CITY OF PORTSMOUTH, NEW HAMPSHIRE

INFORMATION FOR BIDDERS
FORMS FOR BID, AGREEMENT, AND BONDS, SPECIFICATIONS

FOR

PEIRCE ISLAND FORCE MAIN AND WATER MAIN REPLACEMENT

BID NO. 35-21

AUGUST 2021

AECOM

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SECTION 00020

INVITATION TO BID

PEIRCE ISLAND FORCE MAIN AND WATER MAIN REPLACEMENT
CITY OF PORTSMOUTH NEW HAMPSHIRE
BID NUMBER #35-21

OWNER: The City of Portsmouth, New Hampshire, hereby gives notice that sealed Bids will be received for the construction of approximately 4,140 feet of 24" HDPE force main, 920 feet of 12" ductile iron water main, 315 feet of 20" fusible PVC slip lining, and other appurtenances as part of the Peirce Island Force Main and Water Main Replacement Project**.**

TIME AND PLACE OF BID OPENING: Sealed Bids will be received until 2:00 p.m. Local Time on the 30th day of September, 2021. Deliver sealed Bids to the Front Desk at City Hall, 1 Junkins Avenue, Portsmouth, NH 03801 addressed to the Purchasing Coordinator. After the official Bid closing time, the Bids will be publicly opened and read aloud in the Seybolt Conference Room. Masks should be worn upon entering any municipal building.

BIDDING DOCUMENTS: The Bidding Documents are on file for review between the hours of 8:30 am to 4:00 pm at the office of the Portsmouth Department of Public Works, Second Floor, 680 Peverly Hill Road, Portsmouth, NH 03801, and the offices of AECOM, 250 Apollo Drive, Chelmsford, MA 01824. No monetary deposit is required to obtain an electronic copy of the Bidding Documents from the City's Purchasing website *(https://www.cityofportsmouth.com/finance/purchasing-bids-and-proposals)*. Any questions regarding bidding should be directed to the Purchasing Department at 603-610-7227. Any technical questions should be directed to AECOM's Project Manager, Erik Meserve at 978-905-3145 or erik.meserve@aecom.com. Addenda, if issued, shall be posted to the City's Purchasing website only a minimum of 5 business days prior to the bid date. Prospective bidders are responsible for obtaining addenda from the City's website prior to the bid date.

PRE-BID CONFERENCE: A mandatory pre-bid conference will be held prior to the Bid opening on September 16th, 2021 at 1 p.m. at the City of Portsmouth DPW, 680 Peverly Hill Road, Portsmouth, NH 03801 to familiarize Bidders with the Project. A site tour will follow. Masks should be worn upon entering any municipal building.

BID SECURITY: Bid Security, certified treasurer's or cashier's check or bid bond in the amount of 5 percent of the Bid shall accompany each Bid in accordance with the Instructions to Bidders.

CONTRACT SECURITY: The Bidder to whom a Contract is awarded shall furnish a Performance Bond and a Payment Bond each in an amount equal to the Contract Price.

BID REJECTION/ACCEPTANCE: OWNER reserves the right to reject any and all Bids, waive informalities in bidding or to accept the Bid or Bids, should the OWNER deem it in the Public Interest to do so.

BID WITHDRAWAL: No Bid shall be withdrawn for a period of 90 days after the opening of Bids without consent of OWNER.

TIME FOR COMPLETION: The Work shall be completed within 220 calendar days from the date when the Contract Times commence to run.

END OF SECTION

SECTION 00200

INSTRUCTION TO BIDDERS

ARTICLE 1 – DEFINED TERMS

1.01 Terms used in these Instructions to Bidders have the meanings indicated in the General Conditions and Supplementary Conditions. Additional terms used in these Instructions to Bidders have the meanings indicated below:

A. *Issuing Office* – The office from which the Bidding Documents are to be issued and where the bidding procedures are to be administered.

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

C. *Successful Bidder* - The lowest, responsible Bidder submitting a responsive Bid to whom Owner (on the basis of Owner's evaluation as hereinafter provided) makes an award.

ARTICLE 2 – COPIES OF BIDDING DOCUMENTS

2.01 Complete sets of the Bidding Documents in electronic format only may be obtained from City's Purchasing Website (*https://www.cityofportsmouth.com/finance/purchasing-bids-and-proposals*).

2.02 Complete sets of Bidding Documents shall be used in preparing Bids; neither Owner nor Engineer assumes any responsibility for errors or misinterpretations resulting from the use of incomplete sets of Bidding Documents.

2.03 Owner and Engineer, in making copies of Bidding Documents available on the above terms, do so only for the purpose of obtaining Bids for the Work and do not authorize or confer a license for any other use.

2.04 Fee for Drawings and Documents:

A. No monetary deposit is required to obtain an electronic copy of the Bidding Documents.

ARTICLE 3 – QUALIFICATIONS OF BIDDERS

3.01 Owner's decision as to qualification of the Bidders shall be final.

3.02 Bidder is advised to carefully review those portions of the Bid Form requiring Bidder's representations and certifications.

3.03 Ability and Experience of Bidder:

A. No award will be made to any bidder who cannot satisfy the Owner that the Bidder has sufficient ability and experience in this class of work and sufficient capital and plant to enable the Bidder to prosecute and complete the Work successfully within the time

named. The Owner's decision or judgment on these matters shall be final, conclusive, and binding.

B. The Owner may make such investigations as it deems necessary, and the Bidder shall furnish to the Owner, under oath if so required, all such information and data for this purpose as the Owner may request.

ARTICLE 4 – EXAMINATION OF BIDDING DOCUMENTS, OTHER RELATED DATA, AND SITE

4.01 *Subsurface and Physical Conditions:*

A. All information given on the Drawings or in the other Contract Documents relating to subsurface and other conditions, natural phenomena, existing pipes, and other structures is from the best sources at present available to the Owner. All such information is furnished only for the information and convenience of bidders and is not guaranteed.

B. It is agreed and understood that the Owner does not warrant or guarantee that the subsurface or other conditions, natural phenomena, existing pipes or other structures encountered during construction will be the same as those indicated on the Drawings or in the other Contract Documents.

C. It is agreed further and understood that no bidder or contractor may make any claim or demand against the Owner or the Engineer, arising from or by reason of any variance which may exist between the information made available and the actual subsurface or other conditions, natural phenomena, existing pipes or other structures actually encountered during the construction work, except as may otherwise be expressly provided for in the Contract Documents.

D. The Supplementary Conditions identify:

1. Those reports known to Owner of explorations and tests of subsurface conditions at or contiguous to the Site.

2. Those drawings known to Owner of physical conditions relating to existing surface or subsurface structures at the Site (except Underground Facilities).

E. Copies of reports and drawings referenced in Paragraph 4.01.D will be made available by Owner to any Bidder on request. Those reports and drawings are not part of the Contract Documents, but the “technical data” contained therein upon which Bidder is entitled to rely as provided in Paragraph 4.02 of the General Conditions has been identified and established in Paragraph 4.02 of the Supplementary Conditions. Bidder is responsible for any interpretation or conclusion Bidder draws from any “technical data” or any other data, interpretations, opinions, or information contained in such reports or shown or indicated in such drawings.

F. Borings have been made in the approximate locations indicated on the drawings. Logs of the borings are bound at the back of the documents in Appendix A.

4.02 *Underground Facilities*

A. Information and data shown or indicated in the Bidding Documents with respect to existing Underground Facilities at or contiguous to the Site is based upon information and data furnished to Owner and Engineer by owners of such Underground Facilities, including Owner, or others.

4.03 *Hazardous Environmental Condition*

A. The Supplementary Conditions identify any reports and drawings known to Owner relating to a Hazardous Environmental Condition identified at the Site.

B. Copies of reports and drawings referenced in the Supplementary Conditions will be made available by Owner to any Bidder on request. Those reports and drawings are not part of the Contract Documents, but the "technical data" contained therein upon which Bidder is entitled to rely as provided in Paragraph 4.06 of the General Conditions has been identified and established in Paragraph 4.06 of the Supplementary Conditions. Bidder is responsible for any interpretation or conclusion Bidder draws from any "technical data" or any other data, interpretations, opinions, or information contained in such reports or shown or indicated in such drawings.

4.04 Provisions concerning responsibilities for the adequacy of data furnished to prospective Bidders with respect to subsurface conditions, other physical conditions, and Underground Facilities, and possible changes in the Bidding Documents due to differing or unanticipated subsurface or physical conditions appear in Paragraphs 4.02, 4.03, and 4.04 of the General Conditions. Provisions concerning responsibilities for the adequacy of data furnished to prospective Bidders with respect to a Hazardous Environmental Condition at the Site, if any, and possible changes in the Contract Documents due to any Hazardous Environmental Condition uncovered or revealed at the Site which was not shown or indicated in the Drawings or Specifications or identified in the Contract Documents to be within the scope of the Work, appear in Paragraph 4.06 of the General Conditions.

4.05 Prospective Bidders who wish to visit the site to conduct such examinations, investigations, explorations, tests, and studies as Bidder deems necessary for submission of a Bid can do so with prior permission by the Owner. Bidder shall fill all holes and clean up and restore the Site to its former condition upon completion of such explorations, investigations, tests, and studies. Bidder shall comply with all applicable Laws and Regulations relative to excavation and utility locating.

4.06 Reference is made to Article 7 of the Supplementary Conditions for the identification of the general nature of other work that is to be performed at the Site by Owner or others (such as utilities and other prime contractors) that relates to the Work contemplated by these Bidding Documents. On request, Owner will provide to each Bidder for examination access to or copies of contract documents (other than portions thereof related to price) for such other work.

4.07 It is the responsibility of each Bidder before submitting a Bid to:

A. examine and carefully study the Bidding Documents, and the other related data identified in the Bidding Documents;

B. visit the Site and become familiar with and satisfy Bidder as to the general, local, and Site conditions that may affect cost, progress, and performance of the Work;

C. become familiar with and satisfy Bidder as to all federal, state, and local Laws and Regulations that may affect cost, progress, and performance of the Work;

D. carefully study all: (1) reports of explorations and tests of subsurface conditions at or contiguous to the Site and all drawings of physical conditions relating to existing surface or subsurface structures at the Site (except Underground Facilities) that have been identified in Paragraph 4.02 of the Supplementary Conditions as containing reliable "technical data," and (2) reports and drawings of Hazardous Environmental Conditions, if any, at the Site that have been identified in the Paragraph 4.06 of the Supplementary Conditions as containing reliable "technical data";

E. consider the information known to Bidder; information commonly known to contractors doing business in the locality of the Site; information and observations obtained from visits to the Site; the Bidding Documents; and the Site-related reports and drawings identified in the Bidding Documents, with respect to the effect of such information, observations, and documents on (1) the cost, progress, and performance of the Work; (2) the means, methods, techniques, sequences, and procedures of construction to be employed by Bidder, including applying any specific means, methods, techniques, sequences, and procedures of construction expressly required by the Bidding Documents; and (3) Bidder’s safety precautions and programs;

F. agree at the time of submitting its Bid that no further examinations, investigations, explorations, tests, studies, or data are necessary for the determination of its Bid for performance of the Work at the price(s) bid and within the times required, and in accordance with the other terms and conditions of the Bidding Documents;

G. become aware of the general nature of the work to be performed by Owner and others at the Site that relates to the Work as indicated in the Bidding Documents;

H. correlate the information known to Bidder, information and observations obtained from visits to the Site, reports and drawings identified in the Bidding Documents, and all additional examinations, investigations, explorations, tests, studies, and data with the Bidding Documents;

I. promptly give Engineer written notice of all conflicts, errors, ambiguities, or discrepancies that Bidder discovers in the Bidding Documents and confirm that the written resolution thereof by Engineer is acceptable to Bidder; and

J. determine that the Bidding Documents are generally sufficient to indicate and convey understanding of all terms and conditions for the performance of the Work.

4.08 The submission of a Bid will constitute an incontrovertible representation by Bidder that Bidder has complied with every requirement of this Article 4, that without exception the Bid is premised upon performing and furnishing the Work required by the Bidding Documents and applying any specific means, methods, techniques, sequences, and procedures of construction that may be shown or indicated or expressly required by the Bidding Documents, that Bidder has given Engineer written notice of all conflicts, errors, ambiguities, and discrepancies that Bidder has discovered in the Bidding Documents and the written resolutions thereof by Engineer are acceptable to Bidder, and that the Bidding Documents are generally sufficient to indicate and convey understanding of all terms and conditions for performing and furnishing the Work.

ARTICLE 5 – PRE-BID CONFERENCE

5.01 A mandatory pre-Bid conference will be held prior to the Bid opening on September 16th, 2021 at 1 p.m. to familiarize Bidders with the Project. Meet at the City of Portsmouth DPW at 680 Peverly Hill Rd, Portsmouth, NH 03801, and a site tour will follow. Masks should be worn upon entering any municipal building.

ARTICLE 6 – SITE AND OTHER AREAS

6.01 The Site is identified in the Bidding Documents. Easements for permanent structures or permanent changes in existing facilities are to be obtained and paid for by Owner unless otherwise provided in the Bidding Documents.

6.02 All additional lands and access thereto required for temporary construction facilities, construction equipment, or storage of materials and equipment to be incorporated in the Work are to be obtained and paid for by Contractor.

6.03 The Contractor shall not work on property requiring obtaining of an easement until the Owner has obtained the necessary easement.

6.04 The Contractor shall have no claim for additional compensation or damage on account of any delay in obtaining the necessary easements.

ARTICLE 7 – INTERPRETATIONS AND ADDENDA

7.01 All questions about the meaning or intent of the Bidding Documents are to be submitted to Engineer in writing. Interpretations or clarifications considered necessary by Engineer in response to such questions will be issued by Addenda. Addenda will be posted to the City's Purchasing Website only at least 5 business days prior to the bid date. Prospective bidders are responsible for obtaining addenda from the City's website prior to the bid date. Questions received less than ten 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.

7.02 To receive consideration, such questions shall be submitted in writing to the Engineer, Erik Meserve, AECOM Project Manager, 978-905-3145 or erik.meserve@aecom.com at least seven days before the established date for receipt of Bids. In general, the Engineer

will neither approve nor disapprove particular products prior to the opening of Bids; such products will be considered when offered by the Contractor for incorporation into the Work.

7.03 The Engineer will set forth as Addenda, which shall become a part of the Contract Documents, such questions received as above provided as in his sole judgment are appropriate or necessary and his decision regarding each. At least five business days prior to the receipt of Bids, he will post a copy of these Addenda to the City's Purchasing Website.

7.04 The Contractor agrees to use the products and methods designated or described in the Specifications as amended by the Addenda.

7.05 Items and Indeterminate Items:

A. The work to be done under this contract has been divided into parts or items to enable each bidder to bid on different portions of the work in accordance with his estimate of their cost and so that the actual quantity of work executed under each item may be paid for at the price bid for that particular item, even though such quantity is greater or less than the estimated quantity stated in the Bid.

B. Certain items in the Bid cover classes of work of doubtful necessity or work for which it is impractical to estimate approximate quantities. Such items have been marked "Indeterminate."

ARTICLE 8 – BID SECURITY

8.01 A Bid must be accompanied by Bid security made payable to Owner in amount of 5 percent of the Bidder's maximum Bid price and in the form of a certified check or a Bid Bond (on the form attached) issued by a surety meeting the requirements of Paragraphs 5.01 and 5.02 of the General Conditions.

8.02 The Bid security of the Successful Bidder will be retained until such Bidder has executed the Contract Documents, furnished the required contract security and met the other conditions of the Notice of Award, whereupon the Bid security will be returned. If the Successful Bidder fails to execute and deliver the Contract Documents and furnish the required contract security within 15 days after the Notice of Award, Owner may consider Bidder to be in default, annul the Notice of Award, and the Bid security of that Bidder will be forfeited. Such forfeiture shall be Owner's exclusive remedy if Bidder defaults. The Bid security of other Bidders whom Owner believes to have a reasonable chance of receiving the award may be retained by Owner until the earlier of seven days after the Effective Date of the Agreement or 91 days after the Bid opening, whereupon Bid security furnished by such Bidders will be returned.

8.03 Bid security of other Bidders whom Owner believes do not have a reasonable chance of receiving the award will be returned within seven days after the Bid opening.

ARTICLE 9 – CONTRACT TIMES

9.01 The Work shall be substantially completed within 160 days from the date when the Contract Times commence to run, and the Work shall be completed and ready for final payment within 220 days from the date when the Contract Times commence to run as set forth in the Agreement.

ARTICLE 10 – LIQUIDATED DAMAGES

10.01 Provisions for liquidated damages are set forth in the Agreement.

ARTICLE 11 – SUBSTITUTE AND "OR-EQUAL" ITEMS

11.01 The Contract, if awarded, will be on the basis of materials and equipment specified or described in the Bidding Documents without consideration of possible substitute or "or-equal" items. Whenever it is specified or described in the Bidding Documents that a substitute or "or-equal" item of material or equipment may be furnished or used by Contractor if acceptable to Engineer, application for such acceptance will not be considered by Engineer until after the Effective Date of the Agreement.

ARTICLE 12 – BASIS OF DESIGN AND MAJOR EQUIPMENT ITEMS

12.01 *Basis of Design*

A. Unless otherwise indicated, design of this Project is based upon the material or Supplier's equipment named first in the list of manufacturers in the Specifications. Engineer has performed an evaluation of other listed manufacturers for compliance with the requirements of the Contract Documents. When other manufacturers are listed, Contractor may be required to make modifications or adjustments, at Contractor's expense, to coordinate the installation of the furnished equipment with associated elements of Work, such as piping and electrical connections, or support and mounting provisions.

ARTICLE 13 – PREPARATION OF BID

A. The Bid Form is included with the Bidding Documents. All blanks on the Bid Form shall be completed in ink and Bid Form signed in ink. Erasures or alterations shall be initialed in ink by the person signing the Bid Form.

B. A Bid price shall be indicated for each **Bid item** listed therein.

C. The Bid shall contain an acknowledgement of all Addenda, the numbers of which shall be filled in on the Bid Form.

D. Postal and e-mail addresses and telephone number for communications regarding the Bid shall be shown.

E. All names shall be printed in ink below the signatures.

F. It is the responsibility of the Bidder to submit a neat, accurate, and complete Bid.

13.02 The Bidder, when signing the Bid(s) shall meet the following requirements:

A. A Bid by an individual shall show Bidder's name and Bidder's official address.

B. A Bid by a partnership shall be executed in the partnership name and signed by a partner (whose title must appear under the signature) accompanied by evidence of authority to sign. The official address of the partnership shall be shown.

C. A Bid by a corporation shall be executed in the corporate name by the president or a vice-president or other corporate officer accompanied by evidence of authority to sign. The corporate seal shall be affixed and attested by the secretary or an assistant secretary. The corporate address and state of incorporation shall be shown.

D. A Bid by a joint venture shall be executed by each joint venture in the manner indicated on the Bid form. The official address of joint venture shall be shown.

E. A Bid by a limited liability company shall be executed in the name of the firm by a member and accompanied by evidence of authority to sign. The state of formation of the firm and the official address of the firm shall be shown.

13.03 The Bid shall contain evidence of Bidder's authority and qualification to do business in the state where the Project is located, or Bidder shall covenant in writing to obtain such authority and qualification prior to award of the Contract and attach such covenant to the Bid. Bidder's state Contractor license number, if any, shall also be shown on the Bid form.

ARTICLE 14 – BASIS OF BID; COMPARISON OF BIDS

14.01 *Unit Price*

A. Bidders shall submit a Bid on a unit price basis for each item of Work listed in the Bid schedule.

B. The total of all estimated prices will be the sum of the products of the estimated quantity of each item and the corresponding unit price. The final quantities and Contract Price will be determined in accordance with Paragraph 11.03 of the General Conditions.

C. Discrepancies between the multiplication of units of Work and unit prices will be resolved in favor of the unit prices. Discrepancies between the indicated sum of any column of figures and the correct sum thereof will be resolved in favor of the correct sum.

ARTICLE 15 – SUBMITTAL OF BID

15.01 A Bid shall be submitted no later than the date and time prescribed and at the place indicated in the advertisement or invitation to bid and shall be enclosed in a plainly

marked package with the Project title (and, if applicable, the designated portion of the Project for which the Bid is submitted), the name and address of Bidder, and shall be accompanied by the Bid security and other required documents. If a Bid is sent by mail or other delivery system, the sealed envelope containing the Bid shall be enclosed in a separate package plainly marked on the outside with the notation "BID ENCLOSED." A mailed Bid shall be addressed to **Purchasing Coordinator, City Hall, 1 Junkins Avenue, Portsmouth NH 03801**.

15.02 Bids received after the official Bid closure time will be returned to the Bidder unopened.

ARTICLE 16 – MODIFICATION AND WITHDRAWAL OF BID

16.1 Except as hereinafter in this subsection otherwise expressly provided, once his Bid is submitted and received by the Owner for consideration and comparison with other bids similarly submitted, the bidder agrees that he may not and will not withdraw it within 120 consecutive calendar days after the actual date of the opening of Bids.

16.2 Upon proper electronic or faxed written request and identification, Bids may be withdrawn only as follows:

1. At any time prior to the designated time for the opening of Bids.

2. Provided the Bid has not theretofore been accepted by the Owner, at any time subsequent to the expiration of the period during which the bidder has agreed not to withdraw his Bid.

16.3 Unless a Bid is withdrawn as provided above, the bidder agrees that it shall be deemed open for acceptance until the AGREEMENT has been executed by both parties thereto or until the Owner notifies a bidder in writing that his Bid is rejected or that the Owner does not intend to accept it, or returns his Bid deposit. Notice of acceptance of a Bid shall not constitute rejection of any other Bid.

ARTICLE 17 – OPENING OF BIDS

17.01 Bids will be opened at the time and place indicated in the Advertisement or Invitation to Bid and, unless obviously non-responsive, read aloud publicly. An abstract of the amounts of the base Bids and major alternates, if any, will be made available to Bidders after the opening of Bids.

ARTICLE 18 – BIDS TO REMAIN SUBJECT TO ACCEPTANCE

18.01 All Bids will remain subject to acceptance for the period of time stated in the Bid Form, but Owner may, in its sole discretion, release any Bid and return the Bid security prior to the end of this period.

ARTICLE 19 – EVALUATION OF BIDS AND AWARD OF CONTRACT

19.01 Owner reserves the right to reject any or all Bids, including without limitation, nonconforming, nonresponsive, unbalanced, or conditional Bids. Owner further reserves the right to reject the Bid of any Bidder whom it finds, after reasonable inquiry and evaluation, to not be responsible. Owner may also reject the Bid of any Bidder if Owner believes that it would not be in the best interest of the Project to make an award to that Bidder. Owner also reserves the right to waive all informalities not involving price, time, or changes in the Work and to negotiate contract terms with the Successful Bidder.

19.02 More than one Bid for the same Work from an individual or entity under the same or different names will not be considered. Reasonable grounds for believing that any Bidder has an interest in more than one Bid for the Work may be cause for disqualification of that Bidder and the rejection of all Bids in which that Bidder has an interest.

19.03 In evaluating Bids, Owner will consider whether or not the Bids comply with the prescribed requirements, and such alternates, unit prices and other data, as may be requested in the Bid Form or prior to the Notice of Award.

19.04 In evaluating Bidders, Owner will consider the qualifications of Bidders and may consider the qualifications and experience of Subcontractors, Suppliers, and other individuals or entities proposed for those portions of the Work for which the identity of Subcontractors, Suppliers, and other individuals or entities must be submitted as provided in the Supplementary Conditions.

19.05 Owner may conduct such investigations as Owner deems necessary to establish the responsibility, qualifications, and financial ability of Bidders, proposed Subcontractors, Suppliers, individuals, or entities proposed for those portions of the Work in accordance with the Contract Documents.

19.06 In the event that there is a discrepancy in the Bid between the lump sum or unit prices written in words and figures, the prices written in words shall govern.

ARTICLE 20 – CONTRACT SECURITY AND INSURANCE

20.01 Article 5 of the General Conditions, as may be modified by the Supplementary Conditions, sets forth Owner's requirements as to performance and payment bonds and insurance. When the Successful Bidder delivers the executed Agreement to Owner, it shall be accompanied by such bonds.

ARTICLE 21 – SIGNING OF AGREEMENT

21.01 When Owner issues a Notice of Award to the Successful Bidder, it shall be accompanied by the required number of unsigned counterparts of the Agreement along with the other Contract Documents which are identified in the Agreement as attached thereto. Within ten days thereafter, Successful Bidder shall sign and deliver the required number of counterparts of the Agreement and attached documents to Owner. Within ten days thereafter, Owner shall deliver one fully signed counterpart to Successful Bidder with a

complete set of the Drawings with appropriate identification.

ARTICLE 22 – PUBLIC HEALTH

22.01 Contractor shall follow any City of Portsmouth guidance issued by the City Manager relative to mask wearing when in any occupied City building.

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SECTION 00301

BID

PEIRCE ISLAND FORCE MAIN AND WATER MAIN REPLACEMENT

CITY OF PORTSMOUTH, NEW HAMPSHIRE

BID NUMBER #35-21

ARTICLE 1 – BID RECIPIENT

1.01 This Bid is submitted to:

City of Portsmouth, NH
Finance/Purchasing Department
1 Junkins Avenue
Portsmouth, NH 03801

(Hereinafter called Owner)

1.02 The undersigned Bidder proposes and agrees, if this Bid is accepted, to enter into an Agreement with Owner in the form included in the Bidding Documents to perform all Work as specified or indicated in the Bidding Documents for the prices and within the times indicated in this Bid and in accordance with the other terms and conditions of the Bidding Documents.

ARTICLE 2 – BIDDER'S ACKNOWLEDGEMENTS

2.01 Bidder accepts all of the terms and conditions of the Invitation to Bid and Instructions to Bidders, including without limitation those dealing with the disposition of Bid security. This Bid will remain subject to acceptance for the Bid withdrawal time period specified in the Invitation to Bid or Instructions to Bidders after the Bid opening, or for such longer period of time that Bidder may agree to in writing upon request of Owner.

ARTICLE 3 – BIDDER'S REPRESENTATIONS

3.01 In submitting this Bid, Bidder represents that:

A. Bidder has examined and carefully studied the Bidding Documents, other related data identified in the Bidding Documents, and the following Addenda, receipt of which is hereby acknowledged:

Addendum No.	Addendum Date

_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

B. Bidder has carefully examined the sites of the proposed work and fully informed and satisfied himself as to the conditions there existing, the character and requirements of the proposed work, the difficulties attendant upon its execution and the accuracy of all estimated quantities stated in this Bid, and the Bidder has carefully read and examined the Bidding Documents therein referred to and knows and understands the terms and provisions thereof.

C. Bidder has visited the Site and become familiar with and is satisfied as to the general, local, and Site conditions that may affect cost, progress, and performance of the Work.

D. Bidder is familiar with and is satisfied as to all Laws and Regulations that may affect cost, progress, and performance of the Work.

E. Bidder has carefully studied all: (1) reports of explorations and tests of subsurface conditions at or contiguous to the Site and all drawings of physical conditions relating to existing surface or subsurface structures at the Site (except Underground Facilities) that have been identified in SC-4.02 as containing reliable "technical data," and (2) reports and drawings of Hazardous Environmental Conditions, if any, at the Site that have been identified in SC-4.06 as containing reliable "technical data."

F. Bidder has considered the information known to Bidder; information commonly known to contractors doing business in the locality of the Site; information and observations obtained from visits to the Site; the Bidding Documents; and the Site-related reports and drawings identified in the Bidding Documents, with respect to the effect of such information, observations, and documents on (1) the cost, progress, and performance of the Work; (2) the means, methods, techniques, sequences, and procedures of construction to be employed by Bidder, including applying the specific means, methods, techniques, sequences, and procedures of construction expressly required by the Bidding Documents; and (3) Bidder’s safety precautions and programs.

G. Based on the information and observations referred to in Paragraph 3.01.E above, Bidder does not consider that further examinations, investigations, explorations, tests, studies, or data are necessary for the determination of this Bid for performance of the Work at the price(s) bid and within the times required, and in accordance with the other terms and conditions of the Bidding Documents.

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

I. Bidder has given Engineer written notice of all conflicts, errors, ambiguities, or discrepancies that Bidder has discovered in the Bidding Documents, and the written resolution thereof by Engineer is acceptable to Bidder.

J. The Bidding Documents are generally sufficient to indicate and convey understanding of all terms and conditions for the performance of the Work for which this Bid is submitted.

ARTICLE 4 – BIDDER'S CERTIFICATION

4.01 Bidder certifies that:

A. This Bid is genuine and not made in the interest of or on behalf of any undisclosed individual or entity and is not submitted in conformity with any collusive agreement or rules of any group, association, organization, or corporation;

B. Bidder has not directly or indirectly induced or solicited any other Bidder to submit a false or sham Bid;

C. Bidder has not solicited or induced any individual or entity to refrain from bidding; and

D. Bidder has not engaged in corrupt, fraudulent, collusive, or coercive practices in competing for the Contract. For the purposes of this Paragraph 4.01.D:

1. "corrupt practice" means the offering, giving, receiving, or soliciting of any thing of value likely to influence the action of a public official in the bidding process;

2. "fraudulent practice" means an intentional misrepresentation of facts made (a) to influence the bidding process to the detriment of Owner, (b) to establish bid prices at artificial non-competitive levels, or (c) to deprive Owner of the benefits of free and open competition;

3. "collusive practice" means a scheme or arrangement between two or more Bidders, with or without the knowledge of Owner, a purpose of which is to establish bid prices at artificial, non-competitive levels; and

4. "coercive practice" means harming or threatening to harm, directly or indirectly, persons or their property to influence their participation in the bidding process or affect the execution of the Contract.

ARTICLE 5 – BASIS OF BID

5.01 Bidder will complete the Work in accordance with the Contract Documents for the following unit prices:

A. Unit Price shall be computed in accordance with Paragraph 11.03 of the General Conditions.

Item No.	Estimated Quantity	Brief description; Unit or lump sum price bid in both words and figures	Total Figure
1		WATER MAIN REPLACEMENT	
1a	920 lin. ft.	12-in. ductile iron water pipe with Polyethylene Encasement, per lin. ft., _____ dollars and _____cents ($_____)	$_____
1b	1 valve	12-in. gate valve assembly, per valve, _____ dollars and _____cents ($_____)	$_____
1c	Lump Sum	Temp water system (potable), the lump sum of, _____ dollars and _____cents ($_____)	$_____
1d	1 connection	State Commercial Fish Pier Water Main Connection, per connection, _____ dollars and _____cents ($_____)	$_____
1e	1 connection	Four Tree Island Water Main Connection, per connection, _____ dollars and _____cents ($_____)	$_____
1f	1 connection	Installation of drinking water fountain and drinking water fountain connection, per connection, _____ dollars and _____cents ($_____)	$_____
2		FORCE MAIN REPLACEMENT	
2a	250 lin. ft.	Replacement of existing 18” ductile iron force main with 24” HDPE, per lin. ft _____ dollars and _____cents ($_____)	$_____

Item No.	Estimated Quantity	Brief description; Unit or lump sum price bid in both words and figures	Total Figure
2b	8 plugs	Cutting, plugging and abandonment of 18" FM on the island, per plug _____ dollars and _____cents ($_____)	$_____
2c	4 EA	Connections to existing ductile iron force main, per each _____ dollars and _____cents ($_____)	$_____
2d	2 disconnec-tions	Disconnecting 30-in. temporary force main, per disconnection. _____ dollars and _____cents ($_____)	$_____
2e	4,140 lin. ft.	24-in. High Density Polyethylene force main, per lin. ft., _____ dollars and _____cents ($_____)	$_____
2f	1 Lump sum	20-in. fusible polyvinylchloride force main slipliner, the lump sum of, _____ dollars and _____cents ($_____)	$_____
2g	1 valve	24-in gate valve assembly, per valve, _____ dollars and _____cents ($_____)	$_____
2h	1 set	Force main connections to the State Commercial Fishing Pier, per set of connections, _____ dollars and _____cents ($_____)	$_____

Item No.	Estimated Quantity	Brief description; Unit or lump sum price bid in both words and figures	Total Figure
2i	1 set	Force main connections to Four Tree Island, per set of connections, _____ dollars and _____cents ($_____)	$_____
2j	2 sets	Force main connections to the swimming pool and pool pump station, per set of connections, _____ dollars and _____cents ($_____)	$_____
3	2 connection	Force main blowoff connections, per connection, _____ dollars and _____cents ($_____)	$_____
4		FORCE MAIN BLOWOFF MANHOLES:	
4a	1 Bases	Blowoff manhole bases, per base, _____ dollars and _____cents ($_____)	$_____
4b	15 vert. ft.	Blowoff manhole walls and cones, per vert. ft., _____ dollars and _____cents ($_____)	$_____
4c	1 Sets	Installation of manhole frames and covers, per set, _____ dollars and _____cents ($_____)	$_____
5		MISCELLANEOUS EARTH EXCAVATION:	
5a	60* cu. yd.	Excavation and backfill for test pits, per cu. yd., _____ dollars and _____cents ($_____)	$_____
5b	150* cu. yd.	Excavation below normal depth, per cu. yd., _____ dollars and _____cents ($_____)	$_____

Item No.	Estimated Quantity	Brief description; Unit or lump sum price bid in both words and figures	Total Figure
6	150 * cu. yd.	Change in the quantity of earth excavation and backfill due to water main or force main depth change, per cu. yd., _____ dollars and _____cents ($_____)	$_____
7	2,900* cu. yd.	Rock excavation and disposal, per cu. yd., (minimum bid 75.00 per cu. yd.)** _____ dollars and _____cents ($_____)	$_____
8	100* cu. yd.	Bank run gravel, per cu. yd., _____ dollars and _____cents ($_____)	$_____
9	100* cu. yd.	Additional screened gravel, per cu. yd., _____ dollars and _____cents ($_____)	$_____
11		PAVEMENT:	
11a	270* cu. yd.	8” NHDOT Crushed Stone, per cu. yd., _____ dollars and _____cents ($_____)	$_____
11b	1,200* sq. yd.	2 1/2-inch bituminous concrete binder course permanent pavement, per sq. yd., _____ dollars and _____cents ($_____)	$_____
11c	300* lin. ft.	Remove and reset granite curbing, per lin. ft., _____ dollars and _____cents ($_____)	$_____
12	35* sq. yd.	Concrete sidewalk, per sq. yd., _____ dollars and _____cents ($_____)	$_____

Item No.	Estimated Quantity	Brief description; Unit or lump sum price bid in both words and figures	Total Figure
13	4,000* lbs.	Calcium chloride for dust control, per lb., _____ dollars and _____cents ($_____)	$_____
14		STORMWATER MANAGEMENT	
14a	Lump Sum	Stormwater Pollution Prevention Plan, the lump sum of _____ dollars and _____cents ($_____)	$_____
14b	Lump Sum	Monitoring SWPPP and Erosion and Sediment Controls, the lump sum of _____ dollars and _____cents ($_____)	$_____
15	Lump Sum	Removing previously installed traffic signs, the lump sum of _____ dollars and _____cents ($_____)	$_____
16	Allowance	Services of police details, an allowance of: Fifty Thousand _____dollars and No _____cents	$50,000.00
17	Allowance	Additional Traffic Control, an allowance of: Ten Thousand _____dollars and No _____cents	$10,000.00
18	2 Message boards	Variable message boards, per message board, _____ dollars and _____cents ($_____)	$_____

Item No.	Estimated Quantity	Brief description; Unit or lump sum price bid in both words and figures	Total Figure
19	Lump Sum	Mobilization, (maximum 5% of items 1 thru 18), the lump sum of, _____ dollars and _____cents ($_____)	$_____

*Indeterminate; quantity assumed for comparison of bids.
**Bidder must insert minimum price or greater and insert extended item prices.

The undersigned agrees that for extra work, if any, performed in accordance with the terms and provisions of the annexed form of AGREEMENT, he will accept compensation as stipulated therein in full payment for such extra work.

If this BID is accepted by the Owner, the undersigned agrees to complete the entire work provided to be done under the Contract within the time stipulated in the AGREEMENT.

For informal comparison only and not to be considered as part of this BID, the total price for Items 1 to 19, inclusive, derived as described in the INFORMATION FOR BIDDERS under the heading "Comparison of Bids," is

_____dollars

and _____cents

$_____

ARTICLE 6 – TIME OF COMPLETION

6.01 Regardless of whether any of the Bid Alternates are executed, Bidder agrees that the Work will be substantially complete and will be completed and ready for final payment in accordance with Paragraph 14.07 of the General Conditions on or before the dates or within the number of calendar days indicated in the Agreement.

6.02 Regardless of whether any of the Bid Alternates are executed, Bidder accepts the provisions of the Agreement as to liquidated damages.

ARTICLE 7 – ATTACHMENT TO THIS BID

7.01 The following documents are submitted with and made a condition of this Bid:

A. Required Bid security in the form of a certified treasurer's or cashier's check or bid bond.

ARTICLE 8 – DEFINED TERMS

8.01 The terms used in this Bid with initial capital letters have the meanings stated in the Instructions to Bidders, the General Conditions, and the Supplementary Conditions.

ARTICLE 9 – BID SUBMITTAL

9.01 This Bid is submitted by:

If Bidder is:

An Individual

Name (typed or printed): _____

By: _____
(Individual's signature)

Doing business as: _____

A Partnership

Partnership Name: _____

By: _____
(Signature of general partner -- attach evidence of authority to sign)

Name (typed or printed): _____

A Corporation

Corporation Name: _____ (SEAL)

State of Incorporation: _____
Type (General Business, Professional, Service, Limited Liability):_____

By: _____
(Signature -- attach evidence of authority to sign)

Name (typed or printed): _____

Title: _____
(CORPORATE SEAL)

Attest _____

Date of Qualification to do business in New Hampshire is ____/____/____.

A Joint Venture

Name of Joint Venture: _____

First Joint Venturer Name: _____ (SEAL)

By: _____
(Signature of first joint venture partner -- attach evidence of authority to sign)

Name (typed or printed): _____

Title: _____

Second Joint Venturer Name: _____(SEAL)

By: _____
(Signature of first joint venture partner -- attach evidence of authority to sign)

Name (typed or printed): _____

Title: _____

(Each joint venturer must sign. The manner of signing for each individual, partnership, and corporation that is a party to the joint venture should be in the manner indicated above.)

Bidder's Business Address _____

_____

Phone No. _____ Fax No. _____

E-mail _____ _____

SUBMITTED on _____, 2021.

State Contractor License No. _____.

Sworn and subscribed to before me this

_____ day of _____, 2021.

_____

Notary or other officer authorized to administer oaths

My commission expires: _____ , 20 ___ .

(Bidders shall not add any conditions or qualifying statements to this Bid as otherwise the Bid may be declared irregular as being not responsive to the advertisement. BIDDERS SHALL USE THIS BID FORM IN SUBMITTING THEIR BIDS.)

END OF SECTION

SECTION 00410

BID BOND

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

BIDDER *(Name and Address)*:

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

OWNER *(Name and Address)*:
City of Portsmouth, NH
1 Junkins Ave
Portsmouth, NH 03801

BID
Bid Due Date:
Description *(Project Name and Include Location)*:
Peirce Island Force Main and Water Main Replacement, Portsmouth, NH

BOND
Bond Number:
Date *(Not earlier than Bid due date)*:
Penal sum _____ $ _____
(Words) (Figures)

Surety and Bidder, intending to be legally bound hereby, subject to the terms set forth below, do each cause this Bid Bond to be duly executed by an authorized officer, agent, or representative.

BIDDER	**SURETY**
_____ (Seal)	_____ (Seal)
Bidder's Name and Corporate Seal	Surety's Name and Corporate Seal
By: _____	By: _____
Signature	Signature (Attach Power of Attorney)
_____	_____
Print Name	Print Name
_____	_____
Title	Title
Attest: _____	Attest: _____
Signature	Signature
_____	_____
Title	Title

Note: Above addresses are to be used for giving any required notice. Provide execution by any additional parties, such as joint venturers, if necessary.

1. Bidder and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors, and assigns to pay to Owner upon default of Bidder the penal sum set forth on the face of this Bond. Payment of the penal sum is the extent of Bidder's and Surety's liability. Recovery of such penal sum under the terms of this Bond shall be Owner's sole and exclusive remedy upon default of Bidder.

2. Default of Bidder shall occur upon the failure of Bidder to deliver within the time required by the Bidding Documents (or any extension thereof agreed to in writing by Owner) the executed Agreement required by the Bidding Documents and any performance and payment bonds required by the Bidding Documents.

3. This obligation shall be null and void if:

3.1 Owner accepts Bidder's Bid and Bidder delivers within the time required by the Bidding Documents (or any extension thereof agreed to in writing by Owner) the executed Agreement required by the Bidding Documents and any performance and payment bonds required by the Bidding Documents, or

3.2 All Bids are rejected by Owner, or

3.3 Owner fails to issue a Notice of Award to Bidder within the time specified in the Bidding Documents (or any extension thereof agreed to in writing by Bidder and, if applicable, consented to by Surety when required by Paragraph 5 hereof).

4. Payment under this Bond will be due and payable upon default of Bidder and within 30 calendar days after receipt by Bidder and Surety of written notice of default from Owner, which notice will be given with reasonable promptness, identifying this Bond and the Project and including a statement of the amount due.

5. Surety waives notice of any and all defenses based on or arising out of any time extension to issue Notice of Award agreed to in writing by Owner and Bidder, provided that the total time for issuing Notice of Award including extensions shall not in the aggregate exceed 120 days from Bid due date without Surety's written consent.

6. No suit or action shall be commenced under this Bond prior to 30 calendar days after the notice of default required in Paragraph 4 above is received by Bidder and Surety and in no case later than one year after Bid due date.

7. Any suit or action under this Bond shall be commenced only in a court of competent jurisdiction located in the state in which the Project is located.

8. Notices required hereunder shall be in writing and sent to Bidder and Surety at their respective addresses shown on the face of this Bond. Such notices may be sent by personal delivery, commercial courier, or by United States Registered or Certified Mail, return receipt requested, postage pre-paid, and shall be deemed to be effective upon receipt by the party concerned.

9. Surety shall cause to be attached to this Bond a current and effective Power of Attorney evidencing the authority of the officer, agent, or representative who executed this Bond on behalf of Surety to execute, seal, and deliver such Bond and bind the Surety thereby.

10. This Bond is intended to conform to all applicable statutory requirements. Any applicable requirement of any applicable statute that has been omitted from this Bond shall be deemed to be included herein as if set forth at length. If any provision of this Bond conflicts with any applicable statute, then the provision of said statute shall govern and the remainder of this Bond that is not in conflict therewith shall continue in full force and effect.

11. The term "Bid" as used herein includes a Bid, offer, or proposal as applicable.

SECTION 00510

NOTICE OF AWARD (EJCDC C-510)

Notice of Award

Date: _____

Project: Peirce Island Force Main and Water Main Replacement	
Owner: City of Portsmouth, NH	Owner's Contract No.: 35-21
Contract:	Engineer's Project No.: 60649477
Bidder:	
Bidder's Address: ***[send Notice of Award Certified Mail, Return Receipt Requested]***	

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

[Indicate total Work, alternates, or sections of Work awarded.]

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

[Insert appropriate data if unit prices are used. Change language for cost-plus contracts.]

[_____] copies of the proposed Contract Documents (except Drawings) accompany this Notice of Award.

[_____] sets of the Drawings will be delivered separately or otherwise made available to you immediately.

You must comply with the following conditions precedent within [**10**] days of the date you receive this Notice of Award.

1. Deliver to the Owner [_____] fully executed counterparts of the Contract Documents.
2. Deliver with the executed Contract Documents the Contract security [**Bonds**] as specified in the Instructions to Bidders (Article 20), General Conditions (Paragraph 5.01), and Supplementary Conditions (Paragraph SC-5.01).
3. Other conditions precedent:
   [_____]

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

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

_____
Owner

By: _____
Authorized Signature

_____
Title

Copy to Engineer

SECTION 00520

AGREEMENT

THIS AGREEMENT is by and between City of Portsmouth, NH ("Owner") and _____ ("Contractor").

Owner and Contractor hereby agree as follows:

ARTICLE 1 – WORK

1.01 Contractor shall complete all Work as specified or indicated in the Contract Documents. The Work is generally described in Section – Summary of Work:

ARTICLE 2 – THE PROJECT

2.01 The Project for which the Work under the Contract Documents may be the whole or only a part is generally described as follows:

Peirce Island Force Main and Water Main Replacement
for the City of Portsmouth, New Hampshire

ARTICLE 3 – ENGINEER

3.01 The Project has been designed by AECOM (Engineer), which is to act as Owner's representative, assume all duties and responsibilities, and have the rights and authority assigned to Engineer in the Contract Documents in connection with the completion of the Work in accordance with the Contract Documents.

ARTICLE 4 – CONTRACT TIMES

4.01 *Time of the Essence*

A. All time limits for Milestones, if any, Substantial Completion, and completion and readiness for final payment as stated in the Contract Documents are of the essence of the Contract.

4.02 *Days to Achieve Substantial Completion and Final Payment*

A. The Work will be substantially completed within 160 days after the date when the Contract Times commence to run as provided in Paragraph 2.03 of the General Conditions, and completed and ready for final payment in accordance with Paragraph 14.07 of the General Conditions within 220 days after the date when the Contract Times commence to run.

4.03 *Liquidated Damages*

A. Contractor and Owner recognize that time is of the essence as stated in Paragraph 4.01 above and that Owner will suffer financial loss if the Work is not completed within the

times specified in Paragraph 4.02 above, plus any extensions thereof allowed in accordance with Article 12 of the General Conditions. The parties also recognize the delays, expense, and difficulties involved in proving in a legal or arbitration proceeding the actual loss suffered by Owner if the Work is not completed on time. Accordingly, instead of requiring any such proof, Owner and Contractor agree that as liquidated damages for delay (but not as a penalty), Contractor shall pay Owner $2,000 for each day that expires after the time specified in Paragraph 4.02 above for Substantial Completion until the Work is substantially complete. After Substantial Completion, if Contractor shall neglect, refuse, or fail to complete the remaining Work within the Contract Time or any proper extension thereof granted by Owner, Contractor shall pay Owner $2,000 for each day that expires after the time specified in Paragraph 4.02 above for completion and readiness for final payment until the Work is completed and ready for final payment.

4.04 Permitting Contractor or Surety to continue and finish the Work or any part of the Work after the times specified for completion, or after the date to which the times for completion may have been extended, shall in no way operate as a waiver on the part of Owner of its rights under the Contract.

4.05 Time limits for Substantial Completion and Final Completion are independent. Liquidated damages shall accrue simultaneously for each violation.

ARTICLE 5 – CONTRACT PRICE

5.01 Owner shall pay Contractor for completion of the Work in accordance with the Contract Documents an amount in current funds equal to the prices stipulated in the Contractor's Bid attached to this Attachment.

ARTICLE 6 – PAYMENT PROCEDURES

6.01 *Submittal and Processing of Payments*

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

6.02 *Progress Payments; Retainage*

A. Owner shall make progress payments on account of the Contract Price on the basis of Contractor's Applications for Payment on or about the last day of each month during performance of the Work as provided in Paragraph 6.02.A.1 below. All such payments will be measured by the schedule of values established as provided in Paragraph 2.07.A of the General Conditions (and in the case of Unit Price Work based on the number of units completed) or, in the event there is no schedule of values, as provided in the elsewhere in the Contract.

1. Prior to Substantial Completion, progress payments will be made in an amount equal to the percentage indicated below but, in each case, less the aggregate of payments previously made and less such amounts as Owner may withhold, including but not

limited to liquidated damages, in accordance with Paragraph 14.02 of the General Conditions.

a. 90 percent of Work completed and of cost of materials and equipment not incorporated in the Work (with the balance being retainage). If the Work has been 50 percent completed as determined by Engineer, and if the character and progress of the Work have been satisfactory to Owner and Engineer, then as long as the character and progress of the Work remain satisfactory to Owner and Engineer, there will be no additional retainage.

B. Upon Substantial Completion of the entire construction to be provided under the Contract Documents, Owner shall pay an amount sufficient to increase total payments to Contractor to 98 percent of the Work completed, less such amounts set off by Owner pursuant to Paragraph 14.02.D of the General Conditions and less 100 percent of the Engineer's estimate of the value of Work to be completed or corrected as shown on the tentative list of items to be completed or corrected Prior to final payment.

C. The Owner will impose a set off in the amount equal to 2% of the Contract value from final completion to the end of the Correction period. Upon reaching the end of the Correction Period and contingent upon satisfactory completion of all warranty and/or remaining punch list item, the set off amount will be paid to the Contractor pursuant to Paragraph 6.03 of the Agreement.

6.03 *Final Payment*

A. Upon final completion and acceptance of the Work in accordance with Paragraph 14.07 of the General Conditions, Owner shall pay the remainder of the Contract Price as recommended by Engineer as provided in said Paragraph 14.07.

ARTICLE 7 – INTEREST

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

ARTICLE 8 – CONTRACTOR'S REPRESENTATIONS

8.01 In order to induce Owner to enter into this Agreement, Contractor makes the following representations:

A. Contractor has examined and carefully studied the Contract Documents and the other related data identified in the Bidding Documents.

B. Contractor has visited the Site and become familiar with and is satisfied as to the general, local, and Site conditions that may affect cost, progress, and performance of the Work.

C. Contractor is familiar with and is satisfied as to all federal, state, and local Laws and Regulations that may affect cost, progress, and performance of the Work.

D. Contractor has carefully studied all: (1) reports of explorations and tests of subsurface conditions at or contiguous to the Site and all drawings of physical conditions relating to existing surface or subsurface structures at the Site (except Underground Facilities), if any, that have been identified in Paragraph SC-4.02 of the Supplementary Conditions as containing reliable "technical data," and (2) reports and drawings of Hazardous Environmental Conditions, if any, at the Site that have been identified in Paragraph SC-4.06 of the Supplementary Conditions as containing reliable "technical data."

E. Contractor has considered the information known to Contractor; information commonly known to contractors doing business in the locality of the Site; information and observations obtained from visits to the Site; the Contract Documents; and the Site-related reports and drawings identified in the Contract Documents, with respect to the effect of such information, observations, and documents on (1) the cost, progress, and performance of the Work; (2) the means, methods, techniques, sequences, and procedures of construction to be employed by Contractor, including any specific means, methods, techniques, sequences, and procedures of construction expressly required by the Contract Documents; and (3) Contractor's safety precautions and programs.

F. Based on the information and observations referred to in Paragraph 8.01.E above, Contractor does not consider that further examinations, investigations, explorations, tests, studies, or data are necessary for the performance of the Work at the Contract Price, within the Contract Times, and in accordance with the other terms and conditions of the Contract Documents.

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

H. Contractor has given Engineer written notice of all conflicts, errors, ambiguities, or discrepancies that Contractor has discovered in the Contract Documents, and the written resolution thereof by Engineer is acceptable to Contractor.

I. The Contract Documents are generally sufficient to indicate and convey understanding of all terms and conditions for performance and furnishing of the Work.

J. In connection with the performance of Work under this Contract, Contractor agrees not to discriminate against any employee or applicant for employment because of age, race, religion, color, handicap, sex, physical condition or developmental disability. This provision 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. Contractor further agrees to take affirmative action to ensure equal employment opportunities for persons with disabilities. Contractor agrees to post in conspicuous places, available for employees and applicants for employment, notices setting forth the provisions of the nondiscrimination clause. Form of notice is included in the Project Forms.

ARTICLE 9 – CONTRACT DOCUMENTS

9.01 *Contents*

A. The Contract Documents consist of the following:

1. This Agreement (pages 00520-1 to 00520-8, inclusive).

2. Performance bond (pages 00610-1 to 00610-3, inclusive).

3. Payment bond (pages 00615-1 to 00615-3, inclusive).

4. General Conditions (pages 00700-1 to 00700-62, inclusive).

5. Supplementary Conditions (pages 00800B-1 to 00800B-19, inclusive).

6. Specifications as listed in the table of contents thereof.

7. Drawings consisting of 21 sheets with each sheet bearing the following general title: Peirce Island Force Main and Water Main Replacement, Bid No. 35-21.

8. Addenda (numbers _____ to _____, inclusive).

9. Exhibits to this Agreement (enumerated as follows):

   a. Contractor's Bid (pages _____ to _____, inclusive).

   b. Documentation submitted by Contractor prior to Notice of Award (pages _____ to _____, inclusive).

10. The following which may be delivered or issued on or after the Effective Date of the Agreement and are not attached hereto:

    a. Notice to Proceed (pages _____ to _____, inclusive).

    b. Work Change Directives.

    c. Change Orders.

B. The documents listed in Paragraph 9.01.A are attached to this Agreement (except as expressly noted otherwise above).

C. There are no Contract Documents other than those listed above in this Article 9.

D. The Contract Documents may only be amended, modified, or supplemented as provided in Paragraph 3.04 of the General Conditions.

ARTICLE 10 – MISCELLANEOUS

10.01 *Terms*

A. Terms used in this Agreement will have the meanings stated in the General Conditions and the Supplementary Conditions.

10.02 *Assignment of Contract*

A. No assignment by a party hereto of any rights under or interests in the Contract will be binding on another party hereto without the written consent of the party sought to be bound; and, specifically but without limitation, moneys that may become due and moneys that are due may not be assigned without such consent (except to the extent that the effect of this restriction may be limited by law), and unless specifically stated to the contrary in any written consent to an assignment, no assignment will release or discharge the assignor from any duty or responsibility under the Contract Documents.

10.03 *Successors and Assigns*

A. Owner and Contractor each binds itself, its partners, successors, assigns, and legal representatives to the other party hereto, its partners, successors, assigns, and legal representatives in respect to all covenants, agreements, and obligations contained in the Contract Documents.

10.04 *Severability*

A. Any provision or part of the Contract Documents held to be void or unenforceable under any Law or Regulation shall be deemed stricken, and all remaining provisions shall continue to be valid and binding upon Owner and Contractor, who agree that the Contract Documents shall be reformed to replace such stricken provision or part thereof with a valid and enforceable provision that comes as close as possible to expressing the intention of the stricken provision.

10.05 *Contractor's Certifications*

A. Contractor certifies that it has not engaged in corrupt, fraudulent, collusive, or coercive practices in competing for or in executing the Contract. For the purposes of this Paragraph 10.05:

1. "corrupt practice" means the offering, giving, receiving, or soliciting of anything of value likely to influence the action of a public official in the bidding process or in the Contract execution;

2. "fraudulent practice" means an intentional misrepresentation of facts made (a) to influence the bidding process or the execution of the Contract to the detriment of Owner, (b) to establish Bid or Contract prices at artificial non-competitive levels, or (c) to deprive Owner of the benefits of free and open competition;

3. “collusive practice” means a scheme or arrangement between two or more Bidders, with or without the knowledge of Owner, a purpose of which is to establish Bid prices at artificial, non-competitive levels; and

4. “coercive practice” means harming or threatening to harm, directly or indirectly, persons or their property to influence their participation in the bidding process or affect the execution of the Contract.

IN WITNESS WHEREOF, Owner and Contractor have signed this Agreement. Counterparts have been delivered to Owner and Contractor. All portions of the Contract Documents have been signed or have been identified by Owner and Contractor or on their behalf.

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

OWNER:	CONTRACTOR
City of Portsmouth, NH	
Signature:	Signature:
By: Karen S. Conard	By:
Title: City Manager	Title:
	(If Contractor is a corporation, a partnership, or a joint venture, attach evidence of authority to sign.)
[**CORPORATE SEAL**]	
Attest:	Attest:
Title:	Title:
Address for giving notices:	Address for giving notices:

END OF SECTION

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SECTION 00550

NOTICE TO PROCEED (EJCDC C-550)

Notice to Proceed

Date: _____

Project: Peirce Island Force Main and Water Main Replacement	
Owner: City of Portsmouth, NH	Owner's Contract No.: 35-21
Contract:	Engineer's Project No.: 60649477
Contractor:	
Contractor's Address: [send Certified Mail, Return Receipt Requested]	

You are notified that the Contract Times under the above Contract will commence to run on [_____]. On or before that date, you are to start performing your obligations under the Contract Documents. In accordance with Article 4 of the Agreement, the date of Substantial Completion is [_____], and the date of readiness for final payment is [_____] [**(or) the number of days to achieve Substantial Completion is [_____], and the number of days to achieve readiness for final payment is [_____]**].

Before you may start any Work at the Site, Paragraph 2.01.B of the General Conditions provides that you and Owner must each deliver to the other (with copies to Engineer and other identified additional insureds and loss payees) certificates of insurance which each is required to purchase and maintain in accordance with the Contract Documents.

Also, before you may start any Work at the Site, you must:

_____ ***[add other requirements]***.

	Owner
	Given by:
	Authorized Signature
	Title
	Date

Copy to Engineer

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EJCDC
ENGINEERS JOINT CONTRACT DOCUMENTS COMMITTEE

SECTION 00610

PERFORMANCE BOND (EJCDC C-610)

CONTRACTOR *(name and address)*:

SURETY *(name and address of principal place of business)*:

OWNER *(name and address)*:

CONSTRUCTION CONTRACT

Effective Date of the Agreement:
Amount:
Description *(name and location)*:

BOND

Bond Number:
Date *(not earlier than the Effective Date of the Agreement of the Construction Contract)*:
Amount:
Modifications to this Bond Form: ☐ None ☐ See Paragraph 16

Surety and Contractor, intending to be legally bound hereby, subject to the terms set forth below, do each cause this Performance Bond to be duly executed by an authorized officer, agent, or representative.

CONTRACTOR AS PRINCIPAL	**SURETY**
_____ *(seal)*	_____ *(seal)*
Contractor's Name and Corporate Seal	Surety's Name and Corporate Seal
By: _____	**By:** _____
Signature	Signature *(attach power of attorney)*
_____	_____
Print Name	Print Name
_____	_____
Title	Title
Attest: _____	**Attest:** _____
Signature	Signature
_____	_____
Title	Title

Notes: (1) Provide supplemental execution by any additional parties, such as joint venturers. (2) Any singular reference to Contractor, Surety, Owner, or other party shall be considered plural where applicable.

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

2. If the Contractor performs the Construction Contract, the Surety and the Contractor shall have no obligation under this Bond, except when applicable to participate in a conference as provided in Paragraph 3.

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

3.1 The Owner first provides notice to the Contractor and the Surety that the Owner is considering declaring a Contractor Default. Such notice shall indicate whether the Owner is requesting a conference among the Owner, Contractor, and Surety to discuss the Contractor's performance. If the Owner does not request a conference, the Surety may, within five (5) business days after receipt of the Owner's notice, request such a conference. If the Surety timely requests a conference, the Owner shall attend. Unless the Owner agrees otherwise, any conference requested under this Paragraph 3.1 shall be held within ten (10) business days of the Surety's receipt of the Owner's notice. If the Owner, the Contractor, and the Surety agree, the Contractor shall be allowed a reasonable time to perform the Construction Contract, but such an agreement shall not waive the Owner's right, if any, subsequently to declare a Contractor Default;

3.2 The Owner declares a Contractor Default, terminates the Construction Contract and notifies the Surety; and

3.3 The Owner has agreed to pay the Balance of the Contract Price in accordance with the terms of the Construction Contract to the Surety or to a contractor selected to perform the Construction Contract.

4. Failure on the part of the Owner to comply with the notice requirement in Paragraph 3.1 shall not constitute a failure to comply with a condition precedent to the Surety's obligations, or release the Surety from its obligations, except to the extent the Surety demonstrates actual prejudice.

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

5.1 Arrange for the Contractor, with the consent of the Owner, to perform and complete the Construction Contract;

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

5.3 Obtain bids or negotiated proposals from qualified contractors acceptable to the Owner for a contract for performance and completion of the Construction Contract, arrange for a contract to be prepared for execution by the Owner and a contractor selected with the Owners concurrence, to be secured with performance and payment bonds executed by a qualified surety equivalent to the bonds issued on the Construction Contract, and pay to the Owner the amount of damages as described in Paragraph 7 in excess of the Balance of the Contract Price incurred by the Owner as a result of the Contractor Default; or

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

5.4.1 After investigation, determine the amount for which it may be liable to the Owner and, as soon as practicable after the amount is determined, make payment to the Owner; or

5.4.2 Deny liability in whole or in part and notify the Owner, citing the reasons for denial.

6. If the Surety does not proceed as provided in Paragraph 5 with reasonable promptness, the Surety shall be deemed to be in default on this Bond seven days after receipt of an additional written notice from the Owner to the Surety demanding that the Surety perform its obligations under this Bond, and the Owner shall be entitled to enforce any remedy available to the Owner. If the Surety proceeds as provided in Paragraph 5.4, and the Owner refuses the payment or the Surety has denied liability, in whole or in part, without further notice the Owner shall be entitled to enforce any remedy available to the Owner.

7. If the Surety elects to act under Paragraph 5.1, 5.2, or 5.3, then the responsibilities of the Surety to the Owner shall not be greater than those of the Contractor under the Construction Contract, and the responsibilities of the Owner to the Surety shall not be greater than those of the Owner under the Construction Contract. Subject to the commitment by the Owner to pay the Balance of the Contract Price, the Surety is obligated, without duplication for:

7.1 the responsibilities of the Contractor for correction of defective work and completion of the Construction Contract;

7.2 additional legal, design professional, and delay costs resulting from the Contractor's Default, and resulting from the actions or failure to act of the Surety under Paragraph 5; and

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

8. If the Surety elects to act under Paragraph 5.1, 5.3, or 5.4, the Surety's liability is limited to the amount of this Bond.

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

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

11. Any proceeding, legal or equitable, under this Bond may be instituted in any court of competent jurisdiction in the location in which the work or part of the work is located and shall be instituted within two years after a declaration of Contractor Default or within two years after the Contractor ceased working or within two years after the Surety refuses or fails to perform its obligations under this Bond, whichever occurs first. If the provisions of this paragraph are void or prohibited by law, the minimum periods of limitations

available to sureties as a defense in the jurisdiction of the suit shall be applicable.

12. Notice to the Surety, the Owner, or the Contractor shall be mailed or delivered to the address shown on the page on which their signature appears.

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

14. Definitions

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

14.2 Construction Contract: The agreement between the Owner and Contractor identified on the cover page, including all Contract Documents and changes made to the agreement and the Contract Documents.

14.3 Contractor Default: Failure of the Contractor, which has not been remedied or waived, to perform or otherwise to comply with a material term of the Construction Contract.

14.4 Owner Default: Failure of the Owner, which has not been remedied or waived, to pay the Contractor as required under the Construction Contract or to perform and complete or comply with the other material terms of the Construction Contract.

14.5 Contract Documents: All the documents that comprise the agreement between the Owner and Contractor.

15. If this Bond is issued for an agreement between a contractor and subcontractor, the term Contractor in this Bond shall be deemed to be Subcontractor and the term Owner shall be deemed to be Contractor.

16. Modifications to this Bond are as follows:

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EJCDC
ENGINEERS JOINT CONTRACT DOCUMENTS COMMITTEE

SECTION 00615

PAYMENT BOND (EJCDC C-615)

CONTRACTOR *(name and address)*:

SURETY *(name and address of principal place of business)*:

OWNER *(name and address)*:

CONSTRUCTION CONTRACT

Effective Date of the Agreement:
Amount:
Description *(name and location)*:

BOND

Bond Number:
Date *(not earlier than the Effective Date of the Agreement of the Construction Contract)*:
Amount:
Modifications to this Bond Form: ☐ None ☐ See Paragraph 18

Surety and Contractor, intending to be legally bound hereby, subject to the terms set forth below, do each cause this Payment Bond to be duly executed by an authorized officer, agent, or representative.

CONTRACTOR AS PRINCIPAL	**SURETY**
_____ *(seal)*	_____ *(seal)*
Contractor's Name and Corporate Seal	Surety's Name and Corporate Seal
By: _____	**By:** _____
Signature	Signature *(attach power of attorney)*
_____	_____
Print Name	Print Name
_____	_____
Title	Title
Attest: _____	**Attest:** _____
Signature	Signature
_____	_____
Title	Title

Notes: (1) Provide supplemental execution by any additional parties, such as joint venturers. (2) Any singular reference to Contractor, Surety, Owner, or other party shall be considered plural where applicable.

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

2. If the Contractor promptly makes payment of all sums due to Claimants, and defends, indemnifies, and holds harmless the Owner from claims, demands, liens, or suits by any person or entity seeking payment for labor, materials, or equipment furnished for use in the performance of the Construction Contract, then the Surety and the Contractor shall have no obligation under this Bond.

3. If there is no Owner Default under the Construction Contract, the Surety's obligation to the Owner under this Bond shall arise after the Owner has promptly notified the Contractor and the Surety (at the address described in Paragraph 13) of claims, demands, liens, or suits against the Owner or the Owner's property by any person or entity seeking payment for labor, materials, or equipment furnished for use in the performance of the Construction Contract, and tendered defense of such claims, demands, liens, or suits to the Contractor and the Surety.

4. When the Owner has satisfied the conditions in Paragraph 3, the Surety shall promptly and at the Surety's expense defend, indemnify, and hold harmless the Owner against a duly tendered claim, demand, lien, or suit.

5. The Surety's obligations to a Claimant under this Bond shall arise after the following:

   5.1 Claimants who do not have a direct contract with the Contractor,

      5.1.1 have furnished a written notice of non-payment to the Contractor, stating with substantial accuracy the amount claimed and the name of the party to whom the materials were, or equipment was, furnished or supplied or for whom the labor was done or performed, within ninety (90) days after having last performed labor or last furnished materials or equipment included in the Claim; and

      5.1.2 have sent a Claim to the Surety (at the address described in Paragraph 13).

   5.2 Claimants who are employed by or have a direct contract with the Contractor have sent a Claim to the Surety (at the address described in Paragraph 13).

6. If a notice of non-payment required by Paragraph 5.1.1 is given by the Owner to the Contractor, that is sufficient to satisfy a Claimant's obligation to furnish a written notice of non-payment under Paragraph 5.1.1.

7. When a Claimant has satisfied the conditions of Paragraph 5.1 or 5.2, whichever is applicable, the Surety shall promptly and at the Surety's expense take the following actions:

   7.1 Send an answer to the Claimant, with a copy to the Owner, within sixty (60) days after receipt of the Claim, stating the amounts that are undisputed and the basis for challenging any amounts that are disputed; and

   7.2 Pay or arrange for payment of any undisputed amounts.

   7.3 The Surety's failure to discharge its obligations under Paragraph 7.1 or 7.2 shall not be deemed to constitute a waiver of defenses the Surety or Contractor may have or acquire as to a Claim, except as to undisputed amounts for which the Surety and Claimant have reached agreement. If, however, the Surety fails to discharge its obligations under Paragraph 7.1 or 7.2, the Surety shall indemnify the Claimant for the reasonable attorney's fees the Claimant incurs thereafter to recover any sums found to be due and owing to the Claimant.

8. The Surety's total obligation shall not exceed the amount of this Bond, plus the amount of reasonable attorney's fees provided under Paragraph 7.3, and the amount of this Bond shall be credited for any payments made in good faith by the Surety.

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

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

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

12. No suit or action shall be commenced by a Claimant under this Bond other than in a court of competent jurisdiction in the state in which the project that is the subject of the Construction Contract is located or after the expiration of one year from the date (1) on which the Claimant sent a Claim to the Surety pursuant to Paragraph 5.1.2 or 5.2, or (2) on which the last labor or service was performed by

anyone or the last materials or equipment were furnished by anyone under the Construction Contract, whichever of (1) or (2) first occurs. If the provisions of this paragraph are void or prohibited by law, the minimum period of limitation available to sureties as a defense in the jurisdiction of the suit shall be applicable.

