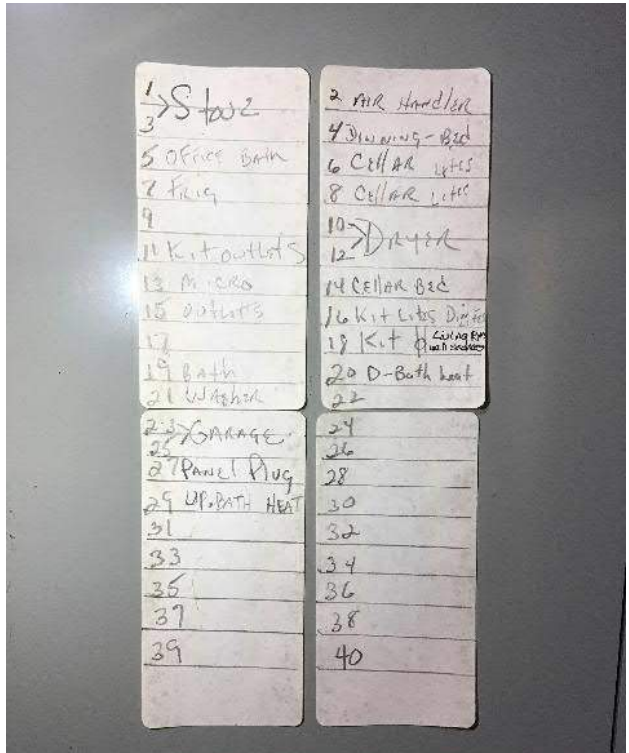
View of cobblestone patio and location of the buried septic tank facing South.



View of manhole cover in the middle of the cobble patio to access septic tank facing Northeast.



View of the breaker box and surrounding wall space located in the crawlspace facing West.



View of the breaker box schedule on the interior of the panel cover.

3 Sagamore Grove



View of 3 Sagamore Grove and retaining wall around the asphalt driveway facing South.



View of shrubs and brush along the asphalt driveway and proposed sewer service path facing South.



View of retaining wall crossing the proposed sewer service path facing West.



View of shrubs and wooden ramp along proposed sewer service path facing North.

3 Sagamore Grove (Cont.)



View of wooden ramp on top of the proposed location for a sewer lateral, facing North.



View of exposed ledge in the backyard next to the outdoor shower, facing Northeast.



View of the backyard and approximate location of the septic tank to the left facing Northeast.



View of PVC plumbing located in the crawlspace underneath the house facing South.

3 Sagamore Grove (Cont.)



View of exposed cast iron lateral exiting the foundation to the backyard, facing Southeast.

4 Sagamore Grove



View of 4 Sagamore Grove and front yard facing Northeast.



View of front yard and approximate location of buried drainage pipe facing Southeast.



View of approximate septic tank location beneath the brick patio in the rear of the house facing Northwest.



View of landscaping, brick patio, and furniture in the rear of the house

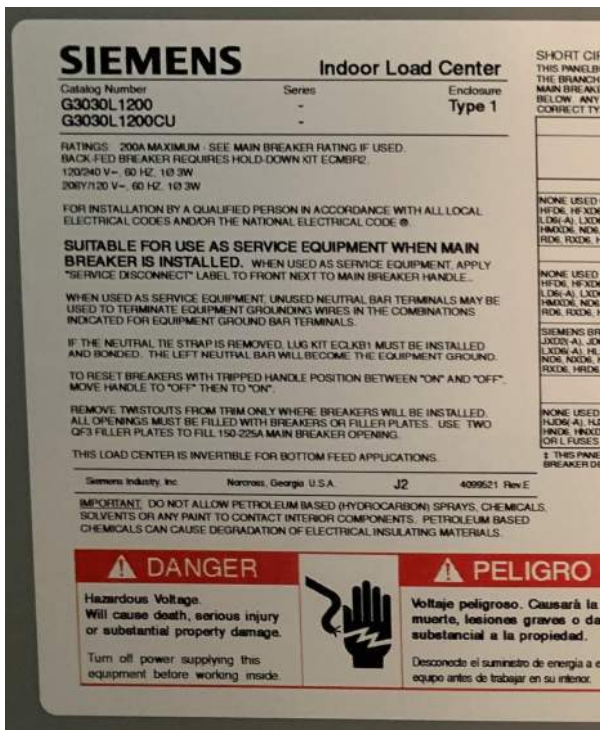
4 Sagamore Grove (Cont.)



View of West yard in front of the house looking towards 2 Sagamore Grove, facing Northwest



View of breaker box #1 circuit breakers and schedule adjacent to the breaker switches.



View of breaker box #1 model information and specifications.

5 Sagamore Grove



View of 5 Sagamore Grove from the front yard, facing East.



View of retaining wall crossing the proposed sewer service pathway facing West.



View of exposed ledge in the front yard on the West side of the property, facing West.



View of approximate location of buried sewer lateral underneath the stone, shrubs, and brick, facing Southeast.

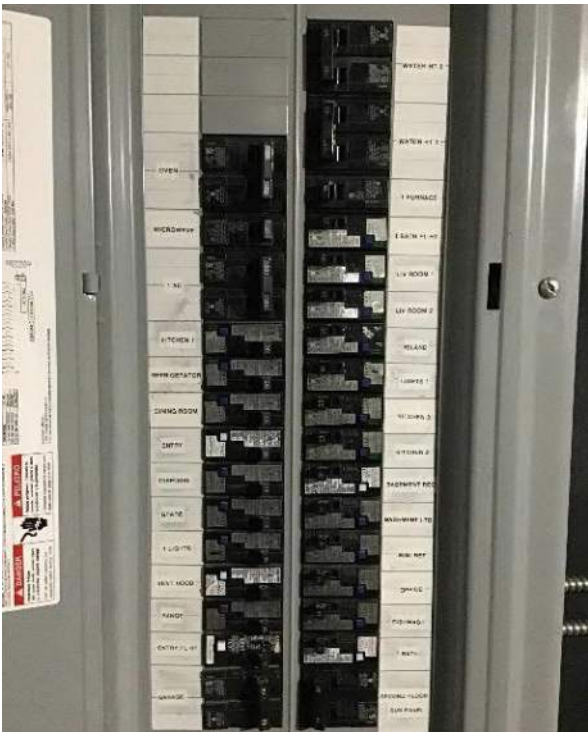
5 Sagamore Grove (Cont.)



View of shrubs and pick walkway in front of the house, facing Northeast.



View of approximate location of the buried sewer lateral exiting the foundation, facing Southeast.



View of breaker box #1 circuit breakers and schedule adjacent to the breaker switches.

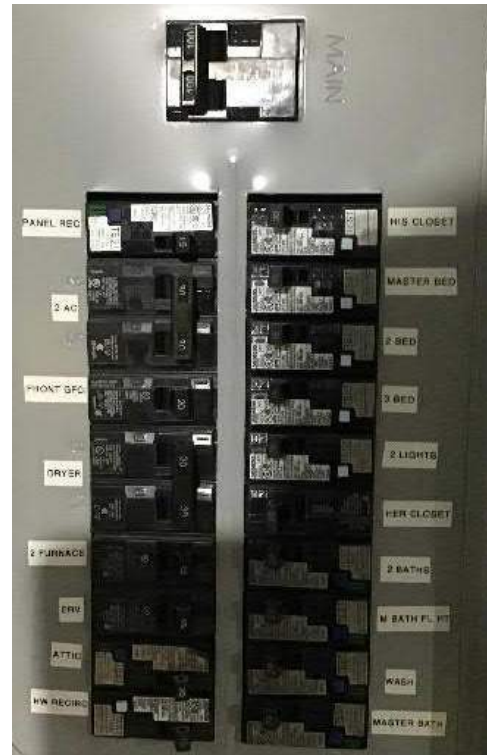


View of breaker box #1 model information and specifications.

5 Sagamore Grove (Cont.)



View of breaker box #2 located on a basement wall, facing North.



View of breaker box #2 (Siemens) circuit breakers and schedule adjacent to the

6 Sagamore Grove



View of 6 Sagamore Grove and front yard from the driveway facing North.



View of the asphalt driveway looking towards the backyard, facing Northeast.



View of the backyard and proposed sewer service pathway facing North.



View of lawn and tree adjacent the driveway and location of proposed sewer service, facing Northeast.

6 Sagamore Grove (Cont.)



View of the asphalt driveway and location of proposed sewer service to the left of the driveway, facing West.



View of exposed sewer lateral located underneath the wooden deck facing Southwest.



View underneath the wooden deck with sewer lateral and tank alarm system, facing Southwest.



View of breaker box #1 located in the basement facing West.

11 Sagamore Grove



View of 11 Sagamore Grove property from Sagamore Grove facing Northeast



View of wooden fence and asphalt driveway West of the proposed sewer service path facing South



View of proposed sewer service path towards the road East of the driveway facing South.



Buried propane tank in the East yard facing Northeast

7 Shaw Road



View of 7 Shaw Road from the road facing Northwest.



View of sewer lateral located under the wooden porch and behind the lattice, facing Southwest.

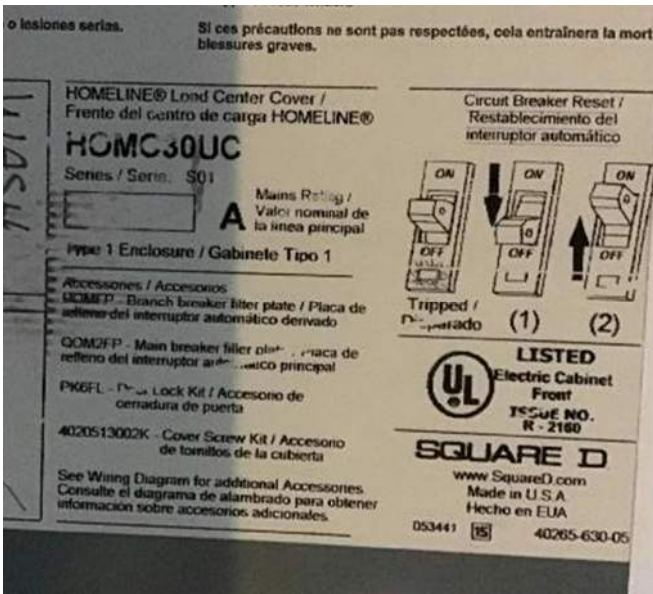


View of exposed PVC sewer lateral exiting the foundation facing Southwest.

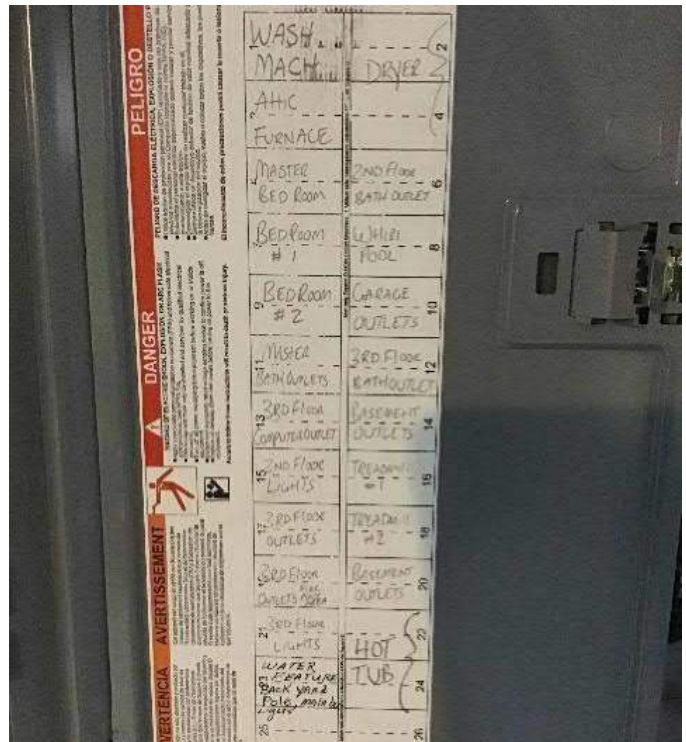


View of breaker boxes (#1 on left) and surrounding wall space located in the garage, facing Northeast.