13. Notice and Claims to the Surety, the Owner, or the Contractor shall be mailed or delivered to the address shown on the page on which their signature appears. Actual receipt of notice or Claims, however accomplished, shall be sufficient compliance as of the date received.

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

15. Upon requests by any person or entity appearing to be a potential beneficiary of this Bond, the Contractor and Owner shall promptly furnish a copy of this Bond or shall permit a copy to be made.

16. **Definitions**

16.1 **Claim:** A written statement by the Claimant including at a minimum:

1. The name of the Claimant;
2. The name of the person for whom the labor was done, or materials or equipment furnished;
3. A copy of the agreement or purchase order pursuant to which labor, materials, or equipment was furnished for use in the performance of the Construction Contract;
4. A brief description of the labor, materials, or equipment furnished;
5. The date on which the Claimant last performed labor or last furnished materials or equipment for use in the performance of the Construction Contract;
6. The total amount earned by the Claimant for labor, materials, or equipment furnished as of the date of the Claim;
7. The total amount of previous payments received by the Claimant; and
8. The total amount due and unpaid to the Claimant for labor, materials, or equipment furnished as of the date of the Claim.

16.2 **Claimant:** An individual or entity having a direct contract with the Contractor or with a subcontractor of the Contractor to furnish labor, materials, or equipment for use in the performance of the Construction Contract. The term Claimant also includes any individual or entity that has rightfully asserted a claim under an applicable mechanic's lien or similar statute against the real property upon which the Project is located. The intent of this Bond shall be to include without limitation in the terms of "labor, materials, or equipment" that part of the water, gas, power, light, heat, oil, gasoline, telephone service, or rental equipment used in the Construction Contract, architectural and engineering services required for performance of the work of the Contractor and the Contractor's subcontractors, and all other items for which a mechanic's lien may be asserted in the jurisdiction where the labor, materials, or equipment were furnished.

16.3 **Construction Contract:** The agreement between the Owner and Contractor identified on the cover page, including all Contract Documents and all changes made to the agreement and the Contract Documents.

16.4 **Owner Default**: Failure of the Owner, which has not been remedied or waived, to pay the Contractor as required under the Construction Contract or to perform and complete or comply with the other material terms of the Construction Contract.

16.5 **Contract Documents:** All the documents that comprise the agreement between the Owner and Contractor.

17. If this Bond is issued for an agreement between a contractor and subcontractor, the term Contractor in this Bond shall be deemed to be Subcontractor and the term Owner shall be deemed to be Contractor.

18. Modifications to this Bond are as follows:

SECTION 00630

CHANGE ORDER (EJCDC C-941)

Change Order

No. [_____]

Date of Issuance: _____ Effective Date: _____

Project:	Owner:	Owner's Contract No.:
Contract:		Date of Contract:
Contractor:		Engineer's Project No.:

The Contract Documents are modified as follows upon execution of this Change Order:

Description:

Attachments (list documents supporting change):

CHANGE IN CONTRACT PRICE:	**CHANGE IN CONTRACT TIMES:**
Original Contract Price: $_____	Original Contract Times: ☐ Working days ☐ Calendar days Substantial completion (days or date): _____ Ready for final payment (days or date): _____
[Increase] [Decrease] from previously approved Change Orders No. _____ to No. _____: $_____	[**Increase] [Decrease**] from previously approved Change Orders No. _____ to No. _____: Substantial completion (days): _____ Ready for final payment (days): _____
Contract Price prior to this Change Order: $_____	Contract Times prior to this Change Order: Substantial completion (days or date): _____ Ready for final payment (days or date): _____
[Increase] [Decrease] of this Change Order: $_____	[Increase] [Decrease] of this Change Order: Substantial completion (days or date): _____ Ready for final payment (days or date): _____
Contract Price incorporating this Change Order: $_____	Contract Times with all approved Change Orders: Substantial completion (days or date): _____ Ready for final payment (days or date): _____

RECOMMENDED:	ACCEPTED:	ACCEPTED:
By: _____	By: _____	By: _____
Engineer (Authorized Signature)	Owner (Authorized Signature)	Contractor (Authorized Signature)
Date: _____	Date: _____	Date: _____

Approved by Funding Agency (if applicable):

_____ Date: _____

Change Order

Instructions

A. GENERAL INFORMATION

This document was developed to provide a uniform format for handling contract changes that affect Contract Price or Contract Times. Changes that have been initiated by a Work Change Directive must be incorporated into a subsequent Change Order if they affect Price or Times.

Changes that affect Contract Price or Contract Times should be promptly covered by a Change Order. The practice of accumulating Change Orders to reduce the administrative burden may lead to unnecessary disputes.

If Milestones have been listed in the Agreement, any effect of a Change Order thereon should be addressed.

For supplemental instructions and minor changes not involving a change in the Contract Price or Contract Times, a Field Order should be used.

B. COMPLETING THE CHANGE ORDER FORM

Engineer normally initiates the form, including a description of the changes involved and attachments based upon documents and proposals submitted by Contractor, or requests from Owner, or both.

Once Engineer has completed and signed the form, all copies should be sent to Owner or Contractor for approval, depending on whether the Change Order is a true order to the Contractor or the formalization of a negotiated agreement for a previously performed change. After approval by one contracting party, all copies should be sent to the other party for approval. Engineer should make distribution of executed copies after approval by both parties.

If a change only applies to price or to times, cross out the part of the tabulation that does not apply.

SECTION 00650

CERTIFICATE OF SUBSTANTIAL COMPLETION (EJCDC C-625)

Certificate of Substantial Completion

Project:	
Owner:	Owner's Contract No.:
Contract:	Engineer's Project No.:

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

☐ All Work under the Contract Documents: ☐ The following specified portions of the Work:

Date of Substantial Completion

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

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

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

☐ Amended Responsibilities ☐ Not Amended

Owner's Amended Responsibilities:

Contractor's Amended Responsibilities:

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

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

Executed by Engineer	Date
Accepted by Contractor	Date
Accepted by Owner	Date

CERTIFICATE OF FINAL COMPLETION

Owner's Project No. 35-21 Engineer's Project No. _____
Project Peirce Island Force Main and Water Main Replacement
Owner: City of Portsmouth, NH
Contractor: _____
Engineer: AECOM

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, and Engineer, the punch list has been completed and the Work of the Contract is hereby declared to be Finally Complete in accordance with the Contract Documents on:

_____
Date of Final Completion

This Certificate does not constitute an acceptance of any Work not in accordance with the Contract Documents nor is it a release of Contractor's obligation to complete the Work in accordance with the Contract Documents. The Warranty for all Work completed subsequent to the date of Substantial Completion expires one year from the date of this Final Acceptance.

Executed by Engineer on: _____, 20____

By:_____

Contractor Accepts this Certificate of Final Completion on: _____, 20____

By:_____

Owner Accepts this Certificate of Final Completion on: _____, 20____

By:_____

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

STANDARD GENERAL CONDITIONS OF THE CONSTRUCTION CONTRACT

Prepared by

ENGINEERS JOINT CONTRACT DOCUMENTS COMMITTEE

and

Issued and Published Jointly by

ACEC
American Council of Engineering Companies

The Associated General Contractors of America
SKILL RESPONSIBILITY INTEGRITY

ASCE American Society of Civil Engineers

National Society of Professional Engineers
Professional Engineers in Private Practice

AMERICAN COUNCIL OF ENGINEERING COMPANIES

ASSOCIATED GENERAL CONTRACTORS OF AMERICA

AMERICAN SOCIETY OF CIVIL ENGINEERS

PROFESSIONAL ENGINEERS IN PRIVATE PRACTICE
A Practice Division of the
NATIONAL SOCIETY OF PROFESSIONAL ENGINEERS

Endorsed by

CONSTRUCTION SPECIFICATIONS INSTITUTE

These General Conditions have been prepared for use with the Suggested Forms of Agreement Between Owner and Contractor (EJCDC C-520 or C-525, 2007 Editions). Their provisions are interrelated and a change in one may necessitate a change in the other. Comments concerning their usage are contained in the Narrative Guide to the EJCDC Construction Documents (EJCDC C-001, 2007 Edition). For guidance in the preparation of Supplementary Conditions, see Guide to the Preparation of Supplementary Conditions (EJCDC C-800, 2007 Edition).

STANDARD GENERAL CONDITIONS OF THE CONSTRUCTION CONTRACT

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ARTICLE 1 – DEFINITIONS AND TERMINOLOGY

1.01 *Defined Terms*

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

21. *General Requirements*—Sections of Division 1 of the Specifications.

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

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

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

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

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

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

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

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

30. *PCBs*—Polychlorinated biphenyls.

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

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

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

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

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

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

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

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

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

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

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

42. *Specifications*—That part of the Contract Documents consisting of written requirements for materials, equipment, systems, standards and workmanship as applied to the Work, and certain administrative requirements and procedural matters applicable thereto.

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

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

45. *Successful Bidder*—The Bidder submitting a responsive Bid to whom Owner makes an award.

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

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

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

49. *Unit Price Work*—Work to be paid for on the basis of unit prices.

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

51. *Work Change Directive*—A written statement to Contractor issued on or after the Effective Date of the Agreement and signed by Owner and recommended by Engineer ordering an

addition, deletion, or revision in the Work, or responding to differing or unforeseen subsurface or physical conditions under which the Work is to be performed or to emergencies. A Work Change Directive will not change the Contract Price or the Contract Times but is evidence that the parties expect that the change ordered or documented by a Work Change Directive will be incorporated in a subsequently issued Change Order following negotiations by the parties as to its effect, if any, on the Contract Price or Contract Times.

1.02 *Terminology*

A. The words and terms discussed in Paragraph 1.02.B through F are not defined but, when used in the Bidding Requirements or Contract Documents, have the indicated meaning.

B. *Intent of Certain Terms or Adjectives:*

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

C. *Day:*

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

D. *Defective:*

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

a. does not conform to the Contract Documents; or

b. does not meet the requirements of any applicable inspection, reference standard, test, or approval referred to in the Contract Documents; or

c. has been damaged prior to Engineer's recommendation of final payment (unless responsibility for the protection thereof has been assumed by Owner at Substantial Completion in accordance with Paragraph 14.04 or 14.05).

E. *Furnish, Install, Perform, Provide:*

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

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

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

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

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

ARTICLE 2 – PRELIMINARY MATTERS

2.01 *Delivery of Bonds and Evidence of Insurance*

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

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

2.02 *Copies of Documents*

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

2.03 *Commencement of Contract Times; Notice to Proceed*

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

2.04 *Starting the Work*

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

2.05 *Before Starting Construction*

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

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

2. a preliminary Schedule of Submittals; and

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

2.06 *Preconstruction Conference; Designation of Authorized Representatives*

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

B. At this conference Owner and Contractor each shall designate, in writing, a specific individual to act as its authorized representative with respect to the services and responsibilities under the Contract. Such individuals shall have the authority to transmit instructions, receive information, render decisions relative to the Contract, and otherwise act on behalf of each respective party.

2.07 *Initial Acceptance of Schedules*

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

1. The Progress Schedule will be acceptable to Engineer if it provides an orderly progression of the Work to completion within the Contract Times. Such acceptance will not impose on Engineer responsibility for the Progress Schedule, for sequencing, scheduling, or progress of

the Work, nor interfere with or relieve Contractor from Contractor's full responsibility therefor.

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

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

ARTICLE 3 – CONTRACT DOCUMENTS: INTENT, AMENDING, REUSE

3.01 *Intent*

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

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

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

3.02 *Reference Standards*

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

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

2. No provision of any such standard, specification, manual, or code, or any instruction of a Supplier, shall be effective to change the duties or responsibilities of Owner, Contractor, or Engineer, or any of their subcontractors, consultants, agents, or employees, from those set forth in the Contract Documents. No such provision or instruction shall be effective to assign to Owner, Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors, any duty or authority to supervise or direct the performance of the Work or any duty or authority to undertake responsibility inconsistent with the provisions of the Contract Documents.

3.03 *Reporting and Resolving Discrepancies*

A. *Reporting Discrepancies:*

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

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

3. Contractor shall not be liable to Owner or Engineer for failure to report any conflict, error, ambiguity, or discrepancy in the Contract Documents unless Contractor had actual knowledge thereof.

B. *Resolving Discrepancies:*

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

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

   b. the provisions of any Laws or Regulations applicable to the performance of the Work (unless such an interpretation of the provisions of the Contract Documents would result in violation of such Law or Regulation).

3.04 *Amending and Supplementing Contract Documents*

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

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

1. A Field Order;

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

3. Engineer's written interpretation or clarification.

3.05 *Reuse of Documents*

A. Contractor and any Subcontractor or Supplier shall not:

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

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

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

3.06 *Electronic Data*

A. Unless otherwise stated in the Supplementary Conditions, the data furnished by Owner or Engineer to Contractor, or by Contractor to Owner or Engineer, that may be relied upon are limited to the printed copies (also known as hard copies). Files in electronic media format of text, data, graphics, or other types are furnished only for the convenience of the receiving party. Any conclusion or information obtained or derived from such electronic files will be at the user's sole risk. If there is a discrepancy between the electronic files and the hard copies, the hard copies govern.

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

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

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

4.01 *Availability of Lands*

A. Owner shall furnish the Site. Owner shall notify Contractor of any encumbrances or restrictions not of general application but specifically related to use of the Site with which Contractor must comply in performing the Work. Owner will obtain in a timely manner and pay for easements for permanent structures or permanent changes in existing facilities. If Contractor and Owner are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in the

Contract Price or Contract Times, or both, as a result of any delay in Owner's furnishing the Site or a part thereof, Contractor may make a Claim therefor as provided in Paragraph 10.05.

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

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

4.02 *Subsurface and Physical Conditions*

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

1. those reports known to Owner of explorations and tests of subsurface conditions at or contiguous to the Site; and

2. those drawings known to Owner of physical conditions relating to existing surface or subsurface structures at the Site (except Underground Facilities).

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

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

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

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

4.03 *Differing Subsurface or Physical Conditions*

A. *Notice:* If Contractor believes that any subsurface or physical condition that is uncovered or revealed either:

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

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

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

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

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

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

C. *Possible Price and Times Adjustments:*

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

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

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

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

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

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

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

3. If Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in the Contract Price or Contract Times, or both, a Claim may be made therefor as provided in Paragraph 10.05. However, neither Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors shall be liable to Contractor for any claims, costs, losses, or damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) sustained by Contractor on or in connection with any other project or anticipated project.

4.04 *Underground Facilities*

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

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

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

a. reviewing and checking all such information and data;

b. locating all Underground Facilities shown or indicated in the Contract Documents;

c. coordination of the Work with the owners of such Underground Facilities, including Owner, during construction; and

d. the safety and protection of all such Underground Facilities and repairing any damage thereto resulting from the Work.

B. *Not Shown or Indicated:*

1. If an Underground Facility is uncovered or revealed at or contiguous to the Site which was not shown or indicated, or not shown or indicated with reasonable accuracy in the Contract Documents, Contractor shall, promptly after becoming aware thereof and before further disturbing conditions affected thereby or performing any Work in connection therewith (except in an emergency as required by Paragraph 6.16.A), identify the owner of such Underground Facility and give written notice to that owner and to Owner and Engineer. Engineer will promptly review the Underground Facility and determine the extent, if any, to which a change is required in the Contract Documents to reflect and document the consequences of the existence or location of the Underground Facility. During such time, Contractor shall be responsible for the safety and protection of such Underground Facility.

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

4.05 *Reference Points*

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

4.06 *Hazardous Environmental Condition at Site*

A. *Reports and Drawings:* The Supplementary Conditions identify those reports and drawings known to Owner relating to Hazardous Environmental Conditions that have been identified at the Site.

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

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

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

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

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

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

permit Owner to timely obtain required permits and provide Contractor the written notice required by Paragraph 4.06.E.

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

F. If after receipt of such written notice Contractor does not agree to resume such Work based on a reasonable belief it is unsafe, or does not agree to resume such Work under such special conditions, then Owner may order the portion of the Work that is in the area affected by such condition to be deleted from the Work. If Owner and Contractor cannot agree as to entitlement to or on the amount or extent, if any, of an adjustment in Contract Price or Contract Times as a result of deleting such portion of the Work, then either party may make a Claim therefor as provided in Paragraph 10.05. Owner may have such deleted portion of the Work performed by Owner's own forces or others in accordance with Article 7.

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

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

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

ARTICLE 5 – BONDS AND INSURANCE

5.01 *Performance, Payment, and Other Bonds*

A. Contractor shall furnish performance and payment bonds, each in an amount at least equal to the Contract Price as security for the faithful performance and payment of all of Contractor's obligations under the Contract Documents. These bonds shall remain in effect until one year after the date when final payment becomes due or until completion of the correction period specified in Paragraph 13.07, whichever is later, except as provided otherwise by Laws or Regulations or by the Contract Documents. Contractor shall also furnish such other bonds as are required by the Contract Documents.

B. All bonds shall be in the form prescribed by the Contract Documents except as provided otherwise by Laws or Regulations, and shall be executed by such sureties as are named in the list of "Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies" as published in Circular 570 (amended) by the Financial Management Service, Surety Bond Branch, U.S. Department of the Treasury. All bonds signed by an agent or attorney-in-fact must be accompanied by a certified copy of that individual's authority to bind the surety. The evidence of authority shall show that it is effective on the date the agent or attorney-in-fact signed each bond.

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

5.02 *Licensed Sureties and Insurers*

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

5.03 *Certificates of Insurance*

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

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

C. Failure of Owner to demand such certificates or other evidence of Contractor's full compliance with these insurance requirements or failure of Owner to identify a deficiency in compliance from the evidence provided shall not be construed as a waiver of Contractor's obligation to maintain such insurance.

D. Owner does not represent that insurance coverage and limits established in this Contract necessarily will be adequate to protect Contractor.

E. The insurance and insurance limits required herein shall not be deemed as a limitation on Contractor's liability under the indemnities granted to Owner in the Contract Documents.

5.04 *Contractor's Insurance*

A. Contractor shall purchase and maintain such insurance as is appropriate for the Work being performed and as will provide protection from claims set forth below which may arise out of or result from Contractor's performance of the Work and Contractor's other obligations under the Contract Documents, whether it is to be performed by Contractor, any Subcontractor or Supplier, or by anyone directly or indirectly employed by any of them to perform any of the Work, or by anyone for whose acts any of them may be liable:

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

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

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

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

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

   b. by any other person for any other reason;

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

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

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

1. with respect to insurance required by Paragraphs 5.04.A.3 through 5.04.A.6 inclusive, be written on an occurrence basis, include as additional insureds (subject to any customary exclusion regarding professional liability) Owner and Engineer, and any other individuals or entities identified in the Supplementary Conditions, all of whom shall be listed as additional insureds, and include coverage for the respective officers, directors, members, partners,

employees, agents, consultants, and subcontractors of each and any of all such additional insureds, and the insurance afforded to these additional insureds shall provide primary coverage for all claims covered thereby;

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

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

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

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

6. include completed operations coverage:

    a. Such insurance shall remain in effect for two years after final payment.

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

5.05 *Owner's Liability Insurance*

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

5.06 *Property Insurance*

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

1. include the interests of Owner, Contractor, Subcontractors, and Engineer, and any other individuals or entities identified in the Supplementary Conditions, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of

them, each of whom is deemed to have an insurable interest and shall be listed as a loss payee;

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

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

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

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

6. include testing and startup; and

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

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

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

D. Owner shall not be responsible for purchasing and maintaining any property insurance specified in this Paragraph 5.06 to protect the interests of Contractor, Subcontractors, or others in the Work to the extent of any deductible amounts that are identified in the Supplementary Conditions. The risk of loss within such identified deductible amount will be borne by Contractor, Subcontractors, or others suffering any such loss, and if any of them wishes property insurance coverage within the limits of such amounts, each may purchase and maintain it at the purchaser's own expense.

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

5.07 *Waiver of Rights*

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

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

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

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

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

5.08 *Receipt and Application of Insurance Proceeds*

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

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

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

A. If either Owner or Contractor has any objection to the coverage afforded by or other provisions of the bonds or insurance required to be purchased and maintained by the other party in accordance with Article 5 on the basis of non-conformance with the Contract Documents, the objecting party shall so notify the other party in writing within 10 days after receipt of the certificates (or other evidence requested) required by Paragraph 2.01.B. Owner and Contractor shall each provide to the other such additional information in respect of insurance provided as the other may reasonably request. If either party does not purchase or maintain all of the bonds and insurance required of such party by the Contract Documents, such party shall notify the other party in writing of such failure to purchase prior to the start of the Work, or of such failure to maintain prior to any change in the required coverage. Without prejudice to any other right or remedy, the other party may elect to obtain equivalent bonds or insurance to protect such other party's interests at the expense of the party who was required to provide such coverage, and a Change Order shall be issued to adjust the Contract Price accordingly.

5.10 *Partial Utilization, Acknowledgment of Property Insurer*

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

ARTICLE 6 – CONTRACTOR'S RESPONSIBILITIES

6.01 *Supervision and Superintendence*

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

B. At all times during the progress of the Work, Contractor shall assign a competent resident superintendent who shall not be replaced without written notice to Owner and Engineer except under extraordinary circumstances.

6.02 *Labor; Working Hours*

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

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

6.03 *Services, Materials, and Equipment*

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

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

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

6.04 *Progress Schedule*

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

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

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

6.05 *Substitutes and "Or-Equals"*

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

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

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

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

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

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

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

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

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

2. *Substitute Items:*

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

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

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

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

      1) shall certify that the proposed substitute item will:

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

         b) be similar in substance to that specified, and

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

      2) will state:

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

         b) whether use of the proposed substitute item in the Work will require a change in any of the Contract Documents (or in the provisions of any other direct contract with Owner for other work on the Project) to adapt the design to the proposed substitute item, and

         c) whether incorporation or use of the proposed substitute item in connection with the Work is subject to payment of any license fee or royalty;

      3) will identify:

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

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

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

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

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

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

E. *Engineer's Cost Reimbursement*: Engineer will record Engineer's costs in evaluating a substitute proposed or submitted by Contractor pursuant to Paragraphs 6.05.A.2 and 6.05.B. Whether or not Engineer approves a substitute so proposed or submitted by Contractor, Contractor shall reimburse Owner for the reasonable charges of Engineer for evaluating each such proposed substitute. Contractor shall also reimburse Owner for the reasonable charges of Engineer for making changes in the Contract Documents (or in the provisions of any other direct contract with Owner) resulting from the acceptance of each proposed substitute.

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

6.06 *Concerning Subcontractors, Suppliers, and Others*

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

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

entity, whether initially or as a replacement, shall constitute a waiver of any right of Owner or Engineer to reject defective Work.

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

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

2. shall create any obligation on the part of Owner or Engineer to pay or to see to the payment of any moneys due any such Subcontractor, Supplier, or other individual or entity except as may otherwise be required by Laws and Regulations.

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

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

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

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

6.07 *Patent Fees and Royalties*

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

use is subject to patent rights or copyrights calling for the payment of any license fee or royalty to others, the existence of such rights shall be disclosed by Owner in the Contract Documents.

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

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

6.08 *Permits*

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

6.09 *Laws and Regulations*

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

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

C. Changes in Laws or Regulations not known at the time of opening of Bids (or, on the Effective Date of the Agreement if there were no Bids) having an effect on the cost or time of performance of the Work shall be the subject of an adjustment in Contract Price or Contract Times. If Owner

and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any such adjustment, a Claim may be made therefor as provided in Paragraph 10.05.

6.10 *Taxes*

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

6.11 *Use of Site and Other Areas*

A. *Limitation on Use of Site and Other Areas:*

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

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

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

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

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

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

6.12 *Record Documents*

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

6.13 *Safety and Protection*

A. Contractor shall be solely responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the Work. Such responsibility does not relieve Subcontractors of their responsibility for the safety of persons or property in the performance of their work, nor for compliance with applicable safety Laws and Regulations. Contractor shall take all necessary precautions for the safety of, and shall provide the necessary protection to prevent damage, injury or loss to:

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

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

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

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

C. Contractor shall comply with the applicable requirements of Owner's safety programs, if any. The Supplementary Conditions identify any Owner's safety programs that are applicable to the Work.

D. Contractor shall inform Owner and Engineer of the specific requirements of Contractor's safety program with which Owner's and Engineer's employees and representatives must comply while at the Site.

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

any of them may be liable, and not attributable, directly or indirectly, in whole or in part, to the fault or negligence of Contractor or any Subcontractor, Supplier, or other individual or entity directly or indirectly employed by any of them).

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

6.14 *Safety Representative*

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

6.15 *Hazard Communication Programs*

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

6.16 *Emergencies*

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

6.17 *Shop Drawings and Samples*

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

1. *Shop Drawings:*

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

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

2. *Samples:*

a. Submit number of Samples specified in the Specifications.

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

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

C. *Submittal Procedures:*

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

a. reviewed and coordinated each Shop Drawing or Sample with other Shop Drawings and Samples and with the requirements of the Work and the Contract Documents;

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

c. determined and verified the suitability of all materials offered with respect to the indicated application, fabrication, shipping, handling, storage, assembly, and installation pertaining to the performance of the Work; and

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

2. Each submittal shall bear a stamp or specific written certification that Contractor has satisfied Contractor's obligations under the Contract Documents with respect to Contractor's review and approval of that submittal.

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

D. *Engineer's Review:*

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

2. Engineer's review and approval will not extend to means, methods, techniques, sequences, or procedures of construction (except where a particular means, method, technique, sequence, or procedure of construction is specifically and expressly called for by the

Contract Documents) or to safety precautions or programs incident thereto. The review and approval of a separate item as such will not indicate approval of the assembly in which the item functions.

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

E. *Resubmittal Procedures:*

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

6.18 *Continuing the Work*

A. Contractor shall carry on the Work and adhere to the Progress Schedule during all disputes or disagreements with Owner. No Work shall be delayed or postponed pending resolution of any disputes or disagreements, except as permitted by Paragraph 15.04 or as Owner and Contractor may otherwise agree in writing.

6.19 *Contractor's General Warranty and Guarantee*

A. Contractor warrants and guarantees to Owner that all Work will be in accordance with the Contract Documents and will not be defective. Engineer and its officers, directors, members, partners, employees, agents, consultants, and subcontractors shall be entitled to rely on representation of Contractor's warranty and guarantee.

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

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

2. normal wear and tear under normal usage.

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

1. observations by Engineer;

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

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

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

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

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

7. any correction of defective Work by Owner.

6.20 *Indemnification*

A. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to the performance of the Work, provided that any such claim, cost, loss, or damage is attributable to bodily injury, sickness, disease, or death, or to injury to or destruction of tangible property (other than the Work itself), including the loss of use resulting therefrom but only to the extent caused by any negligent act or omission of Contractor, any Subcontractor, any Supplier, or any individual or entity directly or indirectly employed by any of them to perform any of the Work or anyone for whose acts any of them may be liable .

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

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

1. the preparation or approval of, or the failure to prepare or approve maps, Drawings, opinions, reports, surveys, Change Orders, designs, or Specifications; or

2. giving directions or instructions, or failing to give them, if that is the primary cause of the injury or damage.

6.21 *Delegation of Professional Design Services*

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

B. If professional design services or certifications by a design professional related to systems, materials or equipment are specifically required of Contractor by the Contract Documents, Owner and Engineer will specify all performance and design criteria that such services must satisfy. Contractor shall cause such services or certifications to be provided by a properly licensed professional, whose signature and seal shall appear on all drawings, calculations, specifications, certifications, Shop Drawings and other submittals prepared by such professional. Shop Drawings and other submittals related to the Work designed or certified by such professional, if prepared by others, shall bear such professional's written approval when submitted to Engineer.

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

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

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

ARTICLE 7 – OTHER WORK AT THE SITE

7.01 *Related Work at Site*

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

1. written notice thereof will be given to Contractor prior to starting any such other work; and

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

B. Contractor shall afford each other contractor who is a party to such a direct contract, each utility owner, and Owner, if Owner is performing other work with Owner's employees, proper and safe

access to the Site, provide a reasonable opportunity for the introduction and storage of materials and equipment and the execution of such other work, and properly coordinate the Work with theirs. Contractor shall do all cutting, fitting, and patching of the Work that may be required to properly connect or otherwise make its several parts come together and properly integrate with such other work. Contractor shall not endanger any work of others by cutting, excavating, or otherwise altering such work; provided, however, that Contractor may cut or alter others' work with the written consent of Engineer and the others whose work will be affected. The duties and responsibilities of Contractor under this Paragraph are for the benefit of such utility owners and other contractors to the extent that there are comparable provisions for the benefit of Contractor in said direct contracts between Owner and such utility owners and other contractors.

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

7.02 *Coordination*

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

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

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

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

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

7.03 *Legal Relationships*

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

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

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

ARTICLE 8 – OWNER'S RESPONSIBILITIES

8.01 *Communications to Contractor*

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

8.02 *Replacement of Engineer*

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

8.03 *Furnish Data*

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

8.04 *Pay When Due*

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

8.05 *Lands and Easements; Reports and Tests*

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

8.06 *Insurance*

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

8.07 *Change Orders*

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

8.08 *Inspections, Tests, and Approvals*

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

8.09 *Limitations on Owner's Responsibilities*

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

and Regulations applicable to the performance of the Work. Owner will not be responsible for Contractor's failure to perform the Work in accordance with the Contract Documents.

8.10 *Undisclosed Hazardous Environmental Condition*

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

8.11 *Evidence of Financial Arrangements*

A. Upon request of Contractor, Owner shall furnish Contractor reasonable evidence that financial arrangements have been made to satisfy Owner's obligations under the Contract Documents.

8.12 *Compliance with Safety Program*

A. While at the Site, Owner's employees and representatives shall comply with the specific applicable requirements of Contractor's safety programs of which Owner has been informed pursuant to Paragraph 6.13.D.

ARTICLE 9 – ENGINEER'S STATUS DURING CONSTRUCTION

9.01 *Owner's Representative*

A. Engineer will be Owner's representative during the construction period. The duties and responsibilities and the limitations of authority of Engineer as Owner's representative during construction are set forth in the Contract Documents.

9.02 *Visits to Site*

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

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

9.03 *Project Representative*

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

9.04 *Authorized Variations in Work*

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

9.05 *Rejecting Defective Work*

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

9.06 *Shop Drawings, Change Orders and Payments*

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

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

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

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

9.07 *Determinations for Unit Price Work*

A. Engineer will determine the actual quantities and classifications of Unit Price Work performed by Contractor. Engineer will review with Contractor the Engineer's preliminary determinations

on such matters before rendering a written decision thereon (by recommendation of an Application for Payment or otherwise). Engineer's written decision thereon will be final and binding (except as modified by Engineer to reflect changed factual conditions or more accurate data) upon Owner and Contractor, subject to the provisions of Paragraph 10.05.

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

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

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

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

D. When functioning as interpreter and judge under this Paragraph 9.08, Engineer will not show partiality to Owner or Contractor and will not be liable in connection with any interpretation or decision rendered in good faith in such capacity.

9.09 *Limitations on Engineer's Authority and Responsibilities*

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

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

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

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

and in the case of certificates of inspections, tests, and approvals that the results certified indicate compliance with, the Contract Documents.

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

9.10 *Compliance with Safety Program*

A. While at the Site, Engineer's employees and representatives shall comply with the specific applicable requirements of Contractor's safety programs of which Engineer has been informed pursuant to Paragraph 6.13.D.

ARTICLE 10 – CHANGES IN THE WORK; CLAIMS

10.01 *Authorized Changes in the Work*

A. Without invalidating the Contract and without notice to any surety, Owner may, at any time or from time to time, order additions, deletions, or revisions in the Work by a Change Order, or a Work Change Directive. Upon receipt of any such document, Contractor shall promptly proceed with the Work involved which will be performed under the applicable conditions of the Contract Documents (except as otherwise specifically provided).

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

10.02 *Unauthorized Changes in the Work*

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

10.03 *Execution of Change Orders*

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

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

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

3. changes in the Contract Price or Contract Times which embody the substance of any written decision rendered by Engineer pursuant to Paragraph 10.05; provided that, in lieu of

executing any such Change Order, an appeal may be taken from any such decision in accordance with the provisions of the Contract Documents and applicable Laws and Regulations, but during any such appeal, Contractor shall carry on the Work and adhere to the Progress Schedule as provided in Paragraph 6.18.A.

10.04 *Notification to Surety*

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

10.05 *Claims*

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

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

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

1. deny the Claim in whole or in part;

2. approve the Claim; or

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

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

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

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

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

11.01 *Cost of the Work*

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

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

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

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

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

5. Supplemental costs including the following:

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

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

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

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

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

    f. Losses and damages (and related expenses) caused by damage to the Work, not compensated by insurance or otherwise, sustained by Contractor in connection with the performance of the Work (except losses and damages within the deductible amounts of property insurance established in accordance with Paragraph 5.06.D), provided such losses and damages have resulted from causes other than the negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable. Such losses shall include settlements made with the written consent and approval of Owner. No such losses, damages, and expenses shall be included in the Cost of the Work for the purpose of determining Contractor's fee.

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

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

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

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

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

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

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

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

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

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

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

11.02 *Allowances*

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

B. *Cash Allowances:*

1. Contractor agrees that:

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

b. Contractor's costs for unloading and handling on the Site, labor, installation, overhead, profit, and other expenses contemplated for the cash allowances have been included in

the Contract Price and not in the allowances, and no demand for additional payment on account of any of the foregoing will be valid.

C. *Contingency Allowance:*

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

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

11.03 *Unit Price Work*

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

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

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

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

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

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

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

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

12.01 *Change of Contract Price*

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

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

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

2. where the Work involved is not covered by unit prices contained in the Contract Documents, by a mutually agreed lump sum (which may include an allowance for overhead and profit not necessarily in accordance with Paragraph 12.01.C.2); or

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

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

1. a mutually acceptable fixed fee; or

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

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

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

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

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

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

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

12.02 *Change of Contract Times*

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

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

12.03 *Delays*

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

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

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

D. Owner, Engineer, and their officers, directors, members, partners, employees, agents, consultants, or subcontractors shall not be liable to Contractor for any claims, costs, losses, or damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) sustained by Contractor on or in connection with any other project or anticipated project.

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

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

13.01 *Notice of Defects*

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

13.02 *Access to Work*

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

13.03 *Tests and Inspections*

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

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

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

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

3. as otherwise specifically provided in the Contract Documents.

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

D. Contractor shall be responsible for arranging and obtaining and shall pay all costs in connection with any inspections, tests, or approvals required for Owner's and Engineer's acceptance of materials or equipment to be incorporated in the Work; or acceptance of materials, mix designs, or equipment submitted for approval prior to Contractor's purchase thereof for incorporation in the Work. Such inspections, tests, or approvals shall be performed by organizations acceptable to Owner and Engineer.

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

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

13.04 *Uncovering Work*

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

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

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

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

13.05 *Owner May Stop the Work*

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

13.06 *Correction or Removal of Defective Work*

A. Promptly after receipt of written notice, Contractor shall correct all defective Work, whether or not fabricated, installed, or completed, or, if the Work has been rejected by Engineer, remove it from the Project and replace it with Work that is not defective. Contractor shall pay all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers,

architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such correction or removal (including but not limited to all costs of repair or replacement of work of others).

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

13.07 *Correction Period*

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

1. repair such defective land or areas; or

2. correct such defective Work; or

3. if the defective Work has been rejected by Owner, remove it from the Project and replace it with Work that is not defective, and

4. satisfactorily correct or repair or remove and replace any damage to other Work, to the work of others or other land or areas resulting therefrom.

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

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

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

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

13.08 *Acceptance of Defective Work*

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

13.09 *Owner May Correct Defective Work*

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

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

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

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

ARTICLE 14 – PAYMENTS TO CONTRACTOR AND COMPLETION

14.01 *Schedule of Values*

A. The Schedule of Values established as provided in Paragraph 2.07.A will serve as the basis for progress payments and will be incorporated into a form of Application for Payment acceptable to Engineer. Progress payments on account of Unit Price Work will be based on the number of units completed.

14.02 *Progress Payments*

A. *Applications for Payments:*

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

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

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

B. *Review of Applications:*

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

2. Engineer's recommendation of any payment requested in an Application for Payment will constitute a representation by Engineer to Owner, based on Engineer's observations of the executed Work as an experienced and qualified design professional, and on Engineer's

review of the Application for Payment and the accompanying data and schedules, that to the best of Engineer's knowledge, information and belief:

a. the Work has progressed to the point indicated;

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

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

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

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

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

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

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

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

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

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

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

5. Engineer may refuse to recommend the whole or any part of any payment if, in Engineer's opinion, it would be incorrect to make the representations to Owner stated in Paragraph 14.02.B.2. Engineer may also refuse to recommend any such payment or, because of subsequently discovered evidence or the results of subsequent inspections or tests, revise or revoke any such payment recommendation previously made, to such extent as may be necessary in Engineer's opinion to protect Owner from loss because:

a. the Work is defective, or completed Work has been damaged, requiring correction or replacement;

b. the Contract Price has been reduced by Change Orders;

c. Owner has been required to correct defective Work or complete Work in accordance with Paragraph 13.09; or

d. Engineer has actual knowledge of the occurrence of any of the events enumerated in Paragraph 15.02.A.

C. *Payment Becomes Due:*

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

D. *Reduction in Payment:*

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

a. claims have been made against Owner on account of Contractor's performance or furnishing of the Work;

b. Liens have been filed in connection with the Work, except where Contractor has delivered a specific bond satisfactory to Owner to secure the satisfaction and discharge of such Liens;

c. there are other items entitling Owner to a set-off against the amount recommended; or

d. Owner has actual knowledge of the occurrence of any of the events enumerated in Paragraphs 14.02.B.5.a through 14.02.B.5.c or Paragraph 15.02.A.

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

3. Upon a subsequent determination that Owner's refusal of payment was not justified, the amount wrongfully withheld shall be treated as an amount due as determined by Paragraph 14.02.C.1 and subject to interest as provided in the Agreement.

14.03 *Contractor's Warranty of Title*

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

14.04 *Substantial Completion*

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

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

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

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

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

14.05 *Partial Utilization*

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

1. Owner at any time may request Contractor in writing to permit Owner to use or occupy any such part of the Work which Owner believes to be ready for its intended use and substantially complete. If and when Contractor agrees that such part of the Work is substantially complete, Contractor, Owner, and Engineer will follow the procedures of Paragraph 14.04.A through D for that part of the Work.

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

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

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

14.06 *Final Inspection*

A. Upon written notice from Contractor that the entire Work or an agreed portion thereof is complete, Engineer will promptly make a final inspection with Owner and Contractor and will notify Contractor in writing of all particulars in which this inspection reveals that the Work is incomplete or defective. Contractor shall immediately take such measures as are necessary to complete such Work or remedy such deficiencies.

14.07 *Final Payment*

A. *Application for Payment:*

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

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

   a. all documentation called for in the Contract Documents, including but not limited to the evidence of insurance required by Paragraph 5.04.B.6;

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

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

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

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

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

1. If, on the basis of Engineer's observation of the Work during construction and final inspection, and Engineer's review of the final Application for Payment and accompanying documentation as required by the Contract Documents, Engineer is satisfied that the Work has been completed and Contractor's other obligations under the Contract Documents have been fulfilled, Engineer will, within ten days after receipt of the final Application for Payment, indicate in writing Engineer's recommendation of payment and present the Application for Payment to Owner for payment. At the same time Engineer will also give written notice to Owner and Contractor that the Work is acceptable subject to the provisions of Paragraph 14.09. Otherwise, Engineer will return the Application for Payment to Contractor, indicating in writing the reasons for refusing to recommend final payment, in which case Contractor shall make the necessary corrections and resubmit the Application for Payment.

C. *Payment Becomes Due:*

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

14.08 *Final Completion Delayed*

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

14.09 *Waiver of Claims*

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

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

2. a waiver of all Claims by Contractor against Owner other than those previously made in accordance with the requirements herein and expressly acknowledged by Owner in writing as still unsettled.

ARTICLE 15 – SUSPENSION OF WORK AND TERMINATION

15.01 *Owner May Suspend Work*

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

15.02 *Owner May Terminate for Cause*

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

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

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

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

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

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

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

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

3. complete the Work as Owner may deem expedient.

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

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

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

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

15.03 *Owner May Terminate For Convenience*

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

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

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

3. all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other

dispute resolution costs) incurred in settlement of terminated contracts with Subcontractors, Suppliers, and others; and

4. reasonable expenses directly attributable to termination.

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

15.04 *Contractor May Stop Work or Terminate*

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

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

ARTICLE 16 – DISPUTE RESOLUTION

16.01 *Methods and Procedures*

A. Either Owner or Contractor may request mediation of any Claim submitted to Engineer for a decision under Paragraph 10.05 before such decision becomes final and binding. The mediation will be governed by the Construction Industry Mediation Rules of the American Arbitration Association in effect as of the Effective Date of the Agreement. The request for mediation shall be submitted in writing to the American Arbitration Association and the other party to the Contract. Timely submission of the request shall stay the effect of Paragraph 10.05.E.

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

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

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

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

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

ARTICLE 17 – MISCELLANEOUS

17.01 *Giving Notice*

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

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

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

17.02 *Computation of Times*

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

17.03 *Cumulative Remedies*

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

17.04 *Survival of Obligations*

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

17.05 *Controlling Law*

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

17.06 *Headings*

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

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SECTION 00800

SUPPLEMENTARY CONDITIONS

These Supplementary Conditions amend or supplement the Standard General Conditions of the Construction Contract (EJCDC No. C-700, 2007 Edition) and other provisions of the Contract Documents as indicated below. All provisions which are not specifically amended or supplemented hereby remain in full force and effect.

ARTICLE 1. DEFINITIONS

SC-1.01

Defined Terms:

Insert the following language before the word "Agreement" in the first sentence of the definition 1.01A.12 entitled "Contract Documents" in the General Conditions:

"Invitation to Bid, Instructions to Bidders,"

SC-1.01

Delete definition 1.01 A.42 entitled "Specifications" in the General Conditions in its entirety and insert the following in its place:

"Sections included under Division 1 through Division 3 of the Contract Documents."

SC-1.01

Delete the definition 1.01 A.44 entitled "Substantial Completion" in the General Conditions in its entirety and add the following in its place:

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

ARTICLE 2. PRELIMINARY MATTERS

SC-2.01

Delivery of Bonds and Evidence of Insurance

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

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

SC-2.02

Copies of Documents

Delete Paragraph 2.02.A in its entirety and insert the following in its place:

A. Owner shall furnish Contractor up to 6 printed or hard copies of the Drawings and Project Manual and one set in electronic format. Additional printed copies will be furnished upon request at the cost of reproduction.

SC-2.03

Commencement of Contract Times; Notice to Proceed:

Delete paragraph 2.03A of the General Conditions in its entirety and insert the following in its place:

"A. The Contract Time will commence to run on the tenth day following the effective date of the Agreement, or if a Notice to Proceed is issued, the Contract Time will commence to run on the date of the Notice to Proceed."

SC-2.05

Amend the first sentence of Paragraph 2.05.A.3 by inserting the words "except for Unit Price Work" at the beginning of the sentence.

ARTICLE 3. CONTRACT DOCUMENTS: INTENT, AMENDING, REUSE

SC-3.01

Intent:

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

"1. Each and every provision of law and clause required by law to be inserted in the Contract shall be deemed to be inserted herein, and the Contract shall be read and enforced as though they were included herein. If through mistake or otherwise any such provision is

not inserted, or is not correctly inserted, then upon the application of either party, the Contract shall forthwith be physically amended to make such insertion."

SC-3.01

Add the following new paragraph immediately after paragraph 3.01.C:

"D. Sections of Division 1 - General Requirements govern the execution of the work of all sections of the specifications."

ARTICLE 4. AVAILABILITY OF LANDS; SUBSURFACE AND PHYSICAL CONDITIONS; REFERENCE POINTS

SC-4.02

Subsurface and Physical Conditions:

Delete paragraph 4.02A of the General Conditions in its entirety and insert the following in its place:

"A. Reports and Drawings: In the preparation of Drawings and Specifications, Engineer or Engineer's Consultants have relied upon:

1. Engineer has relied upon data obtained from subsurface investigations made at the site in the form of test borings. Such data is in the form of boring logs which are included in Appendix B to the Specifications during regular business hours. The locations of the test borings are indicated on the Drawings."

SC-4.04

Underground Facilities:

Delete the following words from line 5 of paragraph 4.04B.2 of the General Conditions:

"or not shown or indicated with reasonable accuracy"

SC-4.05

Reference Points:

Add a new paragraph at the end of paragraph 4.05A of the General Conditions which is to read as follows:

"B. Contractor to employ surveyor licensed in New Hampshire to provide reference points and monuments. Engineer may check the lines, elevations, reference marks, batter boards, etc., set by Contractor, and Contractor shall correct any errors disclosed by such

check. Such a check shall not be considered as approval of Contractor's work and shall not relieve Contractor of the responsibility for accurate and satisfactory construction and completion of the entire Work. Contractor shall furnish personnel to assist Engineer in checking lines and grades."

ARTICLE 5. BONDS AND INSURANCE

SC-5.01

Add the following language at the end of Paragraph 5.01.C:

"In addition, no further progress payments under the Agreement will be made by OWNER until CONTRACTOR complies with the provisions of this paragraph."

SC-5.02

Licensed Sureties and Insurers:

Insert the following paragraphs at the end of Paragraph 5.02.A.:

"B. The insurance policies and surety bonds required to be provided by the Contractor shall be written by a company or companies licensed by the State of New Hampshire which company or companies shall have not less than an A rating and a Class XV financial status as reported in the latest edition of Best's Insurance Guide. In addition all carriers are subject to approval by the OWNER.

C. The CONTRACTOR shall name the OWNER as an Additional Insured on a primary and non-contributory basis to all polices except Works Compensation and Professional Liability."

SC-5.03

Certificates of Insurance:

Delete paragraph 5.03B of the General Conditions in its entirety.

SC-5.04

Contractor's Insurance:

Add the following new paragraph immediately after Paragraph 5.04.B.:

"C. The limits of liability for the insurance required by Paragraph 5.04 of the General Conditions shall provide coverage for not less than the following amounts or greater where required by Laws and Regulations:

1. Worker's Compensation, and related coverage under Paragraphs 5.04.A.1 and 5.04.A.2 of the General Conditions:
   a. State: Statutory

   b. Applicable Federal
      (e.g., Longshoreman's): Statutory

2. Contractor's General Liability under Paragraphs 5.04.A.3 through 5.04.A.6 of the General Conditions which shall include completed operations and product liability coverage's and eliminate the exclusion with respect to property under the care, custody, and control of Contractor or provide equivalent coverage under Builders Risk:

   a. General Aggregate including per project aggregate endorsement:
      (Except Products-Completed Operations): $ 5,000,000

   b. Products-Completed
      Operations Aggregate: $ 5,000,000

   c. Each Occurrence
      (Bodily Injury and Property Damage): $ 2,000,000
      Property Damage liability insurance shall include Collapse and Underground coverages

   d. If blasting is to be used, include explosion coverage.
      Occurrence: $2,000,000
      Aggregate: $5,000,000

2. Automobile Liability under Paragraph 5.04.A.6 of the General Conditions:

   1. Combined Single Limit for bodily injury
      and property damage: $ 2,000,000

4. The Contractual Liability coverage required by Paragraph 5.04.B.3 of the General Conditions shall provide coverage for not less than the following amounts:

   a. Bodily Injury:
      Each Accident $ 2,000,000
      Annual Aggregate $ 2,000,000

   b. Property Damage:
      Each Accident $ 2,000,000
      Annual Aggregate $ 2,000,000

5. Owner does not have pollution property or liability coverage. Contractor shall maintain Pollution Liability Coverage in a commercially reasonably amount for this Project.

7. Coverage amounts may be satisfied by excess or umbrella policies provided Owner is satisfied as to the form of coverage.

8. Owner shall be listed as an additional insured on all liability policies. The City of Portsmouth shall be named as additional insured as follows:

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

SC-5.05

Owner's Liability Insurance:

Delete paragraph 5.05 of the General Conditions in its entirety and insert the following in its place:

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

1. Bodily Injury:

Each Accident	$ 2,000,000
Annual Aggregate	$ 2,000,000

2. Property Damage:

Each Accident	$ 2,000,000
Annual Aggregate	$ 2,000,000

SC-5.07

Delete Section 5.07 in its entirety.

SC – 5.08

Delete section 5.08 in its entirety.

ARTICLE 6. CONTRACTOR'S RESPONSIBILITIES

SC-6.05

Substitutes and "Or Equals":

Add the following new subparagraphs immediately after Subparagraph 6.05.A.2.d.:

e. The application for review of a substitute shall be on the Contractor's Application for Consideration of Substitution form provided in Section 01250 of the Project Manual and shall be included with the submittal. The Installation List included with the Application shall include only installations of the proposed substitute in applications of approximately the same size and complexity, and the same design as those proposed to be furnished for this Project. Include in the Installation List, as a minimum, the owner's name, address, and telephone number, Engineer's name, address and telephone number, location and name of project, installation date, startup date, and date of final acceptance by owner; and application of material or equipment.

f. If the experience indicated by the Installation List does not demonstrate at least five years of successful operation of the proposed substitute item, Owner may require Contractor and Supplier to furnish, at Contractor's expense, a special performance guarantee with surety bond as required by Paragraph 6.05.D of the General Conditions with respect to the substitute. Only the time period between final acceptance of the proposed material or equipment on the referenced project and the Bid date for this Project will count towards the required satisfactory experience of the proposed substitute item. Engineer will be the sole judge of acceptability of experience, time credited, and whether the special performance guarantee will be required for a substitute item. Engineer will notify Contractor which proposed substitute(s) will require a special performance guarantee and surety bond.

SC-6.05

Substitutes and "Or Equals":

Add the following new paragraphs immediately after Paragraph 6.05.F.:

"1. When a substitute item of material or equipment is proposed by Contractor and accepted by Engineer, and the substitution will require a change in any of the Contract Documents to adapt the design to the proposed substitute, Contractor shall notify Engineer of the changes and be responsible for the costs involved to revise the design and to make modifications or changes to the construction, including the costs associated with the Work of other contractors due to such changes in design or space requirements.

   a. Redesign and drawing revisions will be prepared by Engineer and Contractor shall reimburse Owner for charges of Engineer for redesign and drawing preparation.

b. Reimbursement of Engineer shall be based on Engineer's direct labor costs, indirect labor costs, profit on the total labor, and any direct non-labor expenses such as travel or per diem."

SC-6.06

Concerning Subcontractor's, Suppliers, and Others:

Renumber subparagraph 6.06F to 6.06G and subparagraph 6.06G to 6.06H and add new subparagraph as follows:

"F. Owner or Engineer may furnish to any such Subcontractor, Supplier, or other person or organization, to the extent practicable, information about amounts paid to Contractor in accordance with Contractor's Applications for Payment on account of the particular Subcontractor's, Suppliers, other person's, or other organization's Work."

SC-6.08

Permits:

Add the following language at the end of Paragraph 6.08 of the General Conditions:

"The following permits and/or licenses will be obtained by the Owner:

a. NHDES Wetland Permit

b. The Contractor shall obtain flagger, blasting, and excavation permits for construction of the project from the City of Portsmouth. Permit and inspection fees from the City of Portsmouth for this project have been waived. The Contractor will be required to comply with all conditions in the permits issued by the City of Portsmouth, including inspections. All costs associated with obtaining and complying with permits issued by the City of Portsmouth (other than permit fees, which are waived for this project) shall be included in the Contractor's bid price for the project."

SC-6.16

Emergencies:

Add the following new paragraph immediately after Paragraph 6.16.A.:

"B. In emergencies affecting the safety or protection of persons or property or maintenance of temporary construction at the Site or adjacent thereto, and Contractor cannot be reached, Owner may act to attempt to prevent threatened damage, injury, or loss. Owner will give Contractor and Engineer prompt written notice of such action and the cost of the

correction or remedy shall be charged against Contractor. A Change Order will be issued to document the change in Contract Price."

SC-6.17

Shop Drawings and Samples:

Add the following new paragraphs immediately after Paragraph 6.17.E.:

"F. Contractor shall furnish required submittals with sufficient information and accuracy in order to obtain required approval of an item with no more than three submittals. Engineer will record Engineer's time for reviewing subsequent submittals of Shop Drawings, samples, or other items requiring approval and Contractor shall reimburse Owner for Engineer's charges for such time.

G. After Engineer has reviewed and approved a Shop Drawing or Sample, Contractor shall provide the material or equipment approved. Engineer will not review subsequent submittals of a different manufacturer or Supplier unless Contractor provides sufficient information to Engineer that the approved material or equipment is unavailable, time of delivery will delay the construction progress but not as a result of Contractor's failure to timely pursue the Work or to coordinate various activities properly, or Owner requests a different manufacturer or Supplier."

SC-6.19

Contractor's General Warranty and Guarantee

Add the following new paragraph prior to Article 6.19, Paragraph A of the General Conditions:

A. The Contractor warrants the Work for a period of one year from substantial completion of the entire project or a part thereof, unless a longer warranty is specified for a particular item or element of the project, in which case the longer warranty period shall govern.

ARTICLE 7. OTHER WORK

SC-7.04

Add the following new paragraph at the end of Article 7 of the General Conditions:

"7.04 Damages to the Work or Property:

A. Should Contractor cause damage to the work or property of any separate contractor at the site, or should any claim arising out of Contractor's performance of the Work at the site be made by any separate contractor against Contractor, Owner, Engineer, Engineer's Consultants, or any other person, Contractor shall promptly attempt to settle with such other contractor by agreement, or to otherwise resolve the dispute by arbitration or at law.

Contractor shall, to the fullest extent permitted by Laws and Regulations, indemnify and hold Owner, Engineer, and Engineer's Consultants, harmless from and against all claims, damages, losses, and expenses (including, but not limited to, fees of engineers, architects, attorneys, and other professionals, and court and arbitration costs) arising directly, indirectly, or consequentially out of any action, legal or equitable, brought by any separate contractor against Owner, Engineer, or Engineer's Consultants, to the extent based on a claim arising out of the Contractor's performance of the Work. Should a separate contractor cause damage to the Work or property of Contractor or should the performance of Work by any separate contractor at the site give rise to any other claim, Contractor shall not institute any action, legal or equitable, against Owner, Engineer or Engineer's Consultants, or permit any action against any of them to be maintained and continued in its name or for its benefit in any court or before any arbiter which seeks to impose liability on or to recover damages from Owner, Engineer, or Engineer's Consultants, on such damage or claim. If Contractor is delayed at any time in performing or furnishing Work by any act or neglect of a separate contractor and Owner and Contractor are unable to agree to the extent of any adjustment in Contract Times attributable thereto, Contractor may make a claim for an extension of times in accordance with Article 12. An extension of the Contract Times shall be Contractor's exclusive remedy with respect to Owner, Engineer, and Engineer's Consultants, for any delay, disruption, interference or hindrance caused by any separate contractor. This paragraph does not prevent recovery from Owner, Engineer, or Engineer's Consultant, for activities that are their respective responsibilities."

ARTICLE 8. OWNER'S RESPONSIBILITIES

SC-8.06

Insurance

Delete paragraph 8.06 of the General Conditions in its entirety.

ARTICLE 9. ENGINEER'S STATUS DURING CONSTRUCTION

SC-9.03

Project Representative:

Add the following new paragraphs immediately after Paragraph 9.03.A.:

"1. ENGINEER will furnish a Resident Project Representative to assist ENGINEER in observing the performance of the Work. The duties and responsibility of the Resident Project Representative will be as enumerated in a document entitled "Duties, Responsibilities, and Limitations of the Authority of Resident Project Representative" and will be made available to CONTRACTOR at the start of his work."

SC-9.10

Add the following new paragraph immediately after Paragraph 9.10.A.:

"B. In the event Engineer and/or Owner determines that Contractor's safety plans, programs, and procedures do not provide adequate protection for Engineer and/or Owner, Engineer and/or Owner may direct its employees to leave the Project Site or implement additional safeguards for Engineer's protection. If taken, these actions will be in furtherance of Engineer and/or Owner's responsibility to its own employees only, and Engineer and/or Owner will not assume any responsibility for protection of any other persons affected by the Work. In the event Engineer and/or Owner observes situations which appear to have potential for immediate and serious injury to persons, Engineer may warn the persons who appear to be affected by such situations. Such warnings, if issued, shall be given based on general humanitarian concerns, and Engineer and/or Owner will not, by the issuance of any such warning, assume any responsibility to issue future warnings or any general responsibility for protection of persons affected by the Work."

ARTICLE 10 - CHANGES IN THE WORK; CLAIMS

SC-10.01

Authorized Changes in the Work:

Add the following new subparagraph immediately after Paragraph10.01.B.:

"1. By submission of a Claim Contractor certifies that the claim is made in good faith, that the supporting data are accurate and complete to the best of Contractor's knowledge and belief, and that the amount or time requested accurately reflects the Contract adjustment for which Contractor believes Owner is liable."

ARTICLE 11. COST OF THE WORK; CASH ALLOWANCES; UNIT PRICE WORK

SC-11.01

Cost of the Work:

In the second sentence of Paragraph 11.01.A.1, delete the word "superintendents."

SC-11.01

Cost of the Work:

In Paragraph 11.01.B.1 add "superintendents" after "engineers" in the first sentence.

SC-11.02

Allowances:

In Paragraph 11.02.B.1.b, add "Except where Contractor's costs are allowed in the description of the bid item in Section 01151 - Measurement and Payment," prior to the first sentence.

SC-11.03

Unit Price Work:

Delete Paragraph 11.03.D. in its entirety and insert the following in its place:

"D. The unit price of an item of Unit Price Work shall be subject to reevaluation and adjustment under the following conditions:

1. If the Bid price of a particular item of Unit Price Work amounts to 5 percent or more of the Contract Price and the variation in the quantity of that particular item of Unit Price Work performed by Contractor differs by more than 25 percent from the estimated quantity of such item indicated in the Agreement.

2. If there is no corresponding adjustment with respect to any other item of Work.

3. If Contractor believes that Contractor has incurred additional expense as a result thereof or if Owner believes that the quantity variation entitles Owner to an adjustment in the unit price, either Owner or Contractor may make a claim for an adjustment in the Contract Price in accordance with Article 10 if the parties are unable to agree as to the effect of any such variations in the quantity of Unit Price Work performed."

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

SC-12.01

Change of Contract Price:

Delete paragraph 12.01.C.1 of the General Conditions in its entirety.

SC-12.02

Change of Contract Times:

Add the following new paragraph immediately after Paragraph 12.02.B.:

C. Time extensions provided under Paragraph 12.03 of the General Conditions will only be allowed for controlling items of Work (critical path).

SC-12.03

Delete Paragraph 12.03.B in its entirety and insert the following in its place:

"B. If OWNER, ENGINEER, or other contractors or utility owners performing other work for the OWNER as contemplated by Article 7, or anyone for whom OWNER is responsible, delays, disrupts, or interferes with the performance or progress of the Work, then CONTRACTOR shall be entitled to an equitable adjustment in the Contract Times. CONTRACTOR's entitlement to an adjustment of the Contract Times is conditioned on such adjustment being essential to CONTRACTOR's ability to complete the Work with the Contract Times. Such an adjustment shall be CONTRACTOR's sole and exclusive remedy for the delays described in this Paragraph 12.02.B."

ARTICLE 14. PAYMENTS TO CONTRACTOR AND COMPLETION

SC-14.02

Progress Payments:

Add new paragraphs immediately after paragraph 14.02A.3 of the General Conditions to read as follows:

4. Equipment accepted for delivery at the site or at a local bonded warehouse and included in progress estimates in advance of actual requirement will be subject to all conditions stated below.

5. Equipment will not be included in progress estimates until the following requirements have been fulfilled.

    a. The Contractor must present an invoice to the Engineer for each item of equipment he is requesting payment for. The invoice must be broken down to show the costs for the actual equipment, and reasonable costs for O&M Manuals, spare parts, start-up certification, training, testing, final acceptance testing, and any other services required by Contract.

    b. Sufficient monies have been allocated in the payment requisition line items to cover all of the costs listed in "a" above, plus the costs of physically installing the equipment.

    c. The equipment has been submitted and accepted for use in this Project.

    d. The equipment is acceptably stored and protected. Storage in a bonded warehouse will require proof of bonding, and insurance coverage specifically for the item being stored.

e. The manufacturer's short and/or long term storage requirements have been received by the Engineer, prior to payment.

f. The Contractor has established a program to implement the manufacturer's required storage procedures. Said program to consist of at the very least a written schedule of daily, weekly, monthly, etc., routine maintenance requirements for each piece of equipment. A copy of this schedule to be presented to the Engineer prior to each requisition submittal, signed by the Contractor, stating that the required maintenance has been performed.

g. Signed, notarized Title Transfers, format to be furnished by the Engineer, must be furnished for each item of equipment.

6. When the above have been complied with to the satisfaction of the Engineer, payment will be authorized for the full invoice values of the item of equipment, less normal retainage and less all costs for O&M Manuals, spare parts, start-up certification, training, testing, final acceptance testing, and installation.

SC-14.02

Progress Payments:

Amend Paragraph 14.02.C.1. by striking out the words “Ten days” and inserting the words “Forty five days” in their place.

ARTICLE 16. DISPUTE RESOLUTION

SC-16.01

Methods and Procedures:

Add a new sentence at the end of paragraph 16.01A of the General Conditions which is to read as follows:

> “D. Contractor shall carry on the Work and maintain the progress schedule during the dispute resolution proceedings unless otherwise agreed in writing by Owner and Contractor.”

ARTICLE 17. MISCELLANEOUS

SC-17.06

Delete paragraph 17.06 in its entirety and replace with the following:

“17.06 Headings:

A. The headings or titles of any article, paragraph, subparagraph, section, subsection, or part of the Contract Documents shall not be deemed to limit or restrict the article, paragraph, section, or part."

SC-17.07

Add new paragraph immediately after paragraph 17.06 of the General Conditions as follows:

"17.07 Legal Address of Contractor:

A. Contractor's business address and his office at or near the site of the Work are both hereby designated as places to which communications shall be delivered. The depositing of any letter, notice, or other communication in a postpaid wrapper directed to the Contractor's business address in a post office box regularly maintained by the Post Office Department or the delivery at either designated address of any letter, notice, or other communication by mail or otherwise shall be deemed sufficient service thereof upon Contractor, and the date of such service shall be the date of receipt. The first-named address may be changed at any time by an instrument in writing, executed and acknowledged by Contractor and delivered to Engineer. Service of any notice, letter, or other communication upon the Contractor personally shall likewise be deemed sufficient service."

END OF SECTION

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SECTION 01010

SUMMARY OF WORK

PART 1 - GENERAL

1.01 SUMMARY:

A. Section Includes:

1. Project information.

2. Work covered by Contract Documents.

3. Access to site.

4. Coordination with occupants.

5. Work restrictions.

B. Related Requirements:

1. Division 1 Section 01500 "Temporary Facilities" for limitations and procedures governing temporary use of Owner’s facilities.

1.02 PROJECT INFORMATION:

A. Engineer: AECOM Inc. 250 Apollo Drive, Chelmsford, MA 01824. Project Manager: Erik Meserve. Phone: 978-905-3145. Email: erik.meserve@aecom.com.

1.03 WORK COVERED BY CONTRACT DOCUMENTS:

A. The Work of Project is defined by the Contract Documents and consists of the following:

1. Construction of approximately 4140 LF of 24-inch diameter HDPE force main with associated fittings and appurtenances

2. Construction of approximately 315 LF of 20-inch diameter fusible PVC sliplining with associated fittings and appurtenances

3. Construction of approximately 920 LF of 12-inch diameter ductile iron water main with associated fittings and appurtenances

4. Draining and disconnecting the existing, temporary aboveground 30-inch diameter HDPE force main

B. Work Sequence

1. All sedimentation and erosion controls must be installed prior to the commencement of any work.

2. The work of this contract will require the abandonment and demolition of existing sewer force mains and water mains. Continuous wastewater and water flow must be maintained at all times while the work of the contractor is being performed. The Contractor shall develop a work sequence plan which details how continuous wastewater and water flows will be maintained. Refer to also to Section 01015 Sequence of Construction Operations.

C. Type of Contract:

1. Project will be constructed under a single prime contract.

1.04 ACCESS TO SITE:

A. Use of Site: Limit use of Project site to areas within the Contract limits indicated. Do not disturb portions of Project site beyond areas in which the Work is indicated.

1. Driveways, Walkways and Entrances: Keep driveways, loading areas, and entrances serving premises clear and available to Owner, Owner's employees, and emergency vehicles at all times. Do not use these areas for parking or storage of materials.

a. Schedule deliveries to minimize use of driveways and entrances by construction operations.

b. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.

B. Contractor is advised that Peirce Island is a heavily used recreational area, and construction operations need to accommodate this usage.

C. Peirce Island Road Bridge

1. Vehicular access to Peirce Island and the City of Portsmouth's Wastewater Treatment Facility (WWTF) is provided exclusively via the Peirce Island Road Bridge.

2. There are vehicle loading restrictions on the Bridge that the Contractor shall be aware of and adhere to for the duration of the work. Refer to Section 01500.

1.05 COORDINATION WITH OCCUPANTS:

A. Full Owner Occupancy: Owner will occupy site and adjacent building(s) during entire construction period. Cooperate with Owner during construction operations to minimize conflicts and facilitate Owner usage. Perform the Work so as not to interfere with Owner's day-to-day operations. Maintain existing exits unless otherwise indicated.

B. Maintain access to existing walkways, corridors, and other adjacent occupied or used facilities. Do not close or obstruct walkways, corridors, or other occupied or used facilities without written permission from Owner and approval of authorities having jurisdiction.

C. Notify Owner not less than 72 hours in advance of activities that will affect Owner's operations.

1.06 WORK RESTRICTIONS:

A. Work Restrictions, General: Comply with restrictions on construction operations.

1. Comply with limitations on use of public streets and with other requirements of authorities having jurisdiction.

2. Construction traffic routes as indicated on Contract Drawings.

B. On-Site Work Hours: Limit work in the existing building to normal business working hours of 7 a.m. to 3:30 p.m., Monday through Friday, unless otherwise indicated. Notify Owner and Engineer 2 weeks in advance if work will extend pask 3:30 pm. Include a description of the planned construction activities in the notification.

1. Second shift beyond 3:30 pm.: Upon written approval of the Portsmouth

2. Weekend Hours: Upon written approval of Portsmouth Director of Public Works or his designee.

3. Early Morning Hours: Upon written approval of the Portsmouth Director of Public Works or his designee.

4. Hours for Utility Shutdowns: Upon written approval of the Portsmouth Director of Public Works or his designee.

C. Holidays Observed by the Owner: The following holidays are observed by the Owner’s staff. Contractor shall not work on these days with prior Owner approval:

1. New Year’s Day

2. Dr. Martin Luther King, Jr. Day

3. President’s Day

4. Good Friday (Half Day)

5. Memorial Day

6. Independence Day

7. Labor Day

8. Columbus Day

9. Veteran's Day

10. Thanksgiving Day and Day After

11. Christmas Day

D. City Events: Several large public events take place on Peirce Island throughout the year. Contractor will not be permitted to work on the following days:

1. Fairy House Tour – Friday, Saturday, Sunday in the fall each year. 2020 dates were October 3rd and 4th. City to notify Contractor 1 month in advance.

E. Existing Utility Interruptions: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after providing temporary utility services according to requirements indicated:

1. Notify Engineer not less than ten days in advance of proposed utility interruptions.

2. Obtain Engineer's written permission before proceeding with utility interruptions.

F. Noise, Vibration, and Odors: Coordinate operations that may result in high levels of noise and vibration, odors, or other disruption to Owner occupancy with Owner.

1. Notify Engineer not less than ten days in advance of proposed disruptive operations.

2. Obtain Engineer's written permission before proceeding with disruptive operations.

G. Nonsmoking Building: Smoking is not permitted within the building or within 25 feet (8 m) of entrances, operable windows, or outdoor-air intakes.

H. Controlled Substances: Use of tobacco products and other controlled substances within existing buildings is not permitted.

1.07 RELATED WORK:

A. General: Cooperate fully with separate contractors so work on those contracts may be carried out smoothly, without interfering with or delaying work under this Contract or other contracts. Coordinate the Work of this Contract with work performed under separate contracts.

B. The Contractor is notified that the Owner intends to rehabilitate the Peirce Island Pool while this project is ongoing. Cooperate with this Contractor to minimize conflicts. The Contractor's operations shall allow for construction traffic from this project.

1.08 PUBLIC MEETING:

A. The Contractor shall be required to attend and participate in one public meeting during the project.

PART 2 - PRODUCTS

(Not Used)

PART 3 - EXECUTION

(Not Used)

END OF SECTION

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SECTION 01015

SEQUENCE OF CONSTRUCTION OPERATIONS

PART 1- GENERAL

1.01 GENERAL REQUIREMENTS

A. During the construction of the new Peirce Island Force Mains, the Contractor shall maintain flows to the Peirce Island WWTF though the existing 18" underground force main and the existing 30" temporary above ground force main. As such, a suggested sequence for several critical items has been developed, and certain restrictions are specified in this section and the Contract Documents so as not to compromise the ability to adequately convey wastewater. The Contractor shall include these items in their Bid.

B. The Contractor shall be responsible for continuous operation and protection of the existing underground and aboveground piping throughout the project.

C. Other responsibilities of the Contractor are described in the Specifications and Contract Drawings.

1.02 SEQUENCE OF CONSTRUCTION

A. The suggested construction sequence described herein includes significant work items. The sequence is not intended to describe all proposed work; rather, it is intended to describe where sequence is critical to plant and pump station operations.

B. The Contractor shall give the Owner 7 days' notice when requesting that a pipeline be taken offline, so that Owner may plan his operations accordingly.

C. Within 30 days of signing of the Contract, the Contractor shall submit to the Engineer a schedule and sequence of construction for the Work under this Contract in accordance with the requirements contained herein. The schedule shall indicate the anticipated timing of construction of new pipelines, as well as demolition and abandonment of existing pipelines. The schedule shall also indicate the anticipated availability of all new pipelines. In addition to this, at least 30 days prior to the construction of any work or part hereof which will interfere with the conveyance of wastewater, the Contractor shall submit to the Engineer a detailed schedule and sequence of this proposed construction. The detailed schedule and sequence shall include the time period and nature of the interference and what temporary measures will be utilized to accomplish the work and minimize the interruption.

D. The schedules as accepted shall be adhered to except as deviations therefrom are expressly permitted by the Engineer. Schedules shall be updated and resubmitted as specified and as requested by the Engineer.

E. The Owner and the Engineer reserve the right to reschedule such work at any time if, in their judgment, weather conditions, flow conditions or other factors would adversely affect the performance during the conduct of the work.

F. The Contractor should note that any work requiring shutdown or modification of existing facilities requires prior written acceptance of the proposed schedule and sequence noted above.

1.03 OTHER PROVISIONS

A. In general, the Contractor shall make whatever provisions are necessary to protect and maintain the continued conveyance of wastewater. Such provisions shall include, but are not necessarily limited to, such items as:

1. Protection of the structural integrity of all existing structures, including structures scheduled for demolition or abandonment until such times as they can be demolished as permitted.

2. Maintenance of suitable access to the existing Peirce Island WWTF and other Peirce Island facilities at all times. The Contractor shall keep access reasonably free of dust, ruts, and construction traffic. Free vehicular access to the facilities on Peirce Island is to be provided at all times.

3. All work of connecting with, cutting into, and reconstructing existing pipelines shall be planned to interfere with operation of the said pipelines for the shortest possible time when the demands on the pipelines best permit such interference, even though it may be necessary to work outside the normal working hours to meet these requirements. Before starting work that will interfere with the operation of such pipelines, the Contractor shall do all possible preparatory work, including the construction of temporary connections and the provision of portable generators, pumping equipment, and piping, if required, and shall see that all tools, materials, and equipment are made ready and at hand. The Contractor shall be responsible for the dewatering and cleaning of any pipelines or structures on which he is required to perform work. Dewatering and cleaning methods shall be acceptable to the Owner and Engineer.

4. Installation of satisfactory temporary fencing as indicated on Peirce Island during the work to protect the work temporary staging areas is required.

1.04 CONSTRUCTION RESTRICTIONS

A. For the purposes of this Specification, the term “operational” or “in service” denotes that a process or pipeline and all related appurtenances are available and capable of being used by the Owner for its intended purpose.

B. Temporary systems may be proposed by the Contractor but are subject to the approval of Owner and Engineer.

C. The Contractor and his Subcontractors shall not operate any valve or appurtenance. The Owner's staff shall operate valves or appurtenances at the request of the Contractor.

D. Water supply to and wastewater flow from the State Fish Pier, Four Tree Island, and the Peirce Island Pool shall not be interrupted except to make the interconnections shown on the Contract Documents.

E. Sequence of Sewer Force Main Construction

a. The Contractor shall first construct and test the new northernmost 24" HDPE force main between approximately STA. 4+50 and STA. 21+50 and the new southernmost 24" HDPE force main between STA. 3+00 and STA. 21+50 without disturbing the temporary 30" force main connections to the existing 24" ductile iron force main or the existing 18" ductile iron force main. During this time, wastewater will continue to flow through the existing 18" ductile iron force main and the temporary 30" force main.

b. Second, the Contractor shall request that the City take the temporary 30" HDPE force main out of service by closing the existing 24" ductile iron valve on the western side of Peirce Island Bridge. Afterwards, the Contractor shall carefully disconnect the temporary 30" HDPE force main and move it aside. Cutting the 30" HDPE temporary force main is not permitted. Once it is out of service, the Contractor shall drain the 30" HDPE force main and transport its contents to the Peirce Island WWTF for treatment in coordination with the City. The Contractor shall then complete and test the proposed northernmost 24" HDPE force main, including the connections to the existing force main on either end, the 24" ductile iron gate valve near the connection to the State Fish Pier, the connections to Four Tree Island, and Peirce Island Pool to both force mains, and the connection to the State Fish Pier to the northernmost 24" HDPE force main. During this time, wastewater will continue to flow through the existing 18" ductile iron force main on Peirce Island. Once the connections to the State Fish Pier, Four Tree Island, and Peirce Island Pool are made, the new 24" gate valve near the connection to the State Fish Pier will be closed by the City and wastewater from these sources will flow through the new 24" HDPE force main. At this point, all other flow will go through the existing 16" force main under Peirce Island Bridge and the 18" ductile iron force main on Peirce Island.

c. Third, the Contractor shall drain the 24" ductile iron force main under Peirce Island Bridge and transport its contents to the Peirce Island WWTF in coordination with the City. The 20" fusible PVC sliplining under the Peirce Island Rd. Bridge will be installed and tested. During this time, wastewater will continue to flow through the existing 18" ductile iron force main. Wastewater from the State Fish

Pier, Four Tree Island, and Peirce Island Pool will continue to flow through the new northernmost 24" HDPE force main.

d. Fourth, the Contractor shall request that the City take the existing 18" ductile iron force main out of service and place the 20" PVC slipliner and northernmost 24" HDPE force main in service. The City will operate the valves necessary to accomplish this. Wastewater from the Mechanic St. Pump Station, State Fish Pier, Four Tree Island, and Peirce Island Pool will all flow through the 20" fusible PVC slipliner and northernmost 24" HDPE force main during this time. After the existing 18" ductile iron force main is out of service, the Contractor shall drain it and complete the process of demolishing the segments called for to be demolished and abandoning the segments called for to be abandoned. Wastewater drained from the pipeline may be transported to the Peirce Island WWTF and disposed of there for treatment in coordination with the City. The Contractor shall then complete the southernmost proposed 24" force main by finishing the segment between Peirce Island Bridge and the boat launch and the segment near the Peirce Island WWTF, including the connection to the State Fish Pier. After testing the southernmost proposed 24" force main, the Contractor shall request that the City place it into operation.

F. Sequence of Water Main Construction

a. After installation, the temporary water main shall be tested, disinfected prior to putting the temporary water main into service. The temporary water main shall be protected from freezing. Refer to Section 02736 Temporary Potable Water Connections for details.

END OF SECTION

SECTION 01045

CUTTING, CORING AND PATCHING

PART 1 - GENERAL

1.01 DESCRIPTION:

A. Section Includes:

1. Alterations to existing buildings or structures.

2. Cutting, coring, and patching.

B. All cutting, coring, and rough patching shall be performed by the Contractor. Finish patching shall be the responsibility of the Contractor and shall be performed by the trade associated with the application of the particular finish.

C. Work Includes:

1. Alterations:

a. Cutting, moving or removal of items as shown on Drawings.

b. Cutting, moving or removal of items not shown to be cut, moved or removed, but which must be cut, moved or removed to allow new Work to proceed. Patch or reinstall Work or items which are to remain in finished Work after cutting, moving or removal, and make joints and finishes match adjacent or similar Work.

c. Removal of existing surface finishes as needed to install new Work and finishes.

d. Removal of abandoned items and removal of items serving no useful purpose, such as piping and electrical conduit.

e. Repair or removal of dangerous or unsanitary conditions.

f. Removal of unsuitable or extraneous materials not marked for salvage, such as abandoned furnishings, debris, grease buildup, rotted wood, rusted trench covers, and deteriorated concrete and masonry.

2. Cutting and Patching:

a. Uncovering Work for installation of ill-timed Work.

b. Removal and replacement of defective Work and Work not conforming to Contract Documents.

c. Uncovering Work to provide observation by Engineer or inspection or tests by others of covered Work.

d. Removal of samples of installed materials for testing.

e. To make several parts fit properly.

3. Temporary enclosures and services.

1.02 REFERENCES:

A. American Society for Testing and Materials International (ASTM):

1. E84: Standard Test Method for Surface Burning Characteristics of Building Materials

1.03 ALTERATIONS, CUTTING, AND PROTECTION:

A. Contractor is responsible to survey and record condition of existing facilities to remain in-place that may be affected by alteration operations. After alteration work is complete, survey conditions again and restore existing facilities to pre-alteration condition.

B. Perform Work of moving, removal, cutting, and patching with trades qualified to perform Work in manner causing least damage to each type of Work.

1. Cut finish surfaces such as masonry, tile, plaster or metals, by methods to terminate surfaces in straight line at natural point of division.

C. Protect existing finishes, equipment, and adjacent Work which is to remain, from damage.

1. Protect existing and new Work from weather and extremes of temperature.

a. Maintain existing interior work area above 60 degrees F (15 degrees C).

b. Provide weather protection, waterproofing, heat, and humidity control as needed to prevent damage to remaining existing and new Work.

D. Provide shoring, needling, and bracing to keep building(s) or structures structurally secure and free of damaging deflection for installation of new structural members.

E. Do not pile material to endanger building or structure.

F. Discoveries of construction, furnishings, and articles having historic or private value shall remain in possession of Owner.

1. Promptly notify Engineer.

2. Protect discovery from damage from elements or Work.

3. Engineer will promptly transmit decision for disposition of discovery.

4. Store items to be retained by Owner in safe, dry place on-site, or legally dispose of items which Owner releases.

1.04 HOLES IN EXISTING CONCRETE:

A. When the Contractor is required to make new holes in existing concrete for piping, conduit, cables, or equipment, the Contractor shall accurately and carefully mark out the locations and the extent of cutting required and coordinate with the trade(s) involved. The Contractor shall make new holes using one of the methods described below:

1. Prior to drilling any openings, the Contractor shall determine the location, if any, of existing services concealed in and/or behind the construction to be drilled. X-ray the walls or slabs, if required to determine the location.

2. The Contractor shall chip with an electric hammer with chisel point. Adjust the location of holes as necessary to avoid electrical conduits if encountered. Cut reinforcing steel after permission is received.

1.05 SECURITY:

A. When keys to locked areas are needed to provide access to areas to perform Work, obtain from Owner. Return keys at end of each day's Work.

1.06 PROTECTION AND CONTINUITY OF UTILITIES AND OPERATIONS:

A. Protect existing utilities so they will continue to function during and after construction.

B. Where interference with such facilities occurs, cooperate with Owner of facility and, if necessary, alter facility to eliminate interference.

C. Service Continuity:

1. Provide and maintain continuous electrical, plumbing, and HVAC services to functioning portions of process, building, facilities, or areas during hours normally in use.

2. Temporary outages are permitted during cutover Work at such times and places as can be pre-arranged with Engineer. Keep such outages to minimum number and length of time. Make no outages without prior acceptance.

3. Include costs for temporary equipment, materials, and Work required in Contract Price.

4. Remove temporary equipment and materials when no longer required or at completion of Work.

D. Plant Operation:

1. Maintain continuity of plant operation to functioning portions of existing plant.

2. Temporary shutoff is permitted during cutover Work at such times and places as can be pre-arranged with Engineer and Owner. Keep such shutoffs to minimum number and length of time and, once Work has started on temporary shutoff, continue until Work is complete. Make no shutoffs without prior acceptance.

3. Include costs for temporary piping and Work required in Contract Price.

4. Remove temporary piping when no longer required or at completion of Work.

1.07 TEMPORARY ELECTRICAL AND MECHANICAL SERVICES:

A. Comply with Section 01500.

1.08 QUALITY ASSURANCE:

A. Comply with the requirements specified in Section 01400.

B. Adhere strictly to the manufacturer's current printed recommendations regarding temperature at time of application for all work involving epoxy, cement base coating and protective coating.

C. Use only products of the specified Repair Mortar System Manufacturer(s) or equal.

D. Any changes in the specified repair mortar work methods shall be allowed only with the written acceptance of the Engineer.

PART 2 - PRODUCTS

2.01 MATERIALS:

A. Concrete repair mortar shall be a non-shrink, commercial formulation requiring only the addition of water with minimum 28-day compressive strength of 5,000 psi.

B. Provide a non-shrink cementitious repair mortar material as manufactured by:

1. Sika Repair 224 manufactured by Sika Corp.,

2. EMACO S88CI manufactured by Master Builder, Inc.,

3. Underlayment F-120 by Sauereisen, Inc.,

C. Materials for finish patching shall be equal to those of adjacent construction.

2.02 PRODUCTS FOR PATCHING, EXTENDING, AND MATCHING:

A. Provide same products, salvaged materials, types of construction or finish as that in existing structure, as needed to patch, extend or match existing Work.

1. Generally, Contract Documents will not define products or standards of workmanship present in existing construction, determine products by inspection and necessary testing and workmanship by use of existing as sample of comparison.

PART 3 - EXECUTION

3.01 GENERAL:

A. All cutting and coring shall be performed in such a manner as to limit the extent of patching.

B. All holes cut through concrete and masonry walls, slabs or arches shall be core drilled unless otherwise accepted. No structural members shall be cut without acceptance of the Structural Engineer of Record and all such cutting shall be done in a manner directed by him. No holes may be drilled in beams or other structural members. All work shall be performed by mechanics skilled in this type of work.

C. Rough patching shall be such as to bring the cut or cored area flush with existing construction unless otherwise shown. Finish patching shall match existing surfaces.

3.02 PREPARATION:

A. Where new work conceals existing surfaces or spaces Contractor shall remove foreign substances such as accumulated dirt, dust, grease, sludge, and odoriferous material before concealing existing surfaces.

B. Where surfaces are to remain exposed Contractor shall remove foreign substances described above.

3.03 CUTTING:

A. Inspect existing conditions of Work, including components subject to damage or movement during cutting, patching, excavating or backfilling.

B. After uncovering Work, inspect conditions affecting installation of new materials.

C. Do not cut or notch structural members without specific written acceptance of Engineer.

D. Cutting shall be performed with a concrete saw and diamond saw blades of proper size.

E. Corners of square or rectangular openings shall be cored. Do not overcut corners of openings. Corners shall be chipped out square, if required, so as not to cause cracking at the corners.

F. Provide for control of slurry generated by sawing operation on both sides of element.

G. When cutting reinforced concrete, the cutting shall be done so as not 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.

H. Adequate bracing and/or shoring of area to be cut shall be installed prior to start of cutting. Check area during sawing operations for cracking and provide additional bracing as required to prevent a partial release of cut area during sawing operations.

I. Provide equipment of adequate size to remove cut panel.

3.04 CORING:

A. Coring shall be performed with an accepted non-impact rotary tool with diamond core drills. Size of holes shall be suitable for pipe, conduit, sleeve, equipment or mechanical seals to be installed.

B. Provide protection for existing equipment, utilities and critical areas against water or other damage caused by drilling operation.

C. Slurry or tailings resulting from coring operations shall be removed from the area following drilling.

3.05 PATCHING:

A. Prepare surfaces to receive cementitious repair mortar in accordance with manufacturer's instructions.

B. Mix the cementitious repair mortar material components in accordance with the manufacturer's instructions. Concrete surfaces should be surface saturated dry (SSD) with no standing water prior to mortar application.

C. Work a wet scrub coat of the mortar per the manufacturer's recommendations into the pores and voids in the substrate and over the substrate prior to mortar application by trowel.

D. Apply the cementitious repair mortar using a steel trowel to work the material into the surface. Fill voids from deepest to shallowest areas as the application work proceeds. Strictly follow the manufacturer's application requirements.

E. Once the repair areas are filled with repair mortar, strike off the mortar level with the surrounding concrete substrate. Do not leave a broom finish. Finish with a steel trowel until closed up at the surface and flat.

F. Cure the repair mortar in strict accordance with the manufacturer's instructions.

3.06 CLEANING:

A. Perform periodic and final cleaning as specified in Section 01740, and:

1. Clean spillage, overspray, and heavy collection of dust in Owner-occupied areas immediately.

B. At completion of alterations work in each area, provide final cleaning and return space to condition suitable for use by Owner.

C. Remove debris from site each day. Removed material, except that listed or marked by Engineer for retention, becomes property of Contractor.

3.07 CLOSEOUT ACTIVITIES:

A. Provide in accordance with Section 01700.

END OF SECTION

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SECTION 01046

CONTROL OF WORK

PART 1 - GENERAL

1.01 PLANT:

Furnish plant and equipment which will be efficient, appropriate, and large enough to secure a satisfactory quality of work and a rate of progress which will insure the completion of the work within the Contract Time. If at any time such plant appears to the Engineer to be inefficient, inappropriate, or insufficient for securing the quality of work required or for producing the rate of progress aforesaid, the Engineer may order the Contractor to increase the efficiency, change the character, or increase the plant equipment, and the Contractor shall conform to such order. Failure of the Engineer to give such order shall in no way relieve the Contractor of his obligations to secure the quality of the work and rate of progress required.

1.02 OCCUPYING PRIVATE LAND:

A. The Contractor shall not (except after written consent from the proper parties) enter or occupy with personnel, 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 and Owner.

1.03 PIPE LOCATIONS:

A. Exterior pipelines will be located substantially as indicated on the Drawings, but the right is reserved to the Owner, acting through the Engineer, to make such modifications in location as may be found desirable to avoid interference with existing structures or for other reasons. Where fittings, etc., are noted on the Drawings, such notation is for the Contractor's convenience and does not relieve him from laying and jointing different or additional items where required.

1.04 DIMENSION OF EXISTING STRUCTURES:

A. The Contractor shall verify the dimensions and locations of existing structures in the field before the fabrication of any material or equipment which is dependent on the correctness of such information.

1.05 OPEN EXCAVATIONS:

A. All open excavations shall be adequately safeguarded by providing temporary barricades, fencing, caution signs, lights, and other means to prevent accidents to persons and damage to property, and in accordance with applicable occupational health and safety regulations. The Contractor shall, at his own expense, provide suitable and safe bridges and other crossings for accommodating travel by pedestrians and workmen. Bridges provided for access during construction shall be removed when no longer

required. The length or size of excavation will be controlled by the particular surrounding conditions, but shall always be confined to the limits prescribed by the Engineer. If the excavation becomes a hazard, or if it excessively restricts traffic at any point, the Engineer may require special construction procedures such as limiting the length of the open trench, prohibiting stacking excavated material in the street, and requiring that the trench shall not remain open overnight.

B. The Contractor shall take precautions to prevent injury to the public due to open trenches. The Contractor shall comply with all OSHA regulations regarding trench support. All trenches, excavated material, equipment, or other obstacles which could be dangerous to the public shall be well lighted at night.

1.06 TEST PITS:

A. Test pits for the purpose of locating underground pipeline or structures in advance of the construction shall be excavated and backfilled by the Contractor at the direction of the Engineer. Test pits shall be backfilled immediately after their purpose has been satisfied and the surface restored and maintained in a manner satisfactory to the Engineer. Locations of test pits shall be as directed by the Engineer.

1.07 INTERFERENCE WITH AND PROTECTION OF STREETS:

A. The Contractor shall not close or obstruct any portion of a street, road, or private way without obtaining permits therefor from the proper authorities. If any street, road or private way shall be rendered unsafe by the Contractor's operations, he shall make such repairs or provide such temporary ways or guards as shall be acceptable to the proper authorities.

B. Streets, roads, private ways, and walks not closed shall be maintained passable and safe by the Contractor, who shall assume and have full responsibility for the adequacy and safety of provisions made therefor.

C. The Contractor shall, at least 24 hours in advance, notify the Public Works, Police and Fire Departments in writing, with a copy to the Engineer and Owner, if the closure of a street or road is necessary. The Contractor shall cooperate with the Police Department in the establishment of alternate routes and shall provide adequate detour signs, plainly marked and well lighted, in order to minimize confusion. The Contractor shall follow the City’s street closure application process and City’s flagging permit process.

1.08 TRAFFIC CONTROL:

A. For control of moderate traffic, the Contractor shall provide an adequate number of flagmen employed at his own expense.

B. Contractor shall use routes indicated in Traffic Control Plan for all construction related traffic, including workforce, subcontractor’s materials and equipment traveling to and from the project site. Additional traffic control requirements are located in Section 01500.

C. The cost of police details will be paid for under the appropriate item in the Bid. The Contractor shall be responsible for arranging and coordinating the scheduling of police details. Should costs for police details be incurred due to mis-scheduling by the Contractor, the Contractor is responsible for these costs.

D. The employment or presence of traffic flagmen, special officers, or police shall in no way relieve the Contractor of any responsibility or liability which is his under the terms of the contract.

1.09 CARE AND PROTECTION OF PROPERTY:

A. The Contractor shall be responsible for the preservation of all public and private property, and shall use every precaution necessary to prevent damage thereto. If any direct or indirect damage is done to public or private property by or on account of any act, omission, neglect, or misconduct in the execution of the work on the part of the Contractor, such property shall be restored by the Contractor, at his expense, to a condition similar or equal to that existing before the damage was done, or he shall make good the damage in other manner acceptable to the Engineer.

1.10 INTERFERENCE WITH EXISTING WORKS:

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

B. The Contractor shall make such minor modifications in the work relating to existing structures as may be necessary, without additional compensation.

C. The Contractor shall have no claim for additional compensation by reason of delay or inconvenience in adapting his operations to the need for continuous flow of sewage and water.

1.11 MAINTAINING FLOWS:

A. It is essential to the operation of the existing sewerage system that there be no interruption in the flow of sewage. To this end, the Contractor shall at his own expense, provide, maintain, and operate all temporary facilities such as dams, pumping equipment, conduits, and all other labor and equipment necessary to intercept the sewage

flow before it reaches the points where it would interfere with his work, carry it past his work, and return it to the existing sewer below his work.

B. The Contractor shall at his own cost, provide all the flow of sewers, drains and water courses interrupted during the progress of the work, and shall immediately cart away and remove all offensive matter. The entire procedure of maintaining existing flow shall be fully discussed with the Engineer well in advance of the interruption of any flow.

C. Minimum sewage flow occurs during the night hours and the Contractor may work on the existing sewer at such times if he so chooses with prior written approval of the Portsmouth Director of Public Works or his designee.

1.12 PROTECTION AND RELOCATION OF EXISTING STRUCTURES AND UTILITIES:

A. The Contractor shall assume full responsibility for the protection of all buildings, structures, and utilities, public or private, including poles, signs, services to buildings, utilities in the street, gas pipes, water pipes, hydrants, sewers, drains, and electric and telephone cables, whether or not they are shown on the Drawings. The Contractor shall carefully support and protect all such structures and utilities from injury of any kind. Any damage resulting from the Contractor's operations shall be repaired by him at his expense.

B. The Contractor shall bear full responsibility for obtaining all locations of underground structures and utilities (including existing water services, drain lines, and sewers). Services to buildings shall be maintained, and all costs or charges resulting from damage thereto shall be paid by the Contractor.

C. Protection and temporary removal and replacement of existing utilities and structures as described in this Section shall be a part of the work under the Contract and all costs in connection therewith shall be included in the Total Price Bid in the Bid Form.

D. The Contractor shall notify New Hampshire Dig Safe at least 72 hours prior to start of work.

E. The Contractor shall coordinate the removal and replacement of traffic loops and signals, if required for the performance of the work, at no additional cost to the Owner.

1.13 INSPECTION OF WORK AWAY FROM THE SITE:

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

1.14 COOPERATION WITHIN THIS CONTRACT:

A. All firms or persons authorized to perform any work under this Contract shall cooperate with General Contractor and his Subcontractors or trades, and shall assist in incorporating the work of other trades where necessary or required.

1.15 CLEANUP AND DISPOSAL OF EXCESS MATERIAL:

A. During the course of the work, the Contractor shall keep the site of his operations in as clean and as neat a condition as is possible. He shall dispose of all residue resulting from the construction work and, at the conclusion of the work, he shall remove and haul away any surplus excavation, broken pavement, lumber, equipment, temporary structures, and any other refuse remaining from the construction operations, and shall leave the entire site of the work in a neat and orderly condition.

B. In order to prevent environmental pollution arising from the construction activities related to the performance of this Contract, the Contractor and his subcontractors shall comply with all applicable Federal, State, and local laws, and regulations concerning waste material disposal, as well as the specific requirements stated in this Section and elsewhere in the Specifications.

C. The Contractor is advised that the disposal of excess excavated material in wetlands, stream corridors, and plains is strictly prohibited even if the permission of the property owner is obtained. Any violation of this restriction by the Contractor or any person employed by him, will be brought to the immediate attention of the responsible regulatory agencies, with a request that appropriate action be taken against the offending parties. Therefore, the Contractor will be required to remove the fill at his own expense and restore the area impacted.

1.16 STORAGE OF MATERIALS AND EQUIPMENT:

A. All excavated materials and equipment to be incorporated in the Work shall be placed so as not to injure any part of the Work or existing facilities and so that free access can be had at all times to all parts of the Work and to all public utility installations in the vicinity of the Work. Materials and equipment shall be kept neatly piled and compactly stored in such locations as will cause a minimum of inconvenience to public travel and adjoining Owners, tenants and occupants.

1.17 SAFETY:

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

ground.

B. The Contractor shall provide and maintain all necessary safety equipment such as fences, barriers, signs, lights, walkways, guards and fire prevention and fire-fighting equipment and shall take such other action as is required to fulfill his obligations under this subsection.

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

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

1.18 LINES, GRADES AND MEASUREMENTS:

A. The Contractor shall employ a competent land surveyor, registered within the State as a Professional Land Surveyor. The Contractor shall require said land surveyor to establish all lines, elevations, reference marks, batter boards, etc., needed by the Contractor during the progress of the Work, and from time to time to verify such marks by instrument or other appropriate means.

B. The Engineer shall be permitted at all times to check the lines, elevations, reference marks, batter boards, etc., set by the Contractor, who shall correct any errors in lines, elevations, reference marks, batter boards, etc., disclosed by such check. Such a check shall not be construed to be an approval of the Contractor's work and shall not relieve or diminish in any way the responsibility of the Contractor for the accurate and satisfactory construction and completion of the entire Work.

C. The Contractor shall make, check, and be responsible for all measurements and dimensions necessary for the proper construction of and the prevention of misfittings in the Work.

1.19 WORK TO CONFORM:

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

B. All work done without instructions having been given therefor by the Engineer, without proper lines or levels, or performed during the absence of the Engineer, will not be estimated or paid for except when such work is authorized by the Engineer in writing.

Work so done may be ordered uncovered or taken down, removed, and replaced at the Contractor's expense.

PART 2 - PRODUCTS

(Not Used)

PART 3 - EXECUTION

(Not Used)

END OF SECTION

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SECTION 01063

MISCELLANEOUS REQUIREMENTS

PART 1 - GENERAL

1.01 SCOPE OF WORK:

A. The Contractor shall conform to all miscellaneous requirements as herein specified.

1.02 TRAFFIC CONTROL:

A. As indicated on the drawings, the Contractor shall be responsible for providing flagmen (certified by either American Traffic Safety Services Association (ATSSA) and National Safety Council (NSC) flagger training programs) or Police Details (uniformed special officers) to direct traffic and to keep traffic out of the areas affected by his construction operations. Such flagmen and special officers shall be in addition to the watchmen required under other provisions of the contract.

B. The Contractor shall arrange for and coordinate the scheduling of such flagmen and special officers. Should costs for flagmen and special officers be incurred due to mis-scheduling by the Contractor, the Contractor will be responsible for these costs.

C. The employment or presence of traffic flagmen or special officers shall in no way relieve the Contractor of any responsibility or liability which is his under the terms of the contract.

1.03 BURIED UTILITY WARNING AND IDENTIFICATION TAPE:

A. Provide detectable aluminum foil plastic backed tape or detectable magnetic plastic tape manufactured specifically for warning and identification of buried piping. Tape shall be detectable by an electronic detection instrument. Provide tape in rolls, 3 inches minimum width, color coded for the utility involved with warning and identification imprinted in bold black letters continuously and repeatedly over entire tape length. Warning and identification shall be CAUTION BURIED WATER PIPING BELOW or similar. Use permanent code and letter coloring unaffected by moisture and other substances contained in trench backfill material. Bury tape with the printed side up at a depth of 12 inches below the top surface of earth or the top surface of the subgrade under pavements.

1.04 PROTECTION AGAINST ELECTROLYSIS:

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

1.05 COVERING OPEN EXCAVATIONS:

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

1.06 TRENCH COMPACTION:

A. The Contractor's attention is directed to the fact that he will be required to compact the pipe trenches immediately upon completing the backfilling and only under extremely unusual circumstances will a change in this procedure be allowed.

1.07 WETLAND AND SHORELAND AREAS

A. The Contractor is hereby informed that a portion of this project is adjacent to jurisdictional wetland and shoreland areas as indicated in the Contract Documents.

B. NHDES has issued permits listing conditions for construction. Copies of the permits are presented in the Specification Appendices.

C. The Contractor shall be required to adhere to all requirements of the permits and to comply with applicable regulations of the City and State. The intent of this contract is to limit disturbance of these areas to what is absolutely necessary for construction and to restore these areas as closely as possible to their original state.

1.08 HISTORICAL ARTICLES:

A. Areas outside the limit of work are areas of archaeological sensitivity. Construction activities and ground disturbance shall not take place outside the limit of work. Temporary construction fencing must be maintained.

B. In the event that unanticipated archaeological resources are encountered during construction, the Contractor shall:

1. Immediately cease construction activities in the immediate vicinity of the resource and inform the Owner and Engineer.

2. Cover the exposed resource to protect it from the elements, if possible.

3. Install a temporary barrier such as snow fencing to prevent unauthorized or inadvertent access to the resource.

C. Once notified, the Enginer will contact the project archeologist to inspect and assess the resource within 24 hours. If necessary, the project archeologist will consult with the New

Hampshire Department of Historical Resources (NHDHR).

D. Until such time as guidance is provided by the project archeologist, no construction activities shall take place in the immediate vicinity of the resource.

E. The project archeologist will prepare and submit a report to NHDHR documenting the unanticipated resource and its resolution.

1.09 UTILITY CONTACT INFORMATION:

A. The contact information for the local utilities are as follows:

1. Eversource
Michael Busby, PE
(603) 436-7708 x555-5678
michael.busby@nu.com

2. Comcast
Mike Collins
Mke_collins@cable.comcast.com
(617) 279-6360

1.10 PEIRCE ISLAND BRIDGE RESTRICTIONS:

A. Vehicular access to Peirce Island and the City of Portsmouth's Wastewater Treatment Facility (WWTF) is provided exclusively via the Peirce Island Bridge. There are vehicle loading restrictions on the Bridge that the Contractor shall be aware of and adhere to for the duration of the work. Refer to Section 01500.

1.11 PROTECTION OF TREES:

A. The Contractor shall take care not to harm trees in the area where the contract work is to be done except when indicated on the drawings or with the written permission of the Owner and any other Owner of the trees involved. Care shall be taken not to cut tree roots so as not to harm tree growth of trees to remain.

1.12 EMERGENCY VEHICLES AND SCHOOL BUSES:

A. Provision shall be made for safe passage at all times for emergency vehicles and school buses.

1.13 PUBLIC INFORMATION MEETING:

A. Following the award of the construction contract and prior to the start of construction, a Public Informational Meeting will be held to discuss the various aspects of the project with area residents and other interested parties. The meeting is to be attended by the Contractor, the Engineer, and representatives of the City of Portsmouth. The Contractor

shall be prepared to discuss schedule and sequence of work, and to answer any questions raised.

END OF SECTION

SECTION 01080

DEFINITIONS

PART 1 - GENERAL

A. Abbreviations:Where any of the following abbreviations are used in the Contract Documents, they shall have the meaning set forth opposite each. Abbreviations for trade associations and standards organizations are listed in Section 01090 Reference Standards.

AASHTO	American Association of State Highway and Transportation Officials
ACI	American Concrete Institute
AFBMA	Anti-Friction Bearing Manufacturers Association
AGA	American Gas Association
AGMA	American Gear Manufacturers Association
AISC	American Institute of Steel Construction
AMCA	Air Moving and Conditioning Association
ANS	American National Standard
125-lb. ANS or 250-lb. ANS	American National Standard for Cast-Iron Pipe Flanges and Flanged Fittings, Designation B16.1-1975, for the appropriate class
ANSI	American National Standards Institute
API	American Petroleum Institute
ASCE	American Society of Civil Engineers
ASHRAE	American Society of Heating, Refrigerating and Air Conditioning Engineers
ASME	American Society of Mechanical Engineers
ASTM	American Society for Testing and Materials
AWG	American or Brown and Sharpe Wire Gage
AWPA	American Wood-Preservers' Association

AWWA	American Water Works Association
CS	Commercial Standard
IBR	Institute of Boiler and Radiator Manufacturers
IEEE	Institute of Electrical and Electronics Engineers, Inc.
Fed. Spec.	Federal Specifications issued by the Federal Supply Service of the General Services Administration, Washington, D.C.
IBR	Institute of Boiler and Radiator Manufacturers
IPS	Iron Pipe Size
JIC	Joint Industry Conference Standards
NBS	National Bureau of Standards
NEC	National Electrical Code; latest edition
NEMA	National Electrical Manufacturers Association
NFPA	National Fire Protection Association
NPT	National Pipe Thread
OS&Y	Outside screw and yoke
SMACNA	Sheet Metal and Air Conditioning Contractors National Association, Inc.
Stl. WG	U. S. Steel Wire, Washburn and Moen, American Steel and Wire or Roebling Gage
UL	Underwriters Laboratories, Inc.
USS Gage	United States Standard Gage
WOG	Water, Oil, Gas
WSP	Working steam pressure

1.03 SPECIFICATION AND DRAWING CONVENTIONS:

A. Specification Content: The Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:

1. Imperative mood and streamlined language are generally used in the Specifications. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.

2. Specification requirements are to be performed by Contractor unless specifically stated otherwise.

B. Division 1 General Requirements: Requirements of Sections in Division 1 apply to the Work of all Sections in the Specifications.

1.04 DEFINITIONS:

A. General: Basic Contract definitions are included in the General Conditions.

B. Wherever the words defined in this section or pronouns used in their stead occur in the Contract Documents, they shall have the meanings herein given.

Approved

When used to convey Engineer’s action on Contractor's submittals, applications, and requests, "approved" is limited to Engineer’s duties and responsibilities as stated in the Conditions of the Contract.

As Directed, as Required, Etc.

Wherever in the Contract Documents, or on the Drawings, the words "as directed," "as ordered," "as requested," "as required," "as permitted," “as authorized,” or words of like import are used, it shall be understood that the direction, order, request, requirement, permission, or authorization of the Engineer is intended.

Indicated

Requirements expressed by graphic representations or in written form on Drawings, in Specifications, and in other Contract Documents. Other terms including "shown," "noted," "scheduled," and "specified" have the same meaning as "indicated."

Regulations

Laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, and rules, conventions, and agreements within the construction industry that control performance of the Work.

Furnish

Supply and deliver to Project site, ready for unloading, unpacking, assembly, installation, and similar operations.

Install

Operations at Project site including unloading, temporarily storing, unpacking, assembling, erecting, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations.

Provide

Wherever in the Contract Documents the word "provide" is used, it shall mean to furnish (or supply) and install, complete and ready for the intended use.

Project Site

Space available for performing construction activities. The extent of Project Site is shown on Drawings and may or may not be identical with the description of the land on which Project is to be built.

Elevation

The figures given on the Drawings or in the other Contract Documents after the word "elevation" or abbreviation of it shall mean the distance in feet above the datum adopted by the Engineer.

Rock

The word "rock," wherever used as the name of an excavated material or material to be excavated, shall mean only boulders and pieces of concrete or masonry exceeding 1 cu. yd. in volume, or solid ledge rock which, in the opinion of the Engineer, requires, for its removal, drilling and blasting, wedging, sledging, barring, or breaking up with a power-operated tool. No soft or disintegrated rock which can be removed with a hand pick or power-operated excavator or shovel, no loose, shaken, or previously blasted rock or broken stone in rock fillings or elsewhere, and no rock exterior to the maximum limits of measurement allowed, which may fall into the excavation, will be measured or allowed as "rock."

Earth

The word "earth", wherever used as the name of an excavated material or material to be excavated, shall mean all kinds of material other than rock as above defined.

PART 2 - PRODUCTS

(Not Used)

PART 3 - EXECUTION

(Not Used)

END OF SECTION

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SECTION 01110

PROTECTION OF ENVIRONMENT

PART 1 - GENERAL

1.01 SUMMARY:

A. Contractor, in executing Work, shall maintain Work areas on- and off-site free from environmental pollution that would be in violation of federal, state or local regulations as indicated and in compliance with Contract Documents.

B. The control of environmental pollution requires consideration of air, water, and land, and involves management of noise and solid waste, as well as other pollutants.

C. Any contamination shall be reported by the Contractor to the Owner, the Engineer and the New Hampshire Department of Environmental Services (NHDES) and cleaned up as per State requirements.

D. The Contractor shall be responsible for the protection of the natural environment of the Site and surrounding areas, both land and water. Protection of the environment must start with avoidance and prevention, and then control/mitigation, compensation, or enhancement (in order of descending preference).

E. Schedule and conduct all work in a manner that will minimize the erosion of soils in the area of the work. Provide erosion control measures such as sediment filter logs, seeding, mulching, or other special surface treatments as are required to prevent silting and muddying of streams, rivers, impoundments, lakes, etc. All erosion control measures shall be in place in an area prior to any construction activity in that area. Special requirements for erosion and sedimentation control are specified in Section 01568 .

F. Ensure that construction is achieved with a minimum of disturbance to the existing ecological balance between a water resource and its surroundings. It is the Contractor's responsibility to determine the specific construction techniques and best management practice to meet these guidelines.

G. Schedule and conduct all work in a manner that will minimize the level of noise escaping the site, especially at night and on weekends.

H. Submit Stormwater Pollution Prevention Plan (SWPPP) in accordance with Section 01300.

I. Payment:

1. Consider Work specified in this section incidental and include payment as part of appropriate lump sum or unit prices specified in Bid Form.

1.02 REFERENCES:

A. United States Environmental Protection Agency (USEPA):

1. EPA-72-015: Guidelines for Erosion and Sedimentation Control Planning and Implementation

2. EPA 43019-73-007: Processes, Procedures, and Methods to Control Pollution Resulting from All Construction Activity

B. New Hampshire Department of Environmental Services (NHDES):

1. New Hampshire Stormwater Manual (2008)

2. Env. Wt 100-900 Wetlands Rules

3. Env. Wg 1400 Shoreland Protection

4. Env. Wq 1500 Alteration of Terrain

C. Federal Environmental Protection Act and applicable regulations.

D. Owner's environmental management plans and associated environmental protection plans.

1.03 PROTECTION OF STORM SEWERS:

A. Prevent construction material, pavement, concrete, earth or other debris from entering existing storm sewer or sewer structure.

B. The Engineer will notify the Contractor in writing of any non compliance with the foregoing provisions or any environmentally objectionable acts and corrective action to be taken. State or local agencies responsible for verification of certain aspects of the environmental protection requirements shall notify the Contractor in writing, through the Engineer, of any non compliance with state or local requirements. The Contractor shall, after receipt of such notice from the Engineer or from the regulatory agency through the Engineer, immediately take corrective action. Such notice, when delivered to the Contractor or his authorized representative at the site of the work, shall be deemed sufficient for the purpose. If the Contractor fails or refuses to comply promptly, the Owner may issue an order stopping all or part of the work until satisfactory corrective action has been taken. No part of the time lost due to any such stop orders shall be made subject of a claim for extension of time or for excess costs or damages by the Contractor unless it is later determined that the Contractor was in compliance

1.04 PROTECTION OF WATERWAYS:

A. Observe rules and regulations of State of New Hampshire and Federal agencies of U.S.government prohibiting pollution of lakes, streams, rivers or wetlands by dumping of refuse, rubbish, dredge material or debris.

B. The Contractor shall not cause or permit action to occur which would cause an overflow to existing waterways. Provide holding ponds or accepted best management practices method which will divert flows, including storm flows and flows created by construction activity, to prevent excessive silting of waterways or flooding damage to property.

C. Provide holding ponds or accepted method which will divert flows, including storm flows and flows created by construction activity, to prevent excessive silting of waterways or flooding damage to property.

D. Comply with procedures outlined in U.S. EPA manuals entitled, “Guidelines for Erosion and Sedimentation Control Planning and Implementation”, Manual EPA-72-015 and “Processes, Procedures, and Methods to Control Pollution Resulting from All Construction Activity”, Manual EPA 43019-73-007, and Env. Wq 1400 Shoreland Protection.

E. In cases of conflicts, the most stringent requirements will govern this contract.

1.05 STORM WATER DISCHARGE:

A. Contractor shall comply with the New Hamshire Department of Environmental Services (NHDES) with Construction Activities General Permit and prepare, submit, and comply with all requirements therein. As minimum Contractor is required to prepare, submit, and comply with following.

1. Notice of Intent (NOI).

2. Stormwater Pollution Prevention Plan.

B. Comply with procedures outlined in U.S. EPA manuals entitled, “Guidelines for Erosion and Sedimentation Control Planning and Implementation”, Manual EPA-72-015 and “Processes, Procedures, and Methods to Control Pollution Resulting from All Construction Activity”, Manual EPA 43019-73-007, and IEPA “Standards and Specifications for Soil Erosion and Sediment Control”. In cases of conflicts, the most stringent requirements will govern this contract.

1.06 PROTECTION OF TREES:

A. No trees are to be cut down unless shown on the Contract Drawings or designated by the Engineer. The Contractor shall take precautions to prevent damage to existing trees and shrubs, protect branches and foliage, protect trunks and stems, and prevent machinery from travelling over roots within the 'drip-line' of the trees by placing and maintaining snow fencing around each tree outside of the ‘drip-line’. The Contractor shall not pile

excavated material within the ‘drip-line of existing trees. No ropes, cables, or guys shall be fastened to or attached to any existing nearby trees for anchorage unless specifically authorized by Engineer. Where such special emergency use is permitted, first wrap the trunk with a sufficient thickness of burlap or rags over which softwood cleats shall be tied before any rope, cable, or wire is placed. The Contractor shall in any event be responsible for any damage resulting from such use. Where trees may possibly be defaced, bruised, injured, or otherwise damaged by the Contractor's equipment, dumping or other operations, protect such trees by placing boards, planks, or poles around them. Monuments and markers shall be protected similarly before beginning operations near them.

B. Where damage does occur, it must be reported by the Contractor to the Engineer and repaired or replaced by a qualified person as directed by the Engineer. Any trees or other landscape feature scarred or damaged by the Contractor's equipment or operations shall be restored as nearly as possible to its original condition. The Engineer will decide what method of restoration shall be used and whether damaged trees shall be treated and healed or removed and disposed of.

1. All scars made on trees by equipment, construction operations, or by the removal of limbs larger than 1-in. in diameter shall be coated as soon as possible with an approved tree wound dressing. All trimming or pruning shall be performed in an approved manner by experienced workmen with saws or pruning shears. Tree trimming with axes will not be permitted.

2. Climbing ropes shall be used where necessary for safety. Trees that are to remain, either within or outside established clearing limits, that are subsequently damaged by the Contractor and are beyond saving in the opinion of the Engineer, shall be immediately removed and replaced.

C. The locations of the Contractor's storage, and other construction building, required temporarily in the performance of the work, shall be cleared portions of the job site or areas to be cleared as shown on the Drawings and shall require written approval of the Engineer and shall not be within wetlands or floodplains. The preservation of the landscape shall be an imperative consideration in the selection of all sites and in the construction of buildings. Drawings showing storage facilities shall be submitted for review by the Engineer.

D. Remove all signs of temporary construction facilities such as haul roads, work areas, structures, foundations of temporary structures, stockpiles of excess of waste materials, or any other vestiges of construction as directed by the Engineer. It is anticipated that excavation, filling, and plowing of roadways will be required to restore the area to near natural conditions which will permit the growth of vegetation thereon. The disturbed areas shall be prepared and seeded as described in Section 01568, or as accepted by the Engineer.

E. All debris and excess material will be disposed of outside wetland or floodplain areas in an environmentally sound manner.

F. Refer to Section 02150 and the Contract Drawings for further details.

1.07 DISPOSAL OF EXCESS EXCAVATED AND OTHER WASTE MATERIALS:

A. Excess excavated material not required or not suitable for backfill and other waste material shall be disposed of in accordance with local regulatory requirements.

B. Provide watertight conveyance for liquid, semi-liquid or saturated solids which tend to bleed during transport. Liquid loss from transported materials is not permitted, whether being delivered to construction site or hauled away for disposal. Fluid materials hauled for disposal must be specifically acceptable at selected disposal site.

1.08 PROTECTION OF AIR QUALITY:

A. Minimize air pollution by requiring use of properly operating combustion emission control devices on construction vehicles and equipment and encourage shutdown of motorized equipment not in use.

B. Do not burn trash on or adjacent to construction site.

C. If temporary heating devices are necessary for protection of Work, they shall not cause air pollution.

D. The Contractor shall conduct operations of dumping rock and of carrying rock away in trucks in such a way as to minimize dust. Give unpaved streets, roads, detours, or haul roads used in construction area a dust-preventive treatment or periodically water them to prevent dust. Strictly adhere to all applicable environmental regulations for dust prevention.

1.09 USE OF CHEMICALS:

A. Chemicals used during project construction or furnished for project operation, whether herbicide, pesticide, disinfectant, polymer, reactant or of other classification, shall be approved by U.S. EPA or U.S. Department of Agriculture and any other applicable regulatory agency.

B. Provide secondary containment that is compatible with the chemical being stored and provides adequate protection from rain and snow as to not induce pollution migration.

C. Use and disposal of chemicals and residues shall comply with manufacturer's instructions.

1.10 NOISE CONTROL:

A. Conduct operations to cause least annoyance to residents in vicinity of Work, and comply with City of Portsmouth, NH Ordinance, Chapter 3, Article 4 contained in Appendix C.

B. Equip compressors, hoists, and other apparatus with mechanical devices necessary to minimize noise and dust. Equip compressors with silencers on intake lines.

C. Equip gasoline or oil-operated equipment with silencers or mufflers on intake and exhaust lines.

D. Line storage bins and hoppers with material that will deaden sounds.

E. Conduct operation of dumping rock and of carrying rock away in trucks so as to cause minimum of noise and dust.

F. No excessive idling of motorized equipment is permitted.

G. Where necessary, the Contractor shall place noise attenuation devices (barriers) around the Contractor's construction equipment.

1.11 MUD AND DUST CONTROL:

A. Due to close geographic location of Project to other off-site facilities take special care in providing and maintaining temporary site roadways, Owner's existing roads, and public roads used during construction operations in clean, dust free condition.

B. Comply with local environmental regulations for dust control. If Contractor's dust control measures are considered inadequate by Engineer, Engineer may require Contractor to take additional dust control measures.

C. The Contractor shall obtain the Engineer's acceptance before chemicals for dust control are used. Sodium chloride is not permitted for dust control.

D. All trenches and disturbed areas created during the execution of the Work that will produce dust shall be maintained dust free by an application of calcium chloride at the Engineer's direction.

E. The Contractor shall not use calcium chloride on access roads.

F. The Contractor shall transport dusty materials in covered haulage vehicles.

G. The Contractor shall be responsible for a prompt and complete clean up of all dirt and mud deposited on the public and/or private property as a consequence of the execution of the Work. In the event that the Contractor fails to comply with this obligation the Owner may proceed with the necessary clean up and charge all the costs for the cleanup to the Contractor.

H. The Contractor shall wash mud from construction vehicles before leaving the construction Site.

I. The Contractor shall wash and clean the following roads at the end of each work day during the Contract:

1. Major traffic routes inside the plant and City streets impacted by construction activities.

1.12 CLEANING OF EQUIPMENT

A. The Contractor shall keep construction equipment clean so that no debris is deposited on the plant roadways or any public roadway. The Contractor shall identify a designated vehicle cleaning area within the working limits of the Contract. The Contractor shall contain all construction debris in this designated area only. The Contractor shall dispose of debris off Site.

B. The Contractor shall ensure that debris cleaned from equipment cannot gain access to storm sewers and watercourses.

1.13 FUELS AND LUBRICANTS:

A. Comply with local, state and federal regulations concerning transportation and storage of fuels and lubricants.

B. The Contractor shall designate an area within the working limits to be used exclusively for fuelling of construction equipment. The Contractor shall carry out all refueling in this area only. Refueling of backhoes or shovels will be allowed at locations other than the accepted refueling areas, but not closer than 30 feet (10 m) from any watercourse.

C. Fuel storage area and fuel equipment shall be approved by Owner prior to installation. Submit containment provisions to Engineer for approval.

D. The Contractor shall submit to the Engineer for review prior to starting the Work, procedures for the interception and rapid clean-up and disposal of fuel spillages which may occur. The Contractor shall ensure that the materials required for the clean-up of fuel spillages are readily accessible on Site at all times.

E. The cleaning of equipment in streams and lakes and the emptying of fuel, lubricants and pesticides into watercourses is prohibited. The Contractor shall contain fuel, lubricants, pesticides and construction debris and dispose of it off Site in approved locations.

F. Report spills or leaks from fueling equipment or construction equipment to Owner and cleanup as required by local, state or federal regulations.

G. Owner may require Contractor to remove damaged or leaking equipment from Project site.

1.14 NOTIFICATIONS:

A. The Engineer will notify the Contractor in writing of any non-compliance with the foregoing provisions or of any environmentally objectionable acts and corrective action to be taken. State or local agencies responsible for verification of certain aspects of the environmental protection requirements shall notify the Contractor in writing, through the

Engineer, of any non-compliance with State or local requirements. The Contractor shall, after receipt of such notice from the Engineer or from the regulatory agency through the Engineer, immediately take corrective action. Such notice, when delivered to the Contractor or his authorized representative at the site of the work, shall be deemed sufficient for the purpose. If the Contractor fails or refuses to comply promptly, the Owner may issue an order stopping all or part of the work until satisfactory corrective action has been taken. No part of the time lost due to any such stop orders shall be made the subject of a claim for extension of time or for excess costs or damages by the Contractor unless it is later determined that the Contractor was in compliance.

1.15 IMPLEMENTATION:

A. Prior to commencement of the work, meet with the Engineer to develop mutual understandings relative to compliance with this provision and administration of the environmental pollution control program.

B. Remove temporary environmental control features, when accepted by the Engineer, and incorporate permanent control features into the project at the earliest practicable time.

C. Comply with all conditions of the following permits: NHDES Standard Dredge and Fill Contained in Appendix G.

PART 2 - PRODUCTS

(Not Used)

PART 3 - EXECUTION

(Not Used)

END OF SECTION

SECTION 01150

MEASUREMENT AND PAYMENT

PART 1 - GENERAL

1.01 MEASUREMENT AND PAYMENT – GENERAL:

A. The following subsections describe the measurement of and payment for the work to be done under the items listed in the BID.

1. Estimates of lump sum items shall be based on a schedule of values dividing each such item into its appropriate component parts together with a quantity and a unit price for each part so that the sum of the products of prices and quantities will equal the Contract price for the item. This schedule shall be submitted by the Contractor for and must have the approval of the Engineer before the first estimate becomes due. Submit the schedule of values in accordance with Articles 2.05.A and 2.07 of the General Conditions.

B. Each unit or lump sum price stated in the BID shall constitute full compensation as herein specified for each item of work completed in accordance with the drawings and specifications, including cleanup

C. Unless otherwise indicated, the prices for those items which involve excavation shall include compensation for disposal of surplus excavated material, handling water, and installation of all necessary sheeting and bracing.

D. In all items involving excavation, the price shall be based on doing the entire excavation in earth. Where rock is excavated, the price therefor, shall be in addition to the cost of excavating earth, and no deduction will be made in the amount for earth excavation.

E. The prices for all pipe items (water main and force main) shall constitute full compensation for furnishing, laying, jointing, and testing pipe; earth excavation and backfill; polyethylene wrap (where required); furnishing and installing non-woven geotextile; clearing; cleaning up; screened gravel; site restoration including loaming and seeding, repairing of existing sidewalks, curbing, fences, signs, walls or other structures that are damaged by the Contractor's operations, all necessary grading and reseeding of grassed areas disturbed by the Contractor's operations, other property damaged by the Contractor's activities and not otherwise included under separate pay items.

F. In all items involving pipelines, 80 percent of the pipe item price will be included in progress estimates when all of the work referred to in the preceding paragraph except testing and cleaning up has been completed. An additional 10 percent will be included in progress estimates when a section of pipeline has satisfactorily met the test requirements and an additional 10 percent will be included when cleaning up of a section of the pipeline has been satisfactorily completed.

1.02 LIMITS OF NORMAL EXCAVATION:

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

B. For pipes in trench, the normal width of the trench shall be measured between vertical planes which are a distance apart equal to the sum of 18 inches plus 1-1/3 times the nominal inside diameter of the pipe. If the width so computed is less than 3 feet, a width of 3 feet shall be taken as the normal width for payment. The normal depth shall be measured to a distance of 0.2 feet below the bottom of the pipe in earth and 0.7 feet in rock, unless there is a cradle underneath the pipe, in which case the normal depth shall be measured to the underside of the cradle. The width of trench for the cradle shall be assumed to be that specified above for pipes in trench.

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

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

E. For other structures, except manholes as noted below, the normal width shall be measured between vertical planes 1 foot outside the neat lines of the several parts of the structure, except that the width at any elevation shall be measured as not less than the width at a lower elevation. The normal depth shall be measured to the underside of that part of the structure for which the excavation is made.

F. No additional width or depth of trenches excavated in earth or rock shall be allowed at standard circular manholes.

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

1.03 WATER MAIN REPLACEMENT

A. The length of water main to be paid for under the appropriate subdivision of this item shall be measured by the linear foot along a horizontal projection of the centerline of the completed water main. No deduction will be made for the length of valves or fittings in the completed water main.

B. The unit price for the appropriate subdivision of this item shall constitute full compensation for demolition of the existing 8” ductile iron water main, the construction of the 12” ductile iron water main, complete, as indicated on the drawings and as specified

including all work incidental thereto and not specifically included for payment under other items.

C. The number of 12-in gate valve assemblies to be paid for under the appropriate subdivision of this item shall be the actual number of valve assemblies installed.

D. The unit price for the appropriate subdivision of this item shall constitute full compensation for furnishing all labor, materials, tools and equipment necessary, and for installing, setting, joining; for restrained joints and/or thrust blocks, and for all other incidental work and expenses of the 12-inch gate valves assembly.

E. The lump sum price for the appropriate subdivision of this item shall constitute full compensation for furnishing, installing, testing, maintenance and removal of temporary potable water system including, but not limited to: furnishing a detailed temporary water system design (including required submittals or resubmittals); providing notice to property owners; excavating and backfilling to install temporary pavement; furnishing, installing, and removing hard-pack for driveway crossings; furnishing, installing, disinfecting and maintaining the system including temporary hydrants and service connections; connecting temporary services to properties including any necessary plumbing modifications; providing 24-hour maintenance of the system, removal of the system, restoring all surfaces to their original condition; and all other work required for or incidental to the satisfactory completion of this item.

F. The unit price for the appropriate subdivision of this item shall constitute full compensation for connecting the new water main to the existing State Fish Pier connections, as indicated on the drawings, including but not limited to one (1) 12-in. X 6-in. tee, and one (1) 6-in. gate valve assembly as specified and not specifically paid for under other items.

G. The unit price for the appropriate subdivision of this item shall constitute full compensation for connecting the new water main to the existing Four Tree Island connections, as indicated on the drawings, including but not limited to one (1) 12-in. X 4-in. tee, one (1) 4-in. gate valve assembly and one (1) 4-in. X 3-in. reducer as specified and not specifically paid for under other items.

H. The lump sum price for the appropriate subdivision of this item shall constitute full compensation for furnishing, installing, and testing the drinking water fountain connection according to the contract documents, including, but not limited to: two (2) curb stops, one (1) drywell, one (1) backflow preventer, one (1) non-freeze hose bib, one (1) plastic meter box, interconnecting piping and fittings, installation of a drinking water fountain to be provided by the Owner, and installation of a water meter to be provided by the Owner; restoring all surfaces to their original condition; and all other work required for or incidental to the satisfactory completion of this item.

1.04 FORCE MAIN REPLACEMENT:

A. The length of force main to be paid for under the appropriate subdivision of this item shall be measured by the linear foot along a horizontal projection of the centerline of the completed force main.

B. The unit price for the appropriate subdivision of this item shall constitute full compensation for replacing the existing 18-in. ductile iron sewer force main with 24-in. High Density Polyethylene force main, complete, including, but not limited to, excavating (except ledge and rock); providing excavation support; dewatering; furnishing and installing bedding material, jointing, backfilling; compacting all lifts and all other work required for or incidental to the satisfactory completion of this item, disconnecting the existing 18-in. force main as indicated on the drawings and as specified and not specifically paid for under other items.

C. The number of plugs to be paid for under the appropriate subdivision of this item shall be the actual number of plugs installed to abandon the existing 18" force main.

D. The unit price for the appropriate subdivision of this item shall constitute full compensation for cutting, plugging, and abandoning the existing 18-in. ductile iron force main complete, including, but not limited to, excavating (except ledge and rock); providing excavation support; dewatering; flushing the force main with clean water, transport to and disposing of flush water at the Peirce Island WWTF, furnishing and installing bedding material, furnishing and installing concrete plugs, backfilling; compacting all lifts and all other work required for or incidental to that indicated on the drawings and as specified and not specifically paid for under other items.

E. The number of connections to the existing ductile iron force main to be paid for under the appropriate subdivision of this item shall be the actual number of connections made.

F. The unit price for the appropriate subdivision of this item shall constitute full compensation for connecting new force mains to existing force mains during force main replacement construction, including, one connection to the existing 18-in. force main near the bridge, one connection near the Peirce Island Boat Launch where the temporary 30-in. above grade force main connects to the existing 24-in. force main, and two connections at the WWTF end as indicated on the drawings and as specified and not specifically paid for under other items. Connections to the sliplined portion of the force main on either end of the bridge crossing will not be included for payment under this item.

G. The number of disconnections of the above grade temporary 30-in. force main to be paid for under the appropriate subdivision of this number shall be the actual number of disconnections made.

H. The unit price for the appropriate subdivision of this item shall constitute full compensation for each disconnection to the above grade temporary 30-in. ductile iron force main as indicated on the drawings and as specified and not specifically paid for under other items.

I. The length of force main to be paid for under the appropriate subdivision of this item shall be measured by the linear foot along a horizontal projection of the centerline of the completed force main.

J. The unit price for the appropriate subdivision of this item shall constitute full compensation for the demolition of the existing 18-in. and 24-in. ductile iron force mains, constructing the new 24-in. High Density Polyethylene force mains along the Peirce Island Road, complete, as indicated on the drawings and as specified including all work incidental thereto and not specifically included for payment under other items.

K. The lump sum price for the appropriate subdivision of this item shall constitute full compensation for sliplining the existing 24-in. ductile iron force main under the Peirce Island Road bridge with a new 20-in. fusible polyvinylchloride liner and all connections needed for reconnecting to existing force mains, complete, including but not limited to modifications to the existing ductile iron pipe to install the slipliner, temporary facilities for access to the existing pipe under the bridge, excavation access pits for installation of the slipliner, replacement of existing ductile iron piping demolished within the access pits with new piping, temporary disconnection and reconnection of the existing force mains at both ends of the bridge, cleaning and internal television inspection of the existing force main, furnishing and installing the slipliner, furnishing and installation of a 2-in. tap and a 2-in.ball valve, grouting the slipliner in place, post installation internal television inspection of the liner, and restoration of all disturbed areas including all work incidental thereto and not specifically included for payment under other items.

L. The number of 24-in. gate valve assemblies to be paid for under the appropriate subdivision of this item shall be the actual number of valve assemblies installed.

M. The unit price for the appropriate subdivision of this item shall constitute full compensation for furnishing all valves, valve boxes, labor, materials, tools and equipment necessary, and for installing, setting, joining; for restrained joints and/or thrust blocks, and for all other incidental work and expenses of the 24-inch gate valves assembly.

N. The number of force main connections to the State Fish Pier to be paid for under the appropriate subdivision of this item shall be the actual number of connections to the State Fish Pier installed.

O. The unit price for the appropriate subdivision of this item shall constitute full compensation for connecting the new force mains to the existing State Fish Pier connections, as indicated on the drawings, including but not limited to two (2) 2-in. gate valve assemblies, one (1) 2-in. wye, one (1) 24-in. X 8-in. HDPE tee with reduction to 2-in., one (1) 24-in. X 8-in. ductile iron wye with reduction to 2-in., and connecting the 2-in. sanitary sewer force main and as specified and not specifically paid for under other items.

P. The number of force main connections to Four Tree Island to be paid for under the appropriate subdivision of this item shall be the actual number of connections to Four Tree Island installed.

Q. The unit price for the appropriate subdivision of this item shall constitute full compensation for connecting the new force mains to the existing Four Tree Island connections, including but not limited to two (2) 2-in. gate valve assemblies, one (1) 2-in. wye, two (2) 24-in. X 8-in. HDPE tees with reduction to 2-in., and connecting the 2-in. sanitary sewer force main as indicated on the drawings and as specified and not specifically paid for under other items.

R. The number of force main connections to the Peirce Island Pool and Pool Pump Station to be paid for under the appropriate subdivision of this item shall be the actual number of connections to the Peirce Island Pool and Pool Pump Station installed.

S. The unit price for the appropriate subdivision of this item shall constitute full compensation for connecting the new force mains to the existing connections to the Peirce Island Pool and Pool Pump Station, including but not limited to two (2) 2-in. gate valve assemblies, one (1) 2-in. wye, two (2) 24-in. X 8-in. HDPE tees with reduction to 2-in., and connecting the 2-in. sanitary sewer force main as indicated on the drawings and as specified and not specifically paid for under other items.

T. The number of force main blowoff connections to be paid for under the appropriate subdivision of this item shall be equal to the actual number of force main blowoff connections furnished and installed, complete, as indicated and specified.

U. The unit price for the appropriate subdivision of this item shall constitute full compensation for furnishing and installing blowoff connections, complete, including tee fitting, 6-in. HDPE blowoff piping, fittings, 6-in. gate valve with stem and valve box, and connections to new manholes, and screened gravel, as indicated on the drawings and as specified.

1.05 FORCE MAIN BLOWOFF MANHOLES:

A. The number of force main blowoff manhole bases to be paid for under the appropriate subdivision of this item shall be equal to the actual number of blowoff manhole bases furnished and installed, complete, as indicated and specified.

B. The unit price for force main blowoff manhole bases shall constitute full compensation for furnishing all labor, materials, tools and equipment necessary, and for constructing the manhole bases, complete, as indicated on the drawings and as specified.

C. The vertical footage of manhole walls and cones to be paid for under the appropriate subdivision of this item shall be measured by the vertical foot from the invert of the manhole base at its center to the bottom of the manhole frame.

D. The unit price for manhole walls and cones shall constitute full compensation for constructing manhole walls and cones, complete, as indicated on the drawings and as specified.

E. The number of standard manhole frame and cover sets to be paid for under the appropriate subdivision of this item shall be equal to the actual number furnished and installed.

F. The unit price for standard sewer manhole frames and covers shall constitute full compensation for furnishing and installing standard sewer manhole frames and covers, as indicated on the drawings and as specified.

1.06 MISCELLANEOUS EARTH EXCAVATION:

A. The quantity of earth excavation and backfill above normal depth to be paid for under the appropriate subdivision of this item shall be the number of cubic yards excavated and backfilled, measured to the extent of the work done as ordered by the Engineer for test pits.

B. The unit price for the appropriate subdivision of this item shall constitute full compensation for excavation and backfill for test pits.

C. The quantity of earth excavation below normal depth (limit of normal excavation) to be included for payment under this item shall be the number of cubic yards of unsuitable material excavated, measured to the depths and lengths ordered, and to the width between payment limits for normal excavation as ordered by the Engineer.

D. The unit price for the appropriate subdivision of this item shall constitute full compensation for excavation below normal depth and disposal of unsuitable material.

1.07 CHANGE IN QUANTITY OF EARTH EXCAVATION AND BACKFILL DUE TO WATER MAIN OR FORCE MAIN DEPTH CHANGES:

A. Should a change in the depth of water mains or force mains be ordered or should the depths of water mains or force mains be changed by changes in alignment or by differences between the ground surface indicated on the drawings and that encountered during the work, and should such changes increase or decrease the quantity of excavation and backfill upon which the unit prices for water main and force main pipe are based, adjustment shall be made therefore under the appropriate subdivision of this item.

B. The quantity of earth excavation and backfill to be considered under the appropriate subdivision of this item shall be the additional number of cubic yards excavated and backfilled, or that quantity of excavation and backfill omitted in accordance with the requirements of the Engineer, and as specified above.

C. The quantity to be considered under the appropriate subdivision of this item shall be cumulative; that is, an increase on any part of the work shall offset a decrease on any other part of the work, and the final adjustment shall be based on the net increase or decrease for the appropriate subdivision of this item.

D. If the quantity of earth excavation and backfill work performed is greater than that indicated on the drawings, the Contractor shall be paid therefore under the appropriate subdivision of this item.

E. If the quantity of earth excavation and backfill performed is less than that indicated on the drawings, the Owner will receive credit for such decrease at the unit price for the appropriate subdivision of this item.

F. The unit price for the appropriate subdivision of this item shall constitute full compensation for making additional excavations and backfilling such excavations, as specified.

1.08 ROCK EXCAVATION AND DISPOSAL:

A. Where rock is encountered, it shall be uncovered but not excavated until measurements have been made by the Engineer, unless in the opinion of the Engineer, satisfactory measurements can be made in some other manner.

B. The quantity of rock to be paid for under this item shall be the number of cubic yards of rock, measured in place before excavation, within the payment limits indicated on the drawings and as defined in this Section for water main and force main installation, unless rock excavation beyond such limits has been authorized in writing by the Engineer, in which case measurements shall be made to the authorized limits.