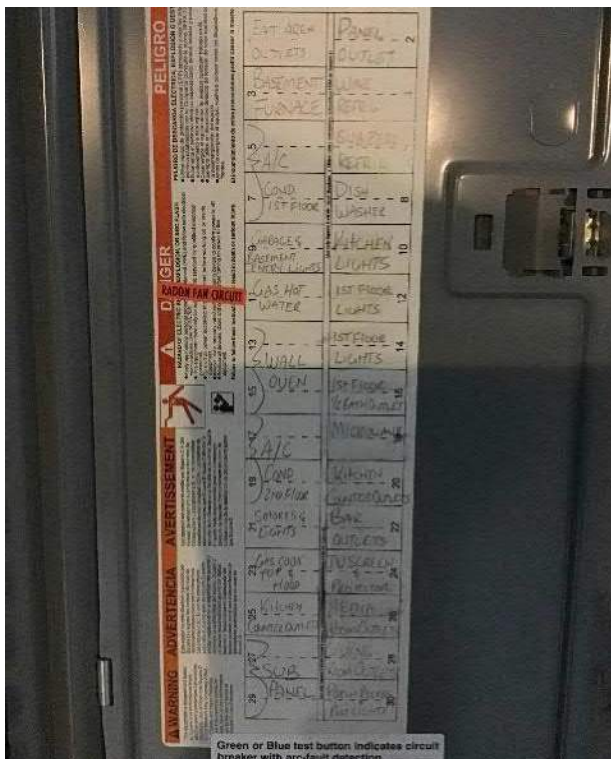
7 Shaw Road (Cont.)



View of model information and specifications, identical for both breaker box #1 and #2.



View of breaker box #1 circuit breaker schedule on the inside of the panel cover.



View of breaker box #2 circuit breaker schedule on the inside of the panel cover.

14 Shaw Road



Source: Google Maps – September 2011

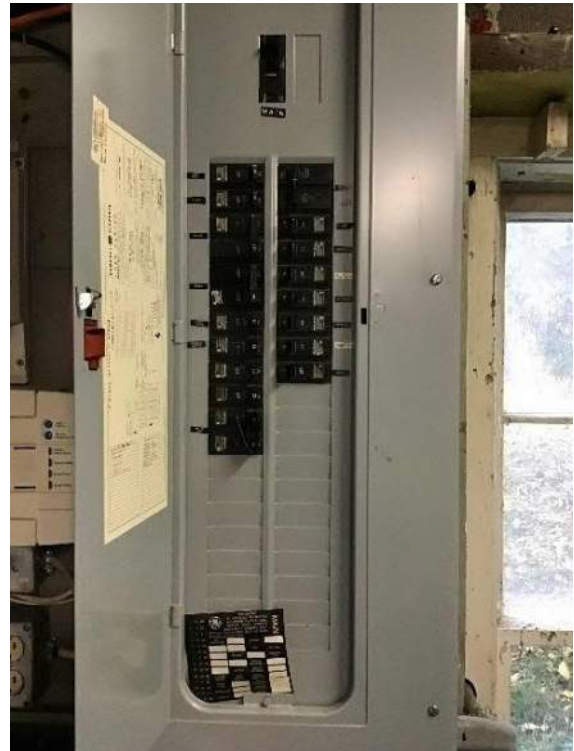
View of 14 Shaw Road from Shaw Road facing Southeast.



View of the Southwest lawn and proposed path for the sewer service facing Northwest.



Exterior view of sewer lateral location facing Northeast.



View of the 200A General Electric breaker box facing Southwest.

17 Shaw Road



View of 17 Shaw Road from the road facing Northwest.



View of front yard and proposed sewer service path towards Shaw Road facing Southeast.



View of the approximate location of buried septic tank adjacent to garage building facing South.



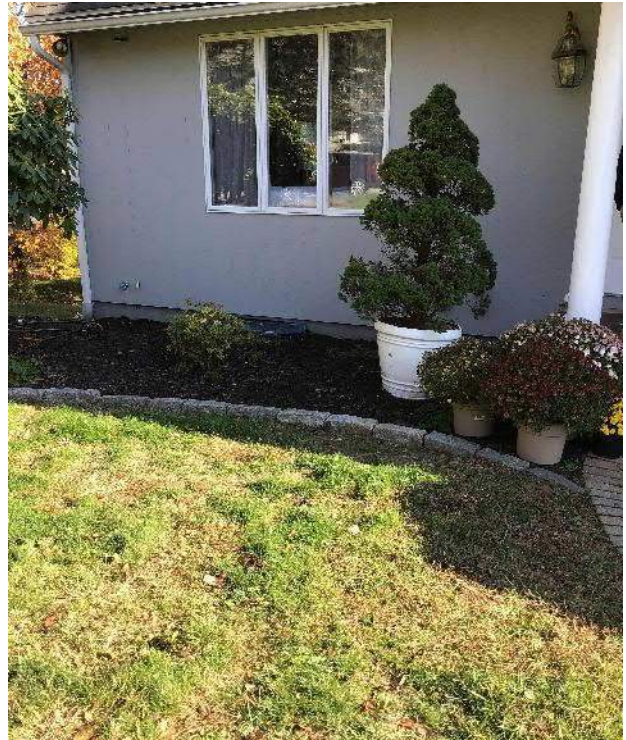
View of the approximate location of the buried sewer lateral leading from the house facing Southwest.

24 Shaw Road



Source: Google Maps - September 2011

View of 24 Shaw Road from the road facing Southeast.



View of landscaping on top of approximate location of buried sewer lateral facing Southeast.

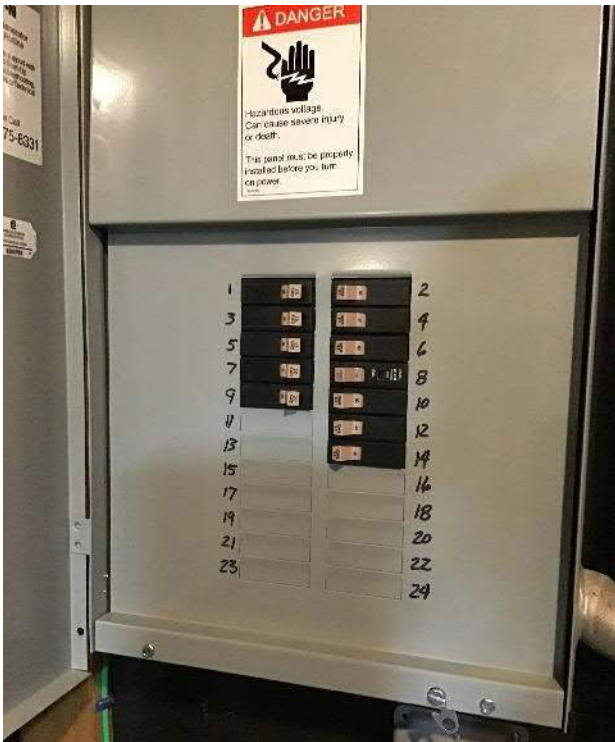


Side view of landscaping and tree near approximate location of buried sewer lateral facing Southwest.

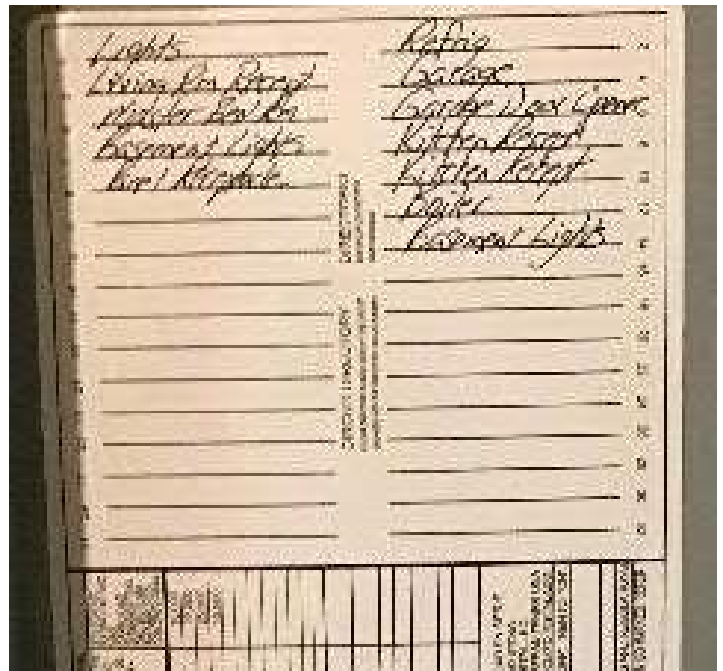


View of breaker box #1 (Eaton) circuit breakers facing Southwest.

24 Shaw Road (Cont.)



View of breaker box #2 (Eaton) circuit breakers adjacent to breaker box #1 facing Southwest.



View of the breaker box #2 schedule on the interior of the panel cover.

27 Shaw Road



View of 27 Shaw Road from the road facing Northwest.



View of small retaining wall and location of the septic tank facing Northwest.



View of the septic tank and approximate location of the sewer lateral underneath the large shrub facing South



View of proposed sewer service pathway and large cedar tree nearby, facing East.

27 Shaw Road (Cont.)



View of large shrubs along proposed sewer service path facing Southeast.



View of catch basin within the shrubs adjacent to the proposed sewer service path facing Southeast.



View of breaker boxes (#1 on left) and surrounding wall space in the basement, facing Southwest.



View of breaker box #1 circuit breakers and schedule adjacent to the breakers.

36 Shaw Road



View of 36 Shaw Road from partway up the driveway facing Southeast.



View of front yard and rain garden adjacent to the garage facing East.



View of rain garden with shrubs and stone landscaping facing Northeast.



View of proposed sewer service pathway through the front yard leading towards the road, facing Northeast.

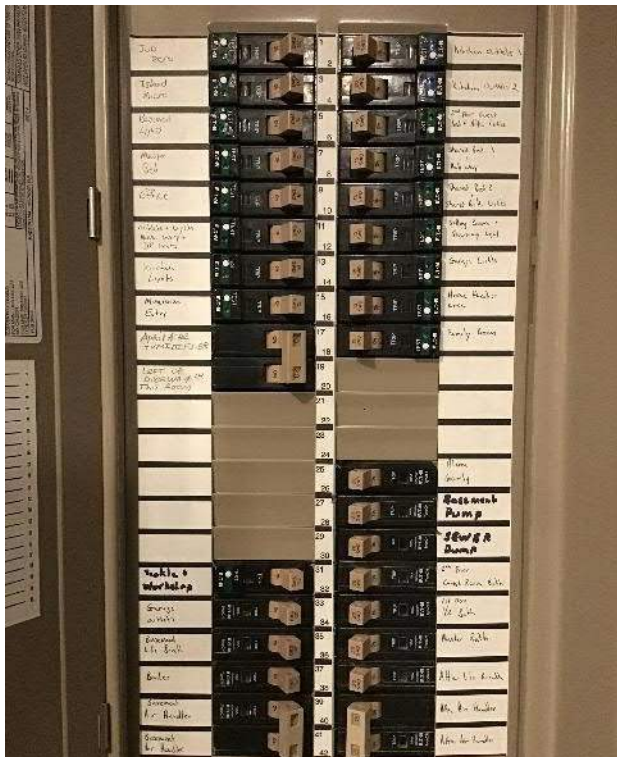
36 Shaw Road (Cont.)