C. Excavated rock which has not been disposed of shall not be included for payment.

D. The bidder shall include in his bid for items involving excavation, the cost of doing the entire excavation as earth, the price for this item being intended to cover the difference between the cost of rock excavation and the cost of earth excavation. The price for this item shall be paid in addition to any payment made for earth excavation.

E. The unit price for this item shall constitute full compensation for rock excavation and disposal, for all necessary backfilling, and for furnishing all additional material needed for backfilling.

1.09 BANK-RUN GRAVEL:

A. Bank-run gravel backfill below normal depth ordered by the Engineer to be used shall be paid for under this item. The quantity of bank-run gravel backfill below normal depth to be paid for shall be the same as that number of cubic yards of earth excavation below normal depth measured for payment under the appropriate subdivision of "Miscellaneous Earth Excavation", which said gravel replaces.

B. Bank-run gravel ordered for backfill of trenches above normal depth ordered by the Engineer shall be paid for under this item. The quantity of bank-run gravel used as backfill for trenches above normal depth shall be measured by the cubic yard to the depth and length ordered and to the width between payment limits for normal excavation as indicated on the drawings. Bank-run gravel outside the limits of normal excavation shall be furnished, placed, and compacted at the Contractor's expense, and no measurement will be made for such gravel.

C. Bank-run gravel ordered to be used at other locations shall be measured after compaction and paid for under this item as the number of cubic yards of gravel actually placed and compacted as specified.

D. Bank-run gravel used to backfill rock excavations will not be measured for payment under this item.

E. The unit price for this item shall constitute full compensation for furnishing, placing, and compacting bank-run gravel, as specified.

1.10 ADDITIONAL SCREENED GRAVEL:

A. Screened gravel backfill below normal depth shall be paid for under this item. The quantity of screened gravel backfill below normal depth to be paid for shall be the same as that number of cubic yards of earth excavation below normal depth measured for payment under the appropriate subdivision of "Miscellaneous Earth Excavation", which said gravel replaces.

B. Additional screened gravel used for support of existing utilities or ordered to be used at other locations shall be paid for under this item. The quantity to be paid for shall be the number of cubic yards, measured in place after compaction, of additional screened gravel within the limits directed by the Engineer.

C. Screened gravel used for bedding pipe, to backfill unauthorized excavations, for any drainage purpose, or as indicated on the drawings for work for which appropriate payment items have been provided, shall not be measured for payment under this item.

D. The unit price for this item shall constitute full compensation for furnishing, placing, and compacting screened gravel, as specified.

1.11 PAVEMENT:

A. The quantity of NHDOT 304.4 crushed stone base course to be measured for payment under the appropriate subdivisions of this item shall be the cubic yards of NHDOT 304.4 crushed stone base course furnished.

B. The unit price for NHDOT 304.4 crushed stone base course shall constitute full compensation for furnishing and placing material for 8-in. NHDOT 304.4 crushed stone base course as specified and as indicated.

C. The quantity of 2 1/2-in. bituminous concrete binder course permanent pavement to be measured for payment under the appropriate subdivision of this item shall be measured by the square yard of binder course permanent pavement placed. The maximum trench width for which bituminous concrete binder course shall be measured for payment shall be 15 ft.

D. The unit price for 2 1/2-in. bituminous concrete binder course permanent pavement shall constitute full compensation for cutting back existing pavement, restoring and regrading the NHDOT crushed stone base course and constructing the permanent pavement, as specified and indicated.

E. The quantity of granite curbing removal and resetting to be paid for under the appropriate subdivision of this item shall be measured by the linear foot of existing granite curb that is removed and reset.

F. The unit price for removal and resetting granite curbing shall constitute full compensation for removal and resetting existing granite curbing as specified and indicated.

1.12 CONCRETE SIDEWALK:

A. The square yards of concrete sidewalk to be paid for under this item shall be the actual square yards of concrete sidewalk removed and reconstructed.

B. The unit price for concrete sidewalk shall constitute full compensation for furnishing the gravel-base course, placing the welded wire fabric, and constructing the concrete sidewalk, as specified and as indicated.

1.04 CALCIUM CHLORIDE:

A. The quantity of calcium chloride to be paid for under this item shall be equal to the number of pounds furnished and spread to the extent ordered by the Engineer.

B. The unit price for this item shall constitute full compensation for furnishing and spreading calcium chloride as specified and as directed by the Engineer.

1.14 STORMWATER MANAGEMENT

A. The lump sum price for the Stormwater Pollution Prevention Plan (SWPPP) item shall constitute full compensation for the preparation of a detailed plan that shows the location of all erosion and stormwater control devices such as silt fence etc., necessary to complete the work that is acceptable to the Engineer, including the effort and costs associated with submitting a Notice of Intent under the EPA's Construction General Permit.

B. The lump sum price for Monitoring the SWPPP and Erosion and Sediment Controls shall constitute full compensation for all materials, labor and equipment necessary for the installation of erosion and sediment controls and stormwater management devices, the required inspection and reporting as defined in the SWPPP, the maintenance of the erosion and sediment controls and stormwater management devices in good working order, replacement of any devices damaged, deteriorated, or filled with sediment and the relocation of devices made necessary by a new phase of work in accordance with the Erosion and Stormwater Pollution Prevention Plan.

C. Failure to maintain erosion and sediment controls and storm water management devices, or failure to fully implement the plan shall result in reduction in the compensation of that period.

1.15 REMOVING TRAFFIC SIGNS

A. The quantity of signs to be paid for under this item will be the actual quantity of signs removed.

B. The unit price for this item shall include removal of all signs, posts, and restoration of the ground surface including all labor, tools, accessories, repairs and all else required to maintain the signs for the duration of the project as well as the cost for sign removal once authorized by the Engineer.

1.16 ALLOWANCE FOR UNIFORMED SPECIAL OFFICERS

A. Under this item, the Contractor will be reimbursed for charges for the services of police details rendered in connection with traffic control as specified in Sections 01046 and 01500. The Contractor shall arrange for and coordinate the scheduling of such officers. Should costs for police details be incurred due to mis-scheduling by the Contractor, the Contractor will be responsible for these costs.

B. The allowance for this item as established in the BID is an estimated figure to facilitate comparison of bids.

C. The actual amount to be paid for under this item shall be the amount actually invoiced for the work performed (with no markup). If the total amount for such charges is greater or less than the allowance amount stated in the BID, a debit or credit of the difference in the amount shall be made to the Owner.

1.17 ALLOWANCE FOR ADDITIONAL TRAFFIC CONTROL

A. Under this item, the Contractor shall be reimbursed for additional traffic control as directed by the Engineer or Owner.

B. The allowance for this item as established in the BID is an estimated figure to facilitate comparison of bids. The actual amount to be paid for under this item shall be the amount actually invoiced for the work performed related to additional traffic control. If the total amount for such charges is greater or less than the amount stated in the BID, a debit or credit of the difference in the amount shall be made to the Owner. Work under this item will be paid for as Extra Work described in the General Conditions.

C. The Engineer will identify the scope of additional traffic control during construction and request proposals from the Contractor to do this work. No work shall begin until authorized by the Engineer.

1.18 VARIABLE MESSAGE BOARDS:

A. The number of variable message boards to be paid for under the appropriate subdivision of this item shall be the actual number of variable message boards provided.

B. The unit price for the appropriate subdivision of this item shall constitute full compensation for furnishing all labor, materials, tools and equipment necessary and for all other incidental work and expenses to provide variable message boards to the Owner for registration.

1.19 MOBILIZATION:

A. The lump-sum price for this item shall constitute full compensation for initiating the contract, exclusive of the cost of materials, and for mobilizing all machinery, tools, and other equipment necessary to carry on and complete the work.

B. The lump-sum price for this item shall not exceed five percent (5%) of the total amount of the bid. Payment for this item shall be payable when the Contractor is operational on the site. For purposes of this policy, "Operational" shall mean the substantial commencement of work on site.

1.20 SCHEDULE OF VALUES:

A. Coordination: Coordinate preparation of the schedule of values with preparation of Contractor's construction schedule.

1. Coordinate line items in the schedule of values with other required administrative forms and schedules, including the following:

a. Application for Payment forms with continuation sheets.

b. Submittal schedule.

c. Items required to be indicated as separate activities in Contractor's construction schedule.

2. Submit the schedule of values to Engineer at earliest possible date, but no later than seven days before the date scheduled for submittal of initial Applications for Payment.

B. Format and Content: Use Contract Documents table of contents as a guide to establish line items for the schedule of values. Provide at least one line item for each Specification Section.

1. Identification: Include the following Project identification on the schedule of values:

a. Project name and location.

b. Name of Engineer.

c. Engineer's project number.

d. Contractor's name and address.

e. Date of submittal.

2. Arrange the schedule of values in tabular form with separate columns to indicate the following for each item listed:

a. Related Specification Section or Division.

b. Description of the Work.

c. Name of subcontractor.

d. Name of manufacturer or fabricator.

e. Name of supplier.

f. Change Orders (numbers) that affect value.

g. Dollar value of the following, as a percentage of the Contract Sum to nearest one-hundredth percent, adjusted to total 100 percent, for previous billing, the invoicing period, the cumulative totals to date, and the total remaining.

(1) Labor.

(2) Materials.

(3) Equipment.

3. Provide a separate row in the schedule of values for each Change Order (numbers) that affect value and provide separate columns to indicate each item listed above.

4. Provide a breakdown of the Contract Sum in enough detail to facilitate continued evaluation of Applications for Payment and progress reports. Coordinate with Contract Documents table of contents. Provide multiple line items for principal subcontract amounts in excess of five percent of the Contract Sum.

5. Round amounts to nearest whole dollar; total shall equal the Contract Sum.

6. Provide a separate line item in the schedule of values for each part of the Work where Applications for Payment may include materials or equipment purchased or fabricated and stored, but not yet installed.

a. Differentiate between items stored on-site and items stored off-site. If required, include evidence of insurance.

7. Provide separate line items in the schedule of values for initial cost of materials, for each subsequent stage of completion, and for total installed value of that part of the Work.

8. Allowances and Unit Price Items: Provide a separate line item in the schedule of values for each allowance. Show line-item value of unit-cost items, as a product of the unit cost, multiplied by measured quantity. Use information indicated in the Contract Documents to determine quantities.

9. Each item in the schedule of values and Applications for Payment shall be complete. Include total cost and proportionate share of general overhead and profit for each item.

    a. Temporary facilities shall be shown as separate line items in the schedule of values.

    b. Other major cost items that are not direct cost of actual work-in-place may be shown either as separate line items in the schedule of values or distributed as general overhead expense, at Contractor's option.

10. Schedule Updating: Update and resubmit the schedule of values before the next Applications for Payment when Change Orders or Construction Change Directives result in a change in the Contract Sum.

1.21 APPLICATIONS FOR PAYMENT:

C. Each Application for Payment following the initial Application for Payment shall be consistent with previous applications and payments as certified by Engineer and paid for by Owner.

    1. Initial Application for Payment, Application for Payment at time of Substantial Completion, Monthly Application for Progress Report, and final Application for Payment involve additional requirements.

D. Payment Application Times: Payments shall be made in accordance with the requirements of the General Conditions. The period of construction work covered by each Application for Payment is the period indicated in the General Conditions.

E. Application for Payment Forms: Engineer will furnish form for Applications for Payment. Submit completed forms for acceptance with initial submittal of schedule of values.

F. Application Preparation: Complete every entry on form. Notarize and execute by a person authorized to sign legal documents on behalf of Contractor. Engineer will return incomplete applications without action.

    1. Entries shall match data on the schedule of values and Contractor's construction schedule. Use updated schedules if revisions were made.

2. Include amounts for work completed following previous Application for Payment, whether or not payment has been received. Include only amounts for work completed at time of Application for Payment.

3. Include amounts of Change Orders and Construction Change Directives issued before last day of construction period covered by application.

4. Indicate separate amounts for work being carried out under Owner-requested project acceleration.

G. Stored Materials: Include in Application for Payment amounts applied for materials or equipment purchased or fabricated and stored, but not yet installed. Differentiate between items stored on-site and items stored off-site.

1. Provide certificate of insurance, evidence of transfer of title to Owner, and consent of surety to payment, for stored materials.

2. Provide supporting documentation that verifies amount requested, such as paid invoices. Match amount requested with amounts indicated on documentation; do not include overhead and profit on stored materials.

3. Provide summary documentation for stored materials indicating the following:

a. Value of materials previously stored and remaining stored as of date of previous Applications for Payment.

b. Value of previously stored materials put in place after date of previous Application for Payment and on or before date of current Application for Payment.

c. Value of materials stored since date of previous Application for Payment and remaining stored as of date of current Application for Payment.

H. Transmittal: Submit three signed and notarized original copies of each Application for Payment to Engineer by a method ensuring receipt within 24 hours. One copy shall include waivers of lien and similar attachments if required.

1. Transmit each copy with a transmittal form listing attachments and recording appropriate information about application.

I. Initial Application for Payment: Administrative actions and submittals that must precede or coincide with submittal of first Application for Payment include the following:

1. List of subcontractors.

2. Schedule of values.

3. Pre-construction surveys and photographs.

4. Health and safety and environmental protection plans.

5. Contractor's construction schedule (preliminary if not final).

6. Products list (preliminary if not final).

7. Schedule of unit prices.

8. Submittal schedule (preliminary if not final).

9. List of Contractor's staff assignments.

10. List of Contractor's principal consultants.

11. Copies of building permits.

12. Copies of authorizations and licenses from authorities having jurisdiction for performance of the Work.

13. Initial progress report.

14. Certificates of insurance and insurance policies.

15. Performance and payment bonds.

J. Application for Monthly Progress Payment: Administrative actions and submittals that must precede or coincide with submittal of monthly Application for Progress Payment include the following:

1. Schedule of values.

2. Schedule of unit prices.

3. Construction photographs.

4. Contractor’s updated construction progress schedule and specified reports.

5. Documented proof that it has recorded information on the Contract Drawings to reflect “As Built” information.

K. Application for Payment at Substantial Completion: After Engineer issues the Certificate of Substantial Completion, submit an Application for Payment showing 100 percent completion for portion of the Work claimed as substantially complete.

1. Include documentation supporting claim that the Work is substantially complete and a statement showing an accounting of changes to the Contract Sum. Documentation include, evidence of all the following:

a. Each item of mechanical, electrical, instrumentation, piping and HVAC equipment installed or modified under this Contract have been tested to demonstrate compliance with the performance requirements of this Contract, including successful functional testing, water testing, performance testing and facility commissioning.

b. All operating, maintenance manuals and as-built drawings have been provided to the Owner.

c. All spare parts and materials have been provided to the Owner.

d. All warranty certificates and test results have been provided to the Owner.

e. The Contractor has provided instructions and training to the Owner's staff to enable the Owner to operate the Works.

2. This application shall reflect Certificate(s) of Substantial Completion issued previously for Owner occupancy of designated portions of the Work.

L. Final Payment Application: After completing Project closeout requirements, submit final Application for Payment with releases and supporting documentation not previously submitted and accepted, including, but not limited, to the following:

1. Evidence of completion of Project closeout requirements.

2. Insurance certificates for products and completed operations where required and proof that taxes, fees, and similar obligations were paid.

3. Updated final statement, accounting for final changes to the Contract Sum.

4. Evidence that claims have been settled.

5. Final meter readings for utilities, a measured record of stored fuel, and similar data as of date of Substantial Completion or when Owner took possession of and assumed responsibility for corresponding elements of the Work.

PART 2 - PRODUCTS

(Not Used)

PART 3 - EXECUTION

(Not Used)

END OF SECTION

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SECTION 01200

PROJECT MEETINGS

PART 1 - GENERAL

1.01 SUMMARY:

A. The Contractor shall:

1. Make physical arrangements for meetings.

2. Schedule and administer progress meetings with their own staff and/or other contractors, construction foremen's meetings, and specially called meetings with these parties throughout progress of Work as needed.

B. The Engineer shall:

1. Prepare agenda for meetings

2. Distribute notice of specially called meetings a minimum of one working day in advance of the meeting date.

3. Preside at meetings.

4. Record minutes, including significant proceedings and decisions.

C. Representatives of Contractor, Subcontractors, and Suppliers attending meetings shall be qualified and authorized to act on behalf of entity each represents.

D. Owner and Engineer may attend meetings.

1.02 PRECONSTRUCTION CONFERENCE:

A. The Engineer will schedule and conduct preconstruction conference in accordance with the General Conditions and this section within 20 days after Effective Date of Contract, but before Contractor starts Work at site. The conference will be the Contractor, the Engineer, and the Owner to review the Contractor's proposed methods of complying with the requirements of the Contract Documents.

B. Location: Portsmouth DPW, 680 Peverly Hill Rd, Portsmouth, NH 03801.

C. Attendance.

1. Contractor's Project Manager.

2. Contractor's Resident Superintendent.

3. Subcontractors' or suppliers' representatives Contractor may desire to invite or Engineer may request.

4. Engineer's representatives.

5. Owner's representatives.

6. Local utility representatives, if applicable.

7. New Hampshire Department of Environmental Services Representatives, if applicable.

D. Suggested format includes, but not be limited to following:

1. Project Safety.

2. Presentation of preliminary progress schedule in accordance with Section 01311 "Construction Progress Schedule" and preliminary schedule of Shop Drawing and sample submissions in accordance with Section 01300 "Submittals" of Contract Documents.

3. Check of required bonds and insurance policies prior to Notice to Proceed.

4. Liquidated damages.

5. Procedures for handling submittals such as substitutions and Shop Drawings.

6. O&M submittal procedures.

7. Training requirements.

8. Direction of correspondence and coordinating responsibility.

9. Weekly and monthly progress meetings.

10. Laboratory and field testing requirements.

11. Schedule of values, application for progress payment, and progress payment procedures.

12. Change Order procedures.

13. Contractor's proposed Environmental Management and Erosion Control Plan.

14. Contractor's proposed Health and Safety Plan.

15. Contractor's proposed Quality Control Plan.

16. Coordination requirements with plant staff and ongoing operations.

17. Construction sequencing and stipulated construction and plant operational constraints.

1.03 PROGRESS MEETINGS WITH ENGINEER:

A. In addition to other regular project meetings for other purposes (as indicated elsewhere in the Contract Documents), hold general progress meetings once each month or more frequently if required by the Engineer with times coordinated with preparation of payment requests. Meeting dates shall be established by the Engineer. Require every entity then involved in the planning, coordination or performance of work to be properly represented at each meeting. Include (when applicable):

1. Consultants

2. Separate contractors (if any)

3. Principal subcontractors

4. Suppliers/manufacturers/fabricators

5. Governing authorities

6. Insurers

7. Special supervisory personnel and others with an interest or expertise in the progress of the work.

B. Suggested format includes, but not limited to following:

1. Review each entity's present and future needs including interface requirements

2. Time, sequence

3. Deliveries

4. Access

5. Site utilization

6. Temporary facilities and services

7. Hours of work

8. Safety, hazards and risks

9. Housekeeping

10. Submittals

11. Change managements (request for quotation, change directives, change orders)

12. Contract administration logs (request for information, etc.)

13. Documentation of information for payment requests

C. Discuss whether each element of current work is ahead of schedule. Determine how behind-time work will be expedited and secure commitments from the entities involved in doing so. Discuss whether schedule revisions are required to ensure that current work and subsequent work will be completed within the Contract Time. Review everything of significance which could affect the progress of the work.

D. After each progress meeting date, the Engineer will forward copies of the minutes-of-the-meeting, to the Contractor.

E. Immediately following each progress meeting where revisions to the Progress Schedule/Critical Path Schedule have been made or recognized (regardless of whether agreed to by each entity represented), revise the Schedule. Reissue revised Schedule within 10 working days after meeting.

F. At intervals matching the preparation of payment requests, revise and reissue the Schedule to show actual progress of the work in relation to the latest revision of the Schedule.

PART 2 - PRODUCTS

(Not Used)

PART 3 - EXECUTION

(Not Used)

END OF SECTION

SECTION 01250

SUBSTITUTION PROCEDURES

PART 1 - GENERAL

1.01 DESCRIPTION:

A. Section includes administrative and procedural requirements for substitutions.

1.02 DEFINITIONS:

A. Substitutions: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents and proposed by Contractor.

1. Substitutions for Cause: Changes proposed by Contractor that are required due to changed Project conditions, such as unavailability of product, regulatory changes, or unavailability of required warranty terms.

2. Substitutions for Convenience: Changes proposed by Contractor or Owner that are not required in order to meet other Project requirements but may offer advantage to Contractor or Owner.

1.03 SUBMITTALS:

A. Submit the following shop drawings in accordance with Section 01300.

B. Substitution Requests: Submit three copies of each request for consideration. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.

1. Substitution Request Form: Use Form 01250-1 to request substitution.

2. Documentation: Show compliance with requirements for substitutions and the following, as applicable:

a. Justification for use of the proposed equivalent item(s), including evidence, as applicable, that Contract specified material, product or equipment is unobtainable or unobtainable within an acceptable time for Contract completion.

b. Statement indicating why specified product or fabrication or installation cannot be provided, if applicable. If the Contractor is proposing the substitution because of unavailability of the product, submit a letter from the manufacturer stating the product is unavailable with an explanation of why it is unavailable with the form 01250-1

c. Coordination information, including a list of changes or revisions needed to other parts of the Work and to construction performed by Owner and separate contractors that will be necessary to accommodate proposed substitution.

d. Detailed comparison of qualities of proposed substitution with those of the Work specified. Include annotated copy of applicable Specification Section. Significant qualities may include attributes such as performance, weight, size, electrical characteristics, visual effect, sustainable design characteristics, warranties, and specific features and requirements indicated and specified. Indicate deviations, if any, from the Work specified.

e. Product Data, including drawings and descriptions of products and fabrication and installation procedures.

f. Samples, where applicable or requested.

g. Certificates and qualification data, where applicable or requested.

h. List of similar installations for completed projects with project names and addresses and names, telephone numbers and addresses of engineers and owners.

i. Material test reports from a qualified testing agency indicating and interpreting test results for compliance with requirements indicated.

j. Research reports evidencing compliance with building code in effect for Project, including the International Building Code.

k. Detailed comparison of Contractor's construction schedule using proposed substitution with products specified for the Work, including effect on the overall Contract Time. If specified product or method of construction cannot be provided within the Contract Time, include letter from manufacturer, on manufacturer's letterhead, stating date of receipt of purchase order, lack of availability, or delays in delivery.

l. Cost information, including a proposal of change, if any, in the Contract Sum.

m. A prediction of any effects the proposed change will have on operation and maintenance costs, where applicable.

n. Contractor's certification that proposed substitution complies with requirements in the Contract Documents except as indicated in substitution request, is compatible with related materials, and is intended for applications indicated.

o. Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.

3. Engineer's Action: If necessary, Engineer will request additional information or documentation for evaluation within 21 days of receipt of a request for substitution. Engineer will notify Contractor of acceptance or rejection of proposed substitution within 30 days of receipt of request, or 21 days of receipt of additional information or documentation, whichever is later.

a. Forms of Acceptance: Change Order, Construction Change Directive, or Engineer's Supplemental Instructions for minor changes in the Work.

b. Use product specified if Engineer does not issue a decision on use of a proposed substitution within time allocated.

1.04 ACCEPTABLE EQUIVALENT PRODUCTS, MATERIALS AND EQUIPMENT:

A. Any other product the contractor wants to substitute must follow the requirements of this Section.

B. If the Contractor chooses to substitute equipment other than a named manufacturer, any additional costs or time required to accommodate such equipment shall be made without a change in the Contract Price or Contract Time and at no additional cost to the Owner.

B. The Contractor may choose equipment from a manufacturer of an acceptable equivalent product, however, this will be treated as a substitution and the Contractor must follow the requirements of this Section. Any additional costs or time required to accommodate such equipment shall be made without a change in the Contract Price or Contract Time.

1.05 MATERIAL AND WORKMANSHIP:

A. Whenever a material, article, system or sub-system is specified or described by using the name and/or model of a proprietary product or trademark or the name of the manufacturer or vendor, the specified item shall establish the type, function, and quality required; it shall be understood that the words “or approved equivalent” are implied whether or not they follow the proprietary enumeration.

B. The Owner reserves the right to determine when proprietary items have no equivalency, and when uniformity of operations, interchangeability of parts, standard parts inventory, etc., are in Owner’s best interest.

C. Requests for review of equivalency will be considered upon submission of sufficient information as described herein, to allow complete review.

D. Such requests will not be accepted from anyone other than the Contractor. Such submission must be made prior to purchase, fabrication, manufacture or use of the equivalent items under consideration.

E. The Contractor is responsible for all delays caused by its failure to submit complete and accurate information with any request for approval of any material, article, system or subsystem, as an equivalent.

1. Contractor Risk:

a. If the Contractor includes in his bid or later proposes any material, product or equipment that he considers equivalent to that specified, the Contractor assumes all risk of any sort associated with acceptance or rejection of proposed equivalent items.

b. The Contractor shall have no right to make claim based upon his bid that includes a proposed equivalent item(s) of work which resulted in a lower bid amount for said item(s) or lower total bid.

2. Equivalency:

a. An item will be considered equivalent to the item specified if:

(1) It is equal or better in design and strength in all subparts, quality, reliability and durability, operation, maintenance and serviceability, as applicable; and

(2) It is equal or better in specified parameters in performance in all respects for the specific function(s) indicated in the contract.

3. Supplemental Requirements:

a. The time associated with equivalency review will be paid by the Contractor.

b. Any tests required by the Owner or Engineer to establish quality and performance standards shall be promptly conducted by or through the Contractor at no additional cost to the Owner.

c. The Contractor shall submit any additional data requested by the Engineer for the equivalency review.

d. The Contractor shall satisfactorily accomplish all changes, including any engineering associated with use of equivalent items, at no additional cost to the Owner.

e. The Contractor shall have no right of appeal to any decision rejecting the equivalency of any item.

1.06 QUALITY ASSURANCE:

A. Comply with the requirements specified in Section 01400.

B. Compatibility of Substitutions: Investigate and document compatibility of proposed substitution with related products and materials. Engage a qualified testing agency to perform compatibility tests recommended by manufacturers at no cost to the Engineer or Owner.

1.07 PROCEDURES:

A. Coordination: Revise or adjust affected work as necessary to integrate work of the approved substitutions.

PART 2 - PRODUCTS

2.01 SUBSTITUTIONS:

A. Substitutions for Cause: Submit requests for substitution immediately on discovery of need for change, but not later than 30 days prior to time required for preparation and review of related submittals.

1. Conditions: Engineer will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Engineer will return requests without action, except to record noncompliance with these requirements:

a. Requested substitution is consistent with the Contract Documents and will produce specified and indicated results.

b. Requested substitution will not negatively affect Contractor's construction schedule.

c. Requested substitution has received necessary approvals of authorities having jurisdiction.

d. Requested substitution is compatible with other portions of the Work.

e. Requested substitution has been coordinated with other portions of the Work.

f. Requested substitution provides specified warranty.

g. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.

B. Substitutions for Convenience: Engineer will consider requests for substitution if received within 60 days after commencement of the Work. Requests received after that time may be considered or rejected at discretion of Engineer.

2. Conditions: Engineer will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Engineer will return requests without action, except to record noncompliance with these requirements:

   a. Requested substitution offers Owner an advantage in cost, time, energy conservation, or other considerations, after deducting additional responsibilities Owner must assume. Owner's additional responsibilities may include compensation to Engineer for redesign and evaluation services, increased cost of other construction by Owner, and similar considerations.

   b. Requested substitution does not require revisions to the Contract Documents.

   c. Requested substitution is consistent with the Contract Documents and will produce specified and indicated results.

   d. Substitution request is fully documented and properly submitted.

   e. Requested substitution will not affect Contractor's construction schedule.

   f. Requested substitution has received necessary approvals of authorities having jurisdiction.

   g. Requested substitution is compatible with other portions of the Work.

   h. Requested substitution has been coordinated with other portions of the Work.

   i. Requested substitution provides specified warranty.

   j. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.

PART 3 - EXECUTION

3.01 CONTRACT CLOSEOUT:

A. Provide in accordance with Section 01700.

Form 01250-1
SUBSTITUTION REQUEST

The Undersigned certifies:

- Proposed substitution has been fully investigated and determined to be equal or superior in all respects to specified product.
- Same warranty will be furnished for proposed substitution as for specified product.
- Same maintenance service and source of replacement parts, as applicable, is available.
- Proposed substitution will have no adverse effect on other trades and will not affect or delay progress schedule.
- Claims for additional costs related to accepted substitution which may subsequently become apparent are to be waived.
- Proposed substitution does not affect dimensions and functional clearances.
- Payment will be made for changes to design, including Engineer design, detailing, and construction costs caused by the substitution.
- Coordination, installation, and changes in the Work as necessary for accepted substitution will be complete in all respects.

Submitted by: _____

Signed by: _____

Firm: _____

Address: _____

_____

Telephone: _____

Attachments: _____

_____

_____

Engineer REVIEW AND ACTION

☐ Substitution approved – Make submittals in accordance with Specification Section 01250.

☐ Substitution approved as noted – Make submittals in accordance with Specification Section 01250.

☐ Substitution rejected – Use specified materials.

☐ Substitution Request received too late – Use specified materials.

Signed by: _____ Date: _____

Additional Comments: ☐ Contractor ☐ Subcontractor ☐ Supplier ☐ Manufacturer ☐ Engineer ☐ Other: _____

_____

_____

_____

_____

_____

Form 01250-1 (Continued)
SUBSTITUTION REQUEST

Project: _____ Substitution Request Number: _____

_____ From: _____

To: _____ Date: _____

_____ Engineer Project Number: _____

Re: _____ Contract For: _____

Specification Title: _____ Description: _____

Section: _____ Page: _____ Article/Paragraph: _____

Proposed Substitution: _____

Manufacturer: _____ Address: _____ Phone: _____

Trade Name: _____ Model No. _____

Installer: _____ Address: _____ Phone: _____

History: ☐ New product ☐ 1-4 years old ☐ 5-10 years ☐ More than 10 years old

Differences between proposed substitution and specified product: _____

_____

_____

☐ Point-by-point comparative data attached – REQUIRED BY Engineer

Reason for not providing specified item: _____

_____

Similar Installation:

Project: _____ Engineer/Architect: _____

Address: _____ Owner: _____

_____ Date Installed: _____

Proposed substitution affects other part of Work: ☐ No ☐ Yes, explain _____

_____

Savings to Owner for accepting substitution: _____

Proposed substitution changes Contract Time: ☐ No ☐ Yes [Add] [Deduct] _____ days.

Supporting Data Attached: ☐ Drawings ☐ Product Data ☐ Samples ☐ Tests ☐ Reports _____

END OF SECTION

SECTION 01300

SUBMITTALS

PART 1 - GENERAL

1.01 DESCRIPTION:

A. This Section specifies the general methods and requirements of submissions applicable to the following work-related submittals as indicated and in compliance with Contract Documents.

1. Shop Drawings, Product Data and Samples.

2. Mock Ups.

3. Construction Photographs.

4. Contractor’s Responsibilities.

5. Submission Requirements.

6. Review of Shop Drawings, Product Data, Working Drawings and Samples.

7. Distribution.

8. General Procedures for Submittals.

9. Certificate of Delegated Design Services.

10. Certificates of Compliance.

11. Schedules.

B. Detailed submittal requirements will be specified in the technical specifications section.

1.02 DEFINITIONS:

A. Written and graphic information and physical samples that require Engineer’s responsive action. Action submittals are those submittals indicated in individual Specification Sections as "action submittals."

B. Portable Document Format (PDF): An open standard file format licensed by Adobe Systems used for representing documents in a device-independent and display resolution-independent fixed-layout document format.

C. Shop drawings, as defined in the General Conditions, and as specified in individual work Sections include, but are not necessarily limited to: custom-prepared data such as

fabrication and erection/installation (working) drawings of concrete reinforcement, structural details and piping layout, scheduled information, setting diagrams, actual shopwork manufacturing instructions, custom templates, special wiring diagrams, coordination drawings, individual system or equipment inspection and test reports including performance curves and certifications as applicable to the work.

1.03 SUBMITTALS:

A. Submittal Schedule: Submit a schedule of submittals, arranged in chronological order by dates required by construction schedule. Include time required for review, ordering, manufacturing, fabrication, and delivery when establishing dates. Include additional time required for making corrections or revisions to submittals noted by Engineer and additional time for handling and reviewing submittals required by those corrections.

1. Coordinate submittal schedule with list of subcontracts, the schedule of values, and Contractor's construction schedule.

2. Initial Submittal: Submit concurrently with startup construction schedule. Include submittals required during the first 60 days of construction. List those submittals required to maintain orderly progress of the Work and those required early because of long lead time for manufacture or fabrication.

3. Final Submittal: Submit concurrently with the first complete submittal of Contractor's construction schedule.

    a. Submit revised submittal schedule to reflect changes in current status and timing for submittals.

4. Format: Arrange the following information in a tabular format:

    a. Scheduled date for first submittal.

    b. Specification Section number and title.

    c. Submittal category: Action; informational.

    d. Name of subcontractor.

    e. Description of the Work covered.

    f. Scheduled date for Engineer's final release or acceptance.

    g. Scheduled date of fabrication.

1.04 SUBMITTAL ADMINISTRATIVE REQUIREMENTS:

A. Engineer's Digital Data Files: Electronic digital data files of the Contract Drawings will be provided by Engineer for Contractor's use in preparing submittals.

1. Engineer will furnish Contractor one set of digital data drawing files of the Contract Drawings for use in preparing Shop Drawings.

    a. Engineer makes no representations as to the accuracy or completeness of digital data drawing files as they relate to the Contract Drawings.

    b. Digital Drawing Software Program: The Contract Drawings are available in AutoCAD 2019. Any AutoCAD version earlier than 2018 cannot open the drawing files.

    c. Contractor shall execute a data licensing agreement in the form acceptable to Engineer.

B. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.

1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.

2. Submit all submittal items required for each Specification Section concurrently unless partial submittals for portions of the Work are indicated on accepted submittal schedule.

3. Submit action submittals and informational submittals required by the same Specification Section as separate packages under separate transmittals.

4. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.

    a. Engineer reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.

5. The Contractor shall revise and resubmit rejected submittals and those requiring corrections or verification of information in a timely manner such that the overall progress of the Work is not impeded.

6. Coordination of Submittal Times: The Contractor shall prepare and transmit each submittal sufficiently in advance of performing the related Work or other applicable activities, or within the time specified in the individual Sections of the Specifications, so that the installation will not be delayed by processing times, including rejection and resubmittal (if required), coordination with other submittals, testing, purchasing, fabrication, delivery, and similar sequenced activities. No extension of Contract Time will be authorized because of the Contractor's failure to transmit submittals sufficiently in advance of the Work.

C. All shop drawings shall be submitted using the transmittal form furnished by the Engineer and numbered to be sequential based on specification section.

D. All shop drawings submitted by subcontractors for approval shall be sent directly to the Contractor for checking. The Contractor shall be responsible for their submission at the proper time so as to prevent delays in delivery of materials.

E. Processing Time: Allow time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Engineer's receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.

1. Initial Review: Allow 21 working days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. Engineer will advise Contractor when a submittal being processed must be delayed for coordination.

2. Intermediate Review: If intermediate submittal is necessary, process it in same manner as initial submittal.

3. Resubmittal Review: Allow 21 working days for review of each resubmittal.

F. Contractor shall submit both paper and electronic submittals.

G. Paper Submittals: Place a permanent label or title block on each submittal item for identification.

1. Indicate name of firm or entity that prepared each submittal on label or title block.

2. Provide a space approximately 5 by 3 inches on label or beside title block to record Contractor's review and approval markings and action taken by Engineer.

3. Number of submittals required:

a. Shop Drawings: Unless otherwise stated in the respective Specifications Sections, submit six (6) copies.

b. Product Data: Unless otherwise stated in the respective Specifications Sections, submit six (6) copies.

c. Samples: Submit the number stated in the respective Specification Sections.

4. Include the following information for processing and recording action taken:

a. Project name.

b. Date.

c. Name of Engineer.

d. Name of Contractor.

e. Name of subcontractor.

f. Name of supplier.

g. Name of manufacturer.

h. Submittal number or other unique identifier, including revision identifier.

(1) Submittal number shall use Specification Section number followed by a decimal point and then a sequential number (e.g., 03100.01). Resubmittals shall include an alphabetic suffix after another decimal point (e.g., 03100.01.A).

i. Number and title of appropriate Specification Section.

j. Drawing number and detail references, as appropriate.

k. Location(s) where product is to be installed, as appropriate.

l. Other necessary identification.

5. Additional Paper Copies: Unless additional copies are required for final submittal, and unless Engineer observes noncompliance with provisions in the Contract Documents, initial submittal may serve as final submittal.

6. Transmittal for Paper Submittals: Assemble each submittal individually and appropriately for transmittal and handling. Transmit each submittal using a transmittal form.

a. Transmittal Form for Paper Submittals: Use form provided by Engineer.

H. Electronic Submittals: Electronic submittals are required for all shop drawing submittals. Identify and incorporate information in each electronic submittal file as follows:

1. Assemble complete submittal package into a single indexed file incorporating submittal requirements of a single Specification Section and transmittal form.

2. Name file with submittal number or other unique identifier, including revision identifier.

a. File name shall use project identifier and Specification Section number followed by a decimal point and then a sequential number (e.g., 01300.01). Resubmittals shall include an alphabetic suffix after another decimal point (e.g., 01300.01.A).

3. Transmittal Form for Electronic Submittals: Use form provided by Engineer.

I. Options: Identify options requiring selection by Engineer.

J. Deviations and Additional Information: On an attached separate sheet, prepared on Contractor's letterhead, record relevant information, requests for data, revisions other than those requested by Engineer on previous submittals, and deviations from requirements in the Contract Documents, including minor variations and limitations. Include same identification information as related submittal.

K. Resubmittals: Make resubmittals in same form and number of copies as initial submittal.

1. Note date and content of previous submittal.

2. Note date and content of revision in label or title block and clearly indicate extent of revision.

3. Resubmit submittals until they are marked with acceptance notation from Engineer’s action stamp.

L. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.

M. Use for Construction: Retain complete copies of submittals on Project site. Use only final action submittals that are marked with acceptance notation from Engineer’s action stamp.

1.05 CONSTRUCTION PHOTOGRAPHS:

A. The Contractor shall provide construction photographs in accordance with requirements specified in Section 01380.

PART 2 - PRODUCTS

2.01 SUBMITTAL PROCEDURES:

A. General Submittal Procedure Requirements: Prepare and submit submittals required by individual Specification Sections. Types of submittals are indicated in individual Specification Sections.

1. Post electronic submittals as PDF electronic files directly to construction management document control software such as Procore to be provided by the Contractor.

B. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.

1. If information must be specially prepared for submittal because standard published data are not suitable for use, submit as Shop Drawings, not as Product Data.

2. Mark each copy of each submittal to show which products and options are applicable.

3. Include the following information, as applicable:

   a. Manufacturer's catalog cuts.

   b. Manufacturer's product specifications.

   c. Standard color charts.

   d. Statement of compliance with specified referenced standards.

   e. Testing by recognized testing agency.

   f. Application of testing agency labels and seals.

   g. Notation of coordination requirements.

   h. Availability and delivery time information.

4. For equipment, include the following in addition to the above, as applicable:

   a. Wiring diagrams showing factory-installed wiring.

   b. Printed performance curves.

   c. Operational range diagrams.

   d. Clearances required to other construction, if not indicated on accompanying Shop Drawings.

5. Submit Product Data before or concurrent with Samples.

C. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data, unless submittal based on Engineer's digital data drawing files is otherwise permitted.

1. Certified shop and erection drawings. Contractor shall submit electronic files of the proposed equipment in the capacity, size, and arrangement as indicated and specified. Electronic files shall conform to the following minimum requirements:

   a. Drawings shall include plan views, sectional views, title block, Tag Numbers, serial numbers, Parts List (identifying each component), dimensions, connection sizes and types and all details of all related items. In cases where certain information is proprietary and is omitted, provided a statement indicating that the information is proprietary and is being omitted.

b. Drawings shall be in conformance with all other requirements as specified in this specification.

2. Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:

a. Identification of products.

b. Schedules.

c. Compliance with specified standards.

d. Notation of coordination requirements.

e. Notation of dimensions established by field measurement.

f. Relationship and attachment to adjoining construction clearly indicated.

g. Seal and signature of professional engineer if specified.

3. Sheet Size: Except for templates, patterns, and similar full-size drawings, submit Shop Drawings on sheets at least 8-1/2 by 11 inches, but no larger than 30 by 42 inches.

D. Samples: Submit Samples for review of kind, color, pattern, and texture for a check of these characteristics with other elements and for a comparison of these characteristics between submittal and actual component as delivered and installed.

1. Transmit Samples that contain multiple, related components such as accessories together in one submittal package.

2. Identification: Attach label on unexposed side of Samples that includes the following:

a. Generic description of Sample.

b. Product name and name of manufacturer.

c. Sample source.

d. Number and title of applicable Specification Section.

e. Specification paragraph number and generic name of each item.

3. For projects where electronic submittals are required, provide corresponding electronic submittal of Sample transmittal, digital image file illustrating Sample characteristics, and identification information for record.

4. Disposition: Maintain sets of accepted Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.

    a. Samples that may be incorporated into the Work are indicated in individual Specification Sections. Such Samples must be in an undamaged condition at time of use.

    b. Samples not incorporated into the Work, or otherwise designated as Owner's property, are the property of Contractor.

5. Samples for Initial Selection: Submit manufacturer's color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available.

    a. Number of Samples: Submit one full set(s) of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturer's product line. Engineer**,** will return submittal with options selected.

E. Product Schedule: As required in individual Specification Sections, prepare a written summary indicating types of products required for the Work and their intended location. Include the following information in tabular form:

1. Type of product. Include unique identifier for each product indicated in the Contract Documents or assigned by Contractor if none is indicated.

2. Manufacturer and product name, and model number if applicable.

3. Number and name of room or space.

4. Location within room or space.

F. Qualification Data: Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, contact information of Engineers and owners, and other information specified.

G. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements in the Contract Documents. Submit record of Welding Procedure Specification and Procedure Qualification Record on AWS forms. Include names of firms and personnel certified.

H. Installer Certificates: Submit written statements on manufacturer's letterhead certifying that Installer complies with requirements in the Contract Documents and, where required, is authorized by manufacturer for this specific Project.

I. Manufacturer Certificates: Submit written statements on manufacturer's letterhead certifying that manufacturer complies with requirements in the Contract Documents. Include evidence of manufacturing experience where required.

J. Product Certificates: Submit written statements on manufacturer's letterhead certifying that product complies with requirements in the Contract Documents.

K. Material Certificates: Submit written statements on manufacturer's letterhead certifying that material complies with requirements in the Contract Documents.

L. Material Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements in the Contract Documents.

M. Product Test Reports: Submit written reports indicating that current product produced by manufacturer complies with requirements in the Contract Documents. Base reports on evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.

N. Research Reports: Submit written evidence, from a model code organization acceptable to authorities having jurisdiction, that product complies with building code in effect for Project. Include the following information:

1. Name of evaluation organization.

2. Date of evaluation.

3. Time period when report is in effect.

4. Product and manufacturers' names.

5. Description of product.

6. Test procedures and results.

7. Limitations of use.

O. Field Test Reports: Submit written reports indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements in the Contract Documents.

2.02 DELEGATED-DESIGN SERVICES:

A. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.

1. If criteria indicated are not sufficient to perform services or certification required, submit a written request for additional information to Engineer.

B. Delegated-Design Services Certification: In addition to Shop Drawings, Product Data, and other required submittals, submit certificate (Form 01300-1), signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional.

1. Indicate that products and systems comply with performance and design criteria in the Contract Documents. Include list of codes, loads, and other factors used in performing these services.

2.03 SUBSTITUTION PROCEDURES

A. When products submitted are not named in the sprcifications, follow the substitution procedure detailed in Section 01250.

2.04 CALCULATIONS

A. Calculations should not be submitted with any submittal unless expressly requested. Any calculations received will be returned unreviewed.

PART 3 - EXECUTION

3.01 CONTRACTOR'S REVIEW:

A. Submittals: Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents prior to submission to the Engineer. Mark with approval stamp before submitting to Engineer.

B. Contractor review shall verify the following:

1. Field measurements

2. Field construction criteria

3. Catalog numbers and similar data

4. Conformance with the Specifications

C. If a shop drawing shows any deviation from the requirements of the Contract Documents, the Contractor shall make specific mention of the deviations in the Transmittal Form furnished by the Engineer and provide a description of the deviations in a letter attached to the submittal.

D. The review and approval of shop drawings, samples or product data by the Engineer shall not relieve the Contractor from his responsibility with regard to the fulfillment of

the terms of the Contract. All risks of error and omission are assumed by the Contractor and the Engineer will not have responsibility for any such errors and omissions.

E. No portion of the work requiring a shop drawing, sample, or product data shall be started nor shall any materials be fabricated or installed prior to the approval or qualified approval of such item by the Engineer. Any fabrication performed, materials purchased or on-site construction accomplished which does not conform to accepted shop drawings and data shall be at the Contractor's own risk. The Owner will not be liable for any expense or delay due to corrections or remedies required to accomplish conformity with the requirements of the Contract.

F. Project Closeout and Maintenance Material Submittals: See requirements in Division 1 Section "Closeout Procedures."

G. Approval Stamp: Stamp each submittal with a uniform, approval stamp. Include Project name and location, submittal number, Specification Section title and number, name of reviewer, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.

3.02 ENGINEER’S ACTION:

A. The Engineer's review is for general conformance with the design concept and contract documents. Markings or comments shall not be construed as relieving the Contractor from compliance with the contract plans and specifications or from departures therefrom. The Contractor remains responsible for details and accuracy, for coordinating the work with all other associated work and trades, for selecting fabrication processes, for techniques of assembly, and for performing work in a safe manner.

B. Submittals will be reviewed for the Contractor’s approval stamp. Submittals not stamped by the Contractor will be returned without any action.

C. The review of shop drawings, data, and samples will be general. They shall not be construed:

1. as permitting any departure from the Contract requirements;

2. as relieving the Contractor of responsibility for any errors or omissions, including details, dimensions, and materials;

3. as approving departures from details furnished by the Engineer, except as otherwise provided herein.

D. If the shop drawings, data or samples as submitted describe variations and show a departure from the Contract requirements which the Engineer finds to be in the interest of the Owner and to be so minor as not to involve a change in Contract Price or time for performance, the Engineer may return the reviewed drawings without noting an exception.

E. Two (maximum) copies of shop drawings or product data will be returned to the Contractor via Federal Express or UPS. Samples will not be returned.

F. Submittals will be returned to the Contractor under one of the action codes indicated below and defined on the transmittal form furnished by the Engineer.

1. Marking: No Exception Taken.

a. When submittals are marked as "No Exception Taken," Work covered by submittal may proceed provided it complies with Contract Documents. Acceptance of Work depends on that compliance.

2. Marking: Make Corrections Noted.

a. When submittals are marked as "Make Corrections Noted," Work covered by submittal may proceed provided it complies with Engineer's notations or corrections on submittal and with Contract Documents. Acceptance of Work depends on that compliance. Resubmittal not required.

3. Marking: Amend and Resubmit.

a. When submittals are marked as "Amend and Resubmit," do not proceed with Work covered by submittal. Do not permit Work covered by submittals to be used at Project site or elsewhere where Work is in progress.

b. Revise submittal or prepare new submittal in accordance with Engineer's notations in accordance with resubmittal requirements of this section. Resubmit without delay. Repeat if required to obtain different action marking.

4. Marking: Rejected; See Remarks.

a. When submittals are marked as "Rejected; See Remarks," do not proceed with Work covered by submittal. Work covered by submittal does not comply with Contract Documents.

b. Prepare new submittal for different material or equipment supplier or different product line or material of same supplier complying with Contract Documents.

5. Marking: For Information Only.

a. When submittals are marked as "For Information Only," the Engineer will review the submittal but take no action.

b. It will be recorded as "For Information Only". Work covered by this submittal may proceed provided it complies with the Contract Documents.

6. Marking: Not Required for Review.

a. When submittals are marked as “Not Required for Review,” the Engineer has not reviewed the submittal and it is being returned.

b. Work covered by this submittal may proceed provided it complies with the Contract Documents.

G. Resubmittals will be handled in the same manner as first submittals. On resubmittals the Contractor shall direct specific attention, in writing, on the letter of transmittal and on resubmitted shop drawings by use of revision triangles or other similar methods, to revisions other than the corrections requested by the Engineer on previous submissions. Any such revisions which are not clearly identified shall be made at the risk of the Contractor. The Contractor shall make corrections to any Work done in relation to revisions which are not specifically pointed out to the Engineer which are deemed, by the Engineer, not to be in accordance with the Contract Documents .

H. Partial submittals may not be reviewed. The Engineer will be the only judge as to the completeness of a submittal. Submittals not complete will be returned to the Contractor, and will be considered "Rejected" until resubmitted. The Engineer may at his option provide a list or mark the submittal directing the Contractor to the areas that are incomplete.

I. If the Contractor considers any correction indicated on the shop drawings to constitute a change to the Contract Documents, the Contractor shall give written notice thereof to the Engineer at least seven working days prior to release for manufacture. The shop drawing and the Product data sheet reviews do not authorize changes in Contract Price or Contract Time. Changes involving Contract Price or Contract Time are authorized only by a signed Change Order, in accordance with the General Conditions.

J. When the shop drawings have been completed to the satisfaction of the Engineer, the Contractor shall carry out the construction in accordance therewith and shall make no further changes therein except upon written instructions from the Engineer.

K. Material and equipment delivered to the Site will not be paid for until the pertinent shop drawings have been reviewed and accepted by the Engineer.

3.03 DISTRIBUTION:

A. Distribute reproductions of accepted shop drawings and copies of accepted product data and samples, where required, to the job site file and elsewhere as directed by the Engineer. Number of copies shall be as directed by the Engineer but shall not exceed 6.

3.04 CERTIFICATE OF DESIGN:

A. If specifically specified in other Sections of these Specifications, the Contractor shall submit the applicable Certificate of Design for each item required, Form 01300-1, completely filled in and signed and sealed by a registered professional engineer.

3.05 CERTIFICATES OF COMPLIANCE:

A. Certificates of Compliance as specified in the specifications shall include and mean certificates, manufacturer's certificates, certifications, certified copies, letters of certification and certificate of materials.

B. The Contractor shall be responsible for providing Certificates of Compliance as specified in the technical specifications. Certificates are required for demonstrating proof of compliance with specification requirements and shall be executed in six (6) copies unless otherwise specified. Each certificate shall be signed by an official authorized to certify on behalf of the manufacturing company and shall contain the name and address of the Supplier, the project name and location, and the quantity and date or dates of shipment or delivery to which the certificates apply. Copies of laboratory test reports submitted with certificates shall contain the name and address of the testing laboratory and the date or dates of the tests to which the report applies. Certification shall not be construed as relieving the Supplier from furnishing satisfactory material, if after tests are performed on selected samples, the material is found not to meet the specific requirements.

END OF SECTION

Form 01300-1
CERTIFICATE OF DELEGATED DESIGN SERVICES

The undersigned hereby certifies that he/she is a Professional Engineer registered in the state of _____ and that he/she has been employed by (Name of Contractor) _____ to design _____ in accordance with Specifications Section _____ for the (Name of Project) _____ The undersigned further certifies that he/she has performed similar designs previously and has performed the design of the _____; that said design is in conformance with all applicable local, state, and federal codes, rules, and regulations and professional practice standards; that his/her signature and Professional Engineer (P.E.) Stamp have been affixed to all calculations and drawings used in, and resulting from, the design; and that the use of that stamp signifies the responsibility of the undersigned for that design.

The undersigned hereby certifies that he/she has Professional Liability Insurance with limits of $1,000,000.00 and a Certificate of Insurance is attached.

The undersigned hereby agrees to make all original design drawings and calculations available to the Town/City of _____ or Owner's representative within seven (7) days following written request therefore by the Owner.

_____	_____
P.E. Name	Contractor's Name
_____	_____
Signature	Signature
_____	_____
Title	Title
_____	_____
Address	Address

Form 01300-2
CERTIFICATE OF UNIT RESPONSIBILITY
For Specification Section _____

_____
(Section title)

In accordance with Section 01300, paragraph 3.05 of the contract documents, the undersigned manufacturer accepts unit responsibility for all components of equipment furnished under specification Section [_____] and the requirements specified in Section 01900. We hereby certify that these components are compatible and comprise a functional unit suitable for the specified and indicated performance and design requirements.

_____ _____
Notary Public Name of Corporation

_____ _____
Commission expiration date Address

Seal: By: _____
Duly Authorized Official

_____
Legal Title of Official

Date: _____

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SECTION 01311

CONSTRUCTION PROGRESS SCHEDULES

PART 1 - GENERAL

1.01 DESCRIPTION:

A. Provide Construction Progress Schedules as indicated and in compliance with Contract Documents.

B. Summary:

1. Section includes administrative and procedural requirements for planning, monitoring, and documenting the progress of construction during performance of the Work, including the following:

a. Startup construction schedule.

b. Contractor's construction schedule.

c. Construction schedule updating reports.

C. The Contractor has the obligation and responsibility at all times to plan and monitor all of its activities, anticipating and scheduling its staff, materials, plant and Work methods in a manner that is likely to ensure completion of the Work in accordance with the terms and conditions of the Contract and at a rate that will allow it to be completed within the Contract Time.

1.02 DEFINITIONS:

A. Activity: A discrete part of a project that can be identified for planning, scheduling, monitoring, and controlling the construction project. Activities included in a construction schedule consume time and resources.

1. Critical Activity: An activity on the critical path that must start and finish on the planned early start and finish times.

2. Predecessor Activity: An activity that precedes another activity in the network.

3. Successor Activity: An activity that follows another activity in the network.

B. Critical Path: The longest connected chain of interdependent activities through the network schedule that establishes the minimum overall Project duration and contains no float.

C. Event: The starting or ending point of an activity.

D. Float: The measure of leeway in starting and completing an activity.

1. Float time is not for the exclusive use or benefit of either Owner or Contractor, but is a jointly owned, expiring Project resource available to both parties as needed to meet schedule milestones and Contract completion date.

2. Free float is the amount of time an activity can be delayed without adversely affecting the early start of the successor activity.

3. Total float is the measure of leeway in starting or completing an activity without adversely affecting the planned Project completion date.

4. Use of float suppression techniques such as software constraints, preferential sequencing, special lead/lag logic restraints, extended activity times, or imposed dates, other than as required by the Contract, shall be cause for the rejection of any schedule submitted by the Contractor.

1.03 SUBMITTALS:

A. Submit the following shop drawings in accordance with Section 01300.

B. Format for Submittals: Submit required submittals in the following format:

1. PDF electronic file.

C. Startup construction schedule.

1. Within 15 days after execution of the AGREEMENT, submit 6copies of a preliminary schedule indicating planned operations during first 90 days. Include cost of activities expected to be completed before submission and acceptance of the complete schedule.

D. Contractor's Construction Schedule: Within 30 days after execution of the Agreement, submit 6 copies of the project critical path schedule, of size required to display entire schedule for entire construction period. Construction Progress Schedule and Updating Reports: Submit with Applications for Payment.

1.04 QUALITY ASSURANCE:

A. Comply with the requirements specified in Section 01400.

1.05 COORDINATION:

A. Coordinate preparation and processing of schedules and reports with performance of construction activities and with scheduling and reporting of separate contractors.

B. Coordinate Contractor's construction schedule with the schedule of values, submittal schedule, progress reports, payment requests, and other required schedules and reports.

1. Secure time commitments for performing critical elements of the Work from entities involved.

2. Coordinate each construction activity in the network with other activities and schedule them in proper sequence.

PART 2 - PRODUCTS

2.01 CONTRACTOR'S CONSTRUCTION SCHEDULE, GENERAL:

A. Time Frame: Extend schedule from date established for the Notice to Proceed to date of final completion.

1. Contract completion date shall not be changed by submission of a schedule that shows an early completion date, unless specifically authorized by Change Order.

B. Activities: Treat each separate area as a separate numbered activity for each main element of the Work. Comply with the following:

1. Activity Duration: Define activities so no activity is longer than 90 days, unless specifically allowed by Engineer. In calculating activity durations, normal inclement weather shall be considered.

2. Procurement Activities: Include procurement process activities for the long lead items and major items, requiring a cycle of more than 60 days, as separate activities in schedule. Procurement cycle activities include, but are not limited to, submittals, acceptance, purchasing, fabrication, and delivery.

3. Submittal Review Time: Include review and resubmittal times indicated in Division 1 Section "Submittal" in schedule. Coordinate submittal review times in Contractor’s construction schedule with submittal schedule.

4. Startup and Testing Time Coordinate startup and testing time in Contractor’s construction schedule.

C. Constraints: Include constraints and work restrictions indicated in the Contract Documents, and show how the sequence of the Work is affected.

1. Work Stages: Indicate important stages of construction for each major portion of the Work, including, but not limited to, the following:

a. Submittals.

b. Purchases.

c. Fabrication.

d. Deliveries.

e. Installation.

f. Testing.

g. Project closeout, restoration and final cleaning.

h. Demobilization.

D. Milestones: Include milestones indicated in the Contract Documents in schedule, including, but not limited to, the Notice to Proceed, Substantial Completion, and final completion**.**

E. Upcoming Work Summary: Prepare summary report indicating activities scheduled to occur or commence prior to submittal of next schedule update. Summarize the following issues:

1. Unresolved issues.

2. Unanswered Requests for Information.

3. Rejected or unreturned submittals.

4. Notations on returned submittals.

5. Pending modifications affecting the Work and Contract Time.

F. Computer Scheduling Software: Prepare schedules using current version of a program that has been developed specifically to manage construction schedules.

2.02 CONTRACTOR'S CONSTRUCTION SCHEDULE (GANTT CHART):

A. Gantt-Chart Schedule: Submit a comprehensive, fully developed, horizontal, Gantt-chart-type, Contractor's construction schedule within 30 days of date established for the Notice to Proceed. Base schedule on the startup construction schedule and additional information received since the start of Project.

B. Preparation: Indicate each significant construction activity separately. Identify first workday of each week with a continuous vertical line.

PART 3 - EXECUTION

3.01 CONTRACTOR'S CONSTRUCTION SCHEDULE:

A. Contractor's Construction Schedule Updating: Update schedule monthly to reflect actual construction progress and activities.

END OF SECTION

SECTION 01380

CONSTRUCTION PHOTOGRAPHS

PART 1 - GENERAL

1.01 DESCRIPTION:

A. Provide construction photographs pertinent to the Contract work during the Contract period as indicated and in compliance with Contract Documents.

1. Section includes administrative and procedural requirements for the following:

a. Preconstruction photographs.

b. Final completion construction photographs.

c. Preconstruction video recordings.

1.02 SUBMITTALS:

A. Submit the following shop drawings in accordance with Section 01300.

B. Photographer Qualification Data:

1. Submit different samples of work by proposed photographer on construction photographs of similar nature to the work under this contract.

2. Submit proposed photographer's experience and qualifications in similar work. Include copies of reference and any certifications required.

3. Submit techniques, materials, and equipment to be used.

C. Key Plan: Submit key plan of Project site and building with notation of vantage points marked for location and direction of each photograph. Indicate elevation or story of construction. Include same information as corresponding photographic documentation.

D. Digital Photographs: Submit image files within seven days of taking photographs.

1. Digital Camera: Minimum sensor resolution of 12 megapixels.

2. Format: Minimum 4000 by 3000 pixels, in unaltered original files, with same aspect ratio as the sensor, uncropped, date and time stamped, in folder named by date of photograph, accompanied by key plan file.

3. Identification: Provide the following information with each image description in file metadata tag:

a. Name of Project and Engineer's project number and Owner's project number.

b. Name and contact information for photographer.

c. Name of Engineer.

d. Name of Contractor.

e. Date photograph was taken.

f. Description of vantage point, indicating location, direction (by compass point), and elevation or story of construction.

g. Unique sequential identifier keyed to accompanying key plan.

E. Video Recordings: Submit video recordings within seven days of recording.

1. Submit video recordings in digital video disc format acceptable to Engineer.

2. Identification: With each submittal, provide the following information:

a. Name of Project and Engineer's and Owner's project number.

b. Name and address of photographer.

c. Name of Engineer.

d. Name of Contractor.

e. Date video recording was recorded.

f. Description of vantage point, indicating location, direction (by compass point), and elevation or story of construction.

g. Weather conditions at time of recording.

1.03 QUALITY ASSURANCE:

A. Comply with the requirements specified in Section 01400.

B. Photographer Qualifications: An individual who has been regularly engaged as a professional photographer of construction projects for not less than two years.

C. Photographer to use techniques, material and equipment capable of producing photographs of high quality and resolution.

D. Photographer to be available on call on one day notice when requested by Engineer and be prepared to respond on shorter notice in unusual or unexpected conditions.

E. Dates for photography at site to be coordinated with Engineer and Engineer to be present during photographic periods at site unless approved otherwise by Engineer.

F. Photographer to make and retain detailed records of all photographs by photographer under this Contract:

1. The records to be in sufficient detail to support any attestation that may be required of photographer.

2. Photographer to retain such records for a period not less than two years from the final acceptance of entire work under this Contract.

1.04 USAGE RIGHTS:

A. Obtain and transfer copyright usage rights from photographer to Owner for unlimited reproduction of photographic documentation.

1.05 DELIVERY STORAGE AND HANDLING:

A. Comply with the requirements specified in Section 01610.

PART 2 - PRODUCTS

2.01 PHOTOGRAPHIC MEDIA:

A. Digital Images: Provide images in JPG format, produced by a digital camera with minimum sensor size of 12 megapixels, and at an image resolution of not less than 4000 by 3000 pixels.

B. Digital Video Recordings: Provide high-resolution, digital video disc in format acceptable to Engineer.

PART 3 - EXECUTION

3.01 CONSTRUCTION PHOTOGRAPHS:

A. Photographer: Engage a qualified photographer to take construction photographs.

B. Contractor to notify Engineer at least 5 days in advance of any photographic sessions.

C. All views to contain a relative dimension reference that is easily recognized to the average person. In views where dimensions are critical, use a recognizable measuring device such as a folding ruler or measuring tape in such a manner that the markings are clear and sharp in the photograph and the device is located in close relationship with the subject of the photograph.

D. General: Take photographs using the maximum range of depth of field, and that are in focus, to clearly show the Work. Photographs with blurry or out-of-focus areas will not be accepted.

1. Maintain key plan with each set of construction photographs that identifies each photographic location.

E. Digital Images: Submit digital images exactly as originally recorded in the digital camera, without alteration, manipulation, editing, or modifications using image-editing software.

1. Date and Time: Include date and time in file name for each image.

2. Field Office Images: Maintain one set of images accessible in the field office at Project site, available at all times for reference. Identify images in the same manner as those submitted to Engineer.

F. Preconstruction Photographs: Before starting construction, take photographs of Project site and surrounding properties, including existing items to remain during construction, from different vantage points, as directed by Engineer.

1. Flag excavation areas before taking construction photographs.

2. Take 30 photographs to show existing conditions adjacent to property before starting the Work.

3. Take a minimum of 20 photographs of existing buildings either on or adjoining property to accurately record physical conditions at start of construction.

4. Take additional photographs as required to record settlement or cracking of adjacent structures, pavements, and improvements.

G. Final Completion Construction Photographs: Take color photographs matching locations and vantage points of preconstruction photographs after date of Substantial Completion as project record documents. Engineer will inform photographer of desired vantage points.

3.02 PRECONSTRUCTION VIDEO RECORDINGS:

A. Recording: Mount camera on tripod before starting recording unless otherwise necessary to show area of construction. Display continuous running time and date. At start of each video recording, record weather conditions from local newspaper or television and the actual temperature reading at Project site.

B. Narration: Describe scenes on video recording by audio narration by microphone while video recording is recorded. Include description of items being viewed, recent events, and planned activities. At each change in location, describe vantage point, location, direction (by compass point), and elevation or story of construction.

1. Confirm date and time at beginning and end of recording.

2. Begin each video recording with name of Project, Contractor's name, videographer's name, and Project location.

C. Preconstruction Video Recording: Before starting work on-site record video recording of Project site and surrounding properties from different vantage points, as directed by Engineer.

1. Flag excavation areas before recording construction video recordings.

2. Show existing conditions adjacent to Project site before starting the Work.

3. Show existing buildings either on or adjoining Project site to accurately record physical conditions at the start of construction.

4. Show protection efforts by Contractor.

END OF SECTION

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SECTION 01390

PRE- AND POST-CONSTRUCTION SURVEYS

PART 1 - GENERAL

1.01 DESCRIPTION:

A. Provide pre- and post-construction topographic surveys of all areas within the limit of work.

B. Provide pre- and post-construction condition surveys shall be conducted prior to and within 500 feet of all proposed blasting or sheet pile driving operations as indicated and specified.

C. Section includes administrative and procedural requirements for the following:

1. Pre-construction photographs and video recordings.

2. Pre-construction photographs and video recordings.

3. Pre- and post-construction certified topographic field surveys performed by a New Hampshire Registered Land Surveyor to determine road elevations, etc. as specified herein.

1.02 SUBMITTALS:

A. Submit the following shop drawings in accordance with Section 01300.

B. Pre-Construction Stamped Topographic Survey Drawings.

C. Qualification Data: For photographer, refer to Section 01380 1.02 B and 1.03 B.

D. Field Reports:

1. 4 copies of each draft and final Pre-Construction Survey reports.

2. 4 copies of each draft and final Post-Construction Survey reports.

E. Key Plan: Refer to Section 01380 1.02 C.

F. Digital Photographs: Refer to Section 01380 1.02 D. Submit image files within three days of taking photographs.

G. Video Recordings: Refer to Section 01380 1.02 E. Submit video recordings within seven days of recording.

1. Transcript: Prepared on 8-1/2-by-11-inchpaper, punched and bound in heavy-duty, three-ring, vinyl-covered binders. Mark appropriate identification on front and spine of each binder. Include a cover sheet with same label information as corresponding video recording. Include name of Project and date of video recording on each page.

H. Post-Construction Stamped TopoGraphic Survey Drawings.

1.03 QUALITY ASSURANCE:

A. Comply with the requirements specified in Section 01400.

B. Photographer to use techniques, material and equipment capable of producing photographs with a minimum of six megapixels.

C. Dates for photography at site to be coordinated with the Owner. The Owner must be present during photographic periods at site.

D. Photographer to make and retain all photographs and digital files.

E. The topographic survey shall be performed by or under the supervision of and certified by a New Hampshire Register Land Surveyor.

1.04 USAGE RIGHTS:

A. Obtain and transfer copyright usage rights from photographer to Owner for unlimited reproduction of photographic documentation.

1.05 SEQUENCING AND SCHEDULING:

A. Dates for Pre- and Post-Construction Survey at the site shall be coordinated with the Owner and Engineer.

PART 2 - PRODUCTS

2.01 PHOTOGRAPHIC MEDIA:

A. Digital Images: Provide images in JPG format, produced by a digital camera with minimum sensor size of 8 megapixels, and at an image resolution of not less than 3200 by 2400 pixels.

B. Digital Video Recordings: Provide high-resolution, digital video disc in format acceptable to Engineer.

2.02 PRINTS:

A. Type: Color prints.

B. Finish: Smooth glossy surface.

C. Size: 4-inch x 6-inch (10 cm x 15 cm).

D. Paper weight: Single weight.

E. Number of prints: Two of each photograph.

2.03 PRINT IDENTIFICATION:

A. Each print to carry identification and information without interfering with exposure printed.

B. Each photograph shall have permanently written on it an identification number for reference and a legible description indicating name of Project, title of contract, number of contract, building, structure or road, owner, date taken, location identification, description data, and Contractor's name.

C. Back of Print:

1. Project name, photographer's numbered identification of exposure, time and date of exposure, name of photographer making exposure, detailed description of view including point from which exposure made, compass direction of view, vertical declination of view (horizontal, looking up, looking down, etc.) identification of main features in view and information pertinent to the purpose and identification of the exposure.

2. Weather conditions under which exposure made.

2.04 PRINT MOUNTING:

A. Each print to be inserted in a clear plastic envelope intended for the purpose:

1. Envelope material or fabrication shall be acid free.

2. Envelope shall be sealed to prevent print from accidentally slipping out of the envelope.

3. Front and back of print shall be visible through the plastic envelope.

4. Envelope shall be resealable for removal and insertion of print.

5. Envelope shall have a reinforced binding edge for binder specified herein.

2.05 PRINT FILING BINDER:

A. Furnish binders for filing specified under Paragraph 2.05.

1. Furnish 2 binders for filing prints. Prints shall be inserted into binders.

2. All binders to be identical.

B. Binders:

1. Intended for long term filing of prints.

2. Provisions for labeling front cover and binding face.

3. Have back and front cover hinges.

4. Of size appropriate for filing mounted prints.

5. Permit removal and insertion of mounted prints.

2.06 VIDEO-CD:

A. Provide photographic compact disc (video-CD) for digital image at the time of development of each print.

PART 3 - EXECUTION

3.01 TOPOGRAPHIC SURVEYS

A. Provide elevations of sidewalks, driveways, edge of roadways, retaining walls, fence, garages, shed, etc.

B. The location of each elevation shall be described in detail in words and located on the plan. The contour interval shall be 1 foot.

3.02 PRE- AND POST-CONSTRUCTION SURVEYS:

A. Provide construction surveys for existing (pre-construction) and final (post-construction) conditions in accordance with the following:

1. Notify the Owner a minimum of 48 hours prior to each survey.

2. The proximity of the structure inspected to the proposed blasting or pile driving operations.

3. Obtain the age of each facility, known permit modification and foundation information from local building departments.

4. Detailed examination shall include a visual internal and external survey of the building or structure; digital video and color photographs showing visually evident internal and external structural cracks and damage.

5. For the Pre-Construction Survey, interview Owner staff regarding existing conditions and structural faults, and determine dates and extent of recent repairs.

6. Two digital video recordings (one pre-construction and one post-construction) shall be performed at each of the facilities where the Work of this contract is taking place. Digital video recording shall be taken to thoroughly display structural cracks and any structural damage. The Contractor shall furnish four copies on compact disc of each recording in .mpg format. A brief written summary/description of each video's contents and locations of buildings/structures shall be included in the Survey Reports.

7. Color photographs shall be taken to indicate conditions. The Contractor shall furnish four prints of each photograph and photographic compact disk(s).

8. The report shall include location and description of site; results of visual inspection; color photographs; digital video recordings; sketches; results of property owner or tenant interviews. Description of existing facility foundation. Points where deterioration has occurred shall be noted and color photographs and digital video recording taken on all sides of the buildings and structures to show existing condition and any deterioration or other deficiencies. The absence of deficiencies shall also be recorded. The Owner and Engineer shall examine said draft reports and may indicate additional information that is required. The final report copies shall be given to Engineer and the Owner.

9. Document the locations of existing cracks in all existing structures. Install crack monitors where crack width exceeds 1/16-inch. A photograph shall be taken of each crack monitor/meter installation.

3.03 CONSTRUCTION PHOTOGRAPHS:

A. Construction photographs are specified in Section 01380.

3.04 CLOSEOUT ACTIVITIES:

A. Provide in accordance with Section 01700.

END OF SECTION

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SECTION 01400

QUALITY ASSURANCE

PART 1 - GENERAL

1.01 DESCRIPTION:

A. This section covers Quality Assurance and Quality Control requirements for this contract as indicated and in compliance with Contract Documents.

B. The Contractor is responsible for controlling the quality of work, including work of its subcontractors, and suppliers and for assuring the quality specified in the Technical Specifications is achieved.

C. Refer to the General Conditions Article 5 – Materials, Services, and Workmanship and Article 11 – Contractor's Obligations.

1.02 TESTING LABORATORY SERVICES:

A. All tests which require the services of a laboratory to determine compliance with the Contract Documents, shall be performed by an independent commercial testing laboratory acceptable to the Engineer. The laboratory shall be staffed with experienced technicians, properly equipped, and fully qualified to perform the tests in accordance with the specified standards.

B. Preliminary Testing Services: The Contractor shall be responsible for all testing laboratory services in connection with concrete materials and mix designs, the design of asphalt mixtures, gradation tests for structural and embankment fills, backfill materials, and all other tests and engineering data required for the Engineer's review of materials and equipment proposed to be used in the Work. The Contractor shall obtain the Engineer's acceptance of the testing laboratory before having services performed, and shall pay all costs for services.

C. All field and laboratory testing specified in Section 02210 shall be performed by an independent testing laboratory employed by the Contractor. Comply with all testing methods and frequencies specified in Section 02210.

D. The Contractor shall not retain any testing laboratory against which the Owner or the Engineer have reasonable objection, and if at any time during the construction process the services become unacceptable to the Owner, or the Engineer, either the Owner or the Engineer may direct in writing that such services be terminated. The request must be supported with evidence of improper testing or unreasonable delay. If the Engineer determines that sufficient cause exists, the Contractor shall terminate the services and engage a different testing laboratory.

E. Transmittal of Test Reports: Written reports of testing and engineering data furnished by the Contractor for the Engineer's review of materials and equipment proposed to be used in the Work shall be submitted as specified for Shop Drawings.

F. The Contractor’s testing laboratory shall furnish four copies of a written report of each test performed by laboratory personnel to the Contractor. Distribution shall be two copies of each test report to the Engineer's Representative, one copy to the Owner, and one copy for the Contractor within three days after each test is completed.

1.03 QUALITY ASSURANCE:

A. Codes and Standards: Refer to General Conditions Article 3 - Contract Documents: Intent, Amending, Reuse, Paragraph 3.02

B. Copies of applicable referenced standards are not included in the Contract Documents. Where copies of standards are needed by the Contractor for superintendence and quality control of the work, the Contractor shall obtain a copy or copies directly from the publication source and maintain at the jobsite, available to the Contractor's personnel, subcontractors, and Engineer.

C. Quality of Materials: Unless otherwise specified, all materials and equipment furnished for permanent installation in the Work shall conform to applicable standards and specifications and shall be new, unused, and free from defects and imperfections, when installed or otherwise incorporated in the Work. The Contractor shall not use material and equipment for any purpose other than that intended or specified unless the Engineer authorizes such use.

D. Where so specified, products or workmanship shall also conform to the additional performance requirements included within the Contract Documents to establish a higher or more stringent standard or quality than that required by the referenced standard.

1.04 OFFSITE INSPECTION:

A. When the specifications require inspection of materials or equipment during the production, manufacturing, or fabricating process, or before shipment, such services shall be performed by the Owner’s independent testing laboratory, or inspection organization acceptable to Engineer in conjunction with or by the Engineer**.**

B. The Contractor shall give appropriate written notice to the Engineer not less than 30 days before offsite inspection services are required, and shall provide for the producer, manufacturer, or fabricator to furnish safe access and proper facilities and to cooperate with inspecting personnel in the performance of their duties.

1.05 MATERIALS AND EQUIPMENT:

A. The Contractor shall maintain control over procurement sources to ensure that materials and equipment conform to specified requirements in the Contract Documents.

B. The Contractor shall comply with manufacturer’s printed instructions regarding all facets of materials and/or equipment movement, storage, installation, testing, startup, and operation. Should circumstances occur where the contract documents are more stringent than the manufacturer’s printed instructions, the Contractor shall comply with the specifications. In cases where the manufacturer’s printed instructions are more stringent than the contract documents, the Contractor shall advise the Engineer of the disparity and conform to the manufacturer’s printed instructions. In either case, the Contractor is to apply the more stringent specification or recommendation, unless accepted otherwise by the Engineer.

1.06 SHOP AND FIELD TESTING:

A. The Contractor is responsible for providing advance notice of and access for the shop and field testing specified in the technical specification sections.

B. The Contractor and its Subcontractor shall permit inspections, tests, and other services as required by the Contract Documents.

C. Contractor shall provide twenty-one days written notice to the Engineer so that the Engineer may schedule and witness off site and on site tests. The Engineer’s witnessing of tests does not relieve the Contractor and/or Subcontractors of their obligation to comply with the requirements of the Contract Documents.

1.07 MANUFACTURER'S FIELD SERVICES:

A. When specified in the technical specifications sections, the Contractor shall arrange for and provide technical representation from manufacturer’s of respective equipment, items or components. The manufacturer's representative shall be a factory trained service engineer/technician with the type and length of experience specified in the technical specifications.

B. Services Furnished Under This Contract: An experienced, competent, and authorized factory trained service engineer/technician representative of the manufacturer of each item of equipment for which field services are indicated in the specifications shall visit the site of the Work and inspect, operate, test, check, adjust if necessary, and approve the equipment installation. In each case, the manufacturer's service representative shall be present when the equipment is placed in operation. The manufacturer's service representative shall revisit the jobsite as often as necessary until all problems are corrected and the equipment installation and operation are satisfactory to the Engineer.

1.08 CERTIFICATION FORMS AND CERTIFICATES:

A. The Contractor shall be responsible for submitting the certification forms and certificates in conformance with the requirements specified in Section 01300.

PART 2 - PRODUCTS

(Not Used)

PART 3 - EXECUTION

3.01 QUALITY CONTROL:

A. Quality control is the responsibility of the Contractor, and the Contractor shall maintain control over construction and installation processes to assure compliance with specified requirements.

B. Certifications for personnel, procedures, and equipment associated with special processes (e.g., welding, cable splicing, instrument calibration, surveying) shall be maintained in the Contractor's field office, available for inspection by the Engineer. Copies shall be made available to the Engineer upon request.

C. Means and methods of construction and installation processes are the responsibility of the Contractor, and at no time is it the intent of the Engineer to supersede or void that responsibility.

END OF SECTION

SECTION 01500

TEMPORARY FACILITIES

PART 1 - GENERAL

1.01 SCOPE OF WORK:

A. The Contractor shall provide all temporary facilities for the proper completion of the work as indicated and in compliance with Contract Documents.

1. Section Includes:

a. User Charges:

(1) Sewer.

(2) Water.

(3) Electric.

(4) Temporary heat.

b. Project identification.

c. Peirce Island Bridge Restriction

d. Traffic and Pedestrian Regulation.

e. Temporary Facilities:

(1) Field offices and sheds.

(2) Office for Engineer.

f. Equipment.

g. Operation, termination, and removal.

1.02 REFERENCES:

A. American National Standards Institute (ANSI):

1. A 117.1: Accessible and Usable Buildings and Facilities.

B. American Society for Testing and Materials (ASTM):

1. E84: Standard Test Method for Surface Burning Characteristics of Building Materials

2. E136: Standard Test Method for Behavior of Materials in a Vertical Tube Furnace at 750 deg. C.

C. National Fire Protection Association (NFPA):

1. 70: National Electrical Code

2. 241: Standard of Safeguarding Construction, Alteration, and Demolition Operations

3. 701: Standard Methods of Fire Tests for Flame Propagation of Textiles and Films

1.03 USE CHARGES:

A. General: Costs for installation, removal and use of temporary facilities shall be included in the Contract Sum unless otherwise indicated. Allow other entities to use temporary services and facilities without cost, including, but not limited to, Engineer, Owner testing agencies, and authorities having jurisdiction.

B. Sewer Service: Pay sewer-service use charges for sewer usage by all entities for construction operations.

1. The Contractor shall provide adequate sanitary facilities for the use of those employed on the Work. Such facilities shall be made available when the first employees arrive on the site of the Work, shall be properly secluded from public observation, and shall be constructed and maintained during the progress of the Work in suitable numbers and at such points and in such manner as may be required by pertinent health and safety regulations.

2. The Contractor shall maintain the sanitary facilities in a satisfactory and sanitary condition at all times and shall enforce their use. He shall rigorously prohibit the committing of nuisances on the site of the Work, on the lands of the Owner, or on adjacent property.

C. Water from Existing System: Water from Owner's existing water system is available for use with metering and with payment of use charges. Provide connections and extensions of services as required for construction operations.

D. Electric Power Service: The Contractor shall make all necessary applications and arrangements and pay all fees and charges for electrical energy for power and light necessary for the proper completion of the Work and during its entire progress. The Contractor shall provide and pay for all temporary wiring, switches, connections, and meters.

E. Notwithstanding the availability of potable water services from the existing system, the Contractor shall be solely responsible for the provision of water for leakage and other testing, for concrete protection and to prevent freezing of equipment, as required by the Contract.

F. Temporary Heat:

1. If temporary heat is required for the protection of the Work, the Contractor shall provide and install suitable heating apparatus, shall provide adequate and proper fuel, and shall maintain heat as required. Costs for temporary heating, cooling, and ventilating required to execute the Work shall be borne by the Contractor.

1.04 PEIRCE ISLAND BRIDGE RESTRICTION

A. Construction Vehicle Restrictions:

B. Construction Vehicle Restrictions: All construction vehicles that have a weight greater than the limits set forth in New Hampshire RSA 266, and therefore are required to obtain an Overweight Permit from the New Hampshire Department of Transportation (NHDOT), shall be analyzed by the Engineer to evaluate if the vehicle may cross the bridge, or if additional restrictions are necessary. Refer to Section 1.05.C for information regarding the construction vehicle evaluation process.

C. Construction Vehicle Evaluation:

1. Purpose:

a. Should the Contractor require the use of a construction vehicle that exceeds the limits of NH RSA 266 and requires an NHDOT Overweight Permit, review and approval by the Engineer of the vehicle configuration is required.

2. Required Information:

a. Contractor shall submit the following information about the alternate vehicle to the Engineer, for review:

(1) Gross vehicle weight

(2) Number of axles and axle spacing

(3) Load distribution per axle

(4) Gauge distance (lateral spacing between wheel lines)

(5) Tire/wheel configuration per axle

3. Vehicle Evaluation Duration

a. Contractor shall submit the information necessary for the vehicle evaluation a minimum of seven working days before the anticipated date of use of the vehicle. Owner shall not be responsible for any work delays or associated costs incurred as a result of the exclusion of any construction vehicle. Additionally, any delay claim submitted by Contractor for schedule impacts

related to vehicle evaluation duration will be rejected if the minimum evaluation period is not provided to the Engineer.

4. Cost of Vehicle Evaluations

   a. The Engineer will perform up to ten vehicle configuration evaluations at no cost to the Contractor. Evaluations in excess of the ten included will be charged to the Contractor at the rate of $2,500 per additional vehicle evaluated. Fees charged to the Contractor shall be credited to the Owner through a Change Order.

D. Implementation and Regulation:

1. The Contractor shall be solely responsible for adherence to the restrictions outlined herein, including implementation and regulation of all necessary restrictions to construction vehicles using the Peirce Island Bridge for the project. Restrictions shall apply to, but are not limited to, vehicles operated by Contractor, Contractor's subcontractors, and other vehicles delivering equipment and/or material to the project.

1.05 TRAFFIC AND PEDESTRIAN REGULATION:

A. General: All traffic regulation and management signs, fencing, signals, etc. called for in the Contract Documents shall be in place and operational when construction activity begins.

B. Signs, Signals, and Devices:

1. Post mounted and wall mounted traffic control and information signs: As approved by authority having jurisdiction and shown on plans.

2. Traffic cones and drums, fences, flares and lights: As approved by authority having jurisdiction and shown on plans.

3. Flagger’s equipment: As required by local jurisdiction.

C. Flaggers: Provide trained and equipped flaggers to regulate traffic as necessary. Contractor shall obtain the necessary local permits for flaggers. Refer to Appendix D.

D. Flares and Lights: Use flares and lights during hours of low visibility to delineate traffic lanes and to guide traffic.

E. Haul Routes:

1. Drawings indicate haul routes designated by authorities having jurisdictions for use of construction traffic. Signage designating haul routes as shown on the drawings has been installed prior to construction. The Contractor shall remove this signage and posts after construction.

2. Confine construction traffic to designated haul routes.

   a. Construction traffic identified as traveling outside the designated haul routes as indicated will be subject to a $500 penalty per vehicle, per occurrence, to be paid by the Contractor to the City of Portsmouth, NH

3. Provide traffic control at critical areas of haul routes to regulate traffic, to minimize interference with public traffic.

4. Trucks shall be restricted to normal construction hours unless prior written approval obtained from Engineer or Owner.

5. Contractor shall notify City at least 24 hours before any over-sized construction trucks are scheduled. An escort vehicle shall be provided by the Contractor for all over-sized construction vehicles exiting the construction site until the over-sized vehicle is traveling along Hancock Street.

F. Removal:

1. Remove equipment and devices when no longer required when approved by Owner and Engineer.

2. Repair damage caused by installation.

3. Restore affected areas to pre-construction conditions.

G. Parking During Construction:

1. Parking in areas outside of the designated staging areas such as the Four Tree Island Parking Lot, State Fish Pier, and Boat Ramp is prohibited during construction

2. The Contractor shall be responsible for securing parking for construction personnel should there not be enough space for Contractor staff parking within the designated staging areas.

1.06 SUBMITTALS:

A. Site Plan: Show temporary facilities, utility hookups, staging areas, and parking areas for construction personnel.

B. Traffic Control Plan

1.07 QUALITY ASSURANCE:

A. Electric Service: Comply with NECA, NEMA, and UL standards and regulations for temporary electric service. Install service to comply with NFPA 70.

B. Tests and Inspections: Arrange for authorities having jurisdiction to test and inspect each temporary utility before use. Obtain required certifications and permits.

1.08 PROJECT CONDITIONS:

A. During adverse weather and against the possibility thereof, the Contractor shall take all necessary precautions so that the Work may be properly done and satisfactory in all respects. When required, protection shall be provided by use of tarpaulins, wood and building-paper shelters, or other suitable means.

B. During cold weather, materials shall be preheated, if required, and the materials and adjacent structure into which they are to be incorporated shall be made and kept sufficiently warm so that a proper bond will take place and a proper curing, aging, or drying will result. Protected spaces shall be artificially heated by suitable means which will result in a moist or a dry atmosphere according to the particular requirements of the work being protected. Ingredients for concrete and mortar shall be sufficiently heated so that the mixture will be warm throughout when used.

PART 2 - PRODUCTS

2.01 TEMPORARY FACILITIES:

A. Field Offices, General: Prefabricated or mobile units with serviceable finishes, temperature controls, and foundations adequate for normal loading.

B. The Contractor shall maintain a temporary field office near the work for his own use during the period of construction at which readily accessible copies of all contract documents shall be kept. The office shall be located where it will not interfere with the progress of the work. In charge of this office there shall be a competent superintendent of the Contractor as specified under "Supervision of Work" in the AGREEMENT.

C. Temporary Storage Yards: The Contractor shall construct temporary storage yards for storage of Products that are not subject to damage by weather conditions.

D. Temporary Storage Buildings:

1. The Contractor shall provide environmental control systems that meet the recommendations of Suppliers and manufacturers of the equipment and materials stored.

2. The Contractor shall arrange for a chain link partition fence to provide security of contents and ready access for inspection and inventory.

E. The Contractor shall store combustible materials (paints, solvents, fuels) in a well ventilated and remote building meeting all applicable safety standards.

2.02 OFFICE FOR ENGINEER:

A. Promptly after starting work at the site, the Contractor shall provide and equip a suitable area in the Contractor's trailer (at least 200 sq. ft. of floor area) for the exclusive use of the Engineer, and the Contractor shall maintain this office thereafter until the completion of the work to be done under this contract. The office for the Engineer shall be a separate room which can be locked. A key to the trailer and the office for the Engineer shall be furnished to the Engineer.

B. The office, furniture, equipment, supplies and services necessary shall be satisfactory to the Engineer.

C. The Contractor shall furnish the following furniture, equipment, supplies, and services:

1. One plan table or sloping plan shelf, about 3 ft. by 6 ft.), with a reasonably smooth top, and one suitable swivel stool.

2. Two additional chairs.

3. Shelves, tables, and bookcases as recommended by the Engineer.

4. Electric lights, desk lamps and outlets. The Contractor shall pay for installation and all charges for the energy used.

5. Broom and dustpan.

6. One desks for general office use. Each about 3 ft. by 5 ft., all with a desk chair of the armchair swivel type.

7. One four-drawer, legal size, metal filing cabinets each with locks. The Contractor shall furnish up to two additional filing cabinets if so requested by the Engineer.

8. Private line, touch-tone telephones with internal electronic that allows the telephone to be used on both touch-tone and digital pulse services. Telephone to be ATT or equal. Provide touch-tone service where available. A phone shall be furnished for each desk. One line service and intercom feature shall be provided. A second dedicated phone line shall be provided for the fax machine. The Contractor shall pay all charges for local calls.

9. Class ABC type fire extinguisher of at least 4-lb capacity.

10. Calculating machine, electronic with both digital and tape readout.

11. Paper cups, paper towels, liquid soap, and toilet paper; each with suitable dispenser or holder.

12. A waste basket for each desk, and a supply of appropriately sized plastic trash bags.

13. Thermostatically controlled heating unit or system of adequate capacity to maintain a minimum temperature of not less than 68 degrees F under all cold weather conditions. The Contractor shall provide all fuel used and service necessary.

14. Air conditioning.

15. Metal clothing locker, or closet, 36-in. wide by 18-in. deep by 72-in.with a minimum of five adjustable shelves, and a door lock.

16. The Contractor shall arrange for complete janitor service to be provided on a weekly basis.

17. Outdoor minimum-maximum thermometer with range of -40 deg. F to +120 deg. F and reset provisions.

18. Printer: "All-in-one" unit equipped with printer server, combining color printing, photocopying, scanning, and faxing, or separate units for each of these three functions.

19. Internet Service: Wireless cellular modem with USB connection to computer. Wireless cellular modem shall be capable of 4G wireless upload and download speeds. Contractor shall pay all associated monthly data service fees associated with the wireless cellular modem. Wireless cellular modem shall be compatible with the computer provided under this section.

20. Transit-Level, Lietz Model 20 or equal with adjustable tripod, 16 oz. plumb bob, and 25 yard skein of braided linen plumb bob cord.

21. Builder's Level, Lietz Model 11 or equal with adjustable tripod.

22. 25 ft. sectional leveling rod, Lietz SK or equal.

23. 200 ft. reel-mounted stainless steel Engineer's tape, Richter No. RI 553112 or equal.

24. 200 ft. reel mounted fiberglass tape graduated in feet, inches, and quarters, Richter No. RI 212362 or equal

D. The Contractor shall provide office space and facilities until the office, furnishings, and equipment described above are ready for use, but by so doing he shall not be relieved of his obligation to provide and equip the specified Engineer’s office as promptly as possible.

E. Unless otherwise directed by the Engineer, after the date of completion of the Work as stated in the final estimate, the Contractor shall remove the office and all such temporary

facilities from the site, the same to become his property, and leave the premises in a condition acceptable to the Engineer.

PART 3 - EXECUTION

3.01 INSTALLATION, GENERAL:

A. Locate facilities where they will serve Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required by progress of the Work.

B. Provide each facility ready for use when needed to avoid delay. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent

3.02 SECURITY AND PROTECTION FACILITIES INSTALLATION:

A. Protection of Existing Facilities: Protect existing vegetation, equipment, structures, utilities, and other improvements at Project site and on adjacent properties, except those indicated to be removed or altered. Repair damage to existing facilities.

B. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction to comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.

C. Temporary Erosion and Sedimentation Control: Provide measures to prevent soil erosion and discharge of soil-bearing water runoff and airborne dust to undisturbed areas and to adjacent properties and walkways. Refer to drawings and Section 01568.

1. Verify that flows of water redirected from construction areas or generated by construction activity do not enter or cross tree- or plant- protection zones.

2. Inspect, repair, and maintain erosion- and sedimentation-control measures during construction until permanent vegetation has been established.

3. Clean, repair, and restore adjoining properties and roads affected by erosion and sedimentation from Project site during the course of Project.

4. Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

D. Stormwater Control: Comply with requirements of authorities having jurisdiction. Provide barriers in and around excavations and subgrade construction to prevent flooding by runoff of stormwater from heavy rains.

E. Tree and Plant Protection: Install temporary fencing located as indicated or outside the drip line of trees to protect vegetation from damage from construction operations. Protect tree root systems from damage, flooding, and erosion.

3.03 CLEANING ENGINEERS AND CONSTRUCTION OFFICES DURING CONSTRUCTION:

A. Contractor to maintain the grounds within his working limits and around any equipment or storage areas. This includes removal of waste material, cutting of grass, weed whacking around storage racks and material, snow plowing and snow shoveling.

B. The Contractor shall make arrangements with, and obtain permits from, any authorities having jurisdiction for disposal of waste and debris.

C. The Contractor shall wet down exterior surfaces prior to sweeping to prevent blowing of dust and debris. At least weekly, the Contractor shall sweep all floors (basins, tunnels, platforms, walkways, roof surfaces), and pick up all debris and dispose of off Site.

D. The Contractor shall provide approved containers for collection and disposal of waste materials, debris, and rubbish. At least at weekly intervals, the Contractor shall dispose of such waste materials, debris, and rubbish off Site.

E. At least weekly, the Contractor shall brush sweep entry drive and roadways, and all other streets and walkways affected by the Work and where adjacent to the Work.

3.04 OFFICE FOR ENGINEER:

A. Communication Services: The Contractor shall arrange and provide on Site telephone service and cable Internet access including router/firewall for use during construction. The Contractor shall pay for all installation and basic monthly billing charges. The Contractor shall reinstate service outages resulting from construction activities within one Working Day.

B. Maintain all temporary buildings clean and free from nuisances so as to avoid danger to plant property or structures, and to prevent complaints from plant personnel, and prohibit interferences with the operation of the existing plant.

C. Maintain in good repair and appearance, and provide daily cleaning service and replenishment, as required, of paper towels, paper cups, hand soap, toilet paper, first-aid kit supplies, and bottled water.

D. Provide and maintain services including power, heating and ventilating.

END OF SECTION

SECTION 01568

EROSION CONTROL, SEDIMENTATION AND CONTAINMENT OF CONSTRUCTION MATERIALS

PART 1 - GENERAL

1.01 DESCRIPTION:

A. Provide all work and take all measures necessary to control soil erosion resulting from construction operations, prevent flow of sediment from construction site, and contain construction materials (including excavation and backfill) within protected working area as to prevent damage to any stream or wetlands and waterbodies

1.02 REFERENCES:

A. United Stated Environmental Protection Agency (USEPA):

1. Guidelines for Erosion and Sediment Control, Planning and Implementation.

2. Processes, Procedures and Methods to Control Pollution Resulting from all Construction Activity.

3. EPA-833-R-06-004: Developing Your Stormwater Pollution Prevention Plan, A Guide for Construction Sites

B. New Hampshire Department Services Stormwater Manual (2008)

C. New Hampshire Department of Environmental Services (NHDES) Wetland Permit

1.03 SUBMITTALS:

A. Submit the following shop drawings in accordance with Section 01300:

1. Silt fence, compost filter socks, mats, and netting

2. Temporary erosion control products proposed by Contractor.

B. Sediment and erosion control plans and details.

C. Prior to the start of the work, submit to Engineer, for review a Stormater Pollution Prevention Plan (SWPPP) including a plan with detailed sketches showing the proposed methods to be used for controlling erosion during construction. The SWPPP and plan comply with the requirement of the EPA National Pollutant Discharge Elimination System General Permit for Discharges from Construction Activities.

1.04 QUALITY ASSURANCE:

A. Comply with the requirements specified in Section 01400.

B. Use acceptable best management practices, including use of water diversion structures, diversion ditches, settling basins, and sediment traps.

C. If construction materials are washed away during construction, remove materials from fouled areas.

D. Engineer has authority to limit surface area of erodible earth material exposed by clearing and grubbing, excavation, borrow and fill operations and to direct immediate permanent or temporary pollution control measures to prevent contamination of any stream or wetlands, including construction of temporary berms, dikes, dams, sediment basins, sediment traps, slope drains, and use of temporary mulches, mats, or other control devices or methods to control erosion.

PART 2 - PRODUCTS

2.01 MULCHES

A. Acceptable material as appropriate for the conditions: straw gravel, crushed stone, peat moss, pine straw or needles, wood chips, wood excelsior, or wood fiber cellulose.

2.02 SILT BARRIERS

A. Bales:

1. Straw bales or other suitable material acceptable to Engineer.

2. All bales to be at least 14”x18”x30” and securely tied with either wire band or string and staked twice per bale.

3. Bales shall be free of purple loosestrife and other invasive and noxious species.

B. Compost Filter Socks:

1. The filter sock shall be produced from a 5 mil thick continuous HDPE filament, woven int a tubular mesh netting material, with openings in the knitted mesh of 3/8” (10mm). This shall either be filled wth compost to the diameter of the sock. Compost filter socks shall either be made on site or delivered to the jobsite,

2. Where greater than a 200-foot long section of ground is to be protected with a compost filter sock, the sock length shall be sleeved. After one sock section (200 feet) is filled and tied off (knotted) or zip tied, the second sock section shall be pulled over the first 18 inches or more and “sleeved” creating a overlap. Once overlapped, the second section is filled with compost starting at the sleeved area to create a seamless appearance. The sock may be stakes at the overlapped area (where the

sleeve is) to keep the sections together. Sleeving at the joints is necessary because it reduces the opportunity for water to penetrate the joints when installed in the field.

2.03 MATS AND NETTING:

A. Jute, excelsior and wood fiber mats as identified on the Contract Drawings, or Approved equal.

B. Type and use shall be suitable for the work.

2.04 SYNTHETIC FILTER FABRIC:

A. Synthetic filter fabric to be a pervious sheet of propylene, nylon, polyester or ethylene filaments and shall be certified by the manufacturer or supplier as conforming to the following requirements and the requiremnets specified in Section 02273:

Physical Property	Requirements
Filtering Efficiency	75% (min.)
Tensile Strength at 20% (max.) Elongation	Extra Strength – 50 lbs./lin. In (min.) Standard Strength 30 lbs./lin. In (min.)
Flow Rate	0.3 gal./sq. ft./min. (min)

B. Burlap to be 10 ounce per square yard fabric.

C. Posts for filter fences either 2 x 3 or 2 x 4 inch studs or 0.5 pounds (minimum) per linear foot or steel with a minimum length of 5 feet. Steel posts to have projections for fastening wire to them.

D. Stakes for filter barriers to be 2” x 2” hardwood or equivalent metal with a minimum length of 3 feet.

E. Wire fence reinforcement for silt fences using standard strength filter cloth to be a minimum of 42 inches in height, a minimum of 14 gauge and have a maximum mesh spacing of 6 inches. Use where required per manufacturer’s instructions.

2.05 SEDIMENTATION TRAP:

A. Sedimentation traps shall be sized to collect laden water during dewatering from construction site into an enclosed system. The trap shall be sized to accommodate and effectively remove solids from the maximum volume of dewatering effluent anticipated with a resulting effluent stream free of silt and other suspended solids.

PART 3 - EXECUTION

3.01 GENERAL:

A. Do not discharge chemicals, fuels, lubricants, bitumen, raw sewage and other harmful waste into or alongside any body of water or into natural or man-made channels.

B. Design erosion and sediment controls to handle peak runoff resulting from storm events.

C. The Contractor shall be responsible for inspecting and maintaining these control measures to ensure their proper function and adequate sediment storage at all times. The Contractor shall remove sediment once it reaches 50 percent of the capacity of the structure. Sediment collected shall be disposed of offsite at the Contractor's cost.

3.02 INSTALLATION:

A. Install baled hay or straw erosion checks in all locations as directed, surrounding base of all deposits of stored excavated material outside of disturbed area, and where directed by the Engineer.

B. Install checks immediately after site is cleared and before trench excavation. Locate checks, surrounding stored material, approximately 6 feet (1.8 m) from material.

C. Hold bales in place with two 2 inches by 2 inches by 3 feet (50 mm by 50 mm by 0.9 m) stakes so that each bale is butted tightly against adjoining bale thereby precluding shortcircuiting of erosion check.

D. Stake compost filter socks with 2 inches by 2 inches by 3 feet wood stakes at 10 foot spacing maximum. Provide additional stakes as conditions warrant and as directed by the Engineer.

E. Construct earth berms or diversions to intercept and divert runoff water from critical areas.

F. Discharge silt-laden water from excavations onto filter fabric mat and/or baled hay or straw sediment traps to ensure that only sediment-free water is returned to watercourses.

G. Do not place excavated soil material adjacent to water-course in manner that will cause it to wash away by high water or runoff.

H. Prevent damage to vegetation by excessive watering or silt accumulation in the discharge area.

I. Do not dump spoiled material into any streams, wetlands, surface waters, or unspecified locations.

J. Prevent indiscriminate, arbitrary, or capricious operation of equipment in streams, wetlands or surface waters.

K. Do not pump silt-laden water from trenches or excavations into surface waters, streams, wetlands, or natural or man-made channels leading thereto.

L. Prevent damage to vegetation adjacent to or outside of construction area limits.

M. Do not dispose of trees, brush, debris, paints, chemicals, asphalt products, concrete curing compounds, fuels, lubricants, insecticides, washwater from concrete trucks or hydroseeders, or any other pollutant in streams, wet-lands, surface waters, or natural or man-made channels leading thereto, or unspecified locations.

N. Do not alter flow line of any stream unless indicated or specified.

3.03 REMOVAL OF TEMPORARY WORKS:

A. After temporary works have served their purpose, the Contractor shall remove them or level and grade them to the extent required to present a sightly appearance and to prevent any obstruction of the flow of water or any other interference with the operation of or access to the permanent works.

END OF SECTION

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SECTION 01600

CONTROL OF MATERIALS

PART 1 - GENERAL

1.01 DESCRIPTION:

A. Section includes administrative and procedural requirements for selection of products for use in Project; product delivery, storage, and handling; manufacturers' standard warranties on products; special warranties; and comparable products as indicated and in compliance with Contract Documents.

1. Section Includes:

a. Definitions.

b. Submittals.

c. Spare parts.

d. Quality assurance.

e. Delivery, storage and handling.

f. Warranty.

g. Products.

h. Substitution and “Or Equal” items.

i. Reuse of existing material.

j. Manufacturer’s instructions.

k. Special tools.

l. Lubrication.

m. Nameplates.

n. General material and equipment requirements.

o. Materials and Equipment.

p. Field Quality Control; Installation, Instructional, and Post Startup Services.

1.02 REFERENCES:

A. American Society of Mechanical Engineers (ASME):

1. B1.1: Unified Inch Screw Threads (UN and UNR Thread Form)

B. American Society for Testing and Materials International (ASTM):

1. A123/A123M: Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products

2. A325/A325M: Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength

1.03 DEFINITIONS:

A. Products: Items obtained for incorporating into the Work, whether purchased for Project or taken from previously purchased stock. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.

1. Named Products: Items identified by manufacturer's product name, including make or model number or other designation shown or listed in manufacturer's published product literature, that is current as of date of the Contract Documents.

2. New Products: Items that have not previously been incorporated into another project or facility. Products salvaged or recycled from other projects are not considered new products.

3. Comparable Product: Product that is demonstrated and accepted through submittal process to have the indicated qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics that equal or exceed those of specified product.

1.04 SUBMITTALS:

A. Comparable Product Requests: Submit request for consideration of each comparable product. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.

1. Comply with the requirements of Section 01250.

1.05 SPARE PARTS:

A. Provide spare parts for Products as specified in the individual technical specification sections. Comply with the requirements specified in Section 01600.

B. Pack spare parts to protect them during storage. Tag spare parts and containers to clearly identify them in accordance with Contractor’s parts numbering system as

reviewed by the Engineer**.** All parts shall be cross-referenced to their applicable the Specification Section.

1.06 QUALITY ASSURANCE:

A. Comply with the requirements specified in Section 01600.

B. Compatibility of Options: If Contractor is given option of selecting between two or more products for use on Project, select product compatible with products previously selected, even if previously selected products were also options.

1.07 DELIVERY STORAGE AND HANDLING:

A. The Contractor shall arrange deliveries of materials and equipment in accordance with construction Progress Schedule, coordinate to avoid conflict with Work and conditions at site.

B. Comply with the requirements of Section 01600.

C. Provide equipment and personnel to handle materials and equipment by methods recommended by manufacturer to prevent soiling or damage to materials or equipment, or their packaging.

D. Deliver, store, and handle products using means and methods that will prevent damage, deterioration, and loss, including theft and vandalism. Comply with manufacturer's written instructions.

E. Owner assumes no responsibility for damage or loss due to storage of materials and equipment.

F. Interior Storage:

1. Store with seals and labels intact and legible.

2. Store materials and equipment subject to damage by elements in weathertight enclosures.

3. Maintain temperature and humidity within ranges required by manufacturer’s instructions.

G. Exterior Storage:

1. Store fabricated materials and equipment above ground, on blocking or skids, to prevent soiling or staining. Cover materials and equipment subject to deterioration with impervious sheet coverings. Provide ventilation to avoid condensation.

2. Store loose granular materials in well-drained area on solid surfaces to prevent mixing with foreign matter.

3. Store materials such as pipe, reinforcing steel, structural steel, and equipment on pallets or racks, off ground.

H. Inspection and Maintenance:

1. Arrange storage to provide easy access for inspection, maintenance, and inventory.

2. Make periodic inspections of stored materials and equipment to ensure materials and equipment maintained under specified conditions are free from damage or deterioration, and coverings are in-place and in condition to provide required protection.

3. Perform maintenance on stored material and equipment in accordance with manufacturer's written instructions and in presence of Owner or Engineer.

a. Notify Engineer 24 hrs before performance of maintenance.

b. Submit report of completed maintenance and condition of coverings to Engineer with each Application for Payment.

c. Failure to perform maintenance, to notify Engineer of intent to perform maintenance or to submit maintenance report may result in rejection of material or equipment.

I. The Contractor shall assume responsibility for protection of completed construction and repair and restore damage to completed Work equal to original condition.

J. Wheeling of loads over finished floors, with or without plank protection, is not permitted in anything except rubber-tired wheelbarrows, buggies, trucks or dollies. This applies to finished floors and exposed concrete floors, as well as those covered with composition tile or other applied surfacing.

K. Where structural concrete is also finished surface, avoid marking or damaging surface.

1.08 WARRANTY:

A. Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.

1. Manufacturer's Warranty: Written warranty furnished by individual manufacturer for a particular product and specifically endorsed by manufacturer to Owner.

2. Special Warranty: Written warranty required by the Contract Documents to provide specific rights for Owner.

B. Special Warranties: Prepare a written document that contains appropriate terms and identification, ready for execution.

1. Manufacturer's Standard Form: Modified to include Project-specific information and properly executed.

2. Specified Form: When specified forms are included with the Specifications, prepare a written document using indicated form properly executed.

3. See other Sections for specific content requirements and particular requirements for submitting special warranties.

C. Submittal Time: Comply with requirements in Section 01700.

1.09 PRODUCTS:

A. Furnish products of qualified manufacturers suitable for intended use. Furnish products of each type by single manufacturer unless specified otherwise.

B. Do not use materials and equipment removed from existing premises, except as specifically permitted by Contract Documents.

C. Furnish interchangeable components from same manufacturer for components being replaced.

1.10 SUBSTITUTION AND “OR EQUAL” ITEMS:

A. Follow the procedures in Section 01250.

1.11 ACCEPTANCE OF MATERIALS:

A. Unless otherwise specified, only new materials and equipment shall be incorporated in the work. All materials and equipment furnished by the Contractor shall be subject to the inspection and acceptance of the Engineer. No material shall be delivered to the work without prior acceptance of the Engineer.

B. As specified in Section 01300, the Contractor shall submit to the Engineer, data relating to materials and equipment he proposes to furnish for the work. Such data shall be in sufficient detail to enable the Engineer to identify the particular product and to form an opinion as to its conformity to the specifications.

C. Facilities and labor for handling and inspection of all materials and equipment shall be furnished by the Contractor. If the Engineer requires, either prior to beginning or during the progress of the work, the Contractor shall submit additional samples or materials for such special tests as may be necessary to demonstrate that they conform to the specifications. Such samples shall be furnished, stored, packed, and shipped at the Contractor's expense. Except as otherwise noted, the Owner will make arrangements for and pay for the tests.

D. Any delay of acceptance resulting from the Contractor's failure to submit samples or data promptly shall not be used as a basis of a claim against the Owner or the Engineer.

E. In order to demonstrate the proficiency of workmen or to facilitate the choice among several textures, types, finishes, and surfaces, the Contractor shall provide such samples of workmanship or finish as may be required.

F. The materials and equipment used on the work shall correspond to the accepted samples or other data.

1.12 REUSE OF EXISTING MATERIAL:

A. Except as specifically indicated or specified, do not use materials and equipment removed from existing structure(s) in new Work.

B. For material and equipment specifically indicated or specified to be reused in Work:

1. Use special care in removal, handling, storage, and reinstallation to ensure proper function in completed Work.

2. The Contractor shall arrange and pay for transportation, storage, and handling of products which require off-site storage, restoration or renovation.

3. Off-site storage areas and buildings shall conform to requirements of this section.

1.13 MANUFACTURER’S INSTRUCTIONS:

A. Installation of equipment and materials shall comply with manufacturer’s instructions. Obtain and distribute printed copies of such instructions to parties involved in installation, including 2 copies to Engineer.

1. Maintain one set of complete instructions at Site during installation and until completion of Work.

B. Handle, store, install, connect, clean, condition, and adjust materials and equipment in accordance with manufacturer’s written instructions and in conformance with Specifications.

1. If Site conditions or specified requirements conflict with manufacturer’s instructions, consult Engineer for further instructions. Do not proceed with Work without written instructions.

1.14 SPECIAL TOOLS:

A. For each type of equipment furnished, the Contractor shall provide a complete set of all special tools (including grease guns or other lubricating devices) which may be necessary for the adjustment, operation, maintenance, and disassembly of such

equipment. Tools shall be high-grade, smooth, forged, alloy, tool steel. Grease guns shall be lever type.

B. Special tools are considered to be those tools which because of their limited use are not normally available, but which are necessary for the particular equipment.

C. Pack items to protect them during storage. Tag items and containers to clearly identify them in accordance with Contractor's part system, as reviewed by the Engineer. Cross-reference all items to their applicable Specification Section.

D. Special tools shall be delivered at the same time as the equipment to which they pertain. The Contractor shall properly store and safeguard such special tools until completion of the work, at which time they shall be delivered to the Owner.

E. The Contractor shall furnish and erect one or more steel wall cases with flat key locks and clips or hooks to hold each tool in arrangement.

1.15 LUBRICATION:

A. Where lubrication is required for proper operation of equipment, incorporate necessary and proper provisions in equipment in accordance with manufacturer's requirements. Where possible, lubrication shall be automated and positive.

B. Where oil is used, reservoir shall be of sufficient capacity to supply unit for 24 hr period.

C. Provide adequate and, as far as practicable, automatic means of lubrication for working parts. Arrange lubrication grease nipples, grease boxes and other lubrication devices so that they are readily accessible for routing greasing using grease nipples and Type 316 stainless steel or copper tubing extensions where required. Secure nipples and tubing to the equipment at appropriate locations. Indicate on the working drawings submitted, the types of lubricants to be used (must be readily available in **[State]**). Use grease nipples of a consistent type, Alemite button head type or equivalent. Provide grease gun(s) of the appropriate size(s) and pressure(s).

1.16 GENERAL MATERIAL AND EQUIPMENT REQUIREMENTS:

A. The requirements of this Paragraph shall constitute the standards for the material and equipment specified herein. Should these requirements conflict with the Supplier's recommendations or in any way be less stringent than the Supplier's requirements, they shall be superseded by the Supplier's requirements.

B. Bolts, Anchor Rods and Nuts:

1. All necessary bolts, anchor rods, nuts, washers, plates and bolt sleeves shall be furnished by the contractor in accordance herewith. Anchor rods shall have suitable washers and hexagonal nuts.

2. All anchor rods, nuts, washers, plates, and bolt sleeves shall be galvanized unless otherwise indicated or specified.

3. Unless otherwise specified, stud, tap, and machine bolts, and nuts shall conform to the requirements of ASTM Standard Specification for Carbon Steel Externally and Internally Threaded Standard Fasteners, Designation A325. Hexagonal nuts of the same quality of metal as the bolts shall be used. All threads shall be clean cut and shall conform to ANSI Standard B1.1 for Unified Inch Screw Threads (UN and UNR Thread Form).

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

5. Bolts, anchor rods, nuts, and washers specified to be stainless steel shall be Type 304 or Type 316 stainless steel, as indicated.

6. Anchor rods shall be set accurately. They shall be carefully held in suitable templates of acceptable design. Where indicated on the Drawings, specified, or required, anchor bolts shall be provided with square plates at least 4 in. by 4 in. by 3/8 in. or shall have square heads and washers and set in the concrete forms with suitable pipe sleeves, or both. If anchor are set after the concrete has been placed, all necessary drilling and grouting or caulking shall be done by the Contractor and care shall be taken not to damage the structure or finish by cracking, chipping, spalling, or otherwise during the drilling and caulking.

C. Grease Fittings:

1. Provide extension fittings and tubing on all grease fittings that are installed in an inaccessible location. The extension is to be located so that equipment can be lubricated from the operating level without the use of ladders, staging or shutting down the equipment. Tubing: 316 stainless steel.

D. Concrete Inserts For Hangers:

1. Concrete inserts for hangers shall be designed to support safely, in the concrete that is used, the maximum load that can be imposed by the hangers used in the inserts. Inserts for hangers shall be of a type which will permit adjustment of the hangers both horizontally (in one plane) and vertically and locking of the hanger head or nut. All inserts shall be galvanized by the hot-dip process in conformity with the ASTM Standard Specification for Zinc (Hot-Galvanized) Coatings on Products Fabricated from Rolled, Pressed, and Forged Steel Shapes, Plates, Bars, and Strip, Designation A123, or the ASTM Standard Specifications for Zinc Coating (Hot Dip) on Iron and Steel Hardware, Designation A153, as is appropriate.

E. Equipment Foundations, Installation and Grouting:

1. The Contractor shall furnish the necessary materials and construct suitable concrete foundations for all equipment installed by him, even though such foundations may not be indicated on the Drawings. The tops of foundations shall be at such elevations as will permit grouting as specified below.

2. All such equipment shall be installed by skilled mechanics and in accordance with the instructions of the manufacturer.

3. In setting pumps, motors, and other items of equipment customarily grouted, the Contractor shall make an allowance of at least 1 inch (25 mm) for grout under the equipment bases. Shims used to level and adjust the bases shall be steel. Shims may be left embedded in the grout, in which case they shall be installed neatly and so as to be as inconspicuous as possible in the completed work. Unless otherwise permitted, all grout shall be a suitable non-metallic, non-shrink grout.

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

5. Where such procedure is impracticable, the method of placing grout shall be as accepted by the Engineer. After the grout has hardened sufficiently, all forms, hoppers, and excess grout shall be removed, and all exposed grout surfaces shall be patched in an accepted manner and given a burlap-rubbed finish.

F. Equipment Drive Guards:

1. All equipment driven by open shafts, belts, chains, or gears shall be provided with acceptable all-metal guards enclosing the drive mechanism. Guards shall be constructed of galvanized sheet steel (12 gage minimum) or galvanized woven wire or expanded metal set in a frame of galvanized steel members. Guards shall be secured in position by steel braces or straps which will permit easy removal for servicing the equipment. The guards shall conform in all respects to all applicable safety codes and regulations.

2. Provide pivoting access covers for shaft speed measurements.

G. Sleeves:

1. Unless otherwise indicated on the drawings, or specified, form openings for the passage of pipes, conduits, and circular ducts through floors and walls using sleeves of standard weight, galvanized-steel pipe. Provide sleeves of ample diameter to pass the pipe and its insulation, if any, and to permit expansion as may occur. Provide sleeves that are flush at the walls and at the bottom of slabs and

project 4 inches (100 mm) above the finished floor surface. Threaded nipples shall not be used as sleeves.

2. Sleeves in exterior walls below ground or in walls that have liquids on one or both sides, shall have a 2-inch (50-mm) annular fin of 1/8-inch (3.125 mm) plated welded with a continuous weld completely around the sleeve at mid-length. Galvanize sleeves after the fins are attached.

3. Sleeves shall be set accurately before the concrete is placed or shall be built in accurately as the masonry is being built.

H. Protection Against Electrolysis:

1. Where dissimilar metals are used in conjuction with each other, provide insulation between adjoining surfaces to eliminate direct contact and any resultant electrolysis. Provide bituminous insulation, heavy bituminous coatings, nonmettalic separators or washers, impregnated felt, or other means to provide insulation.

PART 2 - PRODUCTS

2.01 MATERIALS AND EQUIPMENT:

A. Material and Equipment Incorporated into Work:

1. Conform to applicable specifications and standards.

2. Comply with size, make, type, and quality specified or as accepted by Submittal.

B. Manufactured and Fabricated Materials and Equipment:

1. Design, fabricate, and assemble in accordance with engineering and shop practices standard with industry.

2. Manufacture like parts of duplicate units to standard sizes and gauges, to be interchangeable.

3. Two or more items of same kind shall be identical, by same manufacturer.

4. Material and equipment shall be suitable for service conditions.

5. Equipment capabilities, sizes, and dimensions shown or specified shall be adhered to, unless variations are specifically accepted, in writing.

6. Equipment shall be adapted to best economy in power consumption and maintenance. Parts and components shall be proportioned for stresses occurring during continuous or intermittent operation, and for additional stresses occurring during fabrication or installation.

7. Design so working parts are readily accessible for inspection and repair, easily duplicated, and replaced.

8. Design structural members of equipment for anticipated shock and vibratory loads.

9. Design machinery such that working parts are readily accessible for inspection and repair, and that each part is suitable for the service required.

C. Do not use material or equipment for purpose other than for which it is designed or specified.

PART 3 - EXECUTION

3.01 FIELD QUALITY CONTROL; INSTALLATION, INSTRUCTIONAL, AND POST STARTUP SERVICES:

A. General:

1. Provide on-site services of Supplier's representatives for equipment provided by Contractor during construction, installation, equipment startup, and training of Owner's personnel for equipment or plant operation as specifically required in Specification section for equipment or system.

2. Include and pay costs for Supplier's services.

3. Work day is defined as 8 hr period during Owner's or Contractor's typical calendar day. Work day for purposes of this section does not include travel to or from Site.

4. Specifications include minimum mandays to provide basis for bidding. If additional time is required to perform services Contractor shall include that time in Contract Price.

B. Installation Services:

1. Where installation services are called for in Specifications, provide competent and experienced technical representatives of manufacturers of material or equipment and systems to resolve assembly or installation procedures attributable to, or associated with, equipment furnished.

2. After equipment is installed, representatives shall perform initial equipment and system adjustment and calibration to conform to Specifications and manufacturer's requirements and instructions.

3. Provide "Certificate of Installation Services" stating proper adjustments have been made to equipment or system and equipment or system is ready for startup and system demonstration. Use Form 01600-1 and furnish 2 copies to Engineer.

C. Training:

1. Do not start training until Installation Services have been completed.

2. Where training is called for in Specifications, provide competent and experienced technical representative of Supplier to provide detailed instructions to Owner's personnel for operation of equipment. Training services shall include operation and maintenance of instrumentation and equipment in classroom and on-site. Training shall include electrical, mechanical, and safety aspects of equipment.

3. Submit documentation identifying name of specific representative, factory authorization, and background of named individual(s) to conduct training. Submit information 30 days before scheduled training period for review and acceptance by Engineer.

4. Coordinate training periods with Engineer, Owner and Supplier's representatives.

    a. No training shall be conducted unless instructor has been accepted by Engineer

    b. Notify Engineer at least 48 hrs before training sessions are to begin so Engineer can make arrangements with Owner's operating personnel.

    c. Reschedule canceled training sessions 48 hrs in advance.

    d. Failure of Supplier's or manufacturer's representative to appear for scheduled training, failure to notify Engineer 24 hrs in advance of need to cancel scheduled training or failure to arrive within 30 min of start of scheduled training shall result in reimbursement to Owner for time lost by Owner's personnel in waiting for arrival of manufacturer's representative. Except in case of failure to arrive on time, time will not exceed 1 hr for each employee scheduled to receive training. Failure to arrive on time will be reimbursed by actual time late, up to 1 hr, after 1 hr training will be rescheduled.

    e. Failure of Supplier's or manufacturer's representative to appear for scheduled training, failure to notify Engineer 24 hrs in advance of need to cancel scheduled training or failure to arrive within 30 min of start of scheduled training shall result in reimbursement to Owner for expenses and time incurred by Engineer in traveling and time spent on-site. Minimum time billed shall be 8 hrs.

5. Similar types of equipment differing in model, size or manufacturer shall require equal service time as stated in specific Specification section.

6. O&M data shall constitute basis of instruction.

a. Review data contents with personnel in full detail to explain aspects of operations and maintenance.

7. Provide “Certificate of Instructional Services”, cosigned by Owner and Supplier’s representative, verifying training has been accomplished to satisfaction of each party. Use form in 01730 and furnish 2 copies to Engineer.

3.02 CLOSEOUT ACTIVITIES:

A. Provide in accordance with Section 01700.

FORM 01600-1

EQUIPMENT MANUFACTURER'S CERTIFICATE OF INSTALLATION SERVICES

Owner - _____

Project - _____

Contract No. _____

AECOM No. _____

EQUIPMENT SPECIFICATION SECTION_____

EQUIPMENT DESCRIPTION_____

I_____, Authorized representative of
(Print Name)

_____
(Print Manufacturer's Name)

hereby CERTIFY that _____
(Print equipment name and model with serial No.)

conforms to the requirements of the Contract and is ready for permanent operation and that nothing in the installation will render the manufacturer's warranty null and void.
on

Date:_____ Time:_____

CERTIFIED BY:_____DATE:_____
(Signature of Manufacturer's Representative)

SECTION 01610

DELIVERY, STORAGE AND HANDLING

PART 1 - GENERAL

1.01 GENERAL:

A. This Section specifies the general requirements for the delivery handling, storage and protection for all items required in the construction of the work. Specific requirements, if any, are specified with the related item.

1.02 TRANSPORTATION AND DELIVERY:

A. Transport and handle items in accordance with manufacturer's printed instructions.

B. Schedule delivery to reduce long term on-site storage prior to installation and/or operation. Under no circumstances shall equipment be delivered to the site more than one month prior to installation without written authorization from the Engineer. Deliveries to the site of any kind shall not be permitted prior to August 21, 2021.

C. Ship equipment, material and spare parts complete except where partial disassembly is required by transportation regulations or for protection of components.

D. Pack spare parts in containers bearing labels clearly designating contents and pieces of equipment for which intended. All spare parts shall be cross-referenced to their applicable the Specification Section.

E. Carefully pack and crate equipment for shipment. Protect polished and machined metal surfaces from corrosion and damage during shipment and installation. Specially pack electrical equipment to prevent damage by moisture. Cover equipment having exposed bearings and glands to exclude foreign matter. Carefully pack machines for shipment and protect electrical equipment from moisture damage. Protect bearings, seals and glands from grit and dirt.

F. Identify each component with durable identifying labels or tags securely attached to each piece of equipment, crate or container.

G. Finished surfaces of all exposed flanges shall be protected by fiberboard blank flanges strongly built and securely bolted thereto.

H. Deliver spare parts at same time as pertaining equipment. Deliver spare parts to owner after completion of work.

I. Coordinate delivery with installation to ensure minimum holding time for items that are hazardous, flammable, easily damaged or sensitive to deterioration.

J. Deliver products to the site in manufacturer's original sealed containers or other packing systems, complete with instructions for handling, storing, unpacking, protecting and installing.

K. Assume responsibility for equipment material and spare parts just before unloading from carrier at site.

L. All items delivered to the site shall be unloaded and placed in a manner which will not hamper the Contractor's normal construction operation or those of subcontractors and other contractors and will not interfere with the flow of necessary traffic.

M. Provide equipment and personnel to unload all items delivered to the site..

N. Promptly inspect shipment to assure that products comply with requirements, quantities are correct, and items are undamaged. For items furnished by others (i.e. Owner, other Contractors), perform inspection in the presence of the Engineer. Notify Engineer verbally, and in writing, of any problems.

O. Pay all demurrage charges if failed to promptly unload items.

1.03 STORAGE AND PROTECTION:

A. Store and protect products and equipment in accordance with the manufacturer's instructions, with seals and labels intact and legible. Storage instruction shall be studied by the Contractor and reviewed with the Engineer by him. Instructions shall be carefully followed and a written record of this kept by the Contractor for each product and pieces of equipment.

B. Arrange storage of products and equipment to permit access for inspection. Periodically inspect to make sure products and equipment are undamaged and are maintained under specified conditions.

C. Provide protective maintenance during storage consisting of manually exercising equipment, inspecting mechanical surfaces for signs or corrosion or other damage, lubricating, applying any coatings as recommended by the equipment manufacturer necessary for its protection and all other precautions to assure proper protection of all equipment stored and for compliance with manufacturers' requirements related to warranties. Log all protective maintenance for each piece of equipment in the written record noted above.

D. Store loose granular materials on solid flat surface in a well-drained area. Prevent mixing with foreign matter.

E. Cement and lime shall be stored under a roof and off the ground and shall be kept completely dry at all times. All structural, miscellaneous and reinforcing steel shall be stored off the ground or otherwise to prevent accumulation of dirt or grease, and in a position to prevent accumulations of standing water and to minimize rusting. Beams shall be stored with the webs vertical. Precast concrete shall be handled and stored in a

manner to prevent accumulations of dirt, standing water, staining, chipping or cracking. Brick, block and similar masonry products shall be handled and stored in manner to reduce breakage, cracking and spalling to a minimum.

F. All mechanical and electrical equipment and instruments shall be covered with canvas and stored in a weathertight building to prevent injury. The building may be a temporary structure on the site or elsewhere, but it shall be satisfactory to the Engineer. Building shall be provided with adequate ventilation to prevent condensation. Maintain temperature and humidity within range required by manufacturer and to prevent condensation on the equipment being stored.

1. All equipment shall be stored fully lubricated with oil, grease and other lubricants unless otherwise instructed by the manufacturer.

2. Moving parts shall be rotated a minimum of once weekly to insure proper lubrication and to avoid metal-to-metal "welding". Log all rotation maintenance for each piece of equipment in the written record noted above.

3. Upon installation of the equipment, the Contractor shall start the equipment, at least half load, once weekly for an adequate period of time to ensure that the equipment does not deteriorate from lack of use. Log all startup for each piece of equipment in the written record noted above.

4. Lubricants shall be changed upon completion of installation and as frequently as required thereafter during the period between installation and acceptance. New lubricants shall be put into the equipment at the time of acceptance.

5. Prior to acceptance of the equipment, the Contractor shall have the manufacturer inspect the equipment and certify that its condition has not been detrimentally affected by the long storage period. Such certifications by the manufacturer shall be deemed to mean that the equipment is judged by the manufacturer to be in a condition equal to that of equipment that has been shipped, installed, tested and accepted in a minimum time period. As such, the manufacturer will guaranty the equipment equally in both instances. If such a certification is not given, the equipment shall be judged to be defective. It shall be removed and replaced at the Contractor's expense.

PART 2 - PRODUCTS

(Not Used)

PART 3 - EXECUTION

(Not Used)

END OF SECTION

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SECTION 01700

CONTRACT CLOSEOUT

PART 1 - GENERAL

1.01 RELATED DOCUMENTS:

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY:

A. Section includes administrative and procedural requirements for contract closeout, including, but not limited to, the following as indicated and in compliance with Contract Documents:

1. Substantial Completion procedures.

2. Final completion procedures.

3. Warranties.

4. Final cleaning.

5. Repair of the Work.

6. Specific closeout and special cleaning requirements for the Work in those Sections.

1.03 SUBMITTALS:

A. Submit the following shop drawings in accordance with Section 01300.

B. Contractor's List of Incomplete Items: Initial submittal at Substantial Completion.

C. Certified List of Incomplete Items: Final submittal at Final Completion.

D. Certificates of Release: From authorities having jurisdiction.

E. Certificate of Insurance: For continuing coverage.

F. Schedule of Maintenance Material Items: For maintenance material submittal items specified in other Sections.

1.04 SUBSTANTIAL COMPLETION PROCEDURES:

A. Contractor's List of Incomplete Items: Prepare and submit a list of items to be completed and corrected (Contractor's punch list), indicating the value of each item on the list and reasons why the Work is incomplete.

B. Submittals Prior to Substantial Completion: Complete the following a minimum of 10 days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.

1. Certificates of Release: Obtain and submit releases from authorities having jurisdiction permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.

2. Submit closeout submittals specified in other Division 1 Sections, including project record documents, operation and maintenance manuals, final completion construction photographic documentation, damage or settlement surveys, property surveys, and similar final record information.

3. Submit closeout submittals specified in individual Divisions 2 through 3 Sections, including specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.

4. Submit maintenance material submittals specified in individual Divisions 2 through 3 Sections, including tools, spare parts, extra materials, and similar items, and deliver to location designated by Engineer. Label with manufacturer's name and model number where applicable.

C. Procedures Prior to Substantial Completion: Complete the following a minimum of 10 days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.

1. Advise Owner of pending insurance changeover requirements.

2. Participate with Owner in conducting inspection and walkthrough with local emergency responders.

3. Terminate and remove temporary facilities from Project site.

4. Complete final cleaning requirements.

D. Inspection: Submit a written request for inspection to determine Substantial Completion a minimum of 10 days prior to date the work will be completed and ready for final inspection and tests. On receipt of request, Engineer will either proceed with inspection or notify Contractor of unfulfilled requirements. Engineer will prepare the Certificate of Substantial Completion after inspection or will notify Contractor of items, either on

Contractor's list or additional items identified by Engineer, that must be completed or corrected before certificate will be issued.

1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.

2. Results of completed inspection will form the basis of requirements for final completion.

1.05 DEMONSTRATION AND INSTRUCTIONS:

A. Conform to the requirements of sections 01600, Section 3.01.C.

B. Prepare and insert additional data in operations and maintenance manuals when need for additional data becomes apparent during instruction.

C. Required instruction time for each item of equipment and system is specified in individual sections.

1.06 PROJECT RECORDS DOCUMENTS

A. The Contractor shall record any actual revisions to the Work and maintain one set of the following Project Record Documents on Site:

1. Contract Drawings, Specifications, and Addenda.

2. Change Orders, Field Orders, and other written notices.

3. Shop drawings, Product data, and samples.

4. Records of surveying and layout Work.

5. Project Record Drawings.

B. The Contractor shall record information on the Project Record Documents concurrent with construction progress and store these documents separately from the documents used for construction.

1. The Owner will supply a set of Contract Drawings. The Contractor shall mark thereon all revisions as the Work progresses in order to produce a set of as-bulit drawings.

2. The Contractor shall note any changes made during construction by any of the Contractor's forces or those of any Subcontractors.

3. The Contractor shall dimension the locations of buried or concealed Work, especially piping and conduit, with reference to exposed structures.

4. The Contractor shall dimension the installed locations of concealed service lines on the Site or within the structure by reference from the centre line of the service to the structure column lines, or other main finished faces, or other structural points which are easily identified and located in the finished Work.

5. Certificates of Substantial Performance and Total Performance shall not be issued until as-built drawings are complete and submitted, and the Contractor has satisfied all requirements for Substantial Performance and Total Performance of the Work.

C. For Project Record Documents and Record Shop Drawings, the Contractor shall legibly mark each item to record actual construction including:

1. Field changes of dimensions and details.

2. Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.

3. Changes in the Work caused by Site conditions, or originated by the Owner, the Engineer, the Contractor, Preselected Equipment Vendors, or Subcontractors and by addenda, supplemental drawings, Site instructions, supplementary instructions, change orders, correspondence, and directions of any regulatory authorities.

1.07 PROTECTING INSTALLED CONSTRUCTION:

A. Protect installed Work and provide special protection where specified in individual specification sections.

B. Prohibit traffic from landscaped areas.

1.08 SPARE PARTS AND MAINTENANCE PRODUCTS:

A. Furnish spare parts, maintenance, and extra products in quantities specified in individual specification sections.

B. Deliver to location directed by Engineer; obtain receipt prior to final payment.

C. Coat parts to protect from moisture.

D. Crate in containers designed for prolonged storage suitable for handling with hoisting equipment containers.

E. Stencil on containers:

1. Manufacturer/supplier name.

2. Unit name.

3. Spare part name.

4. Manufacturer catalogue number.

5. Other identifying information.

6. Precautionary information.

1.09 FINAL COMPLETION PROCEDURES:

A. Submittals Prior to Final Completion: Before requesting final inspection for determining final completion, complete the following:

1. Submit a final Application for Payment according to Division 1 Section "Payment Procedures."

2. Certified List of Incomplete Items: Submit certified copy of Engineer's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Engineer. Certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.

3. Certificate of Insurance: Submit evidence of final, continuing insurance coverage complying with insurance requirements.

B. Inspection: Submit a written request for final inspection to determine acceptance a minimum of 10 days prior to date the work will be completed and ready for final inspection and tests. On receipt of request, Engineer will either proceed with inspection or notify Contractor of unfulfilled requirements. Engineer will prepare a final Certificate for Payment after inspection or will notify Contractor of construction that must be completed or corrected before certificate will be issued.

1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.

1.10 LIST OF INCOMPLETE ITEMS (PUNCH LIST):

A. Organization of List: Include name and identification of each space and area affected by construction operations for incomplete items and items needing correction including, if necessary, areas disturbed by Contractor that are outside the limits of construction.

1. Organize list of spaces in sequential order, according to the structural designations from the Contract Drawings.

2. Organize items applying to each space by major element, including categories for ceiling, individual walls, floors, equipment, and building systems.

3. Include the following information at the top of each page:

a. Project name.

b. Date.

c. Name of Engineer.

d. Name of Contractor.

e. Page number.

4. Submit list of incomplete items in the following format:

a. Six (6) paper copies. Engineer, will return two copies.

1.11 SUBMITTAL OF PROJECT WARRANTIES:

A. Refer to Section 01740.

1.12 AS-BUILT DRAWINGS:

A. Comply with the requirements of 01700 and 00800.

B. The "as-built" drawings shall consist of all the Contract Drawings.

C. The Contractor shall maintain one set of "marked up" as-built drawings throughout the duration of the contract.

D. The Contractor shall maintain the drawings and identify all the work completed as the project progresses.

E. The as-built drawings shall be stored and maintained in the Contractor's field office apart from other documents used for construction. The as-built drawings shall be maintained in a clean, dry and legible condition and shall not be used for construction purposes.

F. The as-built drawings shall be made available at all times for the Engineer and/or Owner's review throughout the duration of the project. All deficiencies noted shall be promptly corrected by the Contractor.

G. On a daily basis, the Contractor shall take ties and record top of pipe elevations.

H. The Contractor shall record all changes, including the location, size, number, type, horizontal alignment, elevation, etc. of all elements of the project which deviate from those indicated on the Contract Drawings.

I. The Contractor shall submit the final as-built drawings for the Engineer's review. Inaccuracies in the as-built drawings shall be corrected.