View of the front yard and rain garden from the driveway, facing Northeast.



View of breaker boxes (#1 on left) and solar power electrical system facing South.



View of 200A breaker box #1 (Eaton) circuit breakers and schedule adjacent to the breaker switches.



View of 200A breaker box #2 (Eaton) circuit breakers and schedule adjacent to breaker switches.

16 Walker Bungalow Road



View of 16 Walker Bungalow Road front yard from the driveway facing Southwest.



View of the asphalt driveway leading to the garage facing West.



View of the front yard and asphalt driveway leading down toward Walker Bungalow Road facing East.



View of trees and stone retaining wall running along the North edge of the driveway adjacent to proposed sewer service pathway facing Northeast.

16 Walker Bungalow Road (Cont.)



View of wooden retaining wall separating the backyard and asphalt driveway, adjacent to the garage facing Southwest.



View of wooden deck covering the location of where the buried sewer lateral exits the foundation facing East.



View of brick walkway and landscaping in the backyard facing East.



View of brick stairs and landscaping planted along the wooden retaining wall facing Northeast.

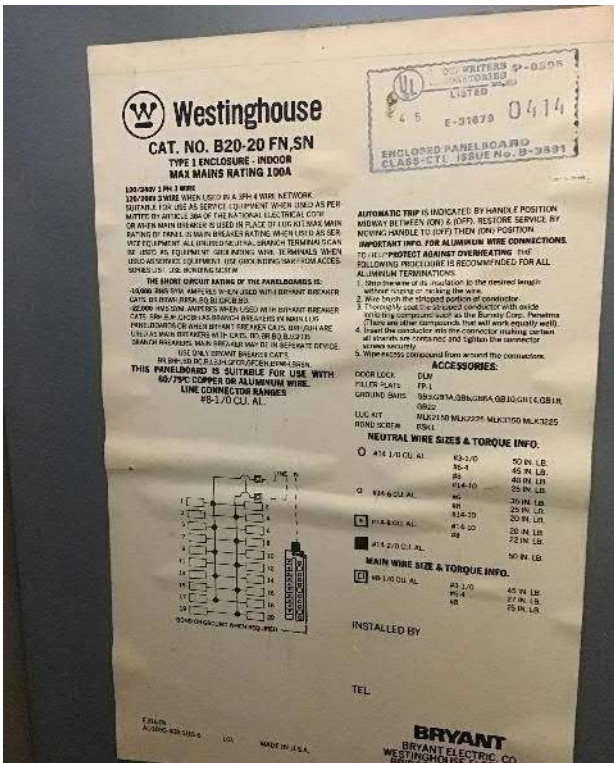
16 Walker Bungalow Road (Cont.)



View of the surrounding wall space around the breaker box and transfer switch facing Northwest



View of circuit breakers and schedule adjacent to breaker switches.



View of 100A breaker box model information and specifications.



View of manual transfer switch front panel and schedule adjacent to the breaker switches.

40 Walker Bungalow Road



View of 40 Walker Bungalow Road and large retaining wall around the driveway from the road, facing Southwest.



View of retaining wall and asphalt driveway facing Northwest.



View of second retaining wall in front of the house facing South.



View of asphalt driveway and proposed sewer service path through the driveway, facing Northwest.

40 Walker Bungalow Road (Cont.)



View from the top of the retaining wall down towards the road facing Northeast.



View of proposed sewer service pathway around the North wall of the garage, facing Northeast.



View of approximate location of buried sewer lateral, facing East.



View of approximate location of buried septic tank and pump station, facing Northeast.

40 Walker Bungalow Road (Cont.)



View of exposed ledge near approximate septic tank location, facing East.



View of the leach field located in the woods in the back of the property, facing Southwest.



View from the leach field towards the pump station and septic tank near the house, facing Northeast.

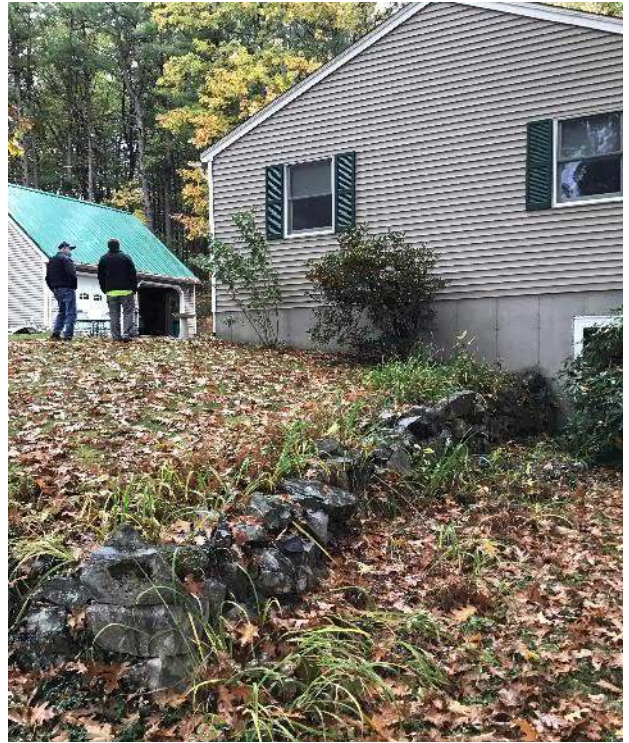


View of the breaker box with front panel cover open, facing Northwest.

58 Walker Bungalow Road



View of 58 Walker Bungalow Road front yard with exposed ledge and shrubs, facing West.



View of small stone retaining wall and landscaping in the south yard, facing Northwest.



View of shrub and utility pole near proposed sewer service pathway facing East.



View of shrubs and trees in front yard facing East.

58 Walker Bungalow Road (Cont.)



View of approximate location of buried sewer lateral and septic tank in the backyard facing North.



View of location of septic tank noted by the torn-up turf, facing East.



View of Siemens breaker box circuit breakers and schedule adjacent to the breaker switches.

72 Walker Bungalow Road



View of 72 Walker Bungalow Road and proposed sewer service pathway facing West.



View of the front lawn and proposed sewer service path facing East.



View of front lawn and location of proposed sewer service facing North.



View of asphalt driveway and concrete apron for the garage, facing Northwest.

86 Walker Bungalow Road



View of 86 Walker Bungalow Road and front yard from the road facing South.



View of shrubs and gardening on top of approximate location of buried sewer lateral facing Southwest.



View of approximate water service location running underneath a brick walkway facing Southwest.

93 Walker Bungalow Road



View of 93 Walker Bungalow Road and approximate location of the septic tank facing North.



View of small tree on the South corner of the house facing Northwest.



View of proposed sewer service pathway towards the East corner of the house facing Northeast.



View of the electricity meter on the Southeast side of the house, facing Northwest.

93 Walker Bungalow Road (Cont.)



View of propane cover in the Southeast yard facing East.



View of small shrub and utility pole near the road facing Southeast.



View of propane cover, shrub and pole near proposed sewer service path facing Southwest.



View of proposed sewer service path through the Southeast yard towards the road facing Southwest.

93 Walker Bungalow Road



View of the backyard and back of the property facing Northeast.



View of the East corner of the house and approximate sewer lateral location covered by shrubs facing North.



View of raised wooden porch in the rear of the house with wooden stairs near the sewer lateral, facing Southwest.



View underneath the raised wooden porch facing Southwest.

93 Walker Bungalow Road (Cont.)



View of the backyard facing West.



View of breaker box front panel and circuit breakers facing North.

93 WALKER BUNGALOW ROAD		ELECTRICAL PANEL		UPDATED NOVEMBER 2017	
1			Full Bathroom O/L	20A	2
30A	Generator		HRV & Hot Water Heater O/L	15A	4
3					
5			Dehydration Room Subpanel	90A	6
50A	Oven & Range				8
7					
9	15A	Boiler / Furnace	Living Room O/L	20A	10
11	20A	Pantry O/L	Refrigerator	20A	12
13	15A	Rear Bed Rm & Attic O/L & Lights	Sump / Sewer Pump	20A	14
15	15A	Front Bed Room O/L & Lights	Kitchen, Dining & Deck Lights	15A	16
17	15A	Master Bed Room O/Ls & Master Closet Lights	Family Room Lights	15A	18
19	20A	Master Closet O/L	Office O/L & Lights	15A	20
21	20A	Master Bathroom O/L	Den Lights & O/L	15A	22
23	15A	Upstairs Hallway Lights & O/L	Hall & Front Porch Lights & O/L, Pantry & 1/2 Bath Lights	15A	24
25	15A	Full & Master Bathroom Lights	Kitchen O/L - Island & South East	20A	26A
			Kitchen O/L - West & Brwn Windows	20A	26B
27	20A	Stove Hood	Dishwasher	20A	28A
			1 st Floor 1/2 Bath O/L	20A	28B
29			Laundry Lights	15A	30
30A					
31			Smoke Detectors	15A	32
33	20A	Basement Bathroom O/L	Craft Room & South Laundry O/L	20A	34
35	20A	Outside O/L	Mud, Side Porch, N-Bath, Craft & Mech Rm Lights & Side Porch O/L	15A	36
37			Washing Machine O/L	20A	38
60A					
39			Mud Room & Craft Room O/L	15A	40

View of breaker box circuit breaker schedule on the inside of the panel cover.

93 WALKER BUNGALOW ROAD		ELECTRICAL PANEL		UPDATED NOVEMBER 2017	
ATTIC LIGHTS		13			
OUTLETS		13			
UPSTAIRS LIGHTS					
	• Bathroom, Full	25			
	• Bathroom, Master	25			
	• Bed Room, Front	15			
	• Bed Room, Rear	13			
	• Hallway	23			
	• Master Bed Room	17			
	• Master Closet	17			
OUTLETS					
	• Bathroom, Full	2			
	• Bathroom, Master	21			
	• Bed Room, Front	15			
	• Bed Room, Rear	13			
	• Hallway	23			
	• Master Bed Room	17			
	• Master BR Closet	19			
MAIN FLOOR LIGHTS					
	• Bathroom, Hall	24			
	• Dining Room	16			
	• Den	22			
	• Kitchen	24			
	• Hallway	16			
	• Living Room	18			
	• Office	20			
	• Pantry	24			
OUTLETS					
	• Bathroom, Hall	26B			
	• Dining Room	19			
	• Den	22			
	• Hallway	24			
	• Kitchen				
	• Island & either side of range	26A			
	• Sink wall & between windows	26B			
	• Refrigerator	12			
	• Range / Oven	5			
	• Living Room	19			
	• Office	20			
	• Pantry	11			
APPLIANCES					
	• Dishwasher	28A			
	• Stove Hood	27			
	• Range/Oven	5/7			
	• Refrigerator	12			
BASEMENT LIGHTS					
	• Bathroom, 1/2	30			
	• Vanity	33			
	• Shower	38			
	• Craft Room	38			
	• Craft Room Closet	30			
	• Dehydration Room	16			
	• Laundry Room	30			
	• Mechanical Room	36			
	• Mud Room	36			
	• Recreation Room	30			
OUTLETS					
	• Bathroom, 1/2	33			
	• Craft Room				
	• Lower 15A	40			
	• 20A Upper 6A	40			
	• Craft Room Closet	40			
	• Laundry Room	40			
	• South Wall	34			
	• West Wall	34			
	• Washer	38			
	• North & East Walls	38			
	• Dryer	25			
	• Sump Pump	14			
	• Mechanical Room	38			
	• Left of Panel	34			
	• Right of Panel	34			
	• HRV & Water Heater	4			
	• Ejector Pump	40			
	• Mud Room	40			
	• Recreation Room	40			
MECHANICAL & APPLIANCES					
	• Boiler/Furnace	9			
	• Dehydration Facility Subpanel	6/8			
	• Dryer	29/31			
	• Ejector Pump Outlet	14			
	• Generator Feed	1			
	• HRV & Hot Water Heater O/L	4			
	• Smoke Detectors	20			
	• Solar Shed / Photo Voltaic Feed	37/39			
	• Sump Pump (Laundry Rm)	14			
	• Washing Machine O/L	38			
EXTERIOR LIGHTS					
	• Deck	16			
	• Dehydration Room	24			
	• Front Porch	36			
	• Side Porch & Rear NE Corner	36			
OUTLETS					
	• Deck	16			
	• Front Porch	36			
	• Side Porch	36			
	• Under Deck	3			

Continued view of breaker box circuit breaker schedule on the inside of the panel cover.