PART 2 - PRODUCTS

2.01 MATERIALS:

A. Cleaning Agents: Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.

PART 3 - EXECUTION

3.01 FINAL CLEANING:

A. General: Perform final cleaning in accordance with Section 01745.

B. Pest Control: Comply with pest control requirements in Division 1 Section "Temporary Facilities".

C. Construction Waste Disposal: Comply with waste disposal requirements in Section 01500.

3.02 REPAIR OF THE WORK:

A. Complete repair and restoration operations before requesting inspection for determination of Substantial Completion.

B. Repair or remove and replace defective construction. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment. Where damaged or worn items cannot be repaired or restored, provide replacements. Remove and replace operating components that cannot be repaired. Restore damaged construction and permanent facilities used during construction to specified condition.

1. Remove and replace chipped, scratched, and broken glass, reflective surfaces, and other damaged transparent materials.

2. Touch up and otherwise repair and restore marred or exposed finishes and surfaces. Replace finishes and surfaces that that already show evidence of repair or restoration.

a. Do not paint over "UL" and other required labels and identification, including mechanical and electrical nameplates. Remove paint applied to required labels and identification.

3. Replace parts subject to operating conditions during construction that may impede operation or reduce longevity.

4. Replace burned-out bulbs, bulbs noticeably dimmed by hours of use, and defective and noisy starters in fluorescent and mercury vapor fixtures to comply with requirements for new fixtures.

3.03 ADJUSTING:

A. Adjust operating products and equipment to ensure smooth and unhindered operation.

END OF SECTION

SECTION 01730

OPERATION AND MAINTENANCE DATA

PART 1 - GENERAL

1.01 DESCRIPTION:

A. This section includes procedural requirements for providing, compiling and submitting operation and maintenance data required for this project.

1.02 DEFINITIONS:

A. System: An organized collection of parts, equipment, or subsystems united by regular interaction.

B. Subsystem: A portion of a system with characteristics similar to a system.

1.03 SUBMITTALS:

A. Provide in accordance with Section 01300.

1.04 FORMAT (HARDCOPY):

A. Prepare data in the form of an O&M instructional manual.

B. Binders: Commercial quality, 8-1/2 x 11-inch three-hole post type binders with hardback, 3-inch maximum binder size. When multiple binders are used, correlate data into related consistent groupings. Three ring binders are not acceptable.

C. Arrange contents by Specification Section numbers and sequence of Table of Contents of this Project Manual.

D. Provide tabbed fly leaf for each separate product and system, with printed description of product and major component parts of equipment. Insert type tab labels must be secured or bonded to prevent the labels from falling out.

E. Text: Manufacturer’s printed data, or typewritten data on 20 pound paper.

F. Drawings: Provide with reinforced punched binder tab. Bind in with text; fold larger drawings to size of text pages and insert into clear plastic envelopes that can be secured into the three-hole post binders.

G. Electronic Media: Provide CD or DVD containing O&M Manual in a sleeve with each copy of the O&M manual. For items provided with a PLC, provide a digital copy of the final software.

1.05 QUALITY ASSURANCE:

A. Preparation of data shall be performed by personnel:

1. Trained and experienced in O&M of described equipment.

2. Familiar with requirements of this section.

3. Skilled as technical writers to the extent required to communicate the essential data to the Reader.

4. Skilled as drafters competent to prepare any required drawings.

PART 2 - PRODUCTS

(Not Used)

PART 3 - EXECUTION

3.01 GENERAL CONTENTS OF DATA:

A. Each individual manual shall contain equipment data pertaining to not more than one Specification section number as indicated in the Contract Documents.

B. Title Sheet: First page in data listing following:

1. Title: “OPERATION AND MAINTENANCE INSTRUCTIONS”.

2. Title of Project: As shown on Contract Documents.

3. Name(s) of applicable building(s) or structure(s) in which equipment is located.

4. Name of equipment as described in Contract Documents.

5. Contractor’s name, address, and telephone number.

6. Subcontractor’s name, address, and telephone number if equipment is provided by Subcontractor.

7. Contractor’s or Subcontractor’s purchase order number, manufacturer’s shop order number or other such numbers required for parts and service ordering.

8. Manufacturer’s name, address, and telephone number.

9. Name, address, and telephone number for local source of supply for parts and service.

C. Equipment List: Immediately following title sheet containing the following:

1. Table of Contents: Immediately following equipment list. Arrange in logical, systematic order and shall include as minimum each tabbed divider. Each page shall be numbered.

2. Tabbed Dividers: Insert tabbed section dividers between each major section

   a. Provide title of section on each tab.

   b. Provide table of contents for each tabbed section, arranged in systematic order.

3. Equipment Data Sheets: Provide catalog sheets showing configuration, manufacturer's specifications, models, options, and styles of equipment and major components being provided. Product data sheets will show project specific information with inapplicable information deleted by crossing out or removal. Include in tabbed section(s).

4. Text:

   a. Include only those sheets applicable to Project.

   b. Each sheet shall:

      (1) Identify specific equipment or part installed.

      (2) Identify text applicable to equipment or part installed.

      (3) Do not include inapplicable information or neatly strike it out.

5. Drawings:

   a. Supplement text with drawings to clearly illustrate following:

      (1) Equipment and components.

      (2) Relations of component parts of equipment and systems.

      (3) Control and flow diagrams.

   b. Actual drawings of equipment from manufacturer. "Typical" drawings are not acceptable, unless they accurately illustrate actual installation for this contract.

6. Specially written information, as required to supplement text for particular installation.

a. Provide explanation of interrelationships of equipment and components, and effects one component has on another or entire system.

b. Provide overall instructions and procedures for equipment tying in instructions and procedures for separate components into unified instructional package.

c. Provide glossary of any special terms used by the manufacturer if applicable.

d. Organize in consistent format under separate headings for different O&M procedures.

e. Provide logical sequence of instructions in order of O&M action required for each procedure.

3.02 SPECIFIC DATA FOR EACH ITEM OF EQUIPMENT AND/OR SYSTEM:

A. For each item of equipment and system include:

1. Completed Equipment Data Form typewritten on copy of Form 01730-1 to Section 01730. An electronic copy of Form 01730-1 will be provided to the contractor.

2. Description of equipment and component parts:

a. Function

b. Normal operating characteristics

c. Limiting conditions.

d. Performance curves

e. Engineering data

f. Test as applicable.

g. Complete nomenclature and model number of replaceable parts including keyed labeled exploded diagram.

h. Complete nameplate data.

i. Owners tag (or asset) numbers for equipment as indicated on the Contract Drawings.

3. Operating Procedures:

a. Startup and break-in.

b. Normal operating instructions.

c. Regulation and control

d. Stopping and shutdown,

e. Emergency instructions.

f. Summer and winter operating instructions, as applicable.

g. Special operating instructions.

4. Maintenance Procedures:

a. Routine maintenance operations.

b. Guide to troubleshooting.

c. Disassembly, repair, and reassembly instructions.

d. Alignment, adjusting, and checking instructions.

5. Servicing and Lubrication Schedule:

a. List of lubricants required and quantity to be applied.

b. Schedule of lubrication.

c. Schedule for other routine maintenance.

6. Manufacturer's printed instructions regarding safety precautions for both (a) protection of personnel operating equipment and systems and (b) prevention of damage to equipment and systems.

7. Description of sequence of operation of controls.

8. Assembly drawings and diagrams required for maintenance.

9. Manufacturer's parts list and illustrations

a. Predicted life of parts subject to wear.

b. Items recommended to be stocked by the Owner as spare parts and quantities of same.

10. Accepted control diagrams such as ladder diagrams, instrumentation loop diagrams, and electrical schematics.

11. Bill of material.

12. Other data as required under applicable Specification sections.

B. Prepare and include additional data when need for such data becomes apparent during instruction of Owner's personnel. Differences between the equipment O&M manual and the manufacturers training session shall result in the training and/or O&M Manual being corrected.

3.03 MANUAL FOR MATERIALS AND FINISHES:

A. Building Products, Applied Materials, and Finishes: Include product data, with catalog number, size, composition, and color and texture designations. Provide information for re-ordering custom manufactured products.

B. Instructions for Care and Maintenance: Include manufacturer's recommendations for cleaning agents and methods, precautions against detrimental agents and methods, and recommended schedule for cleaning and maintenance.

C. Moisture Protection and Weather Exposed Products: Include product data listing applicable reference standards, chemical composition, and details of installation. Provide recommendations for inspections, maintenance, and repair.

D. Additional Requirements: As specified in individual product specification sections.

E. Provide a listing in Table of Contents for design data, with tabbed fly sheet and space for insertion of data.

FORM 01730-1 Page 1 of 4 EQUIPMENT DATA FORM				
PROJECT NAME				
CONTRACT NO.				
CONTRACTOR				
EQUIPMENT NO.			ASSET NO.*	
DESCRIPTION			MAINT. NO.*	
LOCATION				
MANUFACTURER				
PURCHASED FROM				
VENDOR ORDER NO.			PURCHASE $	
DATE OF PURCHASE				
LOCAL SUPPLIER				
ADDRESS				
PHONE NO.				
MODEL NO.				
NO. OF UNITS		SERIAL NOS.		
*By Owner				

FORM 01730-1 Page 2 of 4 EQUIPMENT DATA FORM			
NAMEPLATE DATA			
ELECTRIC MOTOR		PUMP/HVAC UNIT	
MANUFACTURER		MANUFACTURER	
TYPE	[ ] AC [ ] DC	TYPE	
HORSEPOWER		SIZE	
RPM		CAPACITY	
VOLTAGE		PRESSURE	
AMPERAGE		ROTATION	
PHASE		IMPELLER SIZE	
FRAME		IMPELLER MATERIAL	
DRIVE/REDUCER		OTHER (I&C)	
MANUFACTURER		MANUFACTURER	
TYPE	[ ] GEAR [ ] V-BELT [ ] CHAIN [ ] VARIDRIVE	TYPE	
		SIZE	
SERVICE FACTOR		CAPACITY	
RATIO		RANGE	

FORM 01730-1 Page 3 of 4 EQUIPMENT DATA FORM			
MAINTENANCE SUMMARY			
EQUIPMENT NO.		ASSET NO.*	
DESCRIPTION		MAINT. NO.*	
MAINTENANCE OPERATION:		FREQUENCY:	
List briefly each Maintenance Operation required and refer to specific information in Manufacturer's Manual, if applicable. Refer by symbol to "Lubricant List" for Lubrication Operation.		List required frequency of each maintenance operation.	
*By Owner			

FORM 01730-1 Page 4 of 4 EQUIPMENT DATA FORM				
LUBRICANT/RECOMMENDED SPARE PARTS LIST				
EQUIPMENT NO.		ASSET NO.*		
DESCRIPTION		MAINT. NO.*		
LUBRICANT LIST				
REFERENCE SYMBOL	LUBRICANT TYPE (MILITARY STANDARD)	RECOMMENDED LUBRICANT AND MANUFACTURER		
List symbols in "Maintenance Operation" (Page 3).	List general lubricant type.	List specific lubricant name, viscosity, and manufacturer.		
RECOMMENDED SPARE PARTS LIST				
PART NO. **	DESCRIPTION	UNIT	QUANTITY	UNIT COST
ADDITIONAL DATA AND REMARKS				
* By Owner ** Identify parts provided by this contract with two asterisks. Note: Attach additional sheets if necessary; identify each sheet at top with equipment number and description.				

END OF SECTION

SECTION 01740

WARRANTIES AND BONDS

PART 1 - GENERAL

1.01 SCOPE OF WORK:

A. This Section specifies general administrative and procedural requirements for warranties and bonds required by the Contract Documents, including manufacturer's standard warranties on products and special warranties.

1.02 DEFINITIONS:

A. Standard Product Warranties are pre-printed written warranties published by individual manufacturers for particular products and are specifically endorsed by the manufacturer to the Owner.

B. Special Warranties are written warranties required by or incorporated in the Contract Documents, either to extend time limits provided by standard warranties or to provide greater rights for the Owner.

C. Standard Product Warranties and Special Warranties shall start on the date established as the date of Substantial Completion.

1.03 RELATED WORK:

A. Refer to Conditions of Contract for the general requirements relating to warranties and bonds.

B. General closeout requirements are included in Section .

C. Specific requirements for warranties for the Work and products and installations that are specified to be warranted, are included in the individual Sections of Division 2 through 3.

D. Certifications and other commitments and agreements for continuing services to Owner are specified elsewhere in the Contract Documents.

1.04 SUBMITTALS:

A. Submit written warranties to the Owner prior to the date fixed by the Engineer for Substantial Completion. If the Certificate of Substantial Completion designates a commencement date for warranties other than the date of Substantial Completion for the Work, or a designated portion of the Work, submit written warranties upon request of the Owner.

B. When a designated portion of the Work is completed and occupied or used by the Owner, by separate agreement with the Contractor during the construction period, submit properly executed warranties to the Owner within fifteen days of completion of that designated portion of the Work.

C. When a special warranty is required to be executed by the Contractor, or the Contractor and a subcontractor, supplier or manufacturer, prepare a written document that contains appropriate terms and identification, ready for execution by the required parties. Submit a draft to the Engineer for acceptance prior to final execution.

D. Refer to individual Sections of Divisions 2 through 3 for specific content requirements, and particular requirements for submittal of special warranties.

E. At Final Completion, compile two copies of each required warranty and bond properly executed by the Contractor, or by the Contractor, subcontractor, supplier, or manufacturer. Organize the warranty documents into an orderly sequence based on the table of contents of the Contract Documents.

F. Bind warranties and bonds in heavy-duty, commercial quality, durable 3-ring vinyl covered loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2-inch by 11-inch paper.

G. Table of Contents: Neatly typed, in the sequence of the Table of Contents of the Contract Documents, with each item identified with the number and title of the specification Section in which specified, and the name of the product or work item.

H. Provide heavy paper dividers with celluloid covered tabs for each separate warranty. Mark the tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product, and the name, address and telephone number of the installer, supplier, and manufacturer.

I. Identify each binder on the front and the spine with the typed or printed title "WARRANTIES AND BONDS," the Project title or name, and the name, address, and telephone numbers of the Contractor and equipment supplier.

J. When operating and maintenance manuals are required for warranted construction, provide additional copies of each required warranty, as necessary, for inclusion in each required manual.

1.05 WARRANTY REQUIREMENT:

A. Related Damages and Losses: When correcting warranted Work that has failed, remove and replace other Work that has been damaged as a result of such failure or that must be removed and replaced to provide access for correction of warranted Work.

B. Reinstatement of Warranty: When Work covered by a warranty has failed and been corrected by replacement or rebuilding, reinstate the warranty by written endorsement.

The reinstated warranty shall be equal to the original warranty with an equitable adjustment for depreciation.

C. Replacement Cost: Upon determination that Work covered by a warranty has failed, replace or rebuild the Work to an acceptable condition complying with requirements of Contract Documents. The Contractor is responsible for the cost of replacing or rebuilding defective Work regardless of whether the Owner has benefited from use of the Work through a portion of its anticipated useful service life.

D. Owner's Recourse: Written warranties made to the Owner are in addition to implied warranties, and shall not limit the duties, obligations, rights and remedies otherwise available under the law, nor shall warranty periods be interpreted as limitations on time in which the Owner can enforce such other duties, obligations, rights or remedies.

E. Rejection of Warranties: The Owner reserves the right to reject warranties and to limit selections to products with warranties not in conflict with requirements of the Contract Documents.

F. The Owner reserves the right to refuse to accept Work for the Project where a special warranty, certification, or similar commitment is required on such Work or part of the Work, until evidence is presented that entities required to countersign such commitments are willing to do so.

G. Disclaimers and Limitations: Manufacturer's disclaimers and limitations on product warranties do not relieve the Contractor of the warranty on the Work that incorporates the products, nor does it relieve suppliers, manufacturers, and subcontractors required to countersign special warranties with the Contractor.

PART 2 - PRODUCTS

(Not Used)

PART 3 - EXECUTION

(Not Used)

END OF SECTION

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SECTION 01745

CLEANING UP

PART 1 - GENERAL

1.01 SUMMARY:

A. Execute cleaning during progress of Work and at completion of Work as indicated and in compliance with Contract Documents.

B. Refer to specification sections for specific cleaning for Products or Work.

1.02 DISPOSAL REQUIREMENTS:

A. Conduct cleaning and disposal operations to comply with local codes, ordinances, regulations, and anti-pollution laws. Do not burn or bury rubbish or waste materials on Project site. Do not dispose of volatile wastes, such as mineral spirits, oil, or paint thinner, in storm or sanitary drains. Do not dispose of wastes into streams or waterways.

PART 2 - PRODUCTS

2.01 MATERIALS:

A. Use only those cleaning materials which will not create hazards to property and persons or damage surfaces of material to be cleaned.

B. Use only cleaning materials recommended by manufacturer of surface to be cleaned.

PART 3 - EXECUTION

3.01 CLEANING DURING CONSTRUCTION:

A. At all times maintain areas covered by the contract and adjacent properties and public access roads free from accumulations of waste, debris, and rubbish caused by construction operations.

B. During execution of work, clean site, adjacent properties, and public access roads and dispose of waste materials, debris, and rubbish to assure that buildings, grounds, and public properties are maintained free from accumulations of waste materials and rubbish. Unneeded construction equipment shall be removed and all damage repaired so that the public and property owners will be inconvenienced as little as possible.

C. Wet down dry materials and rubbish to lay dust and prevent blowing dust.

D. Cover or wet excavated material leaving and arriving at the site to prevent blowing dust. Clean the public access roads to the site of any material falling from the haul trucks.

E. Where material or debris has washed or flowed into or been placed in existing watercourses, ditches, gutters, drains, pipes structures, work done under this contract, or elsewhere during the course of the Contractor's operations, such material or debris shall be entirely removed and satisfactorily disposed of during the progress of the work, and the ditches, channels, drains, pipes, structures, and work, etc., shall, upon completion of the work, be left in a clean and neat condition.

F. On or before the completion of the work, the Contractor shall, unless otherwise especially directed or permitted in writing, tear down and remove all temporary buildings and structures built by him; shall remove all temporary works, tools, and machinery or other construction equipment furnished by him; shall remove, acceptably disinfect, and cover all organic matter and material containing organic matter in, under, and around privies, houses, and other buildings used by him; shall remove all rubbish from any grounds which he has occupied; and shall leave the roads and all parts of the premises and adjacent property affected by his operations in a neat and satisfactory condition.

G. Provide on-site containers for collection and removal of waste materials, debris, and rubbish in accordance with applicable regulations.

3.02 FINAL CLEANING:

A. General: Perform final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.

B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.

1. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for entire Project or for a designated portion of Project:

a. Clean Project site, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and other foreign substances.

b. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.

c. Rake grounds that are neither planted nor paved to a smooth, even-textured surface.

d. Remove tools, construction equipment, machinery, and surplus material from Project site.

C. Construction Waste Disposal: Comply with waste disposal requirements in Division 1 Section "Temporary Facilities".

D. Prior to substantial completion or Owner occupancy, Contractor with Engineer, shall conduct inspection of sight-exposed interior and exterior surfaces and work areas to verify Work and site is clean.

END OF SECTION

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SECTION 02018

VIBRATION MONITORING

PART 1 - GENERAL

1.01 DESCRIPTION:

A. Provide vibration monitoring as specified and in compliance with Contract Documents.

1. Furnish, install, maintain, monitor, and remove vibration monitoring equipment as specified.

2. At a minimum, three portable seismographs shall be used concurrently to monitor vibrations at the pre-determined vibration control monitoring points as specified. Peirce Island Pool House and the pool shall be monitored whenever the blasting operation is within 250 feet distance.

3. Monitor vibrations, air blast overpressures and noise levels originating from construction operations and blasting as specified.

4. Modify construction operation procedures if existing operation creates vibration, air blast overpressure, or noise exceeding specified amounts.

5. Vibration and noise levels resulting from construction operations shall conform to the requirements of this specification section and the requirements of all applicable Local and State Authorities. Refer to the City of Portsmouth Noise Ordinances in Appendix C, and the City of Portsmouth Blasting Ordinance in Appendix A.

1.02 RELATED WORK

A. Section 01390: Pre-and Post-Construction Surveys

B. Section 02160: Excavation Support Systems

C. Section 02210: Earth Excavation, Backfill, Fill and Grading

D. Section 02211: Rock Excavation and Disposal

1.03 QUALITY ASSURANCE:

A. Provide in accordance with Section 01400.

B. Retain the services of an independent vibration consulting firm with the following in-house personnel to conduct the following vibration monitoring requirements:

1. Preparation, signing and stamping of monitoring plans and daily reports, and overseeing monitoring and interpretation of monitoring equipment shall be performed by personnel with the following qualifications:

    a. Be a New Hampshire Registered Professional Engineer.

    b. Have a minimum of five (5) years experience in the vibration consulting field.

    c. Have successfully completed at least five (5) projects with vibration-inducing operations, air blast overpressures, and noise levels equal to or more severe than those to be encountered.

2. Installation, monitoring and interpretation of monitoring equipment shall be performed by personnel with the following qualifications:

    a. Have at least three (3) years of experience in the operation of monitoring equipment proposed for use and interpretation of records produced by such equipment.

    b. Have installed, operated, monitored and interpreted equipment and records on at least three (3) projects with vibration-inducing operations, air blast overpressures, and noise levels from similar construction activities.

3. Performed and maintained calibration records on all instruments used to monitor the blasting program.

1.04 SUBMITTALS:

A. Submit the following shop drawings in accordance with Section 01300.

1. Qualifications of the independent vibration consulting firm's Professional Engineer as specified in subparagraph 1.03B.1 including the names of the five (5) successful projects with names, current addresses, and telephone numbers of persons in charge of representing the owners or the owners at the time of monitored vibration-inducing operation, air blast overpressures, and noise levels.

2. Qualifications of the vibration consulting firm's personnel to install, operate and interpret the monitoring equipment as specified in subparagraph 1.03B.2 including the name of the personnel and the names of the three (3) projects per person which they installed, operated, monitored, and interpreted monitoring equipment with names, current addresses and telephone numbers of persons in charge of representing the owners or the owners at the time of monitored vibration-inducing operations, air blast overpressures, and noise levels.

3. Two weeks prior to commencement of blasting or other vibration inducing operations, submit in writing the plan for monitoring operations and equipment to

be used to assure compliance with the vibration, air blast overpressure, and noise limitation. As a minimum, this plan shall provide for the following:

a. Manufacturer's brochures and written operation instructions for seismograph recording equipment intended to be used for each vibration occurrence.

b. Instrument specifications and calibrations

c. Description and location of expected vibration and noise producing activities

d. Description of structures, utilities and other vibration and/or noise sensitive receptors that may be impacted by vibration and noise including structure description and location.

e. Proposed monitoring locations

f. Monitoring program procedure including reporting procedures

g. Proposed methods for mitigating vibration and noise during construction

h. Sample vibration and noise data sheets

4. Daily reports, while blasting or performing other vibration-inducing operations, detailing each source of vibration, location of monitoring, and the vibration records highlighting peak particle velocities. For blasting, include the air blast overpressure records as well as a plot of particle velocity versus scaled distance. All daily reports shall be stamped and signed by the Vibration Consulting Firm's Professional Engineer.

1.05 SITE CONDITIONS:

A. Subsurface Conditions: Refer to Appendix B.

1.06 TRAFFIC MANAGEMENT:

A. Truck access for materials and equipment deliveries to Peirce Island is affected by traffic, narrow streets, pedestrians, and tight intersections. The Contract Documents have detailed construction traffic routes which apply to all construction traffic on this project and the Contractor is required to adhere to. Refer to Section 01500 and the Contract Drawings for a full description of the traffic management requirements.

B. Tractor-trailers longer than an AASHTO WB-50 may have difficulty turning from State St. onto Marcy St. To facilitate this turn, parking has been prohibited at this intersection between the hours of 12AM and 8AM.

PART 2 - PRODUCTS

2.01 EQUIPMENT:

A. Provide a low frequency sensitive three-component seismic recording instrument with wave paper trace, variable trigger level setting, peak particle velocity memory operation (in inches/second) and air blast overpressure and sound level readout capability that meets the following criteria:

1. Seismic Frequency Range: 2 to 200 Hz (+/- 3 dB)

2. Acoustic Frequency Range: 2 to 200 Hz (+/- 1 dB)

3. Velocity Range: 0.02 to 4.0 inches per second.

4. Sound Range: 90 to 140 dB linear.

5. Transducer: Three mutually perpendicular axes: radial, transverse, and vertical.

6. Recording: Time-history of waveform capability.

B. Manufacturers:

1. Instantel, Inc., Kanata (Ottawa) Ontario, Canada.

2. Slope Indicator Co., Seattle, WA.

3. Thomas Instruments, Inc., Spofford, NH.

C. At a minimum, three portable seismographs shall be used concurrently to monitor vibrations at the pre-determined vibration control monitoring points as specified.

PART 3 - EXECUTION

3.01 EXAMINATION:

A. Furnish specified instrumentation to be installed, operated and interpreted by the vibration consulting firm's personnel, as specified below.

B. Monitor vibrations and record the entire particle velocity wave train, not just peak velocities. Obtain accurate, legible seismometer records of monitored vibrations.

C. Perform all blasting and other vibration-inducing operations so that vibrations reaching adjacent structures, railroad and facilities are within specified limits.

D. Monitor vibrations by measuring the peak particle velocity in the vicinity of work. Peak particle velocity is defined as a maximum vector sum of three velocity components, measured concurrently in mutually perpendicular directions at any point by an

instrument. The peak particle velocity as measured by the vibration consulting firm's personnel on or at the location as specified in the submitted vibration monitoring plan, shall not exceed the following or the limits indicated in City of Portsmouth and State of New Hampshire blasting regulations.

Type of Concrete	Age of concrete (hrs)	Peak Particle Velocity in./sec
Mass Concrete (footings, mats, slab-on-grade, fill concrete, etc.)	0-10	1.0
	11 and over	2.0
Concrete Structures (walls, columns, elevated slabs, etc.)	0-11	0.5
	11-24	1.0
	24 and over	2.0
Existing Structures, residences, railroad tracks or utilities	-	0.5

E. When blasting is conducted in the vicinity of structures subject to damage, air blast over pressures resulting from the blasting shall not exceed 0.014 psi peak overpressure. Air blast over pressures resulting from the blasting shall be recorded. Operate the instruments to make a permanent record for each blast.

F. In the event any recordings indicate that vibration or air over pressure limits are being exceeded, immediately suspend all blasting and other vibration-inducing operations and submit a report to the Engineer. Revise operations to reduce vibrations and submit a copy of the revised procedure to the Engineer at no additional cost to the Owner.

G. Noise levels shall not exceed 128 dB and shall be in accordance with the City of Portsmouth as included in Appendix C.

H. If evidence of displacement or damage to utilities, equipment, railroad, or structures is observed or reported, immediately notify the Engineer and discontinue operations creating the vibrations. Revise operation to reduce vibrations and submit a copy of the revised procedure to the Engineer.

I. Restore or replace utilities, equipment, or structures damaged by vibrations or air blast overpressures at no additional cost to the Owner.

3.02 CONTRACT CLOSEOUT:

A. Provide in accordance with Section 01700.

END OF SECTION

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SECTION 02100

SITE PREPARATION

PART 1 - GENERAL

1.01 DESCRIPTION:

A. Provide labor, material, tools and equipment to prepare site as indicated and specified.

1.02 RELATED WORK:

A. Division 1: General Requirements

B. Section 02210: Earth Excavation, Backfill, Fill and Grading

C. Section 02900: Planting

D. Appendix G: NHDES Wetlands Permit & Shoreland Permit

1.03 TRAFFIC MANAGEMENT:

A. Truck access for materials and equipment deliveries to Peirce Island is affected by traffic, narrow streets, pedestrians, and tight intersections. The Contract Documents have detailed construction traffic routes which apply to all construction traffic on this project and the Contractor is required to adhere to. Refer to Section 01500 and the Contract Drawings for a full description of the traffic management requirements.

B. Tractor-trailers longer than an AASHTO WB-50 may have difficulty turning from State St. onto Marcy St. To facilitate this turn, parking has been prohibited at this intersection between the hours of 12AM and 8AM.

PART 2 - PRODUCTS

2.01 WOOD CHIPS:

A. Chip from cleared wood.

B. Provide additional wood chips as directed by Engineer.

C. DO NOT PERMIT use of elm wood and elm bark as wood chips.

PART 3 - EXECUTION

3.01 EXISTING TREES AND VEGETATION:

A. Do not cut or injure trees and vegetation outside easement line and outside areas to be cleared as indicated, without Engineer's permission.

B. Accept responsibility for damages outside these lines.

C. Remove trees within permanent and temporary working space as designated by Engineer.

D. For trees to be removed, Contractor to mark the trees prior to removal. Once marked trees are reviewed by the Engineer, removal can occur.

E. Refer to Section 02150.

3.02 EXISTING STRUCTURES AND PROPERTY:

A. Remove existing signs, posts, catchbasin frames and grates, manhole frames and covers, and granite curbing within construction path unless directed otherwise.

B. Store at a site designated by Owner, items in reusable condition as determined by Engineer.

C. For work in loamed areas, strip loam to one side to avoid mixing with excavation materials. Do not take loam from site. Loam in areas of existing known invasive species populations shall not be reused. Loam from these areas shall be buried under a minimum of six inches of invasive-free topsoil.

3.03 CLEARING:

A. Cut or remove trees, brush, and other vegetable matter such as snags, bark and refuse, from areas to be cleared. Clear ground to width of permanent easement unless otherwise directed.

B. Cut trees, stumps, and stubs to be cleared, except where clearing done by machinery, as close to ground surface as practicable, but no more than 6 in. above ground surface for small trees and 12 in. for larger trees.

C. Bury elm bark, at least 1 ft. deep, or burn in incinerators off site with antipollution controls and fire prevention controls, to prevent spread of Dutch Elm disease as required by applicable laws.

3.04 CLEARING IN WOODED AREAS:

A. Chip and stockpile wood cleared at location directed by Owner. Do NOT PERMIT use of elm wood and elm bark as wood chips.

B. Chip and spread wood cleared at locations and cover as indicated. Do NOT PERMIT use of elm wood and elm bark as wood chips.

C. Supply and spread wood chips.

3.05 GRUBBING, STRIPPING, DISPOSAL:

A. Remove stumps and roots larger than 3 in. in diameter to a depth of 12 in., and roots larger than 1/2 in. in diameter to a depth of 6 in. Measure depths to cut from existing ground surface or proposed finished grade, whichever is lower.

B. Strip stumps, roots, foreign matter, topsoil, loam and unsuitable earth from ground surface. Utilize topsoil and loam insofar as possible for finished surfacing. Do not take loam from site.

C. Promptly dispose off site material from clearing and grubbing not reused or stockpiled. In doing so, observe all applicable laws, ordinances, rules and regulations. Do not consider work completed until final cleaning, unless otherwise directed.

3.07 CONTRACT CLOSEOUT:

A. Provide in accordance with Section 01700.

END OF SECTION

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SECTION 02140

DEWATERING

PART 1 - GENERAL

1.01 DESCRIPTION:

A. Design, furnish, operate, maintain, and remove temporary dewatering systems to control groundwater and surface water to maintain stable, undisturbed subgrades, and permit work to be performed under dry and stable conditions. Work to be done as part of dewatering includes, but is not limited to:

1. Lower the groundwater level.

2. Coordinate dewatering system design with the design of excavation support systems.

3. Prevent surface water from entering the excavation during construction.

4. Implement erosion control measures for disposing of discharge water.

B. Groundwater within the excavation area shall be lowered to at least 2 feet below the lowest excavation levels as specified and as indicated.

C. Common dewatering methods include, but are not limited to, sump pumping, deep wells, well points, vacuum well points or any combinations thereof.

D. The Contractor shall obtain coverage for construction activities including discharge from the Contractor's dewatering systems in accordance with final National Pollutant Discharge System (NPDES) Construction General Permit (CGP) effective June 27, 2019 and any subsequent updates by USEPA. The contractor shall prepare his own SWPPP.

E. The discharge location and water quality shall be in accordance with permit requirements.

1.02 RELATED WORK:

A. Section 01568: Erosion Control Sedimentation and Containment of Construction Materials.

B. Section 02160: Excavation Support Systems

C. Section 02210: Earth Excavation, Backfill, Fill, and Grading

D. Section 02223: Screened Gravel

E. Section 02273: Geotextile Fabric

F. Section 02435: Crushed Stone

1.03 SUBMITTALS:

A. Submit the following in accordance with Section 01300:

1. Qualification of the Contractor’s dewatering specialist's or firm's qualifications a minimum of four (4) weeks prior to execution of any dewatering. The submittal shall include, but not be limited to:

a. Qualifications of specialist's or firm's Registered Professional Engineer as specified in Paragraph 1.04 B.

b. Qualifications of specialist's or firm's field representative, as specified in paragraph 1.04 B, who shall oversee the installation, operation and maintenance of the dewatering system.

2. Submit a dewatering plan, and, if applicable, a groundwater recharge plan at least two weeks prior to start of any dewatering operation. Do not submit design calculations. The review will be only for the information of the Owner and third parties for an overall understanding of the project relating to access, maintenance of existing facilities and proper utilization of the site. The Contractor shall remain responsible for the adequacy and safety of the means, methods and sequencing of construction. The plan shall include the following items as a minimum:

a. Dewatering plan and details stamped and signed by a New Hampshire Registered Professional Engineer.

b. Certificate of Delegated Design Services: Refer to Section 01300.

c. A list of equipment including, but not limited to, pumps, prime movers, and standby equipment.

d. Detailed description of dewatering, maintenance, and system removal procedures.

e. Monitoring plan and details, including, but not limited to, number and locations of observation wells, and geotechnical instruments such as settlement markers and piezometers, and frequency of reading the monitoring devices.

f. Erosion/sedimentation control measures, and methods of disposal of pumped water.

g. List of all applicable laws, regulations, rules, and codes to which dewatering design conforms.

h. List of assumptions made for design of dewatering, including but not limited to groundwater levels, soil profile, permeabilities, and duration of pumping.

3. Measurement records consisting of observation well groundwater records and the geotechnical instrumentation readings within one day of monitoring.

4. A modified dewatering plan within 24 hours, if open pumping from sumps and ditches results in boils, loss of fines or softening of the ground.

1.04 QUALITY ASSURANCE:

A. Provide in accordance with Section 01400 and as specified.

B. Employ the services of a dewatering specialist or firm having the following qualifications:

1. Have completed at least five (5) successful dewatering projects of equal size and complexity and with equal systems within the last five (5) years.

2. Retain the services of a New Hampshire Registered Professional Engineer having a minimum of five (5) years experience in the design of well points, deep wells, or equal systems.

3. Retain the services of a field representative having a minimum of 5 years experience in installation as directed by the Contractor's dewatering specialist of well points, deep wells, or equal systems.

C. If subgrade soils are disturbed or become unstable due to dewatering operation or an inadequate dewatering system, notify the Engineer, stabilize the subgrade as directed by the Contractor's dewatering specialist, and modify system to perform as specified at no additional cost to the Owner as directed by the Contractor's dewatering specialist.

D. Notify the Engineer and the Contractor's Dewatering Specialist immediately if any settlement or movement is detected on structures, facilities and roadways. If the settlement or movement is deemed by the Engineer to be related to the dewatering, take actions to protect the adjacent structures and submit a modified dewatering

plan as directed by the Contractor's dewatering specialist to the Engineer within 24 hours. Implement the modified plan as directed by the Contractor's dewatering specialist and repair any damage incurred to the adjacent structures at no additional cost to the Owner.

E. If oil and/or other hazardous materials are encountered after dewatering begins, immediately notify the Engineer and the Contractor's Dewatering Specialist.

1.05 DELIVERY, STORAGE AND HANDLING:

A. Provide in accordance with Section 01610 and as specified.

1.06 PROJECT/SITE CONDITIONS:

A. Subsurface Conditions: Refer to Appendix B.

1.07 TRAFFIC MANAGEMENT:

A. Truck access for materials and equipment deliveries to Peirce Island is affected by traffic, narrow streets, pedestrians, and tight intersections. The Contract Documents have detailed construction traffic routes which apply to all construction traffic on this project and the Contractor is required to adhere to. Refer to Section 01500 and the Contract Drawings for a full description of the traffic management requirements.

B. Tractor-trailers longer than an AASHTO WB-50 may have difficulty turning from State St. onto Marcy St. To facilitate this turn, parking has been prohibited at this intersection between the hours of 12AM and 8AM.

PART 2 - PRODUCTS

2.01 MATERIALS:

A. Provide settlement markers, observation wells, piezometers and/or any other geotechnical instruments in accordance with the submitted dewatering plan or as specified.

B. Provide casings, well screens, piping, fittings, pumps, power and other items required for dewatering system.

C. Provide sand and gravel filter around the well screen. Wrapping geotextile fabric directly around the well screen shall not be allowed.

D. When deep wells, well points, or vacuum well points are used, provide pumping units capable of maintaining high vacuum and handling large volumes of air and water at the same time.

E. Provide and store auxiliary dewatering equipment, consisting of pumps and hoses on the site in the event of breakdown, at least one (1) pump for every five (5) used.

F. Provide and maintain erosion/sedimentation control devices as indicated or specified and in accordance with the dewatering plan.

G. Provide temporary pipes, hoses, flumes, or channels for the transport of discharge water to the discharge location.

H. Provide cement grout having a water cement ratio of 1 to 1 by volume.

PART 3 - EXECUTION

3.01 EXECUTION:

A. Execution of any earth excavation, installing earth retention systems, and dewatering shall not commence until the related submittals have been reviewed by the Engineer with all Engineer's comments satisfactorily addressed and the geotechnical instrumentation has been installed.

B. Furnish, install and maintain dewatering system in accordance with the dewatering plan.

C. Carry out dewatering program in such a manner as to prevent undermining or disturbing foundations of existing structures or of work ongoing or previously completed.

D. Do not excavate until the dewatering system is operational.

E. Unless otherwise specified, continue dewatering uninterrupted until all structures, pipes, and appurtenances below groundwater level have been completed such that they will not be floated or otherwise damaged by an increase in groundwater elevation.

F. Discontinue open pumping from sumps and ditches, if such pumping is resulting in boils, loss of fines, softening of the ground, or instability of the slopes. Modify dewatering plan as directed by the Contractor's dewatering specialist and submit to the Engineer at no additional cost to the Owner.

G. Where subgrade materials are disturbed or become unstable due to dewatering operations, remove and replace the materials in accordance with Section 02210 at no additional cost to the Owner.

H. Dewatering Discharge:

1. Install sand and gravel filters in conjunction with well points and deep wells to prevent the migration of fines from the existing soil during the dewatering operation.

2. Transport pumped or drained water to discharge location without interference to other work, damage to pavement, other surfaces, or property.

3. Provide separately controllable pumping lines.

4. The Engineer reserves the right to sample discharge water at any time.

5. Immediately notify the Engineer if suspected contaminated groundwater is encountered. Do not pump water found to be contaminated with oil or other hazardous material to the discharge locations.

I. Monitoring Devices and Records:

1. Install, maintain, monitor and take readings from the observation wells and geotechnical instruments in accordance with the dewatering plan.

2. Install settlement markers on structures within the zone of influence for dewatering a distance equal to twice the depth of the excavation, from the closest edge of the excavation. Conduct and report settlement surveys to 0.01 ft.

3. For large rectangular, square or circular mass excavations the zone of influence shall be defined by the actual cone of dewatering influence corresponding to a 10% increase in effective vertical stress.

4. Monitor discharge water quality in accordance with regulatory requirements.

J. Install and maintain erosion/sedimentation control devices at the point of discharge as indicated or specified and in accordance with the dewatering plan. Modify erosion/sediment control devices as needed to meet water quality requirements.

K. Removal:

1. Do not remove dewatering system without written approval from the Engineer.

2. Backfill and compact sumps or ditches with screened gravel or crushed stone wrapped with geotextile fabric in accordance with Section 02210.

3. All dewatering wells shall be abandoned upon completion of the work, and completely backfilled with cement grout.

3.02 CONTRACT CLOSEOUT:

A. Provide in accordance with section 01700.

END OF SECTION

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SECTION 02150

TREE PROTECTION AND PRUNING

PART 1 - GENERAL

1.01 DESCRIPTION

A. Include GENERAL CONDITIONS and applicable parts of Division 1 as part of this Section.

B. Examine all other Sections of the specifications for requirements that affect Work of this Section whether or not such work is specifically mentioned in this Section.

C. Coordinate work with that of all other trades affecting, or affected by Work of this Section. Cooperate with such trades to assure the steady progress of all Work under the Contract.

1.02 SUMMARY

A. This Section specifies requirements for the following types of Work and related items, but is not limited to:

1. Tree protection fencing for existing trees to remain within the work area.

2. Tree trunk protection for existing trees as indicated on the Drawings.

3. Pruning of existing trees as indicated on the Drawings.

4. Tree root pruning.

1.03 RELATED WORK SPECIFIED ELSEWHERE

A. Section 02220 – Demolition

B. Section 02900 – Planting

C. Section 02210 – Earth Excavation, Backfill, Fill, and Grading

1.04 REFERENCES AND STANDARDS

A. Where references are made in these Specifications to standard specifications, codes, etc., of the U.S. Government, State or local authorities, or professional and industrial societies and associations, the applicable portions thereof shall govern as fully as if they were recited at length herein, and shall include all revisions thereto issued as of the date of the Notice to Contractors pertaining hereto.

1. AAN: American Association of Nurserymen "American Standard for Nursery Stock," ANSI Z60.1, latest edition.

2. AJCHN: American Joint Committee on Horticultural Nomenclature. "Standardized Plant Names," latest edition.

3. AOAC: Association of Official Agricultural Chemists.

4. TCIA: Tree Care Industry Association (formerly National Arborist Association), Pruning Standards - "Standards for Pruning Shade Trees," and Pesticide Application - "Standards for Pesticide Application Operations," latest editions, 3 Perimeter Road, Unit 1, Manchester, NH 03103.

5. USDA: United States Department of Agriculture, Agricultural Research Service, "USDA Plant Hardiness Zone Map," Miscellaneous Publication No. 1475, latest edition.

6. ASTM: American Society of Testing Materials.

7. AASHTO: American Association of State Highway and Transportation Officials.

8. ANSI/NFPA: American National Standards Institute, National Fire Protection Act.

9. Tree Care Industry Association (formerly National Arborist Association) Standards, 3 Perimeter Road, Manchester, NH 03103.

10. ISA: "Guide for Establishing Values of Trees and Other Plants", latest edition, as published by the International Society of Arboriculture, Urbana, Illinois.

1.05 QUALIFICATIONS AND QUALITY CONTROL

A. All pruning of trees and tree roots shall be done by or under supervision of a State of New Hampshire Certified Arborist or I.S.A.

B. Existing trees which, in the opinion of the Engineer, are damaged as a result of the Contractor's overall operations shall be assessed at a minimum cost of one hundred and fifty dollars ($150.00) per caliper inch at breast height, in accordance with the ISA. Assessed damages shall be deducted from sums payable under the Construction Contract and will be paid for as a credit to the Owner on a Contract Change Order.

1.06 SUBMITTALS

A. Conform to requirements of section 01300 - SUBMITTALS for all procedures.

B. Provide two linear-foot, full height sample of Tree Protection Fencing and one Stake.

1.07 EXAMINATION OF CONDITIONS

A. Contractor shall request at least two weeks in advance for the Engineer to visit site with Contractor, Owner and a NH Certified Arborist, provided by Contractor, to review trees to remain before adjacent work begins. At this time, the Certified Arborist shall be prepared to review the health and status of the trees and shrubs to remain, proposals for tree and root pruning and remedial work, and any revisions to the Drawings indicating Tree Protection and Tree Trunk Protection.

1.08 TRAFFIC MANAGEMENT:

A. Truck access for materials and equipment deliveries to Peirce Island is affected by traffic, narrow streets, pedestrians, and tight intersections. The Contract Documents have detailed construction traffic routes which apply to all construction traffic on this project and the Contractor is required to adhere to. Refer to Section 01500 and the Contract Drawings for a full description of the traffic management requirements.

B. Tractor-trailers longer than an AASHTO WB-50 may have difficulty turning from State St. onto Marcy St. To facilitate this turn, parking has been prohibited at this intersection between the hours of 12AM and 8AM.

PART 2 - PRODUCTS

2.01 TREE PROTECTION FENCING

A. Tree protection fencing shall consist of 4' high 1"-slat wood snow fence secured to steel posts with 8-gauge galvanized wire, forming an enclosure around trees and shrubs to be protected in locations shown in the Drawings and adjusted in the field with the Engineer and Owner. Provide an easily removable loop of wire at one end of the fencing to allow access for cleanup and/or maintenance.

2.02 TREE TRUNK PROTECTION

A. Standard 2” x 4” fir lumber in 6’ lengths shall be used for surrounding each tree trunk to be protected.

B. Galvanized steel 8-gauge wire shall be used to secure tree trunk protection.

2.03 FERTILIZER

A. Fertilizer for trees to be protected shall consist of liquid soil-injectable 10-10-10, formulated especially for trees as per TCIA.

2.04 WATER

A. Water shall be potable and suitable for trees.

PART 3 - EXECUTION

3.01 TREE PROTECTION

A. Erect protection fencing at existing trees to remain near construction before site construction activity of any kind begins. Fencing shall be securely erected, be vertically plumb and be maintained for the duration of the project and shall protect individual trees or shrubs or groups of trees or shrubs. Fencing locations should match painted or staked locations set in field on site walk. No storage of materials, debris or equipment shall be permitted in tree protection areas.

B. Locate tree protection fencing as far beyond the dripline of tree as possible, or as directed by the Engineer. For large shrubs, locate at dripline. Fence groups of trees and shrubs as a group, not individually. Trees near pavement or building need greater protection area on non-built side. Do not store material nor carry on planting operations within the dripline or designated protection area of trees to be saved.

C. Within the drip line of trees to remain, do not excavate at all, nor fill more than two inches, unless permitted to do so by the Engineer.

D. In certain instances, cultivation for lawns or planting may need to occur within the drip line. If such Work is approved by the Engineer, limit the area of root disturbance. Where roots must be disturbed, cut roots by a trencher and hand trim roots over 2 inches in diameter. Digging by backhoe among tree roots under canopy is not permitted without permission of the Engineer.

E. If or when equipment must be brought within dripline of trees, obtain permission of Engineer. Take particular care in the use of heavy machinery to prevent injury to roots and branches.

F. Trees that have a 20% root loss or more, as determined by Certified Arborist and reviewed by the Engineer, shall be thoroughly watered during the growing season as often as required depending on rainfall, and fertilized with specified fertilizer between November and April under the direction of Certified Arborist.

G. Cover tree roots that are exposed to open air during growing season with filter fabric, staked securely or covered with aged wood chips to a depth of 3". Keep root area moist but not flooded.

H. At the completion of operations, review with the Engineer, Owner and Certified Arborist the overall health and maintenance requirements of plants protected, including necessary pruning, watering, fertilizing, and insect or disease control measures.

3.02 PRUNING OF EXISTING TREES

A. The Contractor shall walk the site with the Engineer and Owner to confirm and mark in the field the trees indicated on the Drawings to be pruned. The extent of pruning on each tree will be confirmed at this time.

B. Pruning shall be according to Class 1 pruning. The pruning work shall be overseen by an arborist, who is registered with the State of New Hampshire or I.S.A.

3.03 ROOT PRUNING OF EXISTING TREES

A. The Contractor shall walk the site with the Engineer and Owner to confirm and mark in the field the trees where the root zone will be impacted by Construction. The extent of root pruning on each tree will be confirmed at this time.

B. Pruning shall be performed at all trees impacted by construction that experience root zone loss. Root zone is defined by edge of canopy or dripline of tree. Loss can be to excavation with zone or through compaction of root zone by construction equipment.

C. The trees impacted by construction shall be pruned within two weeks of the impact. Pruning shall be done in accordance with TCIA Class I Pruning Standards to preserve the natural character of the plant, and crown pruning shall reflect extent of damage to compensate for root loss. If trees are expected to be impacted by construction, every effort shall be made by Contractor to identify these trees, protect and prune them when trees are dormant (leafless), early in the construction period. Trees that have been pruned and suffer additional dieback during construction period shall be pruned again as a condition of Final Acceptance.

END OF SECTION

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SECTION 02160

EXCAVATION SUPPORT SYSTEMS

PART 1 - GENERAL

1.01 DESCRIPTION:

A. Design, furnish and install excavation support systems as required to maintain lateral support, prevent loss of ground, limit soil movements to acceptable limits and protect from damage existing and proposed improvements including, but not limited to, pipelines, utilities, structures, roadways, and other facilities.

B. Coordinate excavation support system design with dewatering system specified in Section 02140. Design shall address water pressure outside the excavation and be coordinated with Section 02140 Dewatering.

C. Common types of excavation support system include, but are not limited to, singular or multiple stages comprised of cantilevered or internally braced soldier piles and lagging, steel sheetpile wall, timber sheetpile wall, trench box, or combinations thereof. Trench box temporary excavation support system is only acceptable for pipe or utility trench excavations. Temporary unsupported open cut excavation with stable sloping sides is allowed where applicable.

D. Wherever the word "sheeting" is used in this section or on the contract drawings, it shall be in reference to any type of excavation support system specified except trench box.

E. Construction of the excavation support systems shall not disturb the existing structures or the completed proposed structures. Damage to such structures shall be repaired by the Contractor at no additional cost to the Owner.

F. Adjacent structures are those that are bear upon soils above the proposed excavation depth and within a distance equal to twice the total depth of the excavation away from the closest edge of the excavation. Monitor and protect adjacent structures as specified and indicated.

G. Vibration monitoring for excavation support systems shall be performed by Contractor’s vibration consultant and monitoring firm. Vibration due to Contractor’s operations shall meet the requirements as specified in Section 02018.

H. Construction operations not to exceed specified noise limits in accordance with Section 02018.

I. The Contractor shall bear the entire cost and responsibility of correcting any failure, damages, subsidence, upheaval or cave-ins as a result of installation, maintenance or

design of the excavation support systems. The Contractor shall pay for all claims, costs and damages that arise as a result of the work performed at no additional cost to the Owner.

1.02 RELATED WORK:

A. Section 02018: Vibration Monitoring

B. Section 02140: Dewatering

C. Section 02210: Earth Excavation, Backfill, Fill, and Grading

D. Section 02211: Rock Excavation and Disposal

1.03 REFERENCES:

A. American Society for Testing and Materials (ASTM):

1. A36: Standard Specification for Structural Steel

2. A416: Standard Specification for Strand Steel, Uncoated Seven-Wire for Prestressed Concrete

3. A572: Standard Specifications for High Strength Low-Alloy Columbium-Vanadium Structural Steel

4. A722: Specification for Uncoated High-Strength Steel Bar for Prestressing Concrete

5. A615: Standard Specifications for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement

B. American Wood-Preserves Association (AWPA) Standards.

C. American Welding Society (AWS) Code: D1.1.

D. Federal Standard, FS TT-W-571: Wood Preservation and Treating Practices.

E. Occupational Safety and Health Administration (OSHA) Standards and Regulations contained in Title 29: Subpart P - Excavations, Trenching and Shoring.

F. American Concrete Institute (ACI)

1. ACI 304: Recommended Practice for Measuring, Mixing, Transporting and Placing Concrete.

1.04 SUBMITTALS:

A. Submit the following in accordance with Section 01300:

1. Submit the following qualifications four (4) weeks prior to the construction:

a. Qualifications of independent vibration consulting and monitoring firm as specified in Section 02018.

b. Qualifications of Contractor's excavation support system designer as specified in Paragraph 1.05 F.

c. Qualifications of Contractor's excavation support system installer as specified in Paragraph 1.05 G.

d. Qualifications of Contractor's independent tieback testing laboratory as specified in Paragraph 1.05 H, if a tieback system is utilized.

e. Qualifications of Contractor's excavation support system installation supervisor as specified in Paragraph 1.05 I.

f. Qualifications of vacuum excavation subcontractor as specified in Paragraph 1.05 E, if Deformation Monitoring Points (DMPs) for utilities are utilized.

2. Submit an excavation support plan stamped and signed by a Registered Professional Engineer in New Hampshire at least two weeks prior to start of the construction. Do not submit design calculations. The review will be only for the information of the Owner and third parties for an overall understanding of the project relating to access, maintenance of existing facilities and proper utilization of the site. The Contractor shall remain responsible for the adequacy and safety of the means, methods and sequencing of construction. The plan shall include the following items as a minimum:

a. Proposed excavation support system(s), details, location, layout, depths, extent of different types of support relative to existing features and the permanent structures to be constructed, and methods and sequence of installation and removal.

b. Certificate of Delegated Design Services: Refer to Section 01300.

c. A list of all design assumptions, including safety factors used for the excavation support system(s) and all lateral pressures used for each system.

d. If utilizing a tieback system, include tieback installation procedures and criteria for acceptance of tiebacks for performance and proof tests. Submit the tieback testing results to the Engineer for information only.

e. Requirements of dewatering during the construction.

f. Minimum lateral distance from the edge of the excavation support system for use for vehicles, construction equipment, and stockpiled construction and excavated materials.

g. List of equipment used for installing the excavation support systems.

h. Monitoring schedule, installation procedures and location plans for vibration/noise monitoring as specified in Section 02018, geotechnical instrumentation (deformation monitoring points, inclinometers, etc.) and observation wells/piezometers to monitor ground, excavation support system, adjacent structures and groundwater fluctuation during the entire construction period.

3. Submit a Construction Contingency Plan specifying the methods and procedures to maintain excavation support system stability if the allowable movement of the adjacent ground and adjacent structures is exceeded.

4. Submit monitoring data shall be within one (1) day of data collection from vibration and noise recording equipment, observation wells, deformation monitoring points and offset lines. Data shall include:

a. Horizontal and vertical movements of geotechnical instruments and groundwater readings.

b. New movements since the initial readings of the geotechnical instruments.

c. Weekly summary in tabular and graphic form at the end of each week.

d. A schematic plan of excavation and/or relevant construction activities at the time of monitoring.

5. For excavation support systems left in place, submit the following as-built information prior to backfilling and covering the excavation support systems:

a. Survey locations of the excavation support systems, including coordinates of the ends and points of change in direction.

b. Type of the excavation support system.

c. Elevations of top and bottom of the excavation support systems left in place.

1.05 QUALITY ASSURANCE:

A. Provide in accordance with Section 01400 and as specified.

B. Conform to the requirements of the OSHA Standards and Interpretations: "Part 1926 Subpart P - Excavation, Trenching, and Shoring", and all other applicable laws, regulations, rules, and codes.

C. Construction operations to conform to noise regulations provided in Section 02018 and as required by City of Portsmouth in Appendix C.

D. Retain the services of an independent vibration consulting firm as specified in Section 02018.

E. If utilizing deformation monitoring points (DMPs) for utilities, vacuum excavation shall be performed by subcontractor having five (5) years of experience in non-destructive vacuum excavation methods for utilities.

F. Prepare design, including calculations (not to be submitted), and drawings under the direction of a Professional Engineer registered in the state of New Hampshire and having the following qualifications:

1. Not less than ten (10) years experience in the design of specific excavation support systems to be used.

2. Completed not less than five (5) successful excavation support system projects of equal type, size, and complexity within the last five (5) years.

G. Excavation Support System Installer's Qualifications:

1. Not less than three (3) year experience in the installation of similar types and equal complexity as the proposed system.

2. Completed not less than three (3) successful excavation support systems of similar type and equal complexity as the proposed system.

H. If utilizing a tieback system, employ an independent testing laboratory to test the tieback system with the following qualifications:

1. Be accredited by the American Association of State Highway and Transportation Officials (AASHTO) Accreditation Program.

2. Employ personnel conducting testing who are trained in the methods and procedures to test and monitor tieback systems of similar type and equal complexity, as the proposed system.

3. Have not less than five (5) years experience in testing of tieback systems of similar type and equal complexity as the proposed system.

4. Have successfully tested at least three (3) tieback systems of similar type and equal complexity as the proposed system.

I. Install all excavation support systems under the supervision of a supervisor having the following qualifications:

1. Not less than five (5) years experience in installation of systems of similar type and equal complexity as the proposed system.

2. Completed at least five (5) successful excavation support systems of similar type and equal complexity as the proposed system.

J. All welding shall be performed in accordance with AWS D1.1.

1.06 DESIGN CRITERIA:

A. Design of excavation support systems shall meet the following minimum requirements:

1. Support systems shall be designed for earth pressures, water pressure outside sheeting, equipment, temporary stockpiles, construction loads, roadways, railroads, and other surcharge loads.

2. Design a bracing system to provide sufficient reaction to maintain stability.

3. Limit movement of ground adjacent to the excavation support system to be within the allowable ground deformation as specified.

4. Design the embedment depth below bottom of excavation to minimize lateral and vertical earth movements and provide bottom stability. Toe of braced excavation support systems shall not be less than 5 feet below the bottom of the excavation.

5. Design excavation support systems to withstand an additional 2 feet of excavation below proposed bottom of excavation without redesign except for the addition of lagging and/or bracing.

6. Maximum width of pipe trench excavation shall be as indicated on the drawings.

7. Do not cast permanent structure walls directly against excavation support walls.

8. The design location of the excavation support wall shall be determined such that the installed wall and bracing system components are all located outside the limits of the permanent structure. Construction tolerances (e.g. wall verticality) shall be considered in determining the plan location.

1.07 DELIVERY, STORAGE AND HANDLING:

A. Provide in accordance with Sections 01610 and as specified.

B. Store sheeting and bracing materials to prevent sagging which would produce permanent deformation. Keep concentrated loads which occur during stacking or lifting below the level which would produce permanent deformation of the material.

1.08 PROJECT/SITE CONDITIONS:

A. Subsurface Conditions: Refer to Appendix B.

1.09 TRAFFIC MANAGEMENT:

A. Truck access for materials and equipment deliveries to Peirce Island is affected by traffic, narrow streets, pedestrians, and tight intersections. The Contract Documents have detailed construction traffic routes which apply to all construction traffic on this project and the Contractor is required to adhere to. Refer to Section 01500 and the Contract Drawings for a full description of the traffic management requirements.

B. Tractor-trailers longer than an AASHTO WB-50 may have difficulty turning from State St. onto Marcy St. To facilitate this turn, parking has been prohibited at this intersection between the hours of 12AM and 8AM.

PART 2 - PRODUCTS

2.01 MATERIALS:

A. Structural Steel: All soldier piles, wales, rakers, struts, wedges, plates, waterstop and accessory steel shapes shall conform to ASTM A36.

B. Steel Sheet Piling: ASTM A572, continuous interlocking type.

C. Timber Lagging Left in Place: Pressured treated per appropriate AWPA standards.

D. Tieback Tendons: Tieback tendons shall be high strength steel wire strand cables conforming to ASTM A416, or bars conforming to ASTM A722. Splicing of individual cables shall not be permitted.

E. Raker Ties: ASTM A615 Grade 60.

F. Cement Grout Materials And Admixtures For Tieback Anchorages: Grout cube strength shall be a minimum 3500 psi at 7 days and 5000 psi at 28 days.

G. Concrete: Section 03300.

H. Tamping tools adapted for backfilling voids after removal of the excavation support system.

I. Provide specific trench box sizes for each pipe and utility excavation with structural capacity of retaining soil types as described in OSHA's 29 CFR Part 1926 Subpart P.

2.02 EQUIPMENT:

A. The Contractor’s excavation support system designer shall provide recommendations on the sheeting/pile driving equipment. Selection of the driving equipment shall mitigate potential soil settlement, and minimize damage to surrounding structures, utilities and other properties due to vibrations.

PART 3 - EXECUTION

3.01 INSTALLATION:

A. Installation of the excavation support systems shall not commence until the related earth excavation and dewatering submittals have been reviewed by the Engineer with all Engineer’s comments satisfactorily addressed.

B. Install excavation support systems in accordance with the excavation support plan.

C. If utilizing a tieback system, all performance and proof tests shall be conducted in the presence of the Engineer. Testing performed without the Engineer present will not be accepted. Repeat testing in the Engineer's presence at no additional cost to the Owner.

D. Do not drive sheeting within 100 feet of concrete less than seven (7) days old.

E. Carry out program of excavation support in such a manner as to prevent undermining or disturbing foundations of existing structures of work ongoing or previously completed.

F. Bottom of the trench box excavation support system shall be above the pipe invert prior to installing the pipe.

G. Install and read geotechnical instrumentation in accordance with the excavation support plan. Notify the Engineer immediately if any geotechnical instrumentation is damaged. Repair or replace damaged geotechnical instrumentation at the sole option of the Engineer and at no additional cost to the Owner.

H. Continuously monitor movements of the ground adjacent to excavation support systems and adjacent structures. In events of the measured movements approaching or exceeding the allowable movements, take immediate steps as directed by the excavation support system designer to arrest further movement by revising procedures such as providing supplementary bracing, filling voids behind the trench box, supporting utilities or other measures (Construction Contingency Plan) as required.

I. Notify utility owners if existing utilities interfere with the excavation support system. Modify the existing utility with the utility owners permission or have the utility owner make the modifications at no additional cost to Owner.

3.02 GROUND DEFORMATION ADJACENT TO EXCAVATION SUPPORT SYSTEMS:

A. Allowable Vertical (heave/settlement) and Lateral Movements: 2 inches maximum for the trench box excavation support system, and 1 inch maximum for other types of excavation support systems at any location behind the excavation support system.

B. Monitoring personnel shall use a procedure for reading and recording geotechnical instrumentation data which compares the current reading to the last reading during data collection to eliminate spurious readings.

C. Plot the observed ground deformation readings versus time. Annotate the plots with construction loading and excavation events having an impact on the readings. Evaluate plots by means of secondary rate-of-change plots to provide early warning of accelerating ground movements.

D. Notify the Engineer when the allowable ground deformation is exceeded.

E. Implement Construction Contingency Plan under direction of the excavation support system designer and the Engineer.

3.03 REMOVAL OF EARTH RETENTION SYSTEM:

A. Sheeting shall be left in place unless otherwise indicated or approved in writing by the Engineer.

B. When indicated or approved by the Engineer, remove the excavation support system without endangering the constructed or adjacent structures, utilities, or property. Immediately backfill all voids left or caused by withdrawal of excavation support systems with bank-run gravel, screened gravel or select borrow by tamping with tools specifically adapted for that purpose.

C. When tiebacks are used, release tension in tiebacks as the excavation is backfilled. Do not leave tensioned tieback in place at the completion of the work.

D. The excavation support system left-in-place shall be cut-off a minimum of 2 feet below the bottom of the next higher foundation level or a minimum of 5 feet below finished grade.

E. Conduct survey of the locations and final cut-off elevations of the excavation support systems left in place.

3.04 CONTRACT CLOSEOUT:

A. Provide in accordance with Section 01700.

END OF SECTION

SECTION 02210

EARTH EXCAVATION, BACKFILL, FILL AND GRADING

PART 1 - GENERAL

1.01 DESCRIPTION:

A. Perform the following earth excavation, backfill, fill and grading as indicated or specified:

1. Make excavations to accommodate piping, conduits, foundations and other structures.

2. Provide materials for backfilling excavations and constructing embankments and fills as indicated and specified.

3. Construct embankments of compacted materials.

4. Grade surfaces to meet finished grades indicated.

5. Immediately notify the Engineer if suspected hazardous materials are encountered and cease operations in that part of work.

6. Remove boulders within the excavation limits.

1.02 RELATED WORK:

A. Section 01568: Erosion Control Sedimentation and Containment of Construction Materials.

B. Section 02100: Site Preparation.

C. Section 02140: Dewatering

D. Section 02160: Excavation Support Systems

E. Section 02211: Rock Excavation and Disposal

F. Section 02223: Screened Gravel

G. Section 02224: Bank-run Gravel

H. Section 02225: Select Borrow

I. Section 02435: Crushed Stone

J. Section 03300: Cast-in-Place Concrete

1.03 REFERENCES:

A. American Society for Testing and Materials (ASTM) Publications:

1. C33: Specification for Concrete Aggregates.

2. C136: Sieve Analysis of Fine and Coarse Aggregates.

3. D421: Practice for Dry Preparation of Soil Samples for Particle Size Analysis and Determination of Soil Constants.

4. D1140: Test Method for Amount of Material in Soils Finer than the No. 200 (75 µm) Sieve.

5. D1556: Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method.

6. D1557: Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lb/ft^3).

7. D2167: Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method.

8. D2922: Test Method for Density of Soil and Soil-Aggregate in Place by Nuclear Methods. (Shallow Depth).

9. D3017: Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth).

10. D4318: Test Method for Liquid Limit, Plastic Limit and Plasticity Index of Soils.

11. D4718: Practice for Correction of Unit Weight and Water Content for Soils Containing Oversized Particles.

12. D4944: Test Method for Field Determination of Water (Moisture) Content of Soil by the Calcium Carbide Pressure Tester Method.

13. D4959: Test Method for Field Determination of Water (Moisture) Content of Soil by Direct Heating Method.

14. D5080: Test Method for Rapid Determination of Percent Compaction.

15. D6913: Standard Test Methods for Particle-Size Distribution (Gradation) of Soils Using Sieve Analysis

16. D6938: Standard Test method for In-Place Density and Water Content of Soil and Soil-Aggregate by nuclear Methods (Shallow Depth)

17. D7928: Standard Test Methods for Particle-Size Distribution (Gradation) of Fine-Grained Soils Using the Sedimentation (Hydrometer) Analysis

B. Occupational Safety and Health Administration (OSHA) Standards and Regulations contained in Title 29: Subpart P - Excavations, Trenching and Shoring.

1.04 DEFINITIONS:

A. Percentage of compaction is defined as the ratio of the field dry density, as determined by ASTM D1556 to the maximum dry density determined by ASTM D1557 Procedure C, multiplied by 100.

B. Proof Roll: Compaction with a minimum of 4 passes of a vibratory steel drum or rubber tire roller. Vibratory plate compactors shall be used in small areas where vibratory steel drum or rubber tire roller can not be used.

C. Acceptable Material: Material which does not contain organic silt or organic clay, peat, vegetation, wood or roots, stones or rock fragments over 6-inch in diameter, porous biodegradable matter, loose or soft fill, excavated pavement, construction debris, or refuse. Stones or rock fragments shall not exceed 40 percent by weight of the backfill material.

D. Unacceptable Materials: Materials does not comply with the requirements for the acceptable material or which cannot be compacted to the specified or indicated density.

E. Surplus Excavated Material: Earth and rock generated from excavation activities that is either unacceptable as backfill or not needed for backfilling or other use on the project.

1.05 SUBMITTALS:

A. Submit the following in accordance with Section 01300 - Submittals:

1. Qualifications of the Contractor's Independent Testing Laboratory as specified in Paragraph 1.06 H, four (4) weeks prior to the execution of any earth excavation, backfilling, filling, or compaction process.

2. Submit an excavation, backfilling, and filling plan at least two weeks prior to start of any earth moving activities. The review will be only for the information of the Owner and third parties for an overall understanding of the project relating to access, maintenance of existing facilities and proper utilization of the site. The Contractor shall remain responsible for the adequacy and safety of the means, methods and sequencing of construction. The plan shall include, but not be limited to the following items:

    a. Detailed sequence of work.

    b. General description of construction methods.

    c. Numbers, types, and sizes of equipment proposed to perform excavation and compaction.

    d. Details of dust control measures.

    e. Proposed locations of stockpiled excavation and/or backfill materials.

    f. Proposed surplus excavated material off-site disposal areas and required permits.

    g. Details of erosion and sedimentation control measures which will prevent erosion and sedimentation during the earth moving activities.

3. The following material submittals shall be submitted to the Engineer prior to backfilling and filling:

    a. Screened Gravel: As specified in Section 02223.

    b. Bank-run Gravel: As specified in Section 02224.

    c. Select Borrow: As specified in Section 02225.

    d. Crushed Stone: As specified in Section 02435.

    e. Other Acceptable Materials: Laboratory testing results of gradation and moisture-density relationship. Submittal shall include specific location of the source and the date when sample was taken.