140 Walker Bungalow Road



View of 140 Walker Bungalow Road from Walker Bungalow Road facing West.



View of the paved driveway and gravel area to the left where the proposed sewer service will be facing Southwest



View of the proposed path for the sewer service and shrubs and wood pile obstacles facing Northeast.



View of wooden fence obstacle dividing the backyard and gravel area facing West.

140 Walker Bungalow Road (Cont.)



View of buried septic tank, sewer lateral location and planter boxes set up on top, facing Northwest.



View of buried storm drain pipe running under the fence and access hatch facing North.



View inside drain manhole in the yard facing North.



View of 200A breaker panel #1 wall space located on the Southeast exterior wall of the garage facing Southeast

140 Walker Bungalow Road (Cont.)



View of 200A breaker box #1 (Siemens) breakers and schedule adjacent to breaker switches.



Continued view of 200A breaker box #1 circuit breakers and schedule adjacent to the breakers.



View of breaker box #2 panel and interior panel located in the basement.

147 Walker Bungalow Road



Source: Google Maps – September 2011

View of 147 Walker Bungalow Road from Walker Bungalow Road facing Northeast.



View of 147 mailbox and large stone along proposed sewer service path facing Northeast.



View of asphalt driveway and the proposed sewer path to the left facing West.



View of planter boxes, shrubs, and gardening on top of the buried septic tank and along the proposed path of the sewer service facing South.

147 Walker Bungalow Road (Cont.)



View of buried septic tank and lateral at the bottom of the frame standing adjacent to exterior garage wall facing Southwest.



Exterior view of the exterior garage wall and location of sewer lateral exiting the foundation facing West.

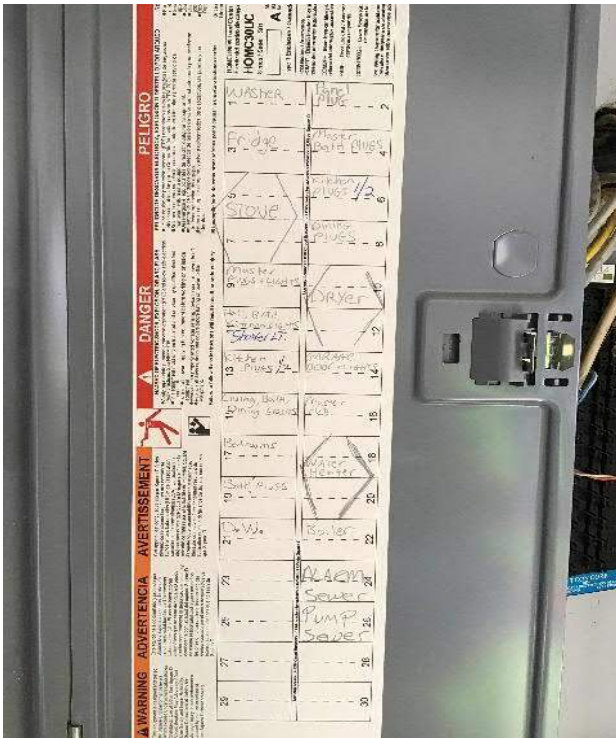


View of the breaker box and wall space adjacent to the garage door facing Southeast.

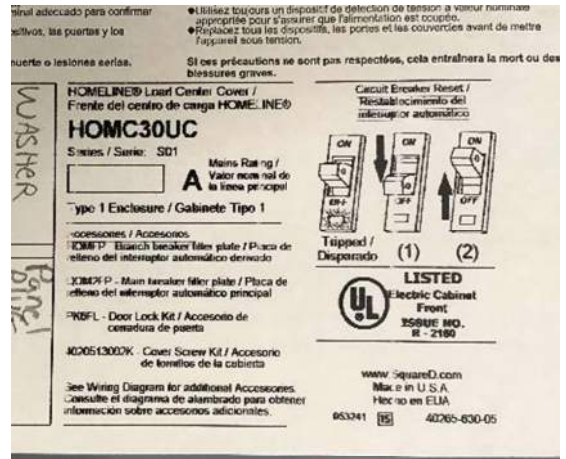


View of the breaker box open and circuit breakers facing Northwest.

147 Walker Bungalow Road (Cont.)



View of the circuit breaker schedule on the inside of the panel cover.



View of breaker box model information and specifications.

159 Walker Bungalow



View of 159 Walker Bungalow Road and buried septic tank off the Southwest corner of the house, adjacent to the asphalt driveway facing East.



View of South corner of the house and with shrubs along the front and a retaining wall is in the forefront of the photo, facing Northeast.



View of breaker box, transfer switch and their surrounding wall space facing Southeast.



View of 200A Siemens breaker panel and schedule adjacent to breaker switches.

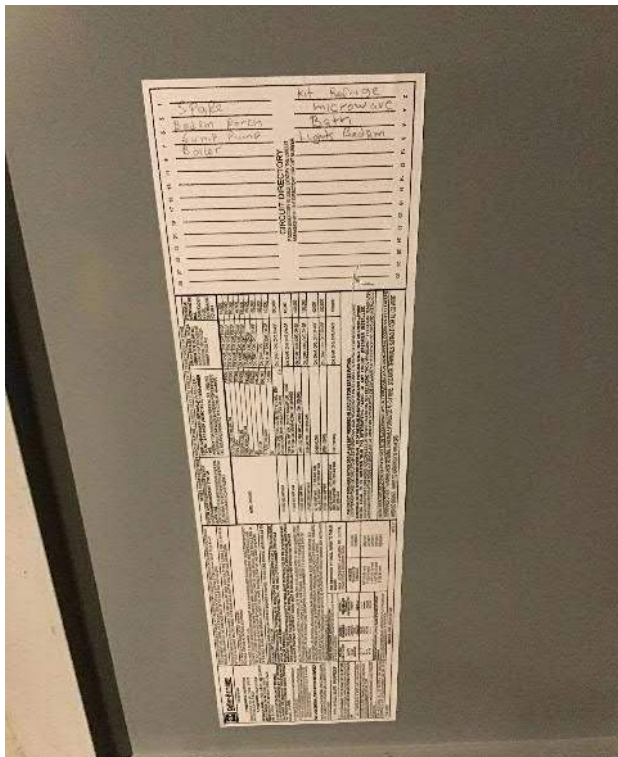
159 Walker Bungalow Road (Cont.)



View of transfer switch with panel cover open.



View of transfer switch front panel.



View transfer switch schedule, model information and specifications.

171 Walker Bungalow Road



View of 171 Walker Bungalow Road from the road facing Northeast.



View of the gravel driveway and proposed pathway for the sewer service facing East.



View exposed ledge Northwest of the driveway near Walker Bungalow Road facing North.



View of asphalt apron between Walker Bungalow Road and the gravel driveway facing Northwest.

171 Walker Bungalow Road (Cont.)



View of the wooden deck where proposed sewer service and plumbing redirecting the existing sewer lateral will be laid facing Southeast.



View from the end of the driveway in the backyard towards Walker Bungalow Road, facing Southwest.



View of the location of the buried septic tank in the backyard facing Southeast.



View of exposed cast iron sewer lateral and surrounding plumbing, facing North.

171 Walker Bungalow Road



View of a hallway on the ground level leading to the room with the existing sewer lateral.



View of breaker box and surrounding wall space located on the ground floor facing Northwest.



View of the breaker box with the panel front cover open.



View of the circuit breakers and schedule adjacent to the breaker switches.

171 Walker Bungalow Road (Cont.)



View of the breaker box model information and specifications.

184 Walker Bungalow Road



Source: Google Maps - September 2011

View of 184 Walker Bungalow Road from the road facing Southwest.



View from Shaw Road of buried septic tank and shrubs along the proposed sewer service path facing Northwest.



View of septic tank cover and proposed sewer service path facing South.



View of breaker box #1 circuit breakers and schedule, located in the garage, facing Southwest.

189 Walker Bungalow Road



View of 189 Walker Bungalow Road from the front yard facing Northwest.



View of the location of the buried septic tank and proposed sewer service path facing North.



View of proposed sewer service pathway towards the road through a gravel driveway facing South.



View of the breaker box and surrounding wall space located next to the door in the garage facing Northeast.

189 Walker Bungalow Road (Cont.)



View of Homeline breaker box front panel and circuit breakers.

201 Walker Bungalow Road



View of 201 Walker Bungalow Road front yard and small retaining wall facing Northwest.



View of the proposed sewer service path towards the backyard facing North.



View of large trees and wooden fence along the proposed sewer path facing South.



View of the leach field at the top of the hill in the backyard facing North.

201 Walker Bungalow Road (Cont.)



View of the rear side of the house and backyard from the top of the hill facing South.



View of approximate location of the buried sewer lateral and covers for the septic tank and pump station facing East.

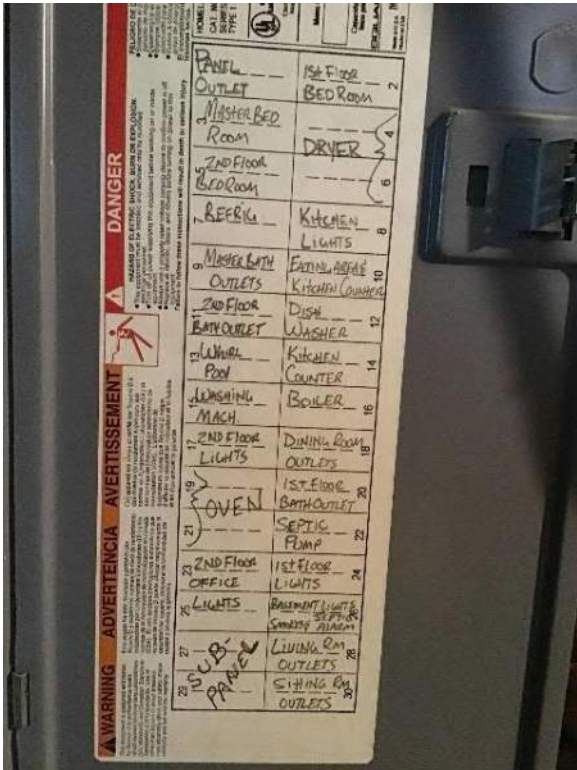


View of breaker box #1 and surrounding wall space located on the South foundation wall in the basement, facing South.



View of breaker box #1 circuit breakers.