4. During Construction, submit written confirmation of fill lift thickness, in-place soil moisture content, and percentage of compaction to the Engineer before placing the next lift or constructing foundations.

1.06 QUALITY ASSURANCE AND CONTROL:

A. Provide in accordance with Section 01400 and as specified.

B. Dewatering and Groundwater Control: Provide and maintain as specified in Section 02140.

C. Excavations shall be performed in the dry, and kept free from water, snow and ice during construction. Bedding and backfill material shall not be placed in water. Water shall not be allowed to rise upon or flow over the bedding and backfill material.

D. Excavation Support Systems: Provide and maintain as specified in Section 02160.

E. The Contractor shall be solely responsible for making all excavations in a safe manner. All excavation, trenching, and related sheeting, bracing, etc. shall comply with the requirements of OSHA excavation safety standards (29 CFR Part 1926 Subpart P) and State requirements. Where conflict between OSHA and State regulations exists, the more stringent requirements shall apply.

F. Do not excavate, construct embankments, or fill until all the required submittals have been reviewed by the Engineer.

G. Formulate excavation, backfilling, and filling schedule and procedures to eliminate possibility of undermining or disturbing foundations of partially and completed structures, pipelines and embankments or existing structures and pipelines.

H. Employ an independent testing laboratory to perform particle size and gradation analyses in accordance with ASTM D6913 and D7928, and to determine compatibility in accordance with ASTM D1557 for all the proposed backfill and fill materials, and monitoring field compaction operations. The Contractor's independent testing laboratory shall have the following qualifications:

1. Be accredited by the American Associates of State Highway and Transportation Officials (AASHTO) Accreditation Program.

2. Have three (3) years experience in sampling, testing and analysis of soil and aggregates, and monitoring field compaction operations.

3. Able to provide three (3) references from previous work.

I. Field Testing and Inspections:

1. By Contractor’s independent testing laboratory, acceptable to the Engineer, at Contractor's expense as specified in Paragraph 1.06 K.

2. Location of tests mutually acceptable to testing laboratory and the Engineer or as directed by the Engineer.

3. In the event compacted material does not meet specified in-place density, recompact material and retest this area until specified results are obtained at no additional to the Owner.

4. Contractor’s testing laboratory to perform inspection at least once daily to confirm lift thickness and compaction effort for entire fill area.

J. Methods of Field Testing:

1. In-Place Density: ASTM D1556, ASTM D2167, or ASTM D6938.

2. In-Place Moisture Content: ASTM D6938, ASTM D4944, or ASTM D4959.

K. Material Testing Frequency: The following testing frequencies are minimum required for all structural and non-structural fill, grading and embankment.

1. Field In-Place Density and Moisture Content - Screened gravel and crushed stone shall be compacted as specified and indicated. For other backfill and fill materials, minimum test frequency shall be as follows, and no less than one test per:

a. Trenches under structures foundation preparation or roadways subbase: Every 1000 lin. ft. per lift.

b. Trenches in areas without structures or roadways: Every 1000 lin. ft. per alternate lift.

c. Paved Roadways: Every 200 lin. ft. per lift.

d. Paved Areas: 3,500 sq. ft. per lift.

e. Under Structure: 1,000 sq. ft. per lift.

f. Around Structures: 1,500 sq. ft. per lift.

g. Embankment Fills: 10,000 sq. ft. per lift.

2. Moisture Density - One per source, except for screened gravel and crushed stone. Repeat the moisture density test for every 5,000 cubic yard of material use, and whenever visual inspection indicates a change in material gradation as determined by the Engineer.

3. Gradation Analysis - A minimum of one per source and for each moisture density test and whenever visual inspection indicates a change in material gradation.

4. Liquid Limit, Plastic Limit and Plasticity Index - Minimum of one test per 5,000 cubic yard of soil for use as fill material and whenever classification of material is in doubt as determined by the Engineer.

L. Construction Tolerances:

1. Construct finished surfaces to plus or minus 1 inch of the elevations indicated.

2. Grade cut and fill areas to plus or minus 0.20 foot of the grades indicated.

3. Complete embankment edges to plus or minus 6 inches of the slope lines indicated.

4. Provide the Engineer with adequate survey information to verify compliance with above tolerances.

M. Cut pavement with a saw or pneumatic tools to prevent damage to remaining pavement without extra compensation. Where pavement is removed in large pieces, dispose of pieces before proceeding with excavation.

N. Pipes, drains, and other utilities may exist in certain locations not indicated on drawings. No attempt has been made to show all services. Completeness or accuracy of information given is not guaranteed.

O. Dig test pits considered as incidental to the normal excavation as indicated and specified in this Section, at no additional compensation.

P. Carefully support and protect from damage, existing pipes, poles, wires, fences, curbings, property line markers, and other structures, which the Engineer determines must be preserved in place without being temporarily or permanently relocated. Should such items be damaged, restore without compensation therefore, to at least as good condition as that in which they were found immediately before the work was begun.

Q. Whenever certain existing structures, as described below, are encountered, and the Engineer so directs, change the location, remove and later restore, or replace such structures, or assist the Owner in doing so. Such work to be paid for under applicable items of work, otherwise as Extra Work.

R. In removing existing pipes or other structures, include for payment only those new materials which are necessary to replace those unavoidably damaged as determined by the Engineer.

S. The preceding two paragraphs apply to pipes, wires, and other structures which meet the following: (a) are not indicated on the drawings or otherwise provided for, (b) encroach upon or are encountered near and substantially parallel to the edge of the excavation, and (c) in the opinion of the Engineer, will impede progress to such an extent that satisfactory construction cannot proceed until they have been changed in location, removed (to be later restored), or replaced.

T. Restore existing property or structures as promptly as practicable.

U. If material unacceptable for foundation (in the opinion of the Engineer) is found at or below the grade to which excavation would normally be carried in accordance with the drawings and/or specifications, remove such material to the required width and depth as directed by the Engineer and replace it with screened gravel, select borrow, or concrete.

V. Do not remove excavation materials from the site of the work or dispose of except as directed or permitted by the Engineer.

W. Haul away and dispose of surplus excavated materials at locations directed by the Engineer at no additional cost to the Owner.

X. During progress of work, conduct earth moving operations and maintain work site so as to minimize the creation and dispersion of dust. Furnish and spread calcium chloride if the Engineer decides that it is necessary for more effective dust control.

Y. Provide suitable and safe bridges and other crossings where required for accommodation of travel, and to provide access to private property during construction, and remove said structures thereafter.

1.07 SITE CONDITIONS:

A. Subsurface Conditions: Refer to Appendix B.

1.08 TRAFFIC MANAGEMENT:

A. Truck access for materials and equipment deliveries to Peirce Island is affected by traffic, narrow streets, pedestrians, and tight intersections. The Contract Documents have detailed construction traffic routes which apply to all construction traffic on this project and the Contractor is required to adhere to. Refer to Section 01500 and the Contract Drawings for a full description of the traffic management requirements.

B. Tractor-trailers longer than an AASHTO WB-50 may have difficulty turning from State St. onto Marcy St. To facilitate this turn, parking has been prohibited at this intersection between the hours of 12AM and 8AM.

PART 2 - PRODUCTS

2.01 GENERAL:

A. Use only acceptable materials from excavations or borrows.

B. Provide 1,500 psi concrete, screened gravel, bank-run gravel, fine aggregate, select borrow, and crushed stone.

C. Provide Fine Aggregate conforming to ASTM C33.

D. Provide erosion/sedimentation control devices as indicated.

2.02 EQUIPMENT:

A. The compaction equipment shall be selected by the Contractor, and shall be capable of consistently achieving the specified compaction requirements. The selected compaction equipment shall meet the following minimum requirements:

1. Manually operated vibratory plate compactors weighing no less than 200 pounds with vibration frequency no less than 1600 cycles per minute.

2. Vibratory steel drum or rubber tire roller weighing at least 12,000 pounds.

PART 3 - EXECUTION

3.01 SITE MAINTENANCE:

A. Roadway and Site Leveling: Grade roadway and site as to maintain them in a level unrutted condition and to eliminate puddling of surface and subsurface water.

3.02 EXCAVATION:

A. Execution of any earth excavation shall not commence until the related dewatering, excavation support systems, and backfill and fill materials submittals are reviewed by the Engineer and all Engineer's comments satisfactorily addressed.

B. Carry out program of excavation, dewatering, and excavation support systems to eliminate possibility of undermining or disturbing foundations of existing structures or of work previously completed under this contract.

C. Excavate to widths that give suitable room for building structures or laying and jointing piping.

D. Do not plow, scrape or dig by machinery near to finished subgrade in a manner that would result in disturbance of subgrade.

E. Excavate to lines and grades indicated in an orderly and continuous program.

F. Establish limits of excavation to allow adequate working space for installing forms and for safety of personnel.

G. Excavate to elevations indicated, or deeper, as directed by the Engineer, to remove unacceptable bottom material.

H. Exercise care to preserve material below and beyond the lines of excavations.

I. Place excavated material at the approved stockpile locations and in no case closer than 3 feet from edge of excavations to prevent cave-ins of bank slides.

J. Regard small, less than one cubic yard, boulders, rock fragments, and concrete encountered during excavation as a normal part of in-place soils and not included for payment as rock.

K. Excavate for depressed foundations, where mat foundations are indicated as depressed. Sheet and shore existing ground so that adjacent sections of foundation mat will rest on undisturbed ground as indicated. Installation of sheeting shall be in accordance with Section 02160.

3.03 SEPARATION OF EXCAVATED MATERIALS FOR REUSE:

A. Remove only existing pavement that is necessary for prosecution of work.

B. Carefully remove loam and topsoil from excavated areas. Store separately for further use or furnish equivalent loam and topsoil as directed.

C. Carefully remove acceptable material from excavated areas and store separately for further use as backfill material.

3.04 TRENCH EXCAVATION:

A. When pipe is to be laid in gravel bedding or concrete cradle, excavate trench by machinery to, or just below designated subgrade. If material remaining at bottom of trench is disturbed, recompaction shall be required.

B. When pipe is to be laid directly on bottom of trench, do not excavate lower part of trenches by machinery to subgrade. Remove remainder of material to be excavated just before placing of pipe by use of hand tools. Form a flat or shaped bottom, true to grade, so pipe will have a uniform and continuous bearing. Support on firm and undisturbed material between joints, except for limited areas where use of pipe slings have disturbed bottom.

3.05 DEPTH OF TRENCH:

A. Excavate trenches to depths so as to permit pipe to be laid at elevations, slopes, or depths of cover indicated on drawings, and at uniform slopes between indicated elevations.

3.06 WIDTH OF TRENCH:

A. Make pipe trenches as narrow as practicable and do not widen by scraping or loosening materials from the sides. Make every effort to maintain sides of trenches firm and undisturbed until backfilling has been placed and compacted.

B. Excavate trenches with approximately vertical sides between springline of pipe and elevation 1 ft. above top of pipe.

3.07 TRENCH EXCAVATION IN FILL:

A. Place and compact material to top of fill or to a minimum height of 1 ft. above top of pipe, whichever is less, when pipe is to be laid in embankment or other recently filled material. Take particular care to ensure maximum consolidation of material under pipe location. Excavate pipe trench as though in undisturbed material.

3.08 EXCAVATION NEAR EXISTING STRUCTURES:

A. Discontinue digging by machinery when excavation approaches pipes, conduits, or other underground structures. Continue excavation by use of hand tools. Include such manual excavation in work to be done when incidental to normal excavation and under items involving normal excavation.

B. Excavate test pits when determination of exact location of pipe or other underground structure is necessary for doing work properly.

3.09 REMOVAL OF SUBSURFACE OBSTRUCTIONS:

A. Remove indicated subsurface structures and related obstructions to extent shown.

B. Promptly notify the Engineer when any unexpected subsurface facilities are encountered during excavation such as utility lines and appurtenances, walls and foundations.

3.10 UNAUTHORIZED EXCAVATION:

A. When the bottom of any excavation for structures is taken out beyond limits indicated or specified, backfill, with screened gravel and crushed stone wrapped with non-woven geotextile fabric or with 1,500 psi concrete.

3.11 REUSE AND DISPOSAL OF SURPLUS EXCAVATED MATERIALS:

A. Reuse surplus acceptable excavated materials for backfill; deposit neatly and grade so as to make or widen fills, flatten side slopes, or fill depressions; or legally dispose off-site; all as directed or permitted and without additional compensation.

3.12 SUBGRADE PREPARATION AND PROTECTION:

A. Remove loam and topsoil, loose vegetable matter, stumps and large roots from areas upon which embankments will be built or material will be placed for grading. Shape subgrade as indicated on drawings, and prepare by forking, furrowing, or plowing so that the first layer of new material placed thereon will be well bonded to it.

B. As directed by the Engineer, overexcavate unacceptable materials below the foundation subgrade. Backfill the overexcavation with compacted screened gravel or crushed stone wrapped with nonwoven geotextile fabric. In no case shall the screened gravel be placed directly on the exposed subgrade prior to placing the geotextile fabric.

C. Proof roll the foundation subgrade prior to backfilling and filling operation, or placing foundation concrete.

D. Proof roll the pipe trench foundation subgrade prior to backfilling and filling operation, or placing soil-supported pipeline.

3.13 CARE AND RESTORATION OF PROPERTY:

A. Enclose uncut tree trunks adjacent to work in wooden boxes of such height as may be necessary for protection from injury from piled material, equipment, operations, or otherwise due to work. Operate excavating machinery and cranes of suitable type with care to prevent injury to trees not to be cut and particularly to overhanging branches and limbs.

B. Cut all branches, limbs, and roots smoothly and neatly without splitting or crushing. Neatly trim, cut the injured portions and cover with an application of grafting wax or tree healing paint as directed.

C. Protect cultivated hedges, shrubs, and plants which might be injured by the Contractor's operations by suitable means or dig up and temporarily replant and maintain. After construction operations have been substantially completed, replant in original positions

and care for until growth is reestablished. If cultivated hedges, shrubs, and plants are injured to such a degree as to effect their growth or diminish in their beauty or usefulness, replace by items of equal kind and quality existing at the start of the work.

D. Do not use or operate tractors, bulldozers, or other power-operated equipment on paved surfaces when their treads or wheels of which are so shaped as to cut or otherwise damage such surfaces.

E. Restore surfaces damaged by the Contractor's operations to a condition at least equal to that in which they were found immediately before work commenced. Use suitable materials and methods for such restoration.

3.14 BACKFILLING - GENERAL:

A. Do not place frozen materials in backfill or place backfill upon frozen material. Remove previously frozen material or treat before new backfill is placed.

B. Do not place, spread, roll or compact fill material during unfavorable weather conditions. If interrupted by heavy rain or other unfavorable conditions, do not resume until ascertaining that the moisture content and density of the previously placed soil are as specified.

C. Do not use puddling, ponding or flooding as a means of compaction.

3.15 MATERIAL PLACEMENT AND COMPACTION REQUIREMENTS:

A. Select Borrow, and Fine Aggregate:

1. Dump and spread in layers not to exceed 8-in. uncompacted thickness.

2. Compact, fill and backfill under structure and bedding for pipes (from below pipe to spring line) as indicated but to not less than 95 percent. Compact to not less than 90 percent in other areas unless otherwise indicated.

B. Screened Gravel and Crushed Stone:

1. Dump and spread in layers not to exceed 8-in. uncompacted thickness.

2. Compact using self propelled vibratory steel drum or rubber tire rollers with a minimum of 4 passes in directions perpendicular to one another in open areas. In small areas, use manually operated vibratory plate compactors with a minimum of 4 passes.

C. Bank-run Gravel and Acceptable materials for use as non-structural fill:

1. Dump and spread in layers not to exceed 12-in. uncompacted thickness.

2. Compact to not less than 90 percent unless otherwise indicated.

D. Backfilling and filling operation shall be suspended in areas where tests are being made until tests are completed and the testing laboratory has advised the Engineer that adequate densities are obtained.

3.16 STRUCTURAL FILL AND BACKFILL UNDER STRUCTURES:

A. Compact fill and backfill under structures and pavements with screened gravel, crushed stone, select borrow, or fine aggregate as specified and indicated.

3.17 NON-STRUCTURAL BACKFILL AROUND STRUCTURES:

A. Use acceptable materials for non-structural backfill around structures and compacted as specified and indicated.

B. Conduct hydraulic testing as soon as practicable after structures are constructed and other necessary work has been done. Start backfilling promptly after completion of tests.

C. Deposit material evenly around structure to avoid unequal soil pressure.

D. Do not place backfill against or on structures until they have attained sufficient strength to support the loads (including construction loads) to which they will be subjected, without distortion, cracking, or other damage.

3.18 BACKFILLING PIPE TRENCHES:

A. General:

1. Begin backfilling and proceed until completed after: the pipes and conduits have been laid, joints have acquired maximum degree of hardness, pipelines and conduits have successfully passed tests and inspections as required in the Specifications, and concrete or masonry structures within the trench have reached their design strength to support all loads.

2. Backfill and compact indicated material under, around, and above pipes, conduits, and other structures to the indicated or specified compaction density requirement. Utilize compaction devices which will not damage the pipe, conduit, or structure within the trench.

3. Do not drop backfill material into trench from a height of more than 5 ft., or in a manner which will damage the pipe, conduit, or other structure within trench.

B. Pipe Trenches:

1. Materials:

a. From below pipe to 1 ft. above top of pipe: Use screened gravel, or crushed stone, unless otherwise indicated.

b. One foot above top of pipe to finished grade or to pavement subbase: Use bank-run gravel or acceptable materials, unless otherwise indicated.

2. Compacting Around Pipes: Compact material around circumference of pipe and the area between the trench wall and the pipe by hand tamping in 6 inches layers.

3. Compacting Above Pipe: Compact material by hand tamping. If trench width is wide enough to accommodate power tools and the compacted material over the pipe will support the load of the power tools without damage to the pipe, use rollers or other powered compaction equipment able to more readily achieve compaction requirements.

3.19 MATERIAL FOR FILLING AND EMBANKMENTS:

A. Use acceptable materials for filling and building embankments unless otherwise indicated.

3.20 PLACING AND COMPACTING EMBANKMENT MATERIAL:

A. Compact fill material as specified and indicated.

B. Perform fill operation in an orderly and systematic manner using equipment in proper sequence to meet the specified compaction requirements.

C. Place fill on surfaces which are free of unacceptable materials.

D. Begin filling in lowest section of work area. Grade surface of fill approximately horizontal but provide with sufficient longitudinal and transverse slope to allow for runoff of surface water from every point.

E. Conduct filling so that no obstruction to drainage from other sections of fill area is created at any time.

F. Install temporary dewatering sumps in low areas during filling operation where excessive amounts of rain runoff collect.

G. Reduce moisture content of fill material, if necessary, in source area by working it over under warm and dry atmospheric conditions. A large disc harrow with two to three foot diameter disks may be required for working soil in a drying operation.

H. Compact uniformly throughout. Keep surfaces of fill reasonably smooth and free from humps and hollows which would prevent proper and uniform compaction. Do not permit hauling equipment to follow a single track on the same layer but direct equipment to spread out to prevent overcompaction in localized areas. Take care in obtaining thorough compaction at edges of fill.

I. Slightly slope surface of fill to ensure drainage during periods of wet weather. Do not place fill while rain is falling or after a rain-storm until the Engineer considers conditions satisfactory. During such periods and upon suspension of filling operations for any period in excess of 12 hours, roll smooth the surface of fill using a smooth wheel static roller to prevent excessive absorption of rainfall and surface moisture. Prior to resuming compaction operations, remove muddy material off surface to expose firm, compacted material, as determined by the Engineer.

J. When fill is placed against an earlier fill or against in-situ material under and around structures, including around piping beneath structures or embankments, slope junction between two sections of fill, 1 vertical to 1.5 horizontal. Bench edge of existing fill 24-in. to form a serrated edge of compact stable material against which to place the new fill. Ensure that rolling extends over junction between fills.

K. When fill is placed directly upon another older fill, clean surface thoroughly of debris and remove any loose material. Then proof roll the entire old surface.

L. After spreading each loose lift to the required thickness and adjusting its moisture content as necessary, roll with 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. Do not make additional passes until previous pass has been completed.

M. In case material of any fill sinks and weaves under roller or under hauling units and other equipment, required degree of compaction is not being obtained. Reduce the moisture content. If such sinking and weaving produces surface cracks, suspend operations on that part of the embankment until it becomes sufficiently stabilized. Ideal condition in fill is that attained when the entire fill below the surface being rolled is so firm and hard as to show only the slightest weaving and deflection as roller passes. Spread out rolling operations over the maximum practicable area to minimize condition of sinking and weaving.

N. If because of defective workmanship, compaction obtained over any area is less than that required, remedy condition at no cost to Owner. If additional rolling or other means fail to produce satisfactory results, remove material in that area down to a level of

satisfactory density. Perform removal, replacement, and rerolling without additional compensation.

3.21 COMPACTION CONTROL OF BACKFILL, FILL, AND EMBANKMENT:

A. Compact to density specified and indicated for various types of material. Control moisture content of material being placed as specified or if not specified, at a level slightly lower than optimum.

B. The soil testing laboratory shall provide inspection during filling or backfilling operations to ensure compaction of screened gravel or crushed stone and record compaction equipment in use.

C. Moisture control may be required either at the stockpile area, pits, or on embankment or backfill. Increase moisture content when material is too dry by sprinkling or other means of wetting uniformly. Reduce moisture content when material is too wet by using ditches, pumps, drainage wells, or other devices and by exposing the greatest possible area to sun and air in conjunction with harrowing, plowing, spreading of material or any other effective methods.

3.22 ALLOWANCE FOR SHRINKAGE:

A. Build embankments or backfill to a height above finished grade which will, in the opinion of the Engineer, allow for the shrinkage or consolidation of material. Initially, provide at all points, an excess of at least one percent of total height of backfill measured from stripped surface to top of finished surface.

B. Supply specified materials and build up low places as directed, without additional cost if embankment or backfilling settles so as to be below the indicated level for proposed finished surface at any time before final acceptance of the work.

3.23 CONTRACT CLOSEOUT

A. Provide in accordance with Section 01700.

END OF SECTION

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SECTION 02211

ROCK EXCAVATION AND DISPOSAL

PART 1 - GENERAL

1.01 DESCRIPTION:

A. Remove and dispose of rock, as defined in Section 01151, Measurement and Payment, and furnish acceptable material for backfill in place of excavated rock as indicated. The work of this Section includes, but is not limited to, performing, monitoring, and recording blasting operations as specified, shown on the Contract Drawings or otherwise required for the proper completion of the Contract.

B. The blasting program shall be designed and implemented in accordance with the requirements of all the related local and state regulations, including City of Portsmouth Blasting Rules and Procedures, as attached in Appendix A.

C. The Blasting Contractor shall furnish insurance as required by the City of Portsmouth Blasting Rules and Procedures, as attached in Appendix A. The City shall be named as an additional insured as required in these rules.

D. The Contractor shall furnish all permits, consultants, labor, equipment, materials, and incidentals necessary to satisfy these specifications relative to blasting such that damage is prevented to adjacent pipes and utilities, structures, property, roadways and such that resulting ground vibrations are consistently maintained below the maximum allowable levels specified in this Section.

E. Notwithstanding full compliance with the Contract Documents and successful limitation of the peak particle velocity and air-overpressures specified in this Section, The Contractor shall be solely responsible for any damage, direct or indirect, arising from blasting, and shall hold the Owner, Engineer, and their consultants harmless from any costs, liens, charges, claims, or suits, including the costs of defense, arising from such damage, real or alleged.

1.02 RELATED WORK:

A. Section 01390: Pre- and Post-Construction Survey

B. Section 02018: Vibration Monitoring

C. Section 02210: Earth Excavation, Backfill, Fill and Grading

D. Section 02223: Screened Gravel

E. Section 02435: Crushed Stone

1.03 DEFINITIONS:

A. Air-overpressure (Airblast): The absolute value of pulsating and transient increases or decreases in ambient air pressure caused by shock waves, venting gasses and rock movement generated by blasting. Air-overpressure is expressed in units of psi or dBL (2-Hz flat response -- linear scale).

B. Blast Area: Zone defined by the Blaster-in-Charge in which preparation for and execution of blasting operations are performed.

C. Blaster: An individual licensed by the office of the State Fire Marshall who supervises or directs and performs the loading and firing of explosive materials.

D. Blasting: The firing of explosive materials for the purpose of breaking rock; the assembly of explosive materials for such purpose.

E. Blaster-in-Charge or Blasting Supervisor: The single designated and licensed person with complete responsibility and total authority over all decisions involving safe handling, use and on-site security of explosives.

F. Blasting Consultant: A person with specialized practical experience gained from direct design and execution of blasting operations, and academic knowledge of commercial explosives, controlled blasting applications, vibration and air-overpressure control; who uses this knowledge to evaluate, plan, and oversee the safe use of explosives in commercial applications in accordance with blasting industry and regulatory standards.

G. Charge-Weight-per-Delay: For purposes of vibration control, any charges firing within any 8-millisecond time period are considered to have a cumulative effect on vibration and air-overpressure. Therefore, the maximum charge per delay equals the sum of the weights of all charges firing within any 8-millisecond time period. For instance, if two 5-lb charges fire at 100 ms and one 5-lb charge fires at 105 ms, the maximum charge per delay would be 15 lb.

H. Controlled Blasting: Controlled blasting is excavation of rock in which the various elements of the blast (hole size, depth, spacing, burden, charge size, distribution, delay sequence) are carefully balanced and controlled to provide a distribution of charge that will excavate the rock to the required contours with a smooth surface to minimize overbreak, stressing and fracturing of the rock beyond the contour line.

I. Cushion Blasting: Forms of Controlled Blasting whereby small-diameter columns of explosives or a series of cartridges taped to detonating cord are cushioned by backfilling the annulus of the borehole with sand or dirt. Cushion Blasting is generally used to slash narrow benches of rock toward an open rock face.

J. Coupling: The degree to which an explosive fills the cross section of a borehole. A 6-inch explosive in a 6-inch borehole is completely coupled. A 2-inch explosive (surrounded by air) in a 6-inch borehole is "air de-coupled."

K. Delay: A distinct pause of pre-determined time between detonation or initiation impulses, to permit the firing of explosive charges separately.

L. Fumes: The gaseous products of an explosion. For the purpose of fume classification only gases such as carbon monoxide, hydrogen sulfide and nitrogen oxides are considered.

M. Institute of Manufacturers of Explosives (IME) Fume Classification: A classification indicating the amount of gases produced by an explosive or blasting agent.

N. Line Drilling: The drilling of a line of closely spaced, unloaded, small-diameter holes along the intended limit of the excavation, to provide a plane of weakness to which the primary blast can break.

O. Mass Rock Excavation: Rock Excavation to the proposed subgrade of structures.

P. Occupied Building: Structure on or off construction limits that is occupied by humans or livestock.

Q. Particle Velocity: A measure of the intensity of ground vibration, specifically the time rate of change of the displacement (velocity) of vibrating ground particles. Particle velocity is expressed in units of in/sec.

R. Peak Particle Velocity: Maximum Particle Velocity measured in any axis during a blast event.

S. Pre-splitting (pre-shearing): A Controlled Blasting method in which cracks for the final contour are created by firing a single row prior to the initiation of the rest of the holes in the blast pattern.

T. Prohibited Persons: Persons prohibited from handling or possessing explosive materials as defined by the seven categories described in Section 555.11 of 27 CFR (ATF Rules).

U. Residential Building: Includes single and family dwellings, hotels, motels and any other structure containing sleeping quarters.

V. Rock Scaling: The process of removing all loose and shattered rock or other loose material, which may endanger the structure or the workers.

W. Scaled Distance: A calculated value describing relative vibration energy based on distance and charge-per-delay. For ground vibration control and prediction purposes, Scaled Distance (Ds) is obtained by dividing the distance of concern (D) by the square

root of the charge-per-delay (W); so $Ds = D/W^{0.5}$ or when a minimum defined scaled distance is specified to limit charge weight, $W = (D/Ds)^2$. For example, if a blast is designed to meet a minimum scaled distance of 60 feet, the maximum charge-per-delay for a blast located 200 feet from the structure of concern would be $(200/60)^2$, or 11.1 pounds.

X. Smooth Wall Blasting: A form of controlled blasting used in tunnel, shaft, trench and other surface blasting excavations. With this method, column charges with a low linear density are placed in holes drilled at the final excavation perimeter. Holes are spaced from 18 to 24 inches apart and fired with highest delay period detonators to remove the final burden of rock between the excavation perimeter and adjacent first-row-in blastholes.

Y. Surplus Excavated Material: Earth and rock generated from excavation activities that is either unacceptable as backfill or not needed for backfilling or other use on the project.

Z. Trench Rock Excavation: Rock excavation below the proposed subgrade of structures and outside (away) from the limits of normal structure excavation for pipelines and utilities.

AA. Vibrations Specialist: The approved person designated to determine compliance with the specified vibration limits and interpret the seismograph records.

1.04 PERMIT FOR USE OF EXPLOSIVES:

A. The Contractor shall have the sole responsibility for obtaining permits for the use of explosives from the City of Portsmouth and the utility companies or any governmental agency and to ascertain their requirements for the use of explosives prior to bidding.

B. Explosives shall be handled in accordance with the National Fire Protection Association (NFPA) Explosive Materials Code and in full compliance with all ATF, OSHA and DOT rules.

1.05 SUBMITTALS:

A. Submit the following in accordance with Section 01300:

1. Qualifications and experience of proposed Blasting Consultant, Blasting Supervisor, and proposed Vibrations Specialist. The qualifications shall demonstrate that these specialists satisfy all requirements of this Section.

2. Submit prior to any Work the qualifications and experience of the Blasting Contracting Firm and the proposed Blasting Supervisor. Qualifications for the Blasting Supervisor and the firm shall include but not be limited to: (1) a detailed description of education, training and project experience as Blasting Supervisor within the last 5 years; (2) a minimum of three references with phone numbers so

as to verify experience of the firm and the supervisor each; and, (3) copies of blasting licenses and permits submitted by the supervisor and the firm as required by the State of New Hampshire and other agencies having jurisdiction. Failure to demonstrate compliance with the minimum qualifications and experience as specified will result in rejection of the Blasting Supervisor candidate.

3. General Blasting Plan: Not less than 30 days prior to starting Work or a new phase of the Work, The Contractor shall submit a detailed blast plan demonstrating the Contractor and its Blasting Consultant have designed blasts to meet the requirements of these specifications. The General Blast Plan must be approved and documented by signed approval cover letters from the Blasting Consultant. Do not submit design calculations. The review will be only for the information of the Owner and third parties for an overall understanding of the plan. The Contractor and the Blasting Consultant shall remain responsible for the accuracy and adequancy of the blasting plan when implemented in the field.

4. For each kind of blasting agents and explosives to be used, submit the perchlorate content provided by the suppliers and/or manufacturers. The Contractor has to obtain written permission from the Engineer to use perchlorate-containing explosive products.

5. The contractor shall complete, maintain and submit to Engineer and at time specified by Engineer, an accurate record of each blast showing general location of blast, depth and number of drillholes, kind and quantity of explosive used, kind and number and interval of delay periods used, and other data required for a complete record.

6. Provide all other required submittals including Licenses, Blasting Permit and Insurance Certificate, etc. as required by the City of Portsmouth Blasting Rules and Procedures.

7. At least two copies of all applicable Federal, State and local codes, laws, regulations, and ordinances regarding the storage and use of explosives. One copy of these codes, laws, regulations, and ordinances shall be submitted to Engineer at least 14 days prior to blasting. The second copy shall be maintained on-site in the Contractor's field office for review by all Contractor personnel involved in blasting.

1.06 QUALITY ASSURANCE:

A. Perform work conforming to Section 02210 for the following:

1. Backfilling above normal depth.

2. Disposal of surplus excavated rock.

3. Filling excess excavation above indicated elevations.

4. Filling excess excavations other than in rock beneath foundations.

B. If rock is excavated beyond the limits of payment indicated on the drawings, specified, or authorized in writing by the Engineer, backfill excess excavation, whether resulting from over-breakage or other causes, at no additional compensation and as specified in Part 3 - EXECUTION.

C. Employ an approved, independent, vibration/blasting consultant to conduct test blasting as specified in Section 02018.

D. The Blasting Consultant shall not be an employee of the Contractor or any affiliated companies and the Blasting Consultant must not have any conflict-of-interest affiliations with any entities involved with the work.

E. Test blast to develop control procedures for production blasting so that no disturbance or damage shall be done to utilities, equipment, buildings, or structures.

F. Based on the results of test blasting, have the vibration blasting consultant develop a suitable blasting program and distance-quantity of explosive tables for the production blasting. Submit the blasting program and distance-quantity tables to the Engineer 21 days prior to commencement of production blasting. Conduct production blasting operations in accordance with the blasting program.

G. The Contractor shall engage the services of a qualified vibration specialist and carry out vibration and noise monitoring as specified in Section 02018.

H. Require the vibration/blasting consultant to perform continuous monitoring of blasting operations and monitor blasting as specified in Section 02018.

I. If evidence of disturbance or damage to utilities, equipment, buildings, or structures is observed or reported, immediately notify the Engineer and discontinue blasting operations and require vibration/blasting consultant to recommend revised blasting procedures.

J. Initiate the revised procedures before blasting is continued.

K. Restore or replace utilities, equipment, buildings, or structures damaged by blasting operations at no cost to the Owner.

1.07 SAFETY REQUIREMENTS:

A. Keep explosives on the site only in such quantity as needed for work under way and only during time as being used. Notify Engineer at least 24 hours in advance of intention to store and use explosives. Store explosives in a secure manner and separate from all tools. Store caps or detonators safely at a point over 100 ft. distant from explosives. Promptly remove from premises remaining material when need for explosives has ended.

B. Conform to State, Federal, and municipal laws, ordinances, and regulations relating to transportation, storage, handling, and use of explosives. If any of above-mentioned laws, ordinances, or regulations require a licensed blaster to perform or supervise the work of blasting, employ a licensed blaster. Require him to have his license on site and permit examination by Engineer or other officials having jurisdiction.

C. Conduct operations involving explosives with all possible care to avoid injury to persons and property. Do blasting only with such quantities and strengths of explosives and in such manner as will break rock approximately to intended lines and grades, leaving rock not to be excavated in an unshattered condition. Avoid excessive cracking of rock upon or against which any structure will be built. Prevent injury to existing pipes, structures and property above or below ground. Cover rock with logs or mats, or both. Give sufficient warning to persons in vicinity of work before a charge is exploded.

D. Complete blasting within a distance of 50 ft. before any portion of a masonry structure is placed or any pipe is laid.

E. Determine presence of two-way-radios, stray electrical currents and other conditions adversely affecting blasting operations and implement necessary precautions to prevent accidents and premature blasts.

1.08 TRAFFIC MANAGEMENT:

A. Truck access for materials and equipment deliveries to Peirce Island is affected by traffic, narrow streets, pedestrians, and tight intersections. The Contract Documents have detailed construction traffic routes which apply to all construction traffic on this project and the Contractor is required to adhere to. Refer to Section 01500 and the Contract Drawings for a full description of the traffic management requirements.

B. Tractor-trailers longer than an AASHTO WB-50 may have difficulty turning from State St. onto Marcy St. To facilitate this turn, parking has been prohibited at this intersection between the hours of 12AM and 8AM.

PART 2 - PRODUCTS

2.01 EXPLOSIVE PRODUCTS:

A. Explosives, blasting agents, and initiating devices shall be as selected by the Contractor to meet the following requirements:

1. Only non-electric detonating devices shall be used.

2. Only explosive and initiation devices packaged by Federally-licensed explosives manufacturing firms shall be used in blasting. All explosives and blasting agents to be used underground shall meet the Fume Class I requirement of the Institute of Makers of Explosives (IME). This restriction does not apply to detonating cords that may be used for trunklines or in controlled blasting charges.

3. Only packaged or cartridge type, non-flowing explosives shall be used in the Works. The diameter of explosive cartridges shall not exceed 1.5 inches.

4. Explosives, blasting agents, and initiating devices shall be boxed with date codes to allow Engineer to determine the age of the materials.

5. All explosives and initiating devices used in the Works shall be aged less than one year from date of manufacture.

6. If in the opinion of Engineer, a blasting product appears to be in a damaged or deteriorated condition, the suspect product shall not be used until its quality can be determined by the Contractor. Products determined to be damaged or deteriorated shall be removed from the site immediately.

7. All blasting products, including products in partially used boxes or containers, shall be delivered to the Site in their original packaging, and manufacturer's code dates shall be clearly visible.

B. To the extent practical, the Contract shall avoid the use of perchlorate-containing explosive products when surface or groundwater can be affected.

2.02 CONCRETE AND GRAVEL:

A. Class A Concrete, (3,000 psi 28 day comp. strength); Class B Concrete, (1,500 psi 28 day comp. strength); and Screened Gravel.

PART 3 – EXECUTION:

3.01 DRILLING AND BLASTING

A. The Contractor shall be held responsible for all claims for damage caused by blasting. The Contractor shall blast with such number, length, spacing, and direction of holes, with such loading of holes, and with explosives of such power, as will allow excavation to the design profile and not make the excavations unduly large or irregular, nor unduly shake up the ground or make it unstable, nor shatter the rock upon or against which masonry is to be built, nor injure masonry already built or existing structures and other installations at the site or in the vicinity thereof. If length, spacing and direction of holes are liable to make the excavations unduly large or ground unstable, or to injure the rock, masonry, or structures, the Contractor shall drill shorter holes and use lighter charges. The Contractor shall, if so ordered by Engineer, cease blasting and continue to excavate the rock by barring, wedging, or other approved methods. Blasting operations are to be limited as specified herein.

B. All drill-and-blast operations shall be done by means of controlled blasting. Acceptable controlled blasting methods will be those utilizing smooth wall blasting or line drilling techniques.

C. All blasts in open cut excavations shall be covered with a sufficient number of woven steel cable or rubber tire mats to control the movement of blasted rock or other material.

D. Excavate rock in pipe trenches to no less than 6 in. in earth, and no less than 12 in. in ledge below the proposed invert of the pipe. Backfill trench, before pipe is laid, to correct subgrade. Use thoroughly compacted, suitable material or, when so specified or indicated on drawings, same material as required for bedding pipe. Furnish and place at no additional compensation.

E. Fill excess excavation below elevation of the top of bedding, cradle, or envelope when in pipe trenches with material of same type and placed and compacted in same manner as specified for bedding, cradle, or envelope.

F. Fill excess excavation in rock beneath foundations with fine aggregate or crushed stone as indicated.

G. Drill and blast a single line of holes in vertical face of rock at end of trench, when shattering rock at ends of pipe or elsewhere as indicated. Provide minimum depth drill holes of 4 ft. and maximum spacing of 18 in. centers. Use sufficient explosive to shatter rock for future excavation. Complete shattering before any pipe or fitting is placed within 50 ft. of rock to be shattered.

H. When the use of perchlorate-containing products is necessary and is approved by the Engineer:

1. Institute rigorous “housekeeping” practices: The explosive products shall be properly detonated so that perchlorates are destroyed to the maximum degree possible. Also, minimize the loss of product via spills or debris that could cause environmental pollution. In the event of spills or debris, reasonable effort should be made to collect and properly manage or dispose of perchlorate-containing materials.

2. Take reasonable steps to prevent and address misfires: In cases where explosives or blasting agents are washed or removed for a borehole following a misfire, reasonable efforts should be made to collect and properly manage or dispose of perchlorate-containing materials.

I. Remove shattered rock. If rock below normal depth is shattered due to drilling or blasting operations of Contractor and Engineer considers such shattered rock to be unfit for foundations, remove it and backfill excavation with concrete as required, except that in pipe trenches, use screened gravel for backfill. Do such removal and backfilling at no additional compensation.

J. Remove dirt and loose rock, as directed, from designated areas and clean surface of rock thoroughly, using steam to melt snow and ice, if necessary. Remove water in depressions, so that whole surface of designated area can be inspected to determine whether seams or other defects exist.

K. Rough surfaces of rock foundations sufficiently to bond well with masonry and embankments to be built thereon and, if required, cut to rough benches or steps.

L. Remove from the rock surface to remain all vegetation, dirt, sand, clay, boulders, scale, excessively cracked rock, loose fragments, ice, snow, and other objectionable substances. Use picking, barring, wedging, streams of water under sufficient pressure, stiff brushes, hammers, steam jets, and other effective means to accomplish this cleaning, and remove free water left on the surface of rock. Perform all of above before any masonry or embankment is built on or against rock.

M. Remove piles of boulders or loose rock encountered within limits of earth embankments to a suitable place of disposal.

N. Use excavated rock in backfilling trenches subject to following limitations:

1. Do not use pieces of rock larger than permitted under subsection "Backfilling Pipe Trenches" of Section 02210.

2. Do not allow rock quantities used in backfill in any location to result in formation of voids.

3. Do not place rock backfill within 16 in. of surface of finish grade.

O. Backfill with material obtained from outside sources at no additional compensation, when material suitable for backfilling is not available in sufficient quantity from other excavations.

P. Haul away and dispose of surplus excavated material, including rock and boulders, that is not acceptable for reuse or needed for backfilling at a location determined by the Contractor in accordance with all applicable laws and regulations

3.02 VIBRATION CONTROL

A. The Contractor shall conduct all work without causing damage to existing structures from ground vibrations caused by blasting or other operations.

B. The Contractor shall monitor and record vibrations and air-over-pressures for each blast detonation and shall adjust blasting procedures accordingly to ensure allowable levels are not exceeded as specified in Section 02018.

C. Air-overpressure measured at the nearest residential or business structures susceptible to damage or claims of annoyance shall not exceed 130 decibels (linear scale). Microphones shall be located at least two feet above the ground surface and shall be pointed toward the blast site.

3.03 AIR-OVERPRESSURE AND NOISE CONTROL

A. Appropriate blast-hole patterns, detonation systems, and stemming shall be used to prevent venting of blasts and to minimize air-overpressure and levels of audible noise produced by the blasting operations, as specified in Section 02018.

3.04 SPECIFIC BLASTING RESTRICTIONS

A. Blasting shall only occur at locations identified in the approved General Blasting Plan.

B. Blasting is not permitted between the hours of 5:00 p.m. and 8:00 a.m., except in an emergency and only with the approval of Engineer. Blasting is not permitted on weekends or holidays.

C. Blasting will not be permitted adjacent to concrete less than 10 days old unless a special blasting plan defining measures that will be used to protect the concrete is submitted and accepted by Engineer.

3.05 SUSPENSION OF BLASTING

A. Air overpressure or ground motion levels exceed specified limits.

B. The Contractor’s safety precautions are inadequate.

C. Blasting causes instability or damage outside the limits of excavation, or overbreak in excess of 18 inches.

D. Failure of the Contractor to adhere to submitted and accepted blast plans.

3.06 DAMAGE REPAIR

A. If blasting operations damage off-site properties or a portion of the Works or material surrounding or supporting the Works, the Contractor shall promptly repair or replace damaged items to the condition that existed prior to the damage.

END OF SECTION

SECTION 02220

DEMOLITION

PART 1 - GENERAL

1.01 DESCRIPTION:

A. Provide demolition and alterations of existing conditions as indicated and in compliance with Contract Documents.

1.02 SUBMITTALS:

A. Submit the following in accordance with Section 01300.

1. Demolition Plan.

1.03 QUALITY ASSURANCE:

A. Comply with the requirements specified in Section 01400.

B. Demolition Plan: Provide description of sequence, methods, and equipment used for demolition (including disposal).

1.04 TRAFFIC MANAGEMENT:

A. Truck access for materials and equipment deliveries to Peirce Island is affected by traffic, narrow streets, pedestrians, and tight intersections. The Contract Documents have detailed construction traffic routes which apply to all construction traffic on this project and the Contractor is required to adhere to. Refer to Section 01500 and the Contract Drawings for a full description of the traffic management requirements.

B. Tractor-trailers longer than an AASHTO WB-50 may have difficulty turning from State St. onto Marcy St. To facilitate this turn, parking has been prohibited at this intersection between the hours of 12AM and 8AM.

PART 2 - PRODUCTS

2.01 RECORD DRAWINGS OF EXISTING FACILITIES:

A. Record drawings showing details of existing pipelines to be demolished are included in Appendix E.

PART 3 - EXECUTION

3.01 PREPARATION:

A. Survey Markers and Monuments:

1. Provide three reference points, established by a licensed land surveyor, for each survey marker or monument temporarily removed. Record locations and designations of survey markers and monuments prior to removal.

2. Store removed markers and monuments during demolition work, and replace upon completion of work. Reestablish survey markers and monuments in conformance with recorded reference points. Forward letter to Engineer, signed by a licensed land surveyor, verifying reestablishment of survey markers and monuments.

B. Burning of demolition debris is prohibited.

C. Protect existing structures, equipment, and appurtenances to remain.

D. Obtain permission from Engineer before abandoning or removing existing structures, materials, equipment and appurtenances.

E. Provide fire extinguishers in areas where demolition work is performed by use of an open flame. Exercise necessary precautions for fire prevention.

F. Maintain circulation of traffic within area at all times during demolition operations.

G. Make necessary arrangements with and perform work required by utility companies and municipal departments for discontinuance or interruption of utility services due to demolition work.

3.02 DEMOLITION:

A. Demolish and remove existing construction, utilities, equipment, and appurtenances.

B. Provide maximum practicable protection from inclement weather for materials, equipment, and personnel located in partially dismantled structures.

C. Protect persons and property throughout progress of work. Provide safe working conditions for personnel.

D. Wet down work during demolition operations to prevent dust from arising. Minimize spread of dust and airborne particles.

E. Complete demolition work on upper levels before disturbing supporting members on lower levels.

F. Cap or plug with non-shrink grout, pipes and other conduits which are abandoned in place.

G. Removed materials, equipment, and appurtenances, not designated for relocation, become property of Contractor and shall be disposed of offsite.

3.03 REPAIR/RESTORATION:

A. Repair or remove items that are damaged. Repair and install damaged items to condition at least equal to that which existed prior to start of work.

3.04 CLOSEOUT ACTIVITIES:

A. Provide in accordance with Section 01700.

END OF SECTION

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SECTION 02223

SCREENED GRAVEL

PART 1 – GENERAL

1.01 DESCRIPTION:

A. Provide and compact screened gravel as indicated and specified.

1.02 RELATED WORK:

A. Section 02210: Earth Excavation, Backfill, Fill and Grading

1.03 REFERENCES:

A. American Society for Testing and Materials (ASTM) Publications:

1. C33: Specification for Concrete Aggregates

2. D6913: Standard Test Methods for Particle-Size Distribution (Gradation) of Soils Using Sieve Analysis

1.04 SUBMITTALS:

A. Submit the following in accordance with Section 01300:

1. Gradation test result from the soil testing laboratory, at least two (2) weeks prior to hauling material, for the Engineer's acceptance.

2. Submit a 20-lb. sample of the material when requested by the Engineer.

1.05 QUALITY ASSURANCE:

A. Provide in accordance with Section 01400 and as specified.

B. Qualifications of the independent soil testing laboratory as specified in Section 02210.

C. Maximum particle size and gradation analyses shall be performed in accordance with ASTM D6913.

D. Material testing frequency and requirements as specified in Section 02210.

1.06 TRAFFIC MANAGEMENT:

A. Truck access for materials and equipment deliveries to Peirce Island is affected by traffic, narrow streets, pedestrians, and tight intersections. The Contract Documents have detailed construction traffic routes which apply to all construction traffic on this project and the Contractor is required to adhere to. Refer to Section 01500 and the Contract Drawings for a full description of the traffic management requirements.

B. Tractor-trailers longer than an AASHTO WB-50 may have difficulty turning from State St. onto Marcy St. To facilitate this turn, parking has been prohibited at this intersection between the hours of 12AM and 8AM.

PART 2 – PRODUCTS

2.01 MATERIAL:

A. Screened gravel: Gradation and physical property requirements of screened gravel shall conform to ASTM C33, Coarse Aggregate number 67.

B. Screened gravel shall be free from roots, leaves, and other organic materials, and free of ice, snow, frost and frozen soil particles.

C. Crushed rock of equivalent size and grading may be used instead of screened gravel.

PART 3 – EXECUTION

3.01 PLACEMENT AND COMPACTION:

A. Specified in Section 02210 and as indicated on the drawings.

3.02 CONTRACT CLOSEOUT:

A. Provide in accordance with Section 01700.

END OF SECTION

SECTION 02224

BANK-RUN GRAVEL

PART 1 – GENERAL

1.01 DESCRIPTION:

A. Provide and compact bank-run gravel as indicated and specified.

1.02 RELATED WORK:

A. Section 02210: Earth Excavation, Backfill, Fill and Grading

1.03 REFERENCES:

A. American Society for Testing and Materials (ASTM) Publications:

1. D1140: Test Method for Amount of Material in Soils Finer than the No. 200 (75 µm) Sieve.

2. D1557: Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft^3)

3. D6913: Standard Test Methods for Particle-Size Distribution (Gradation) of Soils Using Sieve Analysis.

1.04 SUBMITTALS:

A. Submit the following in accordance with Section 01300:

1. Gradation and compaction test results from the soil testing laboratory, at least two (2) weeks prior to hauling material, for the Engineer's acceptance.

2. Submit a 20-lb. sample of the material when requested by the Engineer.

1.05 QUALITY ASSURANCE:

A. Provide in accordance with Section 01400 and as specified.

B. Qualifications of the independent soil testing laboratory as specified in Section 02210.

C. Maximum particle size and gradation analyses shall be performed in accordance with ASTM D6913. Soil compaction test shall be performed in accordance with ASTM D1557 Procedure C.

D. Material testing frequency and requirements as specified in Section 02210.

1.06 TRAFFIC MANAGEMENT:

A. Truck access for materials and equipment deliveries to Peirce Island is affected by traffic, narrow streets, pedestrians, and tight intersections. The Contract Documents have detailed construction traffic routes which apply to all construction traffic on this project and the Contractor is required to adhere to. Refer to Section 01500 and the Contract Drawings for a full description of the traffic management requirements.

B. Tractor-trailers longer than an AASHTO WB-50 may have difficulty turning from State St. onto Marcy St. To facilitate this turn, parking has been prohibited at this intersection between the hours of 12AM and 8AM.

PART 2 – PRODUCTS

2.01 MATERIAL:

A. Bank-run gravel shall be obtained from approved natural deposits and unprocessed except for the removal of deleterious materials and stones larger than the maximum size permitted.

B. Bank-run gravel shall be unfrozen and substantially free from vegetation, roots, loam and other organic matter, clay, snow, frozen particles and other fine or harmful substances.

2 Bank-run gravel: Inorganic granular material meeting the following gradation:

Sieve Designation	Percentage by Weight Passing Square Mesh Sieves
6 in.	100
2 in.	80 - 100
No. 4	20 - 65
No. 200	0 – 12

PART 3 – EXECUTION

3.01 PLACEMENT AND COMPACTION:

A. Specified in Section 02210 and where indicated on the drawings.

3.02 CONTRACT CLOSEOUT:

A. Provide in accordance with Section 01700.

END OF SECTION

SECTION 02225

SELECT BORROW

PART 1 – GENERAL

1.01 DESCRIPTION:

A. Provide and compact select borrow as indicated and specified.

1.02 RELATED WORK:

A. Section 02210: Earth Excavation, Backfill, Fill and Grading

1.03 REFERENCES:

A. American Society for Testing and Materials (ASTM) Publications:

1. C33: Specification for Concrete Aggregates

2. D1140: Test Method for Amount of Material in Soils Finer than the No. 200 (75 µm) Sieve.

3. D1557: Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft^3).

4. D2487: Standard Classification of Soils for Engineering Purposes (Unified Soil Classification System).

5. D6913: Standard Test Methods for Particle-Size Distribution (Gradation) of Soils Using Sieve Analysis.

1.04 SUBMITTALS:

A. Submit the following in accordance with Section 01300:

B. Gradation and compaction test results from the soil testing laboratory, at least two (2) weeks prior to hauling material, for the Engineer's acceptance.

C. Submit a 20-lb. sample of the material when requested by the Engineer.

1.05 QUALITY ASSURANCE:

A. Provide in accordance with Section 01400 and as specified.

B. Qualifications of the independent soil testing laboratory as specified in Section 02210.

C. Maximum particle size and gradation analyses shall be performed in accordance with ASTM D6913. Soil compaction test shall be performed in accordance with ASTM D1557 Procedure C.

D. Material testing frequency and requirements as specified in Section 02210.

1.06 TRAFFIC MANAGEMENT:

A. Truck access for materials and equipment deliveries to Peirce Island is affected by traffic, narrow streets, pedestrians, and tight intersections. The Contract Documents have detailed construction traffic routes which apply to all construction traffic on this project and the Contractor is required to adhere to. Refer to Section 01500 and the Contract Drawings for a full description of the traffic management requirements.

B. Tractor-trailers longer than an AASHTO WB-50 may have difficulty turning from State St. onto Marcy St. To facilitate this turn, parking has been prohibited at this intersection between the hours of 12AM and 8AM.

PART 2 - PRODUCT

2.01 MATERIAL:

A. Use only material free from roots, leaves, and organic matter, and free of ice, snow, frost and frozen soil particles.

B. Select borrow shall be well-graded coarse-grained soil in accordance with ASTM D2487 and shall meet the following gradation:

Sieve Designation	Percentage by Weight Passing Square Mesh Sieves
3 in.	100
1-1/2 in.	70 - 100
3/4 in.	50 - 85
No. 4	30 - 60
No. 50	10 - 25
No. 200	0 - 5

C. Soil particles shall conform to the physical property requirements of ASTM C33.

PART 3 – EXECUTION

3.01 PLACEMENT AND COMPACTION:

A. Specified in Section 02210 and as indicated on the drawings.

3.02 CONTRACT CLOSEOUT:

A. Provide in accordance with Section 01700.

END OF SECTION

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SECTION 02273

GEOTEXTILE FABRIC

PART 1 - GENERAL

1.01 DESCRIPTION:

A. Provide woven geotextile fabric for silt fence as indicated or specified

1.02 RELATED WORK:

A. Section 01568: Erosion Control, Sedimentation and Containment of Construction Materials

B. Section 02210: Earth Excavation, Backfill, Fill and Grading

C. Section 02223: Screened Gravel

D. Section 02435: Crushed Stone

1.03 REFERENCES:

A. ASTM International (ASTM):

1. D4355: Standard Test Method for Deterioration of Geotextiles by Exposure to Light, Moisture and Heat in a Xenon Arc Type Apparatus.

2. D4491: Standard Test Methods for Water Permeability of Geotextiles by Permittivity.

3. D4533: Standard Test Method for Trapezoid Tearing Strength of Geotextiles.

4. D4632: Standard Test Method for Grab Breaking Load and Elongation of Geotextiles.

5. D4751: Standard Test Method for Determining Apparent Opening Size of a Geotextile.

6. D4833: Standard Test Method for Index Puncture Resistance of Geomembranes and Related Products.

1.04 SUBMITTALS:

A. Submit the following shop drawings in accordance with Section 01300.

1. At least two weeks prior to shipment, submit manufacturer's certificate of compliance and physical property data sheet indicating that requirements for materials and manufacture are in conformance as specified.

2. For informational purposes only, submit manufacturer’s printed installation instructions.

1.05 QUALITY ASSURANCE:

A. Comply with the requirements specified in Section 01400.

B. General:

1. Producer of geotextile fabric to maintain competent laboratory at point of manufacture to insure quality control in accordance with ASTM testing procedures. Laboratory to maintain records of quality control results.

2. Do not expose geotextile fabric, except the geotextile fabric for silt fence, to ultraviolet radiation (sunlight) for more than 14 days total in period of time following manufacture until geotextile fabric is installed and covered with fill or backfill material.

3. Take all precautions to protect geotextile fabric from damage resulting from any cause. Either repair or replace geotextile fabric to Engineer's satisfaction at no additional cost to the Owner.

1.06 DELIVERY STORAGE AND HANDLING:

A. Comply with the requirements specified in Section 01610.

B. Provide geotextile fabric in rolls wrapped with protective covering to protect geotextile fabric from mud, dirt, dust, and debris. Label each roll of geotextile fabric with number or symbol to identify production run

C. Provide geotextile fabric from sunlight during transportation and storage. Do not leave geotextile fabric exposed to sunlight for more than two weeks during installation operations.

1.07 TRAFFIC MANAGEMENT:

A. Truck access for materials and equipment deliveries to Peirce Island is affected by traffic, narrow streets, pedestrians, and tight intersections. The Contract Documents have detailed construction traffic routes which apply to all construction traffic on this project and the Contractor is required to adhere to. Refer to Section 01500 and the Contract Drawings for a full description of the traffic management requirements.

B. Tractor-trailers longer than an AASHTO WB-50 may have difficulty turning from State St. onto Marcy St. To facilitate this turn, parking has been prohibited at this intersection between the hours of 12AM and 8AM.

PART 2 - PRODUCTS

2.01 MANUFACTURERS:

A. Provide the following nonwoven geotextile fabric:

1. Geotex 601 as manufactured by Propex.

2. Mirafi 160N as manufactured by TenCate Geosynthetics.

3. 150EX as manufactured by Thrace - LINQ.

B. Provide the following woven geotextile fabric for silt fence:

1. Geotex 2130 as manufactured by Propex.

2. W100 as manufactured by SKAPS Industries.

3. Beltech 940 by Belton Industries Inc.

4. Or acceptable equivalent product

2.02 MATERIALS:

A. Geotextile fabric shall conform to test requirements for minimum average roll value (weakest principle direction) for strength properties of any individual roll tested from manufacturing lot or lots of particular shipment in excess of minimum average roll value (weakest principle direction) as specified hereafter:

B. Physical Properties of Minimum Average Roll of the nonwoven geotextile fabric shall be:

Property	ASTM Test Method	Units	Value
1.Grab Strength	D4632	Lbs	150 (min)
2. Grab Elongation	D4632	%	50 (min)
3. Trapezoidal Tear Strength	D4533	Lbs	60 (min)
4. Puncture Strength	D4833	Lbs	75 (min)
5. Permittivity	D4491	Sec-1	1.3 (min)

6. Apparent Opening Size	D4751	Sieve Number	70-100
7. Ultraviolet Stability	D4355	Percent	70 (min)

C. Physical Properties of Minimum Average Roll of the woven geotextile fabric for silt fence shall be

Property	ASTM Test Method	Units	Value
1. Grab Strength	D4632	Lbs	100 (min)
2. Permittivity	D4491	Sec-1	0.10 (min)
3. Apparent Opening Size	D4751	Sieve Number	20-30
4. Ultraviolet Stability	D4355	Percent	70 (min)

PART 3 - EXECUTION

3.01 INSTALLATION:

A. Install geotextile fabric in accordance with manufacturer's printed instructions.

B. Place geotextile fabric on the foundation subgrade prior to placing screened gravel or crushed stone.

C. Overlap geotextile fabric 18 inches minimum for unsewn lap joint. Overlap fabric 6 inches at seam for sewn joint.

D. Do not permit traffic or construction equipment to travel directly on geotextile fabric.

E. Place geotextile fabric in relatively smooth condition to prevent tearing or puncturing. Lay geotextile fabric loosely but without wrinkles or creases so that placement of the backfill materials will not stretch or tear geotextile fabric. Leave sufficient slack in geotextile fabric around irregularities to allow for readjustments.

F. Patch all tears in geotextile fabric by placing additional section of geotextile fabric over tear with a minimum of 3 feet overlay.

G. Install silt fence in accordance with the manufacturer's printed instructions and as indicated.

3.02 CONTRACT CLOSEOUT:

A. Provide in accordance with Section 01700.

END OF SECTION

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SECTION 02435

CRUSHED STONE

PART 1 - GENERAL

1.01 DESCRIPTION:

A. Provide and compact crushed stone as indicated and specified.

1.02 RELATED WORK:

A. Section 02210: Earth Excavation, Backfill, Fill and Grading

1.03 REFERENCES:

A. American Society for Testing and Materials (ASTM) Publications:

1. C33: Specification for Concrete Aggregates

2. D6913: Standard Test Methods for Particle-Size Distribution (Gradation) of Soils Using Sieve Analysis

1.04 SUBMITTALS:

A. Submit the following in accordance with Section 01300:

1. Gradation test result from the soil testing laboratory, at least two (2) weeks prior to hauling material, for the Engineer's acceptance.

2. Submit a 20-lb. sample of the material when requested by the Engineer.

1.05 QUALITY ASSURANCE:

A. Provide in accordance with Section 01400 and as specified.

B. Qualifications of the independent soil testing laboratory as specified in Section 02210.

C. Maximum particle size and gradation analyses shall be performed in accordance with ASTM D6913.

D. Material testing frequency and requirements as specified in Section 02210.

1.06 TRAFFIC MANAGEMENT:

A. Truck access for materials and equipment deliveries to Peirce Island is affected by traffic, narrow streets, pedestrians, and tight intersections. The Contract Documents have detailed construction traffic routes which apply to all construction traffic on this project and the Contractor is required to adhere to. Refer to Section 01500 and the Contract Drawings for a full description of the traffic management requirements.

B. Tractor-trailers longer than an AASHTO WB-50 may have difficulty turning from State St. onto Marcy St. To facilitate this turn, parking has been prohibited at this intersection between the hours of 12AM and 8AM.

PART 2 - PRODUCTS

2.01 MATERIAL:

A. Crushed Stone: Gradation and physical property requirements of crushed stone shall conform to ASTM C33, Coarse Aggregate number 67.

B. Crushed stone shall be free from roots, leaves, and other organic materials, and free of ice, snow or frost and frozen soil particles.

PART 3 - EXECUTION

3.01 PLACEMENT AND COMPACTION:

A. Specified in Section 02210 and as indicated on the drawings.

3.02 CONTRACT CLOSEOUT:

A. Provide in accordance with Section 01700.

END OF SECTION

SECTION 02510

WATER UTILITIES

PART 1 - GENERAL

1.01 DESCRIPTION:

A. Provide water utilities as indicated and as specified in the City of Portsmouth's Construction Manual for installation of Water Mains. The Manual is attached as Appendix F and is referred to herein as "City Standards".

1.02 REFERENCES:

A. Appendix F Portsmouth Water Division Construction Manual Part C – Installation of Water Mains.

1.03 SUBMITTALS:

A. Submit the following in accordance with Section 01300.

1. Pipe materials.

2. Pipe fittings.

3. Pipe couplings.

4. Pipe thrust restraint.

5. Valves.

6. Fire Hydrants.

7. Accessories.

8. Appurtenances.

B. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

C. Instructions: Provide manufacturer's installation instructions.

D. Field Test Reports: Provide results for hydrostatic and bacteriological tests.

E. Project Record Documents: Provide actual locations of piping mains, valves connections, thrust restraints, and invert elevations. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

1.04 SPARE PARTS:

A. Comply with the requirements specified in Section 01600.

1.05 QUALITY ASSURANCE:

A. Comply with the requirements specified in Section 01400.

B. Perform Work in accordance with municipality standards.

C. Valves: Manufacturer's name**,** FM and pressure rating marked on valve body.

D. Materials used for private fire lines shall be UL listed and approved by Factory Mutual.

E. NSF Approval: Material used in the manufacture of PVC pipe and fittings shall be approved by the National Sanitation Foundation (NSF) for conveying potable water. Pipe and fittings shall bear the NSF label.

1.06 DELIVERY STORAGE AND HANDLING:

A. Comply with the requirements specified in Section 01610.

B. Deliver and store valves in shipping containers with labeling in place.

1.07 WARRANTY:

A. Provide standard product warranties for piping materials and as required by municipality standards.

1.08 TRAFFIC MANAGEMENT:

A. Truck access for materials and equipment deliveries to Peirce Island is affected by traffic, narrow streets, pedestrians, and tight intersections. The Contract Documents have detailed construction traffic routes which apply to all construction traffic on this project and the Contractor is required to adhere to. Refer to Section 01500 and the Contract Drawings for a full description of the traffic management requirements.

B. Tractor-trailers longer than an AASHTO WB-50 may have difficulty turning from State St. onto March St. To facilitate this turn, parking has been prohibited at this intersection between the hours of 12AM and 10AM.

PART 2 - PRODUCTS

2.01 WATER PIPE:

A. Provide pipe and fittings in accordance with City Standards

1. Cathodic Protection: Provide 1/16 x 3/4 inch copper strip conductors for joints indicated to have electrical continuity. Weld terminal strips to bell-ends and spigot ends of pipe in the foundry. Provide jumper strips and silicon bronze bolts and nuts to complete the connections. If field cutting of pipe is necessary, weld terminal strip to cut spigot end using thermit weld or other acceptable process.

2. Provide Polyethylene Encasement/wrap in accordance with AWWA C105. The polyethylene material should be virgin polyethylene conforming to ANSI/ASTM D1248 with a minimum thickness.

3. Provide three serrated silicon bronze wedges per joint to be installed where push-on pipe is used for the new 12-inch water main for purposes of electrical continuity.

2.02 VALVES:

A. Provide in accordance with City Standards.

2.03 OPERATORS:

A. Provide in accordance with City Standards.

2.04 FIRE HYDRANTS:

A. Provide in accordance with City Standards.

2.05 BEDDING AND COVER MATERIALS:

A. As indicated.

2.06 THRUST RESTRAINT:

A. Provide in accordance with City Standards.

2.07 COUPLINGS:

A. Provide in accordance with City Standards.

2.08 ACCESSORIES:

A. Provide in accordance with City Standards.

2.09 DISINFECTION CHEMICALS:

A. Refer to Section 02515.

2.10 APPURTENANCES:

A. Provide appurtenances for a complete piping system suitable for operation, and in conformance with Project Documents.

2.11 SHOP PAINTING/COATINGS:

A. Unless noted otherwise, provide standard manufacturer paint and coatings for piping, valves, hydrants, and accessories to prevent corrosion for the life of the component.

2.12 SHOP TESTING:

A. Test pipes, valves, hydrants, and applicable accessories per manufacturer requirements, and as required by referenced Standards.

PART 3 - EXECUTION

3.01 PREPARATION AND INSTALLATION:

A. Provide in accordance with City Standards

3.02 REPAIR/RESTORATION:

A. Repair any existing utilities/structures, or features damaged during installation of water utilities to Owner's satisfaction, and at no cost to Owner.

3.03 FIELD TESTING:

A. Perform field-testing under provisions of Section 01400**,** Section 02515, and Appendix F.

3.04 FIELD PAINTING/COATINGS:

A. Repair any shop painting/coatings damaged during storage or installation to Owner's satisfaction.

3.05 ADJUSTING:

A. Coordinate with Engineer for any field adjustments. The Engineer reserves the right to reject any field adjustments.

3.06 PROTECTION:

A. Protect installed water utilities from damage throughout storage, installation, testing, and final approval.

3.07 CLOSEOUT ACTIVITIES:

A. Provide in accordance with Section 01700.

END OF SECTION

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SECTION 02515

DISINFECTING OF WATER UTILITY DISTRIBUTION

PART 1 - GENERAL

1.01 DESCRIPTION:

A. Provide disinfecting of water utility distribution systems as indicated and in compliance with Contract Documents.

B. Section Includes:

1. Disinfection of water mains in accordance with AWWA C651, except as modified below.

1.02 REFERENCES:

A. American Water Works Association (AWWA):

1. C651: Disinfecting Water Mains.

1.03 SEQUENCING:

A. Basic procedure for disinfecting water mains:

1. Inspecting materials to be used to ensure their integrity.

2. Preventing contaminating materials from entering the water main during storage, construction, or repair and noting potential contamination at the construction site.

3. Removing, by flushing or other means, those materials that may have entered the water main.

4. Chlorinating any residual contamination that may remain, and flushing the chlorinated water from the main.

5. Protecting the existing distribution system from backflow caused by hydrostatic pressure test and disinfection procedures.