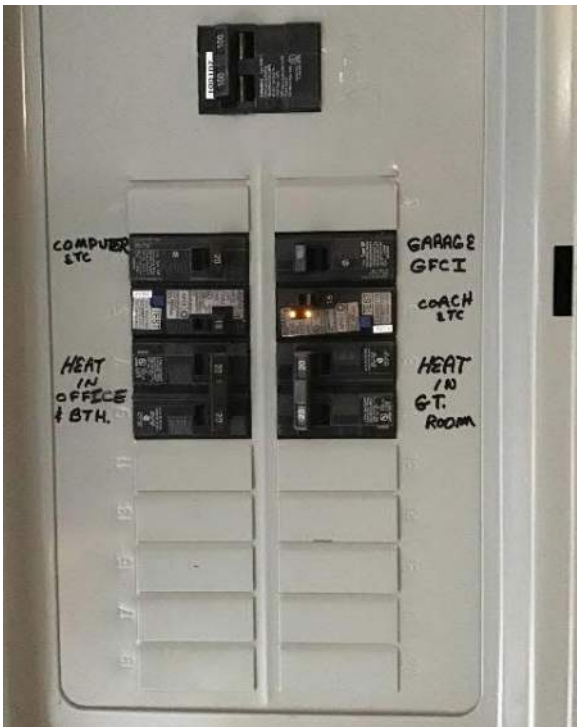
201 Walker Bungalow Road (Cont.)



View of the breaker box #1 schedule on the interior of the panel cover.



View of breaker box #2 (Siemens) and surrounding wall space located on the West wall of the garage facing West.



View of breaker box #2 circuit breakers and schedule adjacent to the breakers.

209 Walker Bungalow Road



View of 209 Walker Bungalow Road and front yard landscaping facing Northeast.



View of the asphalt driveway and proposed sewer service path facing North.



View of the asphalt driveway, granite curb and shrubs, facing South.

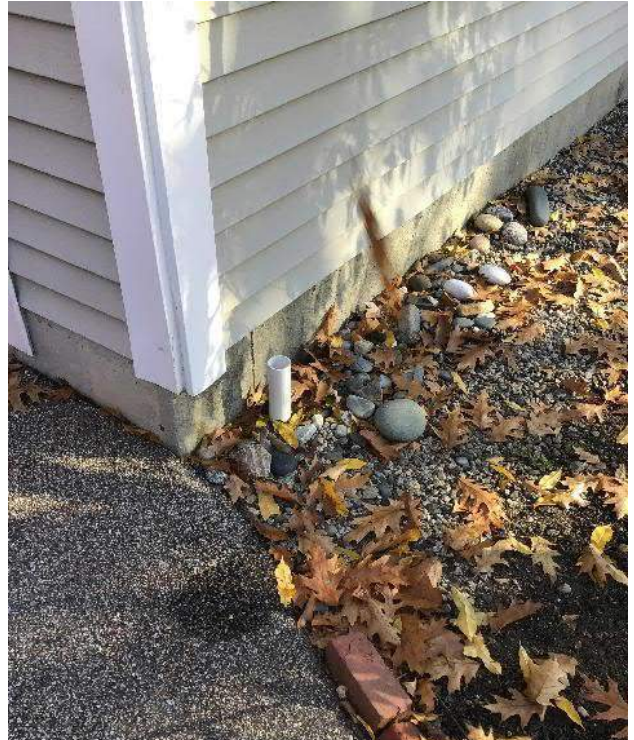


View of the front yard and stone landscaping facing East.

209 Walker Bungalow Road (Cont.)



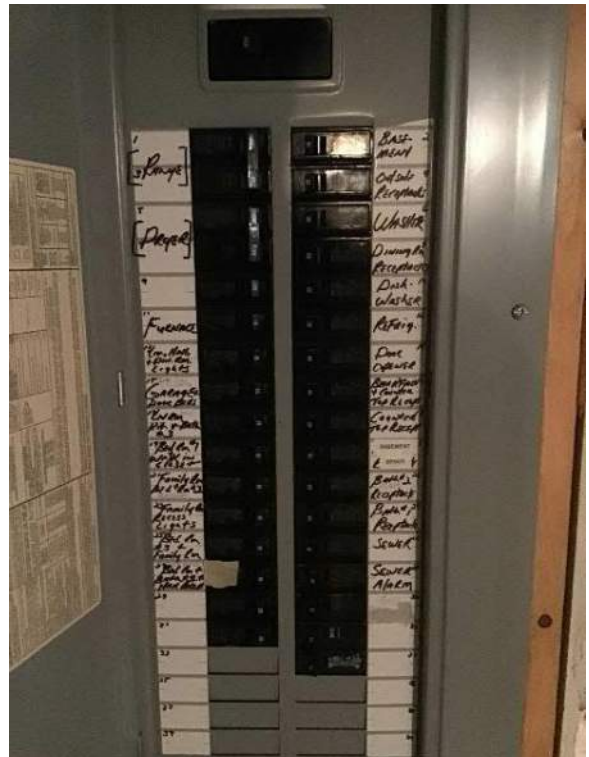
View of a manhole cover to access septic tank underneath the asphalt driveway and small tree, facing Northeast.



View of a small vent and approximate location of the buried sewer lateral facing Northeast.



View of steel manhole cover for septic tank access facing South.



View of Eaton breaker box circuit breakers and schedule adjacent to breaker switches.

212 Walker Bungalow Road



View of 212 Walker Bungalow Road from the driveway facing Southwest



View of the end of the driveway and area of yard where the proposed sewer service will be laid facing North.



View of the leach field in the front yard, facing West.



View of the proposed sewer service pathway across the front yard facing Southwest.

212 Walker Bungalow Road (Cont.)



View of the front yard and asphalt driveway with channel drain, facing North.



View of storm drainpipe along driveway and rocks for erosion control facing Northeast.



View of the front yard from behind the house facing Northeast.



View of septic tank and caps behind the West side of the house facing Southeast.

212 Walker Bungalow Road (Cont.)



View of approximate location of buried sewer lateral facing Southeast.



View of breaker box #1 (Siemens) circuit breakers.

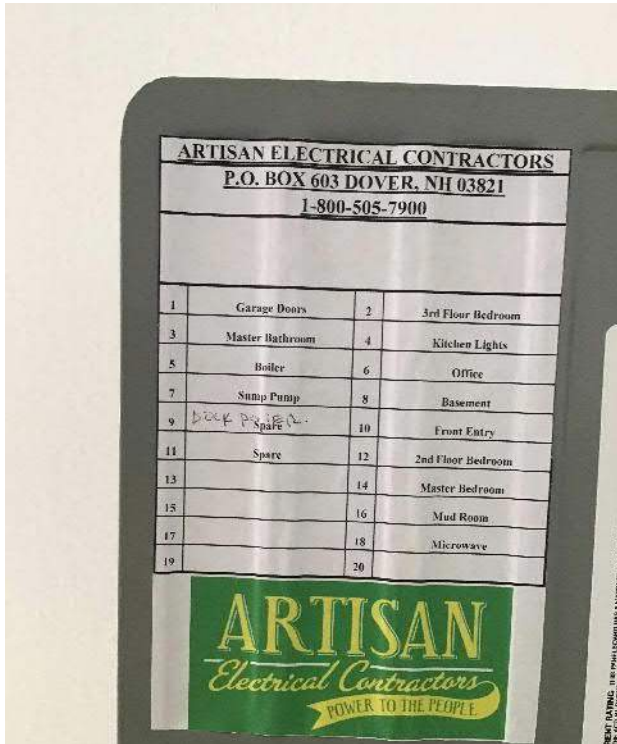
ARTISAN ELECTRICAL CONTRACTORS			
P.O. BOX 603 DOVER, NH 03821			
1-800-505-7900			
1	Garage Outlets	2	Mechanical Room Outlets
3	Dining Room Outlets	4	Washer
5	Refrigerator	6	2nd Floor Bath
7	Office Bathroom	8	Living Room
9	Septic	10	Range
11	Range Hood	12	Vacuum
13	Sub Panel	14	HRV
15		16	2nd Floor Bath
17	Dishwasher	18	Hall Lights
19	Island Kick Heat	20	Dryer
21	Island Outlets	22	
23	Counter Outlets	24	Mechanical Room Lights
25	Counter Outlets	26	
27		28	
29		30	
31		32	
33		34	
35		36	
37		38	
39		40	

View of the breaker box #1 schedule on the interior of the panel cover.



View of breaker box #2 (Siemens) circuit breakers.

212 Walker Bungalow Road (Cont.)



View of the breaker box #2 schedule on the interior of the panel cover.

220 Walker Bungalow Road



View of 220 Walker Bungalow Road facing Southwest.



View of the front yard and holding tank cap in the middle facing West.



View of holding tank cap and location of buried sewer lateral facing South.

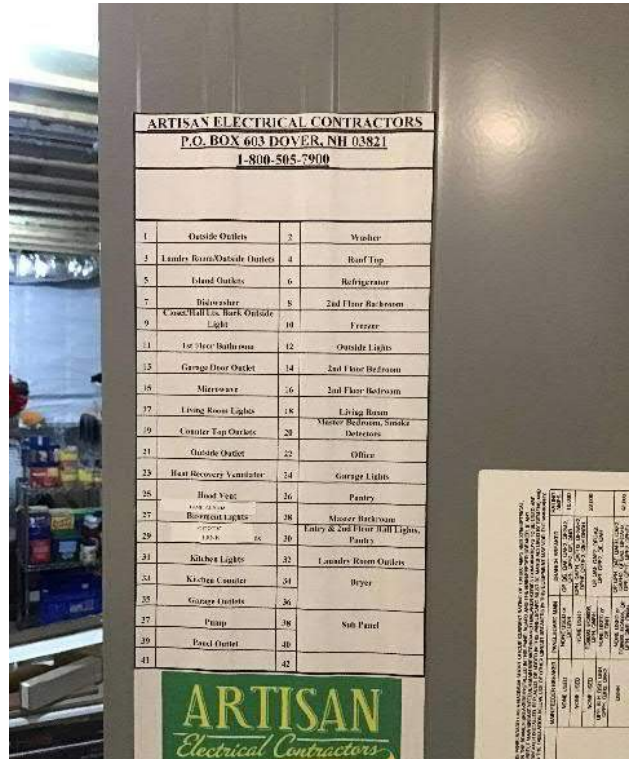


View of two breaker boxes (#1 is left) and surrounding wall space facing West.

220 Walker Bungalow Road (Cont.)



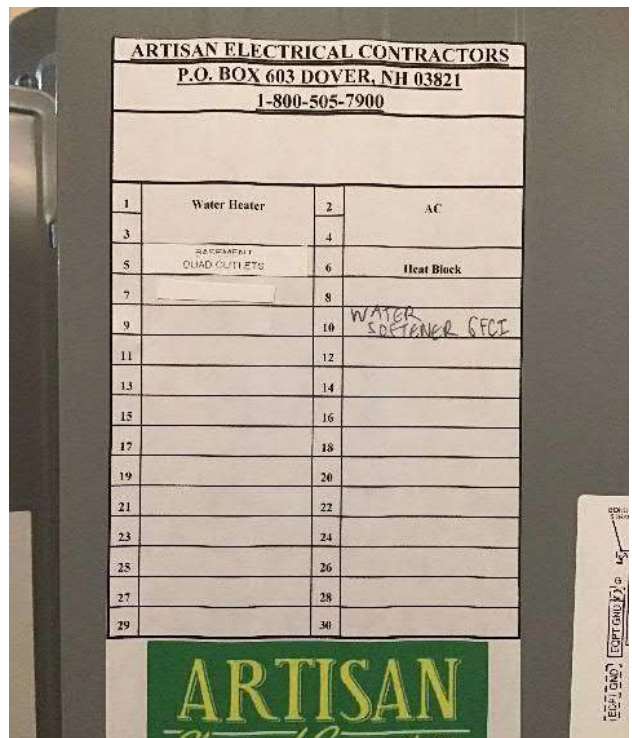
View of breaker box #1 circuit breakers.



View of the breaker box #1 schedule on the interior of the panel cover.



View of breaker box #2 circuit breakers.



View of the breaker box #2 schedule on the interior of the panel cover.

238 Walker Bungalow Road



View of 238 Walker Bungalow Road from the yard facing Southwest.



View of stone path to the front door looking towards the road, facing Northeast.



View of front driveway and wooden fence with arbor facing North.



View of propane tank cover and two large trees along proposed sewer service path facing Northeast.

238 Walker Bungalow Road (Cont.)



View of propane tank cover within the shrubs facing Northeast.



View of large boulder and landscaping in the East yard facing South.



View of tree and landscaping on top of approximate sewer lateral location facing Southwest.

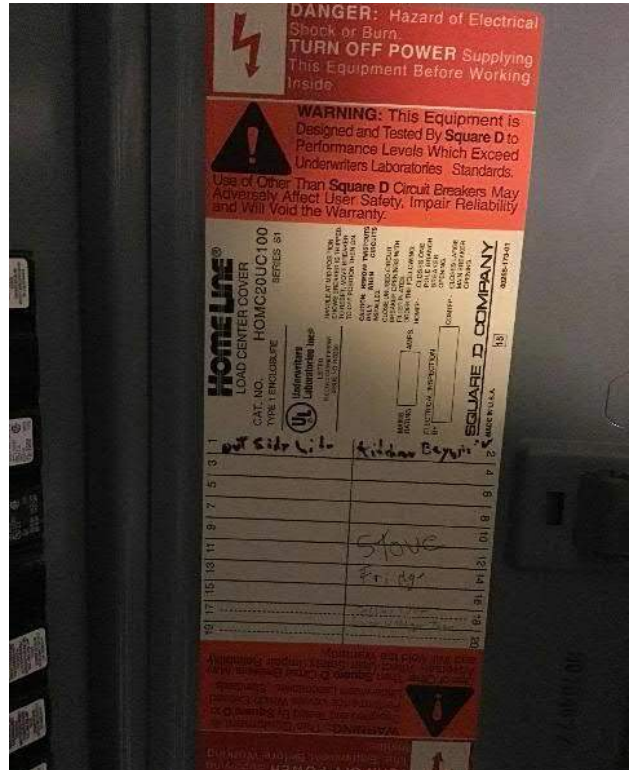


View of breaker box #1 in unfinished basement adjacent to PVC sewer lateral facing Northeast.

238 Walker Bungalow Road (Cont.)



View of breaker box #1 circuit breakers.



View of the breaker box #1 schedule and model information on the interior of the panel cover.



View of breaker box #2 and wall space in closet attached to the finished basement, facing North.



View of breaker box #2 (Homeline) circuit breakers.

241 Walker Bungalow Road



View of 241 Walker Bungalow Road and small retaining wall from the road facing Northeast.



View of proposed sewer service path and culvert and ditch next to the road looking Northeast.



View of front yard slope towards the stone-lined ditch facing East.



View of the proposed sewer service path and front yard facing Northwest.

241 Walker Bungalow Road (Cont.)



View of stone walkway crossing the proposed sewer service path facing Southwest.



View of approximate location of buried sewer lateral facing Northeast.



View of breaker boxes, solar power electrical system and surrounding wall space facing East.

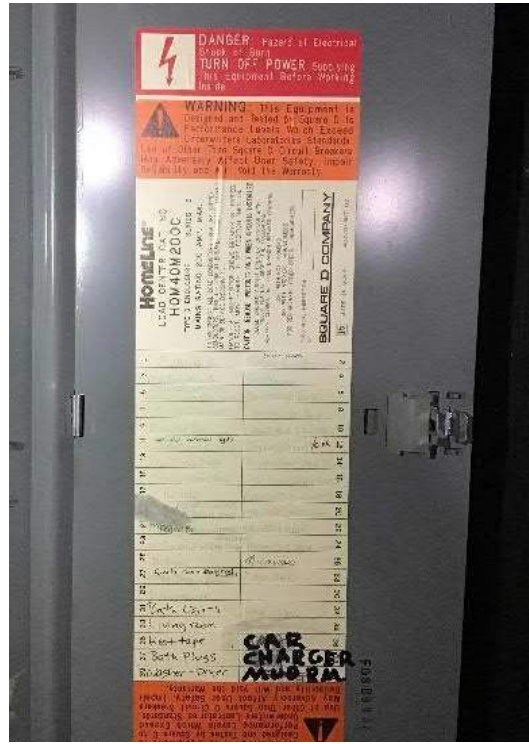


View of breaker box and AC photovoltaic disconnect facing Northeast.

241 Walker Bungalow Road (Cont.)



View of breaker box circuit breakers.



View of the breaker box schedule and model information on the interior of the panel cover.

251 Walker Bungalow Road



View of 251 Walker Bungalow Road from the road, facing Northeast.



View of shrubs and landscaping along driveway and next to proposed sewer service in the lawn, facing South.



View of wooden planter box along proposed sewer service path, facing Southwest.



View of backyard and Northwest corner of the house, facing Southwest.

251 Walker Bungalow Road (Cont.)



View of approximate location of the sewer lateral just beyond the bulkhead door facing Southeast.



View of unused irrigation system located in the backyard, facing West.



View of Southeast side of the house and breaker box location from the outside, facing Northwest.



View of electrical conduit routed from the basement on the Southeast side of the house, facing West.

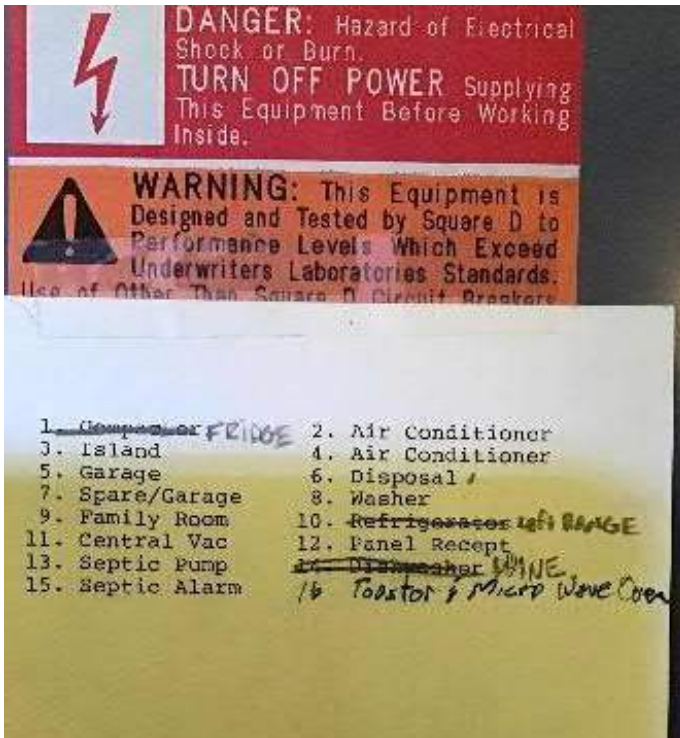
251 Walker Bungalow Road (Cont.)



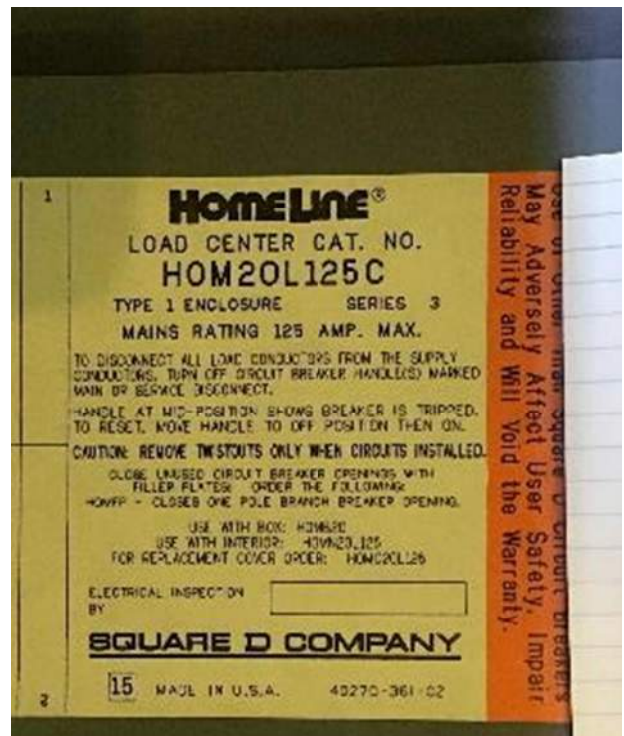
View of manhole cover for septic tank access located under a tree in the back yard facing Southwest.



View of breaker box #1 circuit breakers.



View of breaker box #1 schedule on the interior of the panel cover.



View of breaker box #1 model information and specifications.

251 Walker Bungalow Road (Cont.)



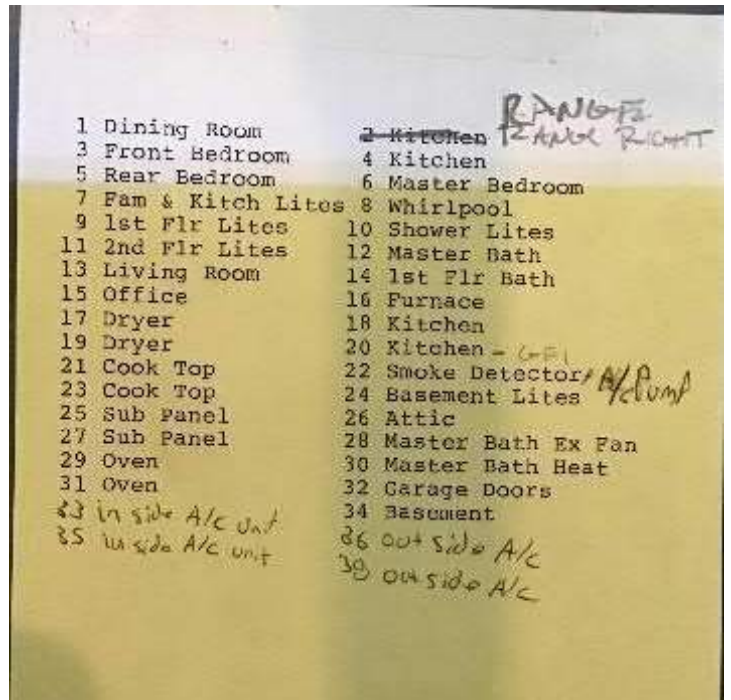
View of breaker box #2 front panel open.



View of breaker box #2 circuit breakers.



Continued view of breaker box #2 circuit breakers.



View of breaker box #2 schedule on the interior of the panel cover.

251 Walker Bungalow Road (Cont.)



View of breaker box #2 model information and specifications.

260 Walker Bungalow Road



Source: Google Maps – September 2011

View of 260 Walker Bungalow Road from the road facing Southwest.



View of the front lawn and proposed sewer service path facing Northeast.

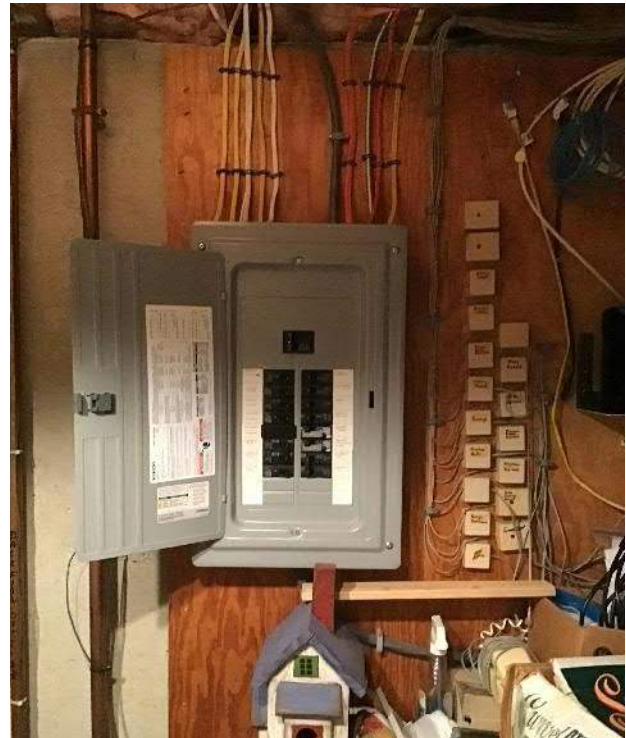
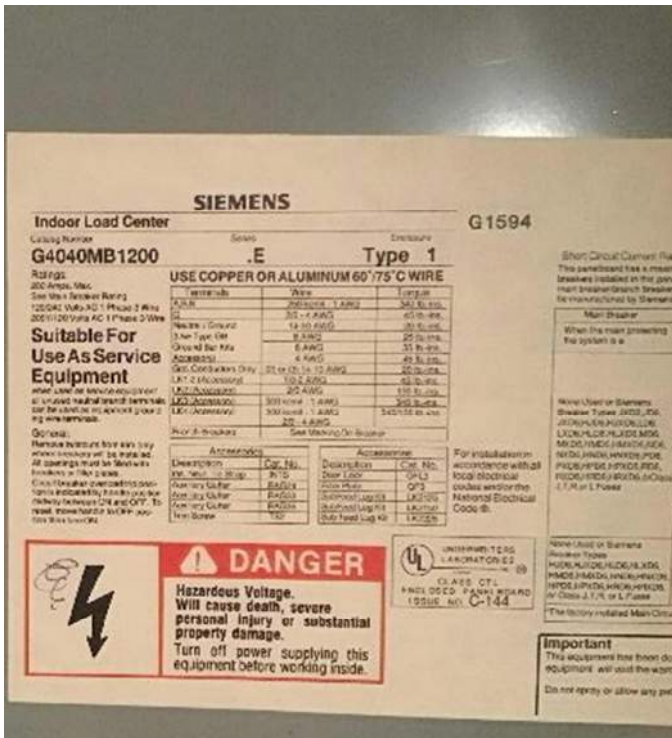


View of shrubs and landscaping on top of approximate location of buried sewer lateral facing Southwest.



View of approximate location of buried septic tank in the East yard, facing Southwest.

260 Walker Bungalow Road (Cont.)



View of breaker box #1 model information and specifications.

View of breaker box #2 (Siemens) surrounding wall space near breaker box #1, facing Northeast.



View of breaker box #2 circuit breakers and schedule adjacent to the breakers.

272 Walker Bungalow Road



View of 272 Walker Bungalow Road from the end of the driveway facing Southeast.



View of the shrubs and stone landscaping leading up to the front door, facing Southeast.



View of the proposed sewer service pathway along the garden towards the backyard facing Southeast.



View of the proposed sewer service pathway looking towards the road from the backyard, facing Northwest.

272 Walker Bungalow Road (Cont.)



View of the backyard and landscaping along the proposed sewer service path facing Northwest.



View of a small retaining wall near the approximate location of the buried sewer lateral facing North.

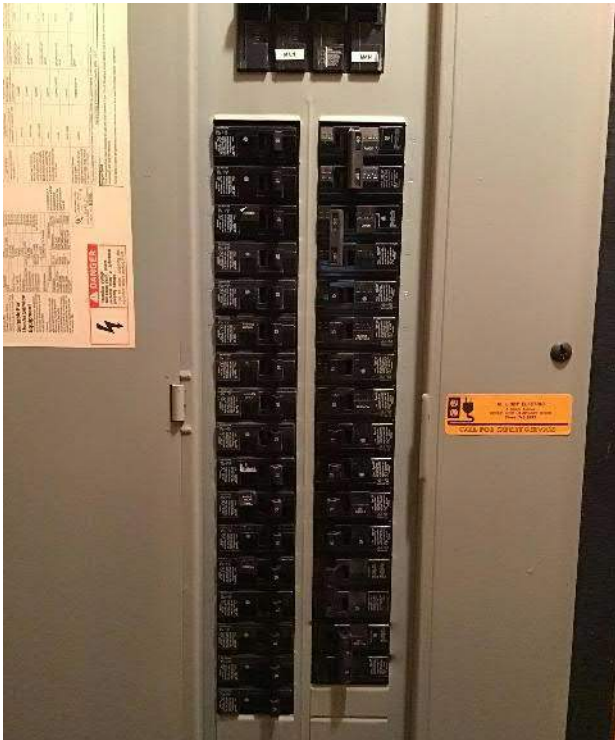


View of the approximate location of the sewer lateral and septic tank, facing East.

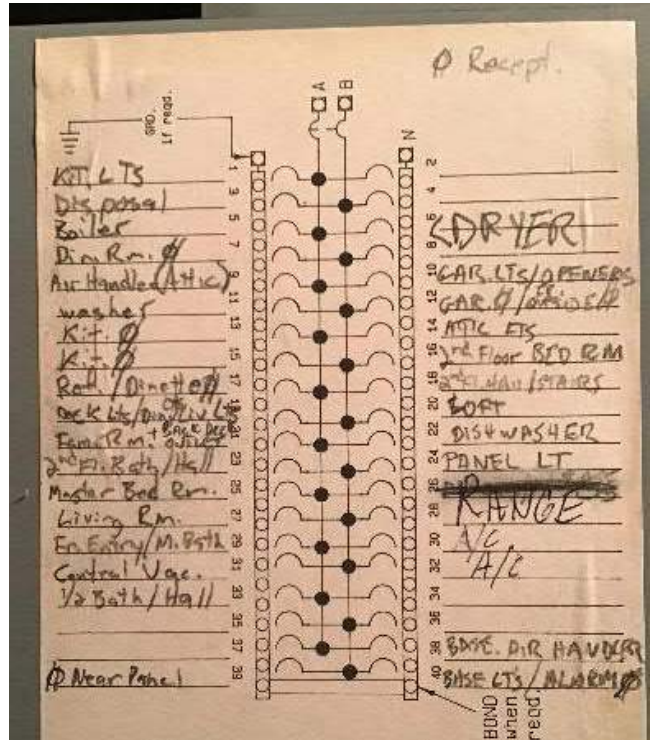


View of the breaker box and surrounding wall space located in a basement closet, facing Northeast.

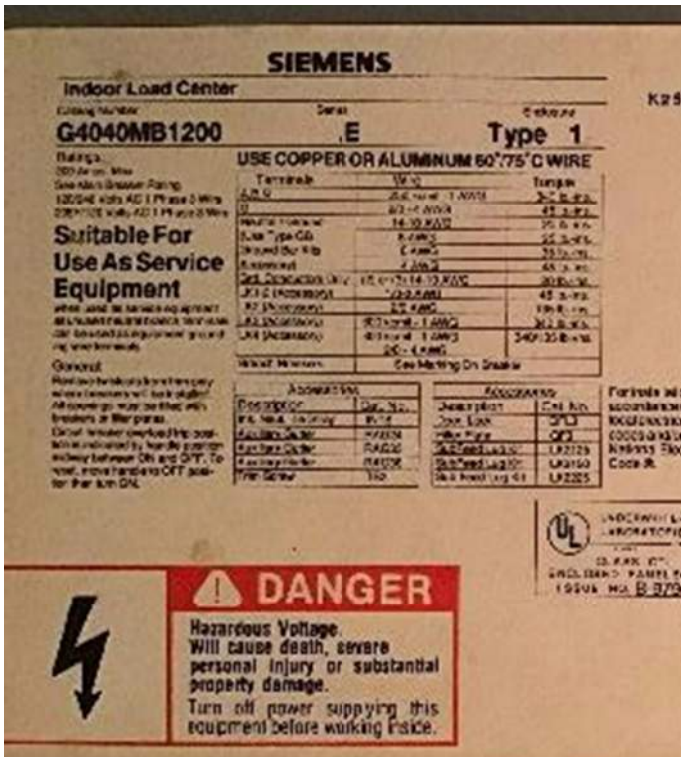
272 Walker Bungalow Road (Cont.)



View of the breaker box circuit breakers.



View of the breaker box schedule on the interior of the panel cover.



View of the breaker box model information and specifications.

290 Walker Bungalow Road



View of 290 Walker Bungalow Road from the driveway facing East.



View of the front yard and large retaining wall sloping towards the road, facing North.



View of stones and shrubs in the front yard near to the road, facing Southeast.



View of small saplings and proposed sewer service pathway facing Northeast.

290 Walker Bungalow Road



View of asphalt driveway and proposed sewer service path towards the road facing Southwest.



View of the proposed sewer service path and shrubs and a tree planted along the house facing Southwest.



View of trees and shrubs planted along the Northwest side of the garage, facing South.



View of the backyard and rear side of the garage, facing Southwest.

290 Walker Bungalow Road (Cont.)



View of the back of the house and backyard facing South.



View of the back of the property with trees and a rock wall, facing Northeast.



View of the leach field standing from the approximate location of the existing septic tank facing Southeast.



View of breaker box #1 circuit breakers facing Northwest.

74 Wentworth House Road



View of 74 Wentworth House Road and approximate location of the septic tank under the cars, facing South.



View of the gravel driveway and trees on either side facing North.



View of PVC vent pipe and shrubs on the East side of the driveway, facing Northeast.



View of retaining wall along the East side of the driveway facing Northeast.

74 Wentworth House Road (Cont.)



View of breaker box #2 and surrounding wall space located on the East interior garage wall, facing East.



View of breaker box #2 circuit breakers and schedule adjacent to breaker switches.

EATON Cutler-Hammer

1-PHASE PANELS: TABLEROS 1 FASE
 120/240 VAC - 120/240 VAC - 60 Hz - 1PH-3W, 1 FASE - 3 HILOS
 200/277 VAC - 200/277 VAC - 60 Hz - 3W, 1 FASE - 3 HILOS

2-PHASE PANELS: TABLEROS 2 FASES
 240 VAC - 240 VAC - 60 Hz - 2PH-3P-3W-3L, 2 FASES - 3 HILOS (1) 1/2 HP
 200/277 VAC - 200/277 VAC - 60 Hz - 3P-3W-3L, 2 FASES - 4 HILOS
 200/277 VAC - 200/277 VAC - 60 Hz - 3P-3W-3L, 2 FASES - 4 HILOS
 (SEE 011187R2)

(1) USE ONLY 240 VOLT CIRCUIT BREAKER
(2) 240 VOLT CIRCUIT BREAKERS MAY BE USED FOR ALL RATINGS. USE 150/160 VOLT CIRCUIT BREAKERS ONLY WHEN PHASE TO GROUND VOLTAGE DOES NOT EXCEED 120 VOLTS.

(1) SOLAMENTE UTILICE INTERRUPTORES (BREAKERS) DE CIRCUITO DE 240 V.
(2) INTERRUPTORES (BREAKERS) DE CIRCUITO DE 240 V PUEDEN SER UTILIZADOS PARA TODAS LAS CAPACIDADES. UTILICE INTERRUPTORES (BREAKERS) DE CIRCUITO DE 150/160 V SOLAMENTE CUANDO EL VOLTAJE DE FASE A TIERRA NO EXCEDE 120 V.

SEE CASE MANUAL FOR FURTHER INFORMATION
PARA INFORMACION ADICIONAL, VEA LA PARTE LATERAL DEL GABINETE Y EL REVERSO DE LA PLACUETA

USE CUTLER-HAMMER TYPE CH, CHAF, CHB OR CHT. USE CHT ON BUS POSITION HAVING REJECTION TAB. CIRCUIT BREAKER MAX. 80MVA BREAKING CAPACITY PER BREAKER.

ALL COPPER BUS, PLATED AND / OR UNPLATED.
TO CLOSE, UNLATCH OPERATOR IN COVER, USE PULLER PL. SEE CUTLER-HAMMER CAT. NO. CHFP.
USE 6- AND MAX. WIRE FOR BREAKER LOADS OPPOSITE TO MOUNTING.

FOR ADDITIONAL 40 - 200 AMP NEUTRAL OR GROUND TERMINALS, USE CUTLER-HAMMER CAT. NO. NLS2.
WHEN USING WIRE BUNDLES, AN INSULATED NEUTRAL HOLES MAY BE USED FOR WIRE BUNDLES. MULTIPLE WIRES IN THE BUNDLE MUST BE THE SAME SIZE AND MATERIAL.
THIS DEVICE ACCEPTS CUTLER-HAMMER TYPE GBK GROUND BARS. WIRE HOLES ARE SUITABLE FOR (1) #14-10 OR UP TO (2) #14-10 WIRES.
REV. 20044

MADE IN USA: HECHO EN ELA

REV. L

SURFACE LUG COVER / CUBIERTA TIPO SUPERFICIE Y TIPO BARRA / TR. CHEF. CHFCM. SURFACE ONLY COVER / CUBIERTA TIPO SUPERFICIE SOLAMENTE. CHECS. CHCSM.

FOR BUILT NEUTRAL PANELS WITH MAIN BREAKER: SUITABLE ONLY FOR USE WITH SERVICE EQUIPMENT UNLESS NEUTRAL BONDING JUNCTION IS REMOVED WITH A REMOVED. IF THE RIGHT HAND BAR IS AN INSULATED NEUTRAL AND THE LEFT BAR IS AN EQUIPMENT GROUND.

FOR SINGLE NEUTRAL PANELS WITH MAIN CIRCUIT BREAKERS: SUITABLE FOR AS SERVICE EQUIPMENT.

FOR SINGLE OR SPLIT NEUTRAL PANELS WITH MAIN LUGS: SUITABLE FOR USE WITH SERVICE EQUIPMENT WHEN A BONDING MAIN BREAKER IS USED WITH HOLD DOWN BRACKET CAT. NO. CH258 OR WHEN NOT MORE THAN SIX DISCONNECTING DEVICES ARE INSTALLED. WHEN NOT USED AS A LIGHTING AND APPLIANCE BRANCH CIRCUIT PANEL ONLY. SEE ARTICLE 408.14 OF THE NEC.

(BREAKER HANDLE IN MID POSITION INDICATES BREAKER IS TRIPPED. TO RESTORE, BRING HANDLE TO EXTREME "OFF", THEN TO "ON".

CORNER GROUNDING DELTA: THIS PANEL IS UL LISTED FOR USE WITH GROUNDING BARS OR CH 3P/3P BREAKERS, RATED 240 V.

WHEN USED FOR DELTA FEED APPLICATIONS THIS PANEL MUST BE PROTECTED BY AN UP ST MAIN OVER CURRENT DEVICE THAT IS RATED AND WIRE FOR GROUNDING DELTA APPLICATION WITH NIT.

COLA CON ISOLACION CONECTADA A TIERRA. ESTE TABLERO ESTA LISTADO PARA USAR PARA USAR CON SISTEMA ALER CONECTADO A TIERRA P.E. 240 V. 3 FASES - 3 HILOS. EXAMINE EL NEUTRO. SOLAMENTE UTILICE INTERRUPTORES (BREAKERS) CUTLER-HAMMER DE 3-P-3P AL APLICACION A OTRO TABLERO. EXISTEN MAS PROYECTOS PARA UN DISPOSITIVO DE CORRIENTE PARA APLICACIONES DE DELTA CONECTADA A TIERRA. CUANDO SEA UTILIZADO COMO BREAKER DEVIENE UN ALMOZADOR CORRIENTE DEBERA SER INSTALADO SEGUN LAS INSTRUCCIONES EN EL LIBRO.

FOR WIRE PRESSURE SCREWS AS FOLLOWS:
FOR 200/277 VOLTAGE OF SERVICE OF CABLE A LOS VALORES DE PAR DE APRIETE SIGUIENTES:

WIRE SIZE	NEUTRAL & GROUND BARS	NEUTRAL / PANEL MAIN LUGS	FOR MAIN LUGS USE CUTLER-HAMMER NO. CH1125H.
CABLE / CABLE 60/75 °C, AL-CU	NO. 7/0 Y SUPERIOR EN GENERAL TIERRA LB-24 (14-10)	TIERRA LB-24 (14-10)	FOR MAIN BREAKER USE CUTLER-HAMMER TYPE CH AND HOLD-DOWN BRACKET NO. CH125SB.
WIRE SIZE	NEUTRAL & GROUND BARS	NEUTRAL / PANEL MAIN LUGS	
3-00-2-00	#11-10	NO. 2/0	
4-00	#8	NO. 3/0	
5-00-6-00	#6	NO. 4	
7-00-8-00	#4	NO. 6	
9-00-10-00	#2	NO. 8	

FOR WIRE PRESSURE SCREWS AS FOLLOWS:
FOR 200/277 VOLTAGE OF SERVICE OF CABLE A LOS VALORES DE PAR DE APRIETE ESPECIFICADOS EN EL INTERVENIENTE.

View of breaker box #2 model information and specifications.

187 Wentworth House Road



View of 187 Wentworth House Road from the road with gravel driveways on either side, facing North.



View of the rear side of the house standing in the gravel parking lot facing Southwest.

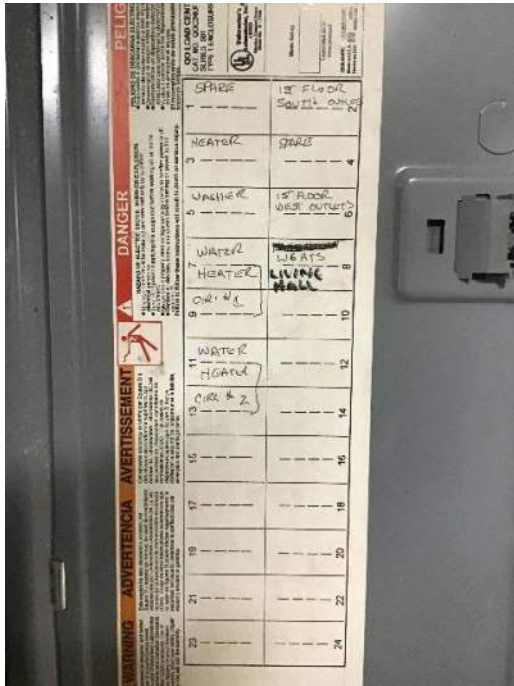


View of 100A breaker box #1 and surrounding wall space facing East.



View of breaker box #1 circuit breakers and available slots.

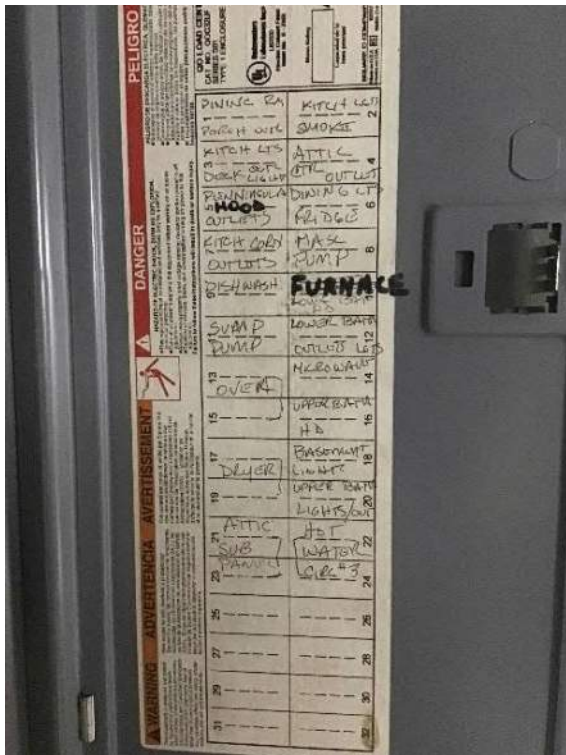
187 Wentworth House Road (Cont.)



View of breaker box #1 circuit breaker schedule on the inside of the panel cover.



View of 100A breaker box #2 circuit breakers, located on the East foundation wall, facing East.



View of breaker box #2 circuit breaker schedule on the inside of the panel cover.

189 Wentworth House Road



View of 189 Wentworth House Road from the road facing North.



View of proposed sewer service path towards the road facing South.



View of 187 Wentworth House Road and gravel parking lot from the backyard of 189, facing West.



View of building behind 189 facing North.

189 Wentworth House Road (Cont.)



View of approximate location of buried septic tank and lateral in the backyard facing East.



View of Siemens circuit breakers and available slots.

APPENDIX E
Approved Plantings List

**Appendix E- Approved Plant List
Sagamore Avenue Sewer Extension**

Botanical Name	Common Name	Size	Mature Height	Tolerates Part Shade	Native
Trees					
<i>* Lower branches of deciduous trees must be pruned for the first two years if close to a sidewalk</i>					
Cornus alternifolia	Pagoda Dogwood	6-7' ht. B&B	25'	Yes	Yes
Carpinus caroliniana	American Hornbeam	6-7' ht. B&B	25'	Yes	Yes
Juniperus virginiana 'Emerald Sentinel'	Emerald Sentinel Juniper	6-7' ht. B&B	18'	No	Yes*
Acer rubrum 'October Glory'	October Glory Red Maple	1.75"-2" cal. B&B	50'	Yes	Yes**
Betula nigra 'Heritage'	Heritage River Birch	8-10' B&B	50'	Yes	Yes**
Quercus rubra	Northern Red Oak	1.75"-2" cal. B&B	60'	No	Yes
Ostrya virginiana	Hop Hornbeam	1.75"-2" cal. B&B	35'	Yes	Yes
Thuja occidentalis	Arborvitae	6-7' ht. B&B	40'	Yes	Yes
Shrubs					
Amelanchier canadensis	Canadian Serviceberry	#7 cont.	5-6'	Yes	Yes
Aronia melanocarpa	Black Chokeberry	#7 cont.	9'	Yes	Yes
Clethra alnifolia	Summersweet	#7 cont.	9'	Yes	Yes
Clethra alnifolia 'Hummingbird'	Hummingbird Summersweet	#7 cont.	3.5'	Yes	Yes**
Cornus sericea 'Isantii'	Isanti Red-Osier Dogwood	#7 cont.	5.5'	Yes	Yes**
Hamamelis virginiana	Common Witchhazel	#7 cont.	18'	Yes	Yes
Viburnum lentago	Nannyberry viburnum	#7 cont.	20'	Yes	Yes
Thuja occidentalis 'Techny'	Mission Arborvitae	2-3' ht. B&B	7'	Yes	Yes
Syringa vulgaris 'Common Purple'	Lilac	2-3' ht. B&B	15'	Yes	Yes

**Improved cultivar of a native species developed for specific characteristics, such as form or site tolerances