6. Documenting that an adequate level of chlorine contacted each pipe to provide disinfection.

7. Determining the bacteriological quality by laboratory test after disinfection.

8. Final connection of the accepted new water main to the active distribution system.

1.04 SUBMITTALS:

A. Submit the following in accordance with Section 01300.

1. Supervisor qualifications.

2. Equipment list.

3. Disinfection plan in accordance with this Section and City requirements.

1.05 QUALITY ASSURANCE:

A. Comply with the requirements specified in Section 01400.

B. Regulatory Requirements:

1. Disinfection work shall be acceptable to Owner. If requirements of this section are in conflict with requirements of regulatory agencies, the latter shall govern.

C. Source Quality Assurance:

1. Perform Work in connection with disinfection under direction of experienced supervisor.

2. Use equipment in proper working condition and adequate for specified Work.

D. Prior to starting disinfection work, furnish detailed outline of proposed sequence of operation, manner of filling and flushing units, source and quality of water to be used, and disposal of wasted water.

E. Perform work in connection with disinfection under direction of experienced supervisor.

F. Use equipment in proper working condition and adequate for specified work.

1.06 DELIVERY STORAGE AND HANDLING:

A. Comply with the requirements specified in Section 01610.

1.07 PROJECT CONDITIONS:

A. Dechlorinate the disinfection water such that the chlorine residual does not exceed 0.5 mg/L.

B. Schedule the rate of flow and locations of discharges in advance to permit review and coordination with Owner. The allowable locations of discharges are described below**:**

1. Peirce Island WWTF.

1.08 TRAFFIC MANAGEMENT:

A. Truck access for materials and equipment deliveries to Peirce Island is affected by traffic, narrow streets, pedestrians, and tight intersections. The Contract Documents have detailed construction traffic routes which apply to all construction traffic on this project and the Contractor is required to adhere to. Refer to Section 01500 and the Contract Drawings for a full description of the traffic management requirements.

B. Tractor-trailers longer than an AASHTO WB-50 may have difficulty turning from State St. onto Marcy St. To facilitate this turn, parking has been prohibited at this intersection between the hours of 12AM and 10AM.

PART 2 - PRODUCTS

2.01 OWNER-SUPPLIED PRODUCTS:

A. The Owner will provide potable water for the first disinfection effort. Submit request for use of water from waterlines of Owner 48 hours in advance. If bacteriological testing shows that the first disinfection effort was not successful, the Contractor will be charged, at the Owner's current rates, the cost of additional water for subsequent disinfection efforts.

2.02 MATERIALS:

A. Water: Use potable water for cleaning and disinfection.

B. Chlorine: Provide in accordance with AWWA C652.

1. Liquid Chlorine: Inject with a solution feed chlorinator and a water booster pump. Follow the instructions of the chlorinator manufacturer.

2. Calcium Hypochlorite (Dry): Dissolve in water to a known concentration in a drum and pump into the pipeline at a metered rate. Tablet form calcium hypochlorite may be used only for water mains up to 12 inches (300 mm) in diameter and less than 2,500 feet (760 m) in length.

3. Sodium Hypochlorite (Solution): Further dilute in water to desired concentration and pump into the pipeline at a metered rate.

2.03 EQUIPMENT:

A. Submit list of equipment used for disinfecting work.

2.04 ACCESSORIES:

A. Chlorine Residual Test Kit: For measuring chlorine concentration, supply and use a medium range, drop count, DPD drop dilution method kit per AWWA C651,

Appendix A.1. Maintain kits in good working order available for immediate test of residuals at point of sampling.

PART 3 - EXECUTION

3.01 PREPARATION:

A. Isolate new work being disinfected from system to avoid possibility of contaminating materials entering distribution system.

B. Method of disinfection for piping systems shall conform to AWWA C651.

3.02 CHLORINE PREPARATION:

A. Liquid Chlorine:

1. Apply chlorine gas-water solution by means of solution feed chlorinating device or, if accepted by Engineer, dry gas may be fed directly through proper devices for regulating rate of flow and providing effective diffusion of gas into water within unit being treated.

2. Provide chlorinating devices for feeding solutions of chlorine gas that prevent backflow of water into chlorine cylinder.

B. Calcium Hypochlorite:

1. Prepare granular calcium hypochlorite as water mixture before introduction into unit. Make dry powder into paste and thin to approximately 1 percent chlorine solution.

2. To prepare chlorine solution, add 1 pound) of calcium hypochlorite (65 to 70 percent available chlorine to 7-1/2 gallons of water.

3.03 PIPELINE PREPARATION:

A. After pressure and leakage tests complete, flush units thoroughly to remove foreign material.

B. Release entrapped air at high points and fill units with disinfecting agent and water to allow disinfecting agent to come in contact with interior surfaces.

C. If complete venting cannot be accomplished through available outlets, provide necessary corporation cocks and vent piping.

3.04 APPLICATION OF DISINFECTANT:

A. Point of Application:

1. Apply chlorinating agent at supply end of unit being disinfected.

2. For pipes, apply disinfectant through corporation cock installed in top of pipe.

3. Place tablets in accordance with AWWA C651.

B. Rate of Application:

1. Introduce water at controlled rate in order to regulate chlorine dosage.

2. Proportion rate of chlorine mixture flow to rate of water entering unit so chlorine dose applied produces at least 25 mg/L chlorine residual after period of 24 hours.

3. Method of determining rate of flow of water into unit being disinfected shall be accepted by Engineer.

C. Isolating Systems:

1. Keep chlorine gas-water disinfecting solution and contaminated water from flowing into units previously chlorinated and flushed.

D. Quality:

1. Retain chlorinated water in unit long enough to destroy non-spore forming bacteria.

2. Minimum retention period shall be 24 hours with chlorine residual at end of this period of not less than 25 mg/L (ppm).

E. Disinfecting Valves:

1. Operate valves and appurtenances while line or unit is being disinfected to ensure surfaces of valves are disinfected.

F. Valve Operation: Performed by Contractor.

3.05 DISINFECTING METHODS:

A. Disinfect accordance with AWWA C651.

B. Continuous Feed Method:

1. Introduce potable water into the pipeline at a constant measured rate. Feed the chlorine solution into the same water at a measured rate. Proportion the two rates so that the chlorine concentration in the pipeline is maintained at a minimum concentration of 50 mg/L. Check the concentration at points downstream during the filling to ascertain that sufficient chlorine is being added.

C. Slug Method:

1. Introduce the water in the pipeline at a constant measured rate. At the start of the test section, feed the chlorine solution into the pipeline at a measured rate so that the chlorine concentration created in the pipeline is 100 mg/L. Feed the chlorine for a sufficient period to develop a solid column or "slug" of chlorinated water that will, as it passes along the line, expose all interior surfaces to a concentration of at least 100 mg/L for at least three hours.

D. Disinfection of Connections to Existing Pipelines

1. Disinfect isolation valves, pipe, and appurtenances in accordance with AWWA C651, Section 4.7. Flush with potable water until discolored water, mud, and debris are eliminated. Swab interior of pipe and fittings with a 1 percent sodium hypochlorite solution. After disinfection, flush with potable water again until water is free of chlorine odor

E. Confirmation of Residual:

1. After the chlorine solution applied by the continuous feed method has been retained in the pipeline for 24 hours, confirm that a chlorine residual of 10 mg/L minimum exists along the pipeline by sampling at air valves and other points of access, such as tapping valves.

2. With the slug method, confirm by sampling as the slug passes each access point and as it leaves the pipeline that the chlorine concentration in the slug is at least 50 mg/L.

3.06 FINAL FLUSHING AND TEST:

A. Following chlorination, flush unit or system until replacement water in system is proven to be comparable in quality to water which will enter unit or system.

B. Above acceptable condition of water delivered by each unit or system shall continue for at least 2 days, as demonstrated by laboratory examination of samples. Laboratory tests shall show chlorine residual, after final flushing, of less than 1 mg/L (ppm).

C. Repetition of Flushing and Testing:

1. If initial treatment results in unsatisfactory bacterial test, repeat disinfection until satisfactory results obtained.

D. Prevent entry of contaminated water into previously disinfected units or systems.

E. AWWA C652, Method 1, 2 or 3 and AWWA C653.

3.07 BACTERIOLOGIC TESTS:

A. Collect two sets of samples per AWWA C651, Section 5.1, deliver to a certified laboratory within six hours of obtaining the samples, and obtain a bacteriologic quality

test to demonstrate the absence of coliform organisms in each separate section of the pipeline after chlorination and refilling. Collect at least one set of samples from every 1,200 feet of the new water main and line stopping insertion point, plus one set from the end of the line and at least one set from each branch. At each connection to an existing pipeline, take two additional samples.

B. Repetition of Procedure: If the initial chlorination fails to produce required residuals and bacteriologic tests, repeat the chlorination and retesting until satisfactory results are obtained.

C. Test Facility Removal: After satisfactory disinfection, disinfect and replace air valves, restore the pipe coating, and complete the pipeline where temporary disinfection or test facilities were installed.

3.08 FIELD QUALITY CONTROL:

A. Owner will obtain samples for and submit to laboratory for analysis before reservoir placed in service.

B. If safe samples not obtained using above procedure, Contractor shall add additional chlorine in amounts necessary to obtain safe samples.

3.09 CLOSEOUT ACTIVITIES:

A. Provide in accordance with Section 01700.

END OF SECTION

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SECTION 02530

SANITARY SEWERAGE UTILITIES

PART 1 - GENERAL

1.01 DESCRIPTION:

A. Provide sanitary force mains as indicated and in compliance with Contract Documents.

B. Section includes: Force mains, Precast concrete manholes, and cast-iron frames and covers.

1.02 REFERENCES:

A. ASTM International (ASTM):

1. A746: Standard Specification for Ductile Iron Gravity Sewer Pipe.

2. C443/443M: Standard Specification for Joints for Concrete Pipe and Manholes, Using Rubber Gaskets.

3. C478: Precast Reinforced Concrete Manhole Sections.

4. C858: Underground Precast Concrete Utility Structures.

5. C923: Resilient Connectors Between Reinforced Concrete Manhole Structures.

6. C924/C924M: Testing Concrete Pipe Sewer Lines by Low-Pressure Air Test Method; American Society For Testing And Materials.

B. American Water Works Association (AWWA):

1. C104/A21.4: Cement-Mortar Lining for Ductile-Iron Pipe and Fittings for Water.

2. C110/A21.10: Ductile Iron and gray Iron Fittings, 3 Inch Through 48 Inch for Water and Other Liquids.

3. C111/A21.11: American National Standard for Rubber Gasket Joints For Cast Iron and Ductile Iron Pressure Pipe and Fittings.

4. C151/A21.51: Ductile-Iron Pipe, Centrifugally Cast, for Water.

5. C153/A21.53: Ductile Iron Compact Fittings, k 3 inch through 24 Inch and 54 Inch Through 64 Inch for Water Service.

6. C509: Resilient-Seated Gate Valves for Water Supply Service.

7. C600: Installation of Ductile-Iron Water Mains and Their Appurtenances.

C. Occupational Safety and Health Administration (OSHA) Standards and Regulations:

1. 29 CFR 1926, Subpart P: Safety and Health Regulations for Construction, Excavations.

1.03 DEFINITIONS:

A. Appurtenances: Additional piping items to provide a complete piping system suitable to convey wastewater as specified and intended. These items may or may not be specified, but are necessary to complete the piping system.

1.04 SUBMITTALS:

A. Submit the following in accordance with Section 01300.

1. Pipe materials.

2. Precast manholes.

3. Pipe fittings.

4. Pipe couplings.

5. Pipe thrust restraint.

6. Valves.

7. Accessories.

8. Appurtenances.

B. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

C. Instructions: Provide manufacturer's installation instructions

D. Field Test Reports: Provide results for all testing performed as indicated in Subparagraph – Field Testing.

E. Project Record Documents: Provide marked-up set of drawings showing actual locations of piping, valves, connections, thrust restraints, and invert elevations. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

1.05 SPARE PARTS:

A. Comply with the requirements specified in Section 01600.

1.06 QUALITY ASSURANCE:

A. Comply with the requirements specified in Section 01400.

B. Valves: Manufacturer's name, UL/FM**,** and pressure rating marked on valve body.

1.07 DELIVERY STORAGE AND HANDLING:

A. Comply with the requirements specified in Section 01610.

B. Deliver and store valves in shipping containers with labeling in place.

1.08 TRAFFIC MANAGEMENT:

A. Truck access for materials and equipment deliveries to Peirce Island is affected by traffic, narrow streets, pedestrians, and tight intersections. The Contract Documents have detailed construction traffic routes which apply to all construction traffic on this project and the Contractor is required to adhere to. Refer to Section 01500 and the Contract Drawings for a full description of the traffic management requirements.

B. Tractor-trailers longer than an AASHTO WB-50 may have difficulty turning from State St. onto Marcy St. To facilitate this turn, parking has been prohibited at this intersection between the hours of 12AM and 8AM.

PART 2 - PRODUCTS

2.01 FORCE MAIN (PRESSURE) SANITARY SEWER PIPE MATERIALS:

A. Force Main (Pressure) Sewer Pipe Less Than 4 Inches in Diameter.

1. Provide and test IPS pressure pipe and fittings as indicated, specified, and in accordance with ANSI/AWWA C901, ASTM D3035, and ASTM F714.

2. Diameters: 3/4 to 3 inch.

3. SDR 9 (250 psi).

4. Material: PPI TRI TR-4 PE 4710, ASTM D3350 Cell Class 445574 CC 2 or 3.

5. ANSI/NSF 61 Certified.

6. Fittings: Socket or butt fusion.

7. Joints: Heat Fusion (Butt, Saddle, or Socket). Provide flanges where indicated for valves, equipment, tanks, and wall penetrations.

B. HDPE Force Main (Pressure) Sewer Pipe 4 Inches in Diameter and Larger:

1. Manufacturers:

    a. Performance Pipe

    b. J-M Manufacturing

2. Provide ductile iron pipe size high density polyethylene pipe and fittings.

    a. Size range: 4-inch (100 mm) to 30-inch (750 mm).

    b. Class: DR 11.

    c. Joints:

        (1) Butt heat fusion.

        (2) Flanged: Provide at all equipment, valves, tanks and wall penetrations.

    d. Flanged Connections: Van Stone type with HDPE flange and bolt ring as specified.

        (1) Bolt Torque: Install in accordance with Plastic Pipe Institute, Inc Technical Note #38.

    e. Fittings:

        (1) 90 Degree Bends: Provide 5 piece HDPE segmented elbows.

        (2) 45 Degree Bends: Provide 3 piece HDPE segmented elbows.

        (3) Concentric Reducers: HDPE three section traditional type design, compact reducers are not acceptable.

        (4) Provide stiffeners where required.

3. Materials:

    a. Pipe and Fittings: Material designation PE4710 in accordance with ASTM D3035 or PE3048 in accordance with ASTM D3350.

    b. Bolt Rings: Type 316 stainless steel ASTM A531 Grade CF8M.

    c. Hardware: Type 316 stainless steel.

C. Ductile Iron Force Main (Pressure) Sewer Pipe 4 Inches in Diameter and Larger: Refer to Section 02615.

D. Fusible PVC Force Main Sewer Pipe: Refer to Section 02956.

2.02 PRECAST CONCRETE MANHOLES:

A. Provide precast base sections that extend above pipe top and form portion of barrel. Barrel sections constructed of manhole risers topped with tapered sections or flat tops as indicated. Conform manhole sections to ASTM C478; resilient connectors to ASTM C923.

B. Manhole Steps: Do not provide steps.

C. Joints: O-Ring rubber-gasket joints conforming to ASTM C443, confined as indicated.

D. Pipe Connections: Flexible Joints for Sanitary Sewer Pipes 42 Inches (1050 mm) and Smaller in Diameter. Conform to ASTM C923. Rubber gasket held in place by metallic sleeve and clamps. Flexible sleeve made of flexible synthetic rubber with stainless steel strap cast in manhole.

E. Precast Inverts: Conform to invert channels specified in Part 3 of this Specification Section.

2.03 MANHOLE FRAME AND COVERS:

A. Owner shall furnish manhole frames and covers to be installed by Contractor.

2.04 VALVES:

A. Resilient Seat Gate Valves:

1. Manufacturers (OS&Y Type Valves):

a. American RD

b. Mueller

2. Manufacturers-NRS Type Valves:

a. US Pipe.

b. American Cast Iron Pipe.

c. Kennedy Valve.

d. Mueller.

3. General:

a. Provide valves that conform to NSF Standard 61.

b. Non-potable water service: Provide resilient seat gate valves for all sizes indicated. If resilient seat valves are not available provide solid wedge gate valves.

c. Provide resilient seated valves conforming to AWWA C509 except as modified herein.

4. Materials:

a. Body and Bonnet: ASTM A536 ductile iron.

b. Wedge: ASTM A536 ductile iron encapsulated with EPDM.

c. Provide all other materials as specified in AWWA C500 and C509.

d. Working water pressure rating:

(1) 3-in to 16-in: 250 psi

(2) 18-in and larger: 150 psi

5. Buried Valves: Mechanical joint or push-on joint ends, non-rising stem valves with operating nut in lieu of hand wheel. Provide gate boxes, steel extension stems or universal-joint operating rods with 2-in square operating nuts at upper end with coupling connected to valve stem to bring to operating nut to within 6 inches of ground surface.

6. Owner to advise on rotation to open valves.

7. Provide conventional packing in OS&Y valves.

8. Provide conventional packing or double O rings in non-rising stem valves.

9. Valves capable of being repacked or O ring replaceable while under pressure.

10. Provide Type 316 stainless steel bolts and bronze nuts for stuffing box follower.

B. Gate Valves - 3-Inch And Smaller:

1. Valves 1/2-inch to 2-inch:

a. Working Pressure: 200 psi (1400 kPa).

b. Rising stem type.

c. Ends: Threaded ASME 1.20.1.

d. Materials:

(1) Body, Bonnet and Disc: ASTM A351 CF8M.

(2) Stem and Gland: ASTM A276 Type 316 stainless steel.

(3) Packing and Gaskets: PTFE.

(4) Handwheel: ASTM A536.

2. Valves 2-1/2-inch to 3-inch:

a. Working Pressure: ANSI Class 150.

b. OS&Y, bolted bonnet, solid or flexible wedge disc type.

c. Ends: Flanged ANSI B16.5.

d. Materials:

(1) Body, Bonnet and Disc: ASTM A351 CF8M.

(2) Stem and Gland: ASTM A276 Type 316 stainless steel.

(3) Packing and Gaskets: PTFE.

(4) Handwheel: ASTM A536.

C. Provide all gate valves with all internal and external wetted parts coated with a fusion bonded epoxy in accordance with ANSI/AWWA C550.

D. Ball VALVES – GENERAL SERVICE:

1. Manufacturers:

a. Jamesbury

b. KF

c. Inline

d. Kitz

2. Valves 1/2-inch through 4-inch

a. Materials:

(1) Body and End Cap: Three piece, ASTM A351 Grade CF8M.

(2) Body Seal: PTFE.

(3) Seat: RTFE.

(4) Ball: Type 316 stainless steel.

(5) Stem: Type 316 stainless steel.

b. Pressure Rating:

(1) 1/2-inch through 2-inch: 1000 psi at 100 degrees F

(2) 2-1/2-inch through 4-inch: 800 psi at 100 degrees F

c. Ends:

(1) 2-inch and Smaller: Screwed or flanged.

(2) 3-inch and larger: Flanged.

3. Valves 4-inch through 12-inch .

a. Materials:

(1) Body and Adaptor: Two piece, ASTM A351 Grade CF8M.

(2) Seat: TFE.

(3) Ball: Type 316 stainless steel.

(4) Stem: Type 316 stainless steel.

b. Pressure Rating: ANSI Class 150.

c. Ends: Flanged.

4. Actuators: 4-inch (100 mm) and Smaller: Lever.

2.05 THRUST RESTRAINT:

A. Mechanical Joint Restraint: Wedge action restrained joint retainer gland devices. Mechanical joint restraint incorporated into the design of the follower gland.

B. Thrust Blocks: Dimensions and concrete type as indicated.

C. Pipe Clamps and Tie Rods: ANSI/NFPA 24.

D. Push-On Restrained Joint Pipe: Provide joint restraint and conforming joint to AWWA C111/21.11, fabricated to be easily disassembled. Provide assembly and disassembly kits. Follow manufacturer's installation instructions.

2.06 ACCESSORIES:

A. Expansion Joints

2.07 APPURTENANCES:

A. Provide all necessary appurtenances for a full and complete piping system suitable for operation, and in conformance with Project Documents.

2.08 SHOP PAINTING/COATINGS:

A. Unless otherwise specified or indicated, provide fusion bonded epoxy coating for all metallic components.

2.09 SHOP TESTING:

A. Test all pipes and valves per manufacturer requirements, and as required by pertinent Standards.

PART 3 - EXECUTION

3.01 EXAMINATION:

A. Verify that excavation is ready to receive work and excavations, dimensions, and elevations are as indicated for sanitary sewer pipe. Verify excavation for manholes to proper depth and proper placement of bedding material.

3.02 PREPARATION:

A. Sanitary sewer pipe: Hand trim excavations to required elevations. Correct over excavation with bedding material. Remove large stones or other hard matter which could damage pipe or impede consistent backfilling or compaction.

B. Manholes: Coordinate placement of inlet and outlet pipe sleeves. Seal exterior surface of sanitary sewer manholes with minimum 14-mil-thick coal tar coating.

3.03 SANITARY SEWER PIPE INSTALLATION:

A. Maintain a minimum of 10 ft. separation of sanitary sewers pipe and water mains unless otherwise indicated.

B. Install pipe, fittings, and accessories in accordance with manufacturer's instructions. Seal joints watertight.

C. Lay pipe to slope indicated; with maximum variation from true slope of 0.10 percent. Lay pipe upgrade, with spigot ends pointing in direction of flow. Lay pipe to form a close concentric joint with adjoining section and to prevent sudden offsets in flow line.

D. Install bedding to depths and dimensions as indicated.

E. Backfill each section of pipe as it is laid, as indicated at least up to centerline, before next joint is made. Do not completely conceal or bury pipe prior to being tested for water tightness and prior to being accepted by the Engineer. Do not displace or damage pipe when compacting. Monitor deflection during installation to confirm the pipe is not disturbing during backfilling.

F. Clear the interior of the pipe of dirt and superfluous materials as the work progresses. Keep a suitable swab or drag in the pipe and pull it forward past each joint immediately after the jointing has been completed.

G. Keep trenches and other excavations free of water until final inspection. Note that the proposed 24" HDPE force mains are buoyant and will float prior to backfilling.

H. Close open ends of pipe and fittings in a manner acceptable to the Engineer when the work is not in progress so that trench water, earth and other substances will not enter the pipe or fittings.

I. Handle pipe and fittings to avoid damage. Carefully inspect pipe and fittings for defects before lowering into the trench.

J. Where necessary deflect pipelines to avoid obstructions or where long-radius curves are indicated. Do not exceed the maximum deflection recommended by pipe manufacturer. Provide short sections of pipe as necessary to maintain required line.

K. Provide compatible pipe connections to each valve and to equipment. Connect different types of pipe and accessories with flexible couplings or pipe and accessories with flexible couplings or accepted transition fittings. Provide insulation fittings where ferrous pipe connects to nonferrous metallic pipe.

L. Repair linings, coatings and coverings damaged during construction with accepted materials equal to and compatible with original lining, coating or covering. Repair damaged galvanizing with zinc-rich paint.

3.04 PRECAST CONCRETE MANHOLE INSTALLATION:

A. Maintain a minimum of 10-ft. separation of sanitary sewer precast concrete manholes and water mains unless otherwise indicated.

B. Place precast manhole sections plumb and level, adjust to correct elevation. Provide bedding material as indicated**.**

C. After manhole assembly, plug liftholes with nonshrink grout.

D. Cut and fit for pipe connections.

E. Set manhole frames and covers level to correct elevations.

3.05 VALVE INSTALLATION:

A. Set valves on solid bearing.

B. Install valves according to applicable AWWA Standard.

3.06 REPAIR/RESTORATION:

A. Repair any existing utilities/structures, or features damaged during installation of sanitary sewerage utilities to Owner's satisfaction, and at no cost to Owner.

3.07 FIELD TESTING:

A. General:

1. Perform field-testing under provisions of Section 01400.

B. Cleaning and Testing

1. Cleaning: Flush out and clean sanitary force mains of foreign matter before placing systems into operation. Use flushing velocity of 10 feet (30 m) per second, minimum. Take care to prevent scale and other objectionable matter from entering piping. Properly dispose of water used for flushing.

2. Force Main Pressure Test: To prevent movement of pipe, backfill between joints to provide 2-foot (0.60 m) minimum cover. Expose only area immediately at pipe joints. Test force main hydrostatically for 2 hours at 1.5 times the design working pressure. Measure leakage in accordance with, and not exceeding, the allowable leakage specified in AWWA C600 or UNI B3.

3. Testing of Sanitary Sewers: At such times as Engineer may direct, prove watertightness of buried sanitary sewer or portions thereof by one of the following tests. Conduct tests under supervision of the Engineer . Furnish materials, labor, and equipment required for tests and repair system until test results are satisfactory.

4. Vacuum test: For precast concrete manholes 25 feet (7.5 m) deep and less, a vacuum test may be used instead of exfiltration test. Conduct tests prior to backfilling and include joint between manhole cover and frame. Plug and brace pipe openings. Draw vacuum of 10 inches of mercury (34 kPa). Minimum time to drop to 9 inches of mercury (30 kPa) follows:

Table 33 30 00-1			
	Manhole Diameter in Inches		
Depth in Feet	48	60	72
Up to 10	60 sec.	75 sec.	90 sec.
10.01-15	75 sec.	90 sec.	105 sec.
15.01-25	90 sec.	105 sec.	120 sec.

5. If manhole fails the test, make necessary repairs and repeat the vacuum test and repairs until manhole passes test. Submit test results.

3.08 FIELD PAINTING/COATINGS:

A. Repair any shop painting/coatings damaged during storage or installation to Owner's satisfaction.

3.09 ADJUSTING:

A. Coordinate with Engineer for any field adjustments. The Engineer reserves the right to reject any field adjustments.

3.10 PROTECTION:

A. Protect sanitary sewerage utilities from damage throughout storage, installation, testing, and final acceptance.

3.11 CLOSEOUT ACTIVITIES:

A. Provide in accordance with Section 01700.

END OF SECTION

SECTION 02615

DUCTILE IRON PIPE AND FITTINGS

PART 1 - GENERAL

1.01 DESCRIPTION:

A. Provide and test ductile iron pipe, fittings and appurtenances as indicated and in compliance with Contract Documents.

B. Options:

1. For buried exterior pipelines provide push-on joint pipe.

a. Provide restrained push-on pipe as specified

b. Provide either restrained push-on joint fittings as specified and indicated or provide mechanical joint fittings with restraint system as specified herein

2. Cast iron pipe and fittings are not acceptable.

1.02 REFERENCES”

A. American Society of Mechanical Engineers (AMSE):

1. B16.1: Cast-Iron Pipe Flanges and Flanged Fittings, Class 25, 125, 250, and 800.

2. B16.21: Nonmetallic Flat Gaskets for Pipe Flanges.

3. B16.42: Ductile Iron Pipe Flanges and Flanged Fittings.

4. B31.1: Power Piping.

B. ASTM International (ASTM):

1. A240: Specification for Heat Resisting Chromium and Chromium-Nickel Stainless Steel Plate, Sheet and Strip for Pressure Vessels.

2. A307: Carbon Steel Bolts and Studs, 60,000 psi Tensile.

3. A380: Standard Practice for Cleaning, Descaling, and Passivation of Stainless Steel Parts, Equipment and Systems.

4. A530: Specification for General Requirements for Specialized Carbon and Alloy Steel Pipe.

5. A774: Specification for As-Welded Wrought Austenitic Stainless Steel Fittings for General Corrosive Service at Low and Moderate Temperatures.

6. A778: Specification for Welded, Unannealed Austenitic Stainless Steel Tubular Products.

C. American Water Works Association (AWWA):

1. A21.4: Cement-Mortar Lining for Ductile-Iron Pipe and Fittings for Water.

2. A21.10: Ductile-Iron and Gray-Iron Fittings, 3 in. through 48 in., for Water and Other Liquids.

3. A21.11: Rubber-Gasket Joints for Ductile-Iron and Gray-Iron Pressure Pipe Fittings.

4. A21.15: Flanged Ductile-Iron Pipe with Threaded Flanges.

5. A21.50: Thickness Design of Ductile-Iron Pipe.

6. A21.51: Ductile-Iron Pipe, Centrifugally Cast in Metal Molds, or Sand-Lined Molds, for Water or Other Liquids.

7. A21.53: Ductile-Iron Compact Fittings, 3-in through 16-in. for Water and Other Liquids.

8. C105/A21.5: Polyethylene Encasement for Ductile Iron Pipe Systems.

D. Fluid Sealing Association: Technical Handbook.

1.03 SUBMITTALS:

A. Submit the following in accordance with Section 01300:

1. Pipe manufacturer’s technical specification and product data.

2. Certified shop and erection drawings.

3. Certificates: Sworn certificates in duplicate showing compliance with material used and shop tests performed.

4. Catalog cuts and technical data for expansion joints, couplings, gaskets, pipe supports and other accessories.

5. Brochures and technical data on coatings and linings and proposed method of application.

6. Manufacturer's descriptive literature and technical data on insulation and proposed method of installation.

B. Material Certification:

1. Provide certification from the pipe and fittings manufacturer that the materials of construction specified are recommended and designed for the service conditions specified and indicated. If materials other than those specified are proposed based on incompatibility with the service conditions, provide technical data and certification that the proposed materials are recommended and designed for the service conditions specified and indicated including an installation list of a minimum of five (5) installations in operation for a minimum of five (5) years. Provide proposed materials at no additional cost to the Owner.

2. Where materials are not specified, provide technical data and certification that the proposed materials are recommended and designed for the service conditions specified and indicated.

C. A copy of the contract civil drawings, with addenda that are applicable to the equipment specified in this section, marked to show all changes necessary for the equipment proposed for this specification section. If no changes are required, mark all drawings with "No changes required" or provide a statement that no changes are required.

1. Failure to include all drawings or a statement applicable to the equipment specified in this section will result in submittal return without review until a complete package is submitted.

2. A copy of this specification section with addenda and all referenced specification sections with addenda, with each paragraph check-marked to indicate specification compliance or marked and indexed to indicate requested deviations and clarifications from the specified requirements.

a. If deviations and clarifications from the specifications are indicated, therefore requested by the Contractor, provide a detailed written justification for each deviation and clarification.

b. Failure to include a copy of the marked-up specification sections and or the detailed justifications for any requested deviation or clarification will result in submittal return without review until marked up specifications and justifications are submitted in a complete package.

1.04 QUALITY ASSURANCE:

A. Provide in accordance with Section 01400 and as specified.

B. Provide manufacturer's certification in writing, that materials meet or exceed minimum requirements as specified.

C. Inspect and test at foundry according to applicable standard specifications.

D. Owner reserves right to inspect and test by independent service at manufacturer's plant or elsewhere at his own expense.

E. Visually inspect before installation.

F. Job Conditions:

1. Coordinate dimensions and drillings of flanges with flanges for valves, pumps and equipment to be installed in the piping systems.

1.05 DELIVERY, STORAGE AND HANDLING:

A. Comply with the requirements specified in Section 01610.

B. During loading, transportation and unloading, prevent damage to pipes and fittings. Load and unload each pipe under control at all times. Under no circumstances will a dropped pipe be used unless inspected and accepted by Engineer . Place skids or blocks under each pipe in the shop and securely wedge pipe during transportation.

1.06 TRAFFIC MANAGEMENT:

A. Truck access for materials and equipment deliveries to Peirce Island is affected by traffic, narrow streets, pedestrians, and tight intersections. The Contract Documents have detailed construction traffic routes which apply to all construction traffic on this project and the Contractor is required to adhere to. Refer to Section 01500 and the Contract Drawings for a full description of the traffic management requirements.

B. Tractor-trailers longer than an AASHTO WB-50 may have difficulty turning from State St. onto Marcy St. To facilitate this turn, parking has been prohibited at this intersection between the hours of 12AM and 8AM.

PART 2 - PRODUCTS

2.01 PIPE:

A. Ductile Iron:

1. Design conforming to AWWA A21.50.

2. Manufacture conforming to AWWA A21.15 or AWWA A21.51.

3. Thickness class, unless otherwise indicated or specified:

a. Minimum Thickness Class 52.

b. Minimum thickness Class 53 for use with threaded flanges.

c. Minimum thickness Class 53 for use with flanged pipe.

2.02 PIPE FOR USE WITH COUPLINGS:

A. As specified above except ends shall be plain.

B. With sleeve couplings, ends cast or machined at right angles to axis.

2.03 FLEXIBLE JOINT PIPE:

A. Provide joints with maximum deflection 15 degrees in any direction from pipe axis. Joint design to prevent pulling apart, and to remain watertight at any deflection angle within specified range.

B. Provide boltless type with rubber gaskets.

C. Pipe barrel thickness: According to manufacturer's standard but not less than AN Standard for pipe of corresponding class.

D. Machine joint contact surfaces spherical, without depressions or chatter marks, or rough tool cuts.

1. Smooth by grinding, and buffing.

2. Machining accuracy: Finished pipes interchangeable without loss of watertightness or flexibility.

3. Protect spherical spigot and plain ends of cut lengths by fastened wood lagging.

2.04 FITTINGS:

A. Provide fittings conforming to AWWA A21.10, at least Class 150 and match piping class.

B. Provide all bell push-on or mechanical-joint fittings unless otherwise indicated or specified.

C. Face and drill flanged fittings conforming to AWWA A21.10 except special drilling or tapping for correct alignment and bolting.

D. If flanged fittings are not available under AWWA A21.10 provide fittings conforming to ASME B16.1 in 125 lb. pressure class.

E. Provide standard base fittings where indicated.

F. Provide grooved-end fittings ductile-iron conforming to AWWA A21.10 for center-to-face dimensions.

1. End preparation for grooved-ends conforming to AWWA C606 for flexible or rigid joints as required by type of joint.

2.05 NONSTANDARD FITTINGS:

A. Acceptable design.

B. Same diameter and thickness as standard fittings.

C. Manufactured to meet requirements of same specifications as standard fittings except for laying length and types of ends.

2.06 ADAPTERS:

A. Furnish and install for joining pipe of different types, unless solid sleeves indicated.

1. Provide ends conforming to above specifications for the correct type of joint, to receive adjoining pipe.

2. Joining two classes of pipe may be of lighter class provided annular space in bell-and-spigot type joints sufficient for jointing.

2.07 JOINTS:

A. Provide push-on joint and mechanical joint pipe with necessary accessories, conforming to AWWA A21.11.

1. Provide gasket composition designed for exposure to liquid within pipe.

2. Provide mechanical joint gaskets with copper tips to provide electrical continuity.

3. Provide serrated brass wedges for push-on joints to provide electrical continuity; two per joint for pipe 12-inch and smaller and four per joint for larger pipe.

B. Provide pipe flanges and accessories conforming to AWWA A21.15.

1. Provide flat faced flanges.

2. Provide 1/8-inch thick, full faced gaskets designed for exposure to liquid within pipe.

C. Provide restrained joint on pipe and fittings where indicated. Provide restrained joint which is:

1. Boltless

2. Capable of being deflected after assembly

3. Designs using set screws or requiring field welding are not acceptable.

4. Manufacturers:

a. American Cast Iron Pipe Co. Flex-Ring.

b. U.S. Pipe TR FLEX.

c. Clow Super-Lock.

2.08 MECHANICAL JOINT FITTINGS – RESTRAINT SYSTEM:

A. Provide restraint devices for pipe consisting of multiple gripping wedges incorporated into a follower gland meeting requirements of AWWA A21.10.

1. Mechanical joint restraint shall require conventional tools and installation procedures per AWWA C600, retaining full mechanical joint deflection during assembly and allowing joint deflection after assembly.

2. Provide actuation of the gripping wedges ensured with torque limiting twist off nuts.

3. Provide restraint devices Listed by Underwriters Laboratories (3 inch through 24 inch size) and Designed by Factory Mutual (3 inch through 12 inch size).

4. Gland body, wedges and wedge actuating components must be domestic manufactured in the USA.

B. Working Pressure Rating:

1. 16-inch and Smaller: 350 psi

2. 18-inch thru 48-inch: 250 psi

3. 54-inch: 200 psi .

4. Minimum safety factor: 2 to 1.

C. Materials:

1. Gland body, wedges and wedge actuating components: Grade 65-45-12 ductile iron in accordance with ASTM A536.

2. Ductile iron gripping wedges: Heat treated, 370 to 470 BHN.

3. Provide three (3) test bars incrementally poured per production shift as per Underwriter's Laboratory (U.L.) specifications and ASTM A536. Testing for tensile, yield and elongation in accordance with ASTM E8.

4. Provide chemical and nodularity tests performed as recommended by the Ductile Iron Society, on a per ladle basis.

5. Provide an identification number consisting of year, day, plant and shift (YYDDD)(plant designation)(Shift number) cast into each gland body.

6. Record all physical and chemical test results such that they can be accessed via the identification number on the casting. Provide the Material Traceability Records (MTRs) available, in hard copy.

7. Provide coating for restraint devices consisting of the following:

   a. Process all wedge assemblies and related parts through a phosphate wash, rinse and drying operation prior to coating application.

   b. Coating: A minimum of two coats of liquid thermoset epoxy coating with heat cure to follow each coat.

   c. Surface pretreat all casting bodies with a phosphate wash, rinse and sealer before drying. The coating shall be electrostatically applied and heat cured. Coating: Polyester based powder to provide corrosion, impact and UV resistance.

   d. Coating system: MEGA-BOND by EBAA Iron, Inc.

D. Manufacturer:

1. EBAA Iron MEGALUG Series 1100

2.09 FLANGE ADAPTORS:

A. Provide restrained flange adaptors for pipe consisting of multiple individual gripping wedges incorporated into a follower gland meeting requirements of AWWA A21.10.

1. Provide actuation of the gripping wedges ensured with torque limiting twist off nuts.

2. Provide restraint devices Listed by Underwriters Laboratories (3-inch through 12 inch size) and Designed by Factory Mutual (4-inch through 12-inch size).

3. Gland body, wedges and wedge actuating components must be domestic manufactured in the USA.

B. Joint Deflection capability:

1. 3-inch through 8-inch : 5 degrees

2. 10-inch and 12-inch: 3 degrees

3. 14-inch and 16-inch: 2 degrees

4. 18-inch and 20-inch: 1.5 degrees

5. 20-inch, 42-inch and 48-inch: 1 degrees

6. 30-inch and 36-inch: 3 degrees

C. Provide flange adaptor to maintain seal with and 0.6 inch gap between end of pipe and mating flange

D. Working Pressure Rating:

1. 16-inch and Smaller: 350 psi

2. 18-inch: 300 psi

3. 20-inch: 250 psi

4. 24-inch: 200 psi

5. 30-inch through 48-inch: 150 psi

6. Minimum safety factor: 2 to 1.

E. Materials:

1. Gland body, wedges and wedge actuating components: Grade 65-45-12 ductile iron in accordance with ASTM A536.

2. Ductile iron gripping wedges: Heat treated, 370 to 470 BHN.

3. Provide three (3) test bars incrementally poured per production shift as per Underwriter's Laboratory (U.L.) specifications and ASTM A536. Testing for tensile, yield and elongation in accordance with ASTM E8.

4. Provide chemical and nodularity tests performed as recommended by the Ductile Iron Society, on a per ladle basis.

5. Provide an identification number consisting of year, day, plant and shift (YYDDD)(plant designation)(Shift number) cast into each gland body.

6. Record all physical and chemical test results such that they can be accessed via the identification number on the casting. Provide the Material Traceability Records (MTRs) available, in hard copy.

7. Provide coating for restraint devices consisting of the following:

a. Process all wedge assemblies and related parts through a phosphate wash, rinse and drying operation prior to coating application.

b. Coating: A minimum of two coats of liquid thermoset epoxy coating with heat cure to follow each coat.

c. Surface pretreat all casting bodies with a phosphate wash, rinse and sealer before drying. The coating shall be electrostatically applied and heat cured. Coating: Polyester based powder to provide corrosion, impact and UV resistance.

d. Coating system: MEGA-BOND by EBAA Iron, Inc.

F. Manufacturer:

1. EBAA Iron MEGAFLANGE Series 2100

2.10 FLEXIBLE CONNECTIONS:

A. Use as specified or indicated:

1. Sleeve couplings

2. Expansion joints

2.11 EXPANSION JOINTS:

A. Provide in accordance with Section 02956.

B. Pressure rating at least equal to that of related pipeline.

2.12 FILLING RINGS:

A. Provide where necessary.

B. Materials, workmanship, facing, and drilling, conforming to 125-lb. ANSI (Class 125).

C. Suitable length with nonparallel faces and corresponding drilling, if necessary, for correct assembly of adjoining piping or equipment.

2.13 CONNECTIONS – TAPPED:

A. Provide service saddles for all taps for lines 24-inch and smaller.

1. Body: Ductile iron ASTM A395 or Bronze.

2. Straps and Hardware: Type 316 stainless steel.

B. For 30-inch and larger provide watertight joint with adequate strength against pullout. Use only tapered thread taps.

1. Maximum size of taps in pipe or fittings without bosses not to exceed that listed in table of Appendix to AWWA A21.51 based on: 2 full threads.

2. Where size of connection exceeds that given above for pipe, provide boss on pipe barrel or use tapping saddle. Make tap in flat part of intersection of run and branch of tee or cross, or connect by means of tapped tee, branch fitting and tapped plug or reducing flange, or tapping tee and tapping valve, or permitted.

3. Provide taps and piping for gauges and pressure sensing instruments in accordance with ANSI/HI standards so that there are no erroneous readings.

2.14 PIPE COATING:

A. Machined surfaces cleaned and coated with rust-preventative compound at shop.

B. Buried pipe and fittings: Standard bituminous coating conforming to AN Standard.

2.15 CEMENT LINING:

A. Inside of pipe and fittings: Provide double thickness cement lining and bituminous seal coat conforming to AWWA A21.4.

2.16 GASKETS, BOLTS, AND NUTS:

A. Provide ring or full face synthetic rubber gaskets for flanged joints and neoprene faced phenolic for insulating gaskets in accordance with AWWA A21.11 and ASME B16.21.

1. 1/8 inch thick.

B. Make flanged joints with:

1. Bolts.

2. Bolt studs with nut on each end.

3. Studs with nuts where flange is tapped.

4. Plastic bolt sleeves and washers for insulating joints.

C. Number and size of bolts conform to same ANS as flanges.

D. Provide Type 316 stainless steel bolts, washers and nuts for all services:

2.17 ELECTRICAL CONDUCTORS:

A. Provide 1/16-inch by 3/4-inch copper strip conductors for joints indicated to have electrical continuity.

B. Weld terminal strips to bell-ends and spigot ends of pipe in the foundry. Provide jumper strips and silicon bronze bolts and nuts to complete the connections.

C. If field cutting of pipe is necessary, weld terminal strip to cut spigot end using thermit weld or other designed process.

PART 3 - EXECUTION

3.01 HANDLING AND CUTTING:

A. Mark pipe and fittings "Rejected" and remove from site when cracked or has received a severe blow.

B. If permitted, cut on sound barrel at a point at least 12 inch from visible limit of crack, at Contractor's expense.

C. Machine cut with milling type cutters, knives, or saws. Snap cutters, torch, or hammer and chisel NOT ALLOWED. Examine for possible cracks.

D. Chamfer cut ends if used for push-on joints.

E. Do not cut glass lined pipes.

3.02 INSTALLATION:

A. Visually inspect before installation.

B. Ensure pipelines parallel to building walls wherever possible. Install piping to accurate lines and grades. Where temporary supports are used, ensure rigidity to prevent shifting or distortion of pipe. Provide for expansion where necessary.

C. Pitch piping toward low points. Provide for draining low points.

D. Before assembly, remove dirt and chips from inside pipe and fittings.

E. Pipe and Fittings:

1. Remove and replace defective pieces.

2. Clear of all debris and dirt before installing and keep clean until accepted.

3. Lay accurately to lines and grades indicated or required. Provide accurate alignment, both horizontally and vertically.

4. Provide firm bearing along entire length of buried pipelines.

5. Do not allow deflection of alignment at joints to exceed permissible deflection as specified below:

PIPE DEFLECTION ALLOWANCES

Maximum permissible deflection, inches*		
Size of pipe, inches (mm)	Push-on joint	Mechanical joint
4	19	31
6	19	27
8	19	20
10	19	20
12	19	20
14	11	13-1/2
16	11	13-1/2
18	11	11
20 24	11	11
30	11	9 9
36	11	8
42	11	7-1/2
48	7-1/2	7-1/2
54	7-1/2	0
	7-1/2	
* Maximum permissible deflection for 20-feet lengths; for other lengths in proportion of such lengths to 20-feet .		

a. For push-on joint or similar pipe, clean bell of excess tar or other obstruction and wipe out before inserting next pipe spigot. Shove new pipe into place until properly seated and hold securely until joint completed.

b. Set castings to be encased in concrete accurately with bolt holes, if any, carefully aligned. Clean off rust and scale before setting.

F. Temporary Plugs: When pipe laying not in progress, close open ends of pipe with temporary watertight plugs. If water in trench, do not remove plug until danger of water entering pipe passed.

G. Appurtenances: Set valves, fittings and appurtenances as indicated.

3.03 JOINTS AND COUPLINGS:

A. Push-on Joints:

1. Insert gasket into groove bell. Apply thin film of nontoxic gasket lubricant over inner surface of gasket in contact with spigot end.

2. Insert chamfered end into gasket. Force pipe past it until it seats against socket bottom.

B. Bolted Joints:

1. Remove rust-preventive coatings from machined surfaces.

2. Clean pipe ends, sockets, sleeves, housings, and gaskets and smooth all burrs and other defects.

3. Use torque wrench to tighten to correct range of torque not to exceed values specified below:

TORQUE RANGE VALUES		
Nominal pipe size, in	**Bolt diameter, in**	**Range of torque, ft-lb**
3	5/8	40-60
4-24, incl.	3/4	75-90
30, 36	1	100-120
42, 48	1-1/4	120-150

C. Flanged Joint:

1. Make up tight.

2. Do not put strain on nozzles, valves, and other equipment.

3. Bolt threads must fully engage the nuts. At a minimum the bolt must be flush with the nut and no more than 1/2-inch excess thread protruding from the nut.

D. Mechanical Joints:

1. Wire brush surfaces in contact with gasket and clean gasket.

2. Lubricate gasket, bell, and spigot with soapy water.

3. Slip gland and gasket over spigot, and insert spigot into bell until seated.

4. Seat gasket and press gland firmly against gasket.

5. After bolts inserted and nuts made finger-tight, tighten diametrically opposite nuts progressively and uniformly around joint by torque wrench. Torque bolts to values specified above.

E. Flexible Joints:

1. Clean and dry before assembly.

2. Place gaskets, rings, glands and followers in position in back of spigot ball.

3. Coat ball and socket with thin film of lubricant conforming to joint manufacturer's standards.

4. Insert ball and seat in socket. Seat gasket against ball.

5. Boltless joints:

   a. Assemble retainer rings and glands conforming to manufacturer's standard.

   b. Lock in place with lead strips.

F. Tapped Connection:

1. Drill and tap normal to longitudinal axis.

2. Drilled by skilled mechanics using proper tools.

3. Use only tapered threads.

G. Electrical Conductors:

1. Install pipes so terminal strips are aligned.

2. Install jumper strips and tighten bolts.

3.04 POLYETHYLENE ENCASEMENT

A. Provide polyethylene encasement for use with ductile iron pipe in accordance with ANSI/AWWA C105/ A21.5, Polyethylene Encasement for Ductile Iron Pipe Systems.

B. Provide the polyethylene encasement for use with ductile iron pipe systems consisting of three layers of co-extruded linear low density polyethylene (LLDPE), fused into a single thickness of not less than eight mils.

C. Provide the inside surface of the polyethylene wrap in contact with the pipe exterior infused with a blend of antimicrobial compound to mitigate microbiologically influenced corrosion and a volatile corrosion inhibitor to control galvanic corrosion.

D. Install ductile iron pipe and the polyethylene encasement in accordance with AWWA C600 and ANSI/AWWA C105/A21.5 and also in accordance with all recommendations and practices of the AWWA M41, Manual of Water Supply Practices – Ductile Iron Pipe and Fittings.

E. Overlap the wrap one foot in each direction at joints and secure in place around the pipe. Provide any wrap at tap locations taped tightly prior to tapping and inspected for any repairs following the tap and repair as required.

3.05 FIELD TESTING:

A. Clean of all dirt, dust, oil, grease and other foreign material, before conducting pressure and leakage tests.

B. Pressure and Leakage Tests:

1. Conduct combined pressure and leakage test:

   a. Initially on pipeline between first two valves, maximum length 1/4 mile , and within three days of completion.

   b. Afterwards on completed sections of maximum length 1/2 mile .

   c. Isolated sections upon completion.

2. Conduct pressure and leakage test consisting of first raising water pressure (based on elevation of lowest point of section under test and corrected to gage location) to pressure in psi numerically equal to pipe pressure rating, but not more than 150 psi .

3. If unable to achieve and maintain specified pressure for one hour with no additional pumping, section fails test.

4. If section fails pressure and leakage test, locate, uncover, and repair or replace defective pipe, fitting, or joint, at no additional expense and without time extension. Conduct additional tests and repairs until section passes test.

5. Modify test procedure only if permitted by Engineer.

3.06 CONTRACT CLOSEOUT:

A. Provide in accordance with Section 01700.

END OF SECTION

SECTION 02736

TEMPORARY POTABLE WATER CONNECTIONS

PART 1 - GENERAL

1.01 DESCRIPTION:

A. Provide temporary connections as indicated and in compliance with Contract Documents.

1. Scope:

a. Provide, disinfect, and maintain temporary potable water bypass pipe, connections, and services as indicated and as specified and later remove temporary facilities.

b. Have readily available sufficient additional quantity of bypass pipe, connections of suitable sizes to replace or supplement the temporary facilities in event these prove inadequate in any way.

c. Perform all appurtenant work including but not limited to excavation and backfilling, insulation and protection from freezing, constructing ramps at driveways and other access ways, replacement of temporary and permanent pavement, restoration of public and private property.

1.02 SUBMITTALS:

A. Submit the following in accordance with Section 01300.

1. Before commencing work, submit for Engineer's review and acceptance, proposed layout plan and operations schedule for installing and removing temporary bypasses, connections and services.

2. Submit for Engineer's review and acceptance, a list of materials with sizes for temporary bypass, connections and services.

3. Submit documents indicating compliance with applicable traffic control and safety requirements and indicated Maintenance of Traffic Plan for the Project.

1.03 QUALITY ASSURANCE:

A. Comply with the requirements specified in Section 01400 and as specified.

B. Use only materials that are suitable for potable water transmission and distribution.

C. Provide temporary connections capable of withstanding service pressure equal to the normal working pressures experienced in the owner’s existing water distribution system or 150 psi whichever is greater.

D. Take water for temporary connections from Owner's nearest available hydrants remaining in service.

1.04 SAFETY REQUIREMENTS:

A. Prevent contamination of contiguous potable water distribution system and services.

B. Coordinate and cooperate with Owner's water utility and fire department to maintain water distribution and fire protection capability.

C. Take all necessary precautions for public safety.

D. Comply with Section 01500 for water supply for Contractor's operations.

E. Conform to all applicable traffic control and safety requirements during temporary connections and operations. Comply with indicated Maintenance of Traffic Plan for the Project.

1.05 TRAFFIC MANAGEMENT:

A. Truck access for materials and equipment deliveries to Peirce Island is affected by traffic, narrow streets, pedestrians, and tight intersections. The Contract Documents have detailed construction traffic routes which apply to all construction traffic on this project and the Contractor is required to adhere to. Refer to Section 01500 and the Contract Drawings for a full description of the traffic management requirements.

B. Tractor-trailers longer than an AASHTO WB-50 may have difficulty turning from State St. onto Marcy St. To facilitate this turn, parking has been prohibited at this intersection between the hours of 12AM and 8AM.

PART 2 - PRODUCTS

2.01 MATERIALS:

A. Provide pipe, fittings, hoses, connections, backflow preventers, and valves suitable for potable water service at equal to the normal working pressures experienced in the owner’s existing water distribution system or 150 psi whichever is greater and as accepted by Engineer.

PART 3 - EXECUTION

3.01 GENERAL:

A. Temporary by-pass piping systems shall be maintained in a safe and operative condition at all times (24 hours per day) during their use.

B. Temporary potable water supply by-pass piping systems utilized when there is a potential for freezing conditions (November 15 through March 31) shall be protected from freezing by the Contractor using insulation or other means. Contractor is responsible for thawing frozen lines and services. Temporary potable water supply by-pass piping systems in place during this time shall be protected from snowplows by being located outside of the roadway or buried. Where piping crosses streets, driveways, etc. it shall be buried.

C. Service connections connected to the temporary by-pass piping system shall be returned to normal service prior to removal of the temporary by-pass piping system.

D. Temporary potable water supply by-pass piping shall be provided with isolation valves spaced at 500-foot maximum intervals as approved by the Engineer. All temporary service connections shall have an isolation valve located at the connection to the temporary potable water supply by-pass pipe.

E. Furnish, install, maintain and later remove devices necessary to ensure public safety as required and as approved by the Owner. Provide backflow preventers as required by City of Portsmouth.

F. Install, operate, maintain, test, disinfect and remove temporary facilities including bypass, connections, laterals, customer services and customer connections and temporary fire hydrants as indicated on drawings, as specified and as accepted by Engineer.

G. Make installation suitable for temporary potable water service pressures equal to the normal working pressures experienced in the owner’s existing water distribution system or 150 psi whichever is greater without leakage

H. Do not operate Owner’s or user's valves, stops and hydrants without Engineer's permission for specific valves, stops and hydrants.

I. Test temporary facilities in presence of Engineer before taking Owner’s water main out of service.

J. Disinfect temporary facilities to meet Engineer's acceptance and in accordance with subsection titled Disinfection and Flushing under Section 02515 prior to placing such temporary facilities in service.

K. Make attachments and connections to fire hydrants and fire protection systems in a manner which can be easily and quickly removed to permit use of fire hydrants and fire protection systems for fire fighting purposes.

L. Notify in writing the Owner and the Owner's water utility and fire department 48 hours in advance of connecting and disconnecting temporary and permanent facilities so that representatives of Owner's water utility and fire department may be present at installation or removal of permanent and temporary connections and to permit Owner to inform customers and users as Owner deems necessary.

M. Do not install temporary bypass, connections and customer services across streets except as permitted by Engineer.

N. After water mains are returned to service, remove temporary facilities not required for remaining work and restore and clean up affected areas to the acceptance of the Engineer.

3.02 TEMPORARY POTABLE WATER SUPPLY BYPASS:

A. Provide bypass not less than sizes indicated on drawings and in any case not less than 2 inch (50 mm) diameter.

B. Lay bypass out of traveled way in manner to protect the bypass from damage.

C. Where bypass is accepted to cross streets and street intersections, lay in trench and place temporary pavement over bypass except as permitted otherwise in writing by the Engineer.

D. Where bypass crosses driveways and similar access ways to properties, construct suitable ramp to allow driving and passing over pipe except where Engineer requires bypass be laid in trench with temporary pavement over bypass.

E. Keep existing fire hydrants in service by making appropriate connections to bypass or by installing and maintaining temporary fire hydrants adjacent to each existing fire hydrant affected by work until restored to service.

F. Provide each temporary fire hydrant with individual valve control.

G. Provide temporary fire hydrants with fire hose connections compatible with existing fire hydrant hose connections as accepted by the Engineer.

H. Satisfactorily flush existing hydrants, to which bypass is connected for water supply, prior to making connections to prevent stagnant or discolored water from entering bypass.

I. If bypass proves inadequate for temporary service, replace or supplement bypass as appropriate to provide adequate temporary service, including replacement with larger diameter bypass, as accepted by the Engineer.

3.03 TEMPORARY SERVICE CONNECTIONS:

A. Furnish, install, maintain and later remove temporary service connections from the bypass to each building and service supplied by water main to be removed from service.

B. Lay temporary connections out of traveled and access ways where possible.

C. Temporary service connections ramped or in trench where directed and accepted by the Engineer.

D. Provide temporary service connections equal to or larger size than permanent service connections.

E. Install and maintain pressure regulators for temporary services where necessary.

F. Install and remove temporary service connections and back clean permanent services at times when work can be observed by the Engineer and other representatives of the Owner.

G. Coordinate and cooperate with service user, Owner's water utility and fire department, to assure minimum disturbance to fire protection system and other special and automated uses.

H. Make temporary service connections to user service line, sill cock, or other convenient and reasonable points and acceptable to the Engineer.

3.04 CLOSEOUT ACTIVITIES:

A. Provide in accordance with Section 01700.

END OF SECTION

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SECTION 02740

FLEXIBLE PAVING

PART 1 - GENERAL

1.01 DESCRIPTION:

A. Furnish and construct trench patch, walkways, and curbing as indicated and specified.

B. Furnish and install incidental items including:

1. Curbing and berms.

2. Pavement markings.

1.02 RELATED WORK:

A. Division 1: General Requirements

B. Section 02210: Earth Excavation, Backfill, Fill and Grading

1.03 REFERENCES:

A. Standard Specification for Roads and Bridge Construction, State of New Hampshire Department of Transportation, latest edition, Section 401 as amended and supplemented. (Referred to herein as the Standard Specification or Standard Specifications).

B. Current version of American Society for Testing and Materials (ASTM) Publications:

1. C136: Sieve Analysis of Fine and Coarse Aggregates.

2. D75: Sampling Aggregates.

3. D1140: Amount of Materials in Soils Finer Than the No. 200 Sieve.

4. D1556: Density and Unit Weight of Soil in Place by the Sand-Cone.

5. D1557: Laboratory Compaction Characteristics of Soil Using Modified Effort.

6. D2172: Quantitative Extraction of Bitumen from Bituminous Paving Mixtures.

7. D2726: Bulk Specific Gravity and Density of Compacted Bituminous Mixtures Using Saturated Surface - Dry Specimens.

8. D2922: Density of Soil and Aggregate in Place by Nuclear Methods (Shallow Depth).

9. D3071: Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth).

10. D3405: Joint Sealants, Hot-poured, for Concrete and Asphalt Pavements.

1.04 QUALITY ASSURANCE:

A. Engineer reserves the right to inspect at any time, the plant producing the paving material for plant conditions and operations, adequacy of equipment, accuracy of scales, temperature, character and proportions of the mixture, aggregates and bitumen and related production procedures.

B. Weather Limitations:

1. Conform to the Standard Specification for bituminous course.

2. Do not construct base course, or sub grade when ambient air temperature is 40 deg. F and falling.

3. The field and laboratory testing of paving materials and frequency by the Contractor's Independent Testing Laboratory shall be in accordance with Standard Specification.

C. Tier 2 QA/QC performance requirements shall apply.

D. Ride Smoothness: Standard Specification Section 401.3.17.3.4.1 shall apply except variations exceeding 3/8 inch in profile or cross slope shall be eliminated.

E. Ride Smoothness: Standard Specification Section 401.3.17.3.4.4 shall apply except high points 0.5 inches in 25 feet shall corrected.

1.05 SUBMITTALS:

A. Submit the following shop drawings in accordance with Section 01300.

1. Certification that plant supplying paving material will comply with the Standard Specification.

2. Pavement mix design.

3. Batch plant slips with each load of bituminous mixture stating the weight delivered, the mix proportions by weight, and the mix and asphalt cement temperature at the time of batching.

4. Test results from an independent testing laboratory certifying that sub grade, base and bituminous mixture aggregates comply with the Standard Specifications.

5. Test certificates from the Supplier indicating that asphalt cement and tack coat materials comply with specifications.

6. Test results from an independent testing laboratory indicating that bituminous mixtures comply with specifications, signed by an officer of bituminous mixture Supplier.

7. Schedule of construction for roadways.

8. Particle-size distribution and moisture-density relations of the processed gravel base and subbase courses tested in accordance with ASTM C136, ASTM D1140 and ASTM D1557.

1.06 DELIVERY STORAGE AND HANDLING OF BITUMINOUS MATERIALS:

A. Transport and deliver hot mix bituminous concrete in accordance with the Standard Specification. Do not use diesel fuel as a lubricant.

B. Transport and distribute tack coat in a bituminous distributor having pneumatic tires and equipped to spray bituminous emulsion material in a uniform coverage at the rate and temperature specified within a tolerance of 5 percent. The distributor shall include a separate power unit for the bitumen pump, full circulation spray bars, tachometer, pressure gages, volume measuring devices, heaters that shall achieve and maintain the specified temperature prior to and during the tack coat application, thermometer for reading the tank contents, and a hand hose attachment for applying tack coat manually to areas inaccessible to the distributor spray bars. The distributor shall be equipped to circulate and agitate the bituminous material during the heating process.

1.07 TRAFFIC MANAGEMENT:

A. Truck access for materials and equipment deliveries to Peirce Island is affected by traffic, narrow streets, pedestrians, and tight intersections. The Contract Documents have detailed construction traffic routes which apply to all construction traffic on this project and the Contractor is required to adhere to. Refer to Section 01500 and the Contract Drawings for a full description of the traffic management requirements.

B. Tractor-trailers longer than an AASHTO WB-50 may have difficulty turning from State St. onto Marcy St. To facilitate this turn, parking has been prohibited at this intersection between the hours of 12AM and 8AM.

PART 2 - PRODUCTS

2.01 ASPHALT BINDER COURSE:

A. Thickness as indicated on drawings.

B. Construct as indicated in Trench Repair detail in the Contract Drawings.

C. Materials and methods of construction for binder course conform to Section 401 of the Standard Specifications.

D. Materials shall conform to Standard Specification Section 401 except the following:

1. The maximum amount of Total Reused Binder (TRB) in the pavement mix design shall be .5% and the mix shall meet all volumetric mix design criteria.

2. Liquid asphalt cement binder shall have a Performance Grade (PG) of PG 64-28 for all standard bituminous and PG 64-E for all high strength bituminous pavements.

3. All pavement mixes shall be designed using the 50 gyration ¾-in winter binder design.

4. Asphalt Cement shall not contain any form of used, recycled or refined oil. Suppliers of PG Binder shall certify that the PG Binder does not contain any used, recycled or refined oil

5. NHDOT Standard Specifications Quality Assurance/Quality Control shall be followed for high strength mixes.

E. Pavement mix designs shall meet NHDOT Standard Specification Section 401.2.5.1 except the following:

1. Minimum asphalt binder content shall be as follows:

Table 02740-1. Minimum Binder Content

Mix Type	50 Gyration
3/8-in	6.3
½-in	5.9
¾-in	5.3

2. The required minimum asphalt content is based on the use of aggregate with a specific gravity of 2.65 to 2.70. The minimum asphalt content requirement may be adjusted when aggregate with a higher specific gravity is used, or the minimum may be adjusted at the Engineer's discretion if it is believed to be in the best interest of the Owner. All mix designs shall be submitted to the Engineer for verification and approval

3. Method Requirements NHDOT Standard Specification Section 401.2.6 shall apply including the following:

a. Coarse Aggregate: Stockpiled coarse aggregate shall meet the requirements of 2.6.1, Table 2.

b. Tolerances: All mixtures shall conform within the range of tolerances provided in NHDOT Standard Specification Section 401.2.6.2.

c. When Non-Compliant test result, it shall be the Contractor's responsibility to correct non-compliant pavement. The Contractor may be required to remove non-compliant material that is poorly graded or material exhibiting cracks, open joints or other imperfections.

2.02 PAVEMENT MARKING AND STRIPING

A. Traffic marking to white or yellow paint as directed by the Owner that complies with Section 632 of the NHDOT Standard Specification.

B. On existing pavement, provide retroreflective paint.

C. On new pavement, provide retroreflective paint pavement markings for longitudinal markings and to designate parking areas.

D. On new pavement, provide retroreflective thermoplastic pavement markings for transverse markings.

2.03 SIDEWALKS AND CURBING:

A. 2-in. thick Class A bituminous concrete sidewalks.

B. Materials and methods of construction for bituminous concrete sidewalks conform to requirements of Section 608 of The Standard Specification.

C. Bituminous concrete and granite curbing constructed in accordance with Section 609 of The Standard Specification.

PART 3 - EXECUTION

3.01 GENERAL:

A. Prior to placing any mix, a pre-paving conference shall be held with the Contractor, Engineer and Owner to discuss the proposed paving schedule, source of mix, type and amount of equipment to be used, sequence of paving pattern, rate of mix supply, traffic control, and general continuity of operation. Special attention shall be made to the paving pattern sequence to minimize cold joints.

B. The Contractor shall notify the Engineer one week in advance of paving operations to allow sufficient time for scheduling personnel.

C. Method requirements in Standard Specification Section 401.3.1.2 shall apply.

D. Provide material, equipment, and labor to construct roadways, berms, walkways, and curbs as specified and indicated.

E. Protect and leave in clean condition manhole covers, catchbasin grates, valve and meter boxes, curbs, walks and walls.

F. Provide interface with existing roadways as indicated and specified.

G. Adjust grates, manhole covers, catch basin grates, valve boxes, cathodic test station boxes and similar items to conform with pavement grade.

H. Surface of base course shall remain in the as-placed condition until pavement is placed.

I. Prior to placing bituminous concrete, sweep clean to satisfaction of Engineer all surfaces on which new pavement or tack coat is to be placed.

J. Repair existing paved areas damaged by the Contractor's construction activities with temporary paving until final roadway is to be constructed.

K. Apply tack coat only when the surface to receive the tack coat is dry, the atmospheric temperature in the shade is 40 degrees F or above and when the temperature has not been below 35 degrees F for the 12 hours prior to application. Apply at the rate of 0.05 to 0.15 gallons per square yard as directed by the Engineer. Apply at a temperature between 70 and 140 degrees F. Provide certified waybills and delivery tickets during progress of the work. As a prelude to providing complete tack, tack 200 feet for the full width of the spray bar as a trial section to evaluate the amount of tack that can be satisfactorily applied. Tack the trial section at the rate of 0.05 gals per square yard unless otherwise directed by the Engineer. Blot up any excess tack coat with clean dry sand. Allow tack to obtain evaporation of moisture prior to paving.

3.02 BITUMINOUS CONCRETE PAVEMENT:

A. Construct roadway pavements to grades, smoothness specified in the Standard Specification and to a grade tolerance of 0.05 feet.

B. At roadway interfaces, sawcut existing pavement edges for bonding with new pavement and paint vertical face with tack coat material. Allow time for tack coat to cure before paving.

C. Place Bituminous Concrete in accordance with the Standard Specification.

D. Installation of curb shall be in accordance with Section 609 of the Standard Specification.

3.03 FIELD TESTING:

A. Measure thickness, grade, and smoothness of all courses placed in accordance with the Standard Specifications.

3.04 SURFACE MAINTENANCE:

A. Until the expiration of the guarantee period, maintain surfacing placed under this contract and promptly correct any defect such as cracks, depressions, and holes that may occur. Surfacing kept in a safe and satisfactory condition for traffic. If defects occur in surfacing constructed by Contractor, remove bituminous concrete and base course as is necessary to properly correct defect. Replace base course and bituminous concrete.

END OF SECTION

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SECTION 02800

SOLAR MESSAGE BOARD

PART 1 - GENERAL

1.01 DESCRIPTION:

A. Provide two 2018 or latest model year Silent Messenger II Sign boards or equivalent.

B. The SILENT MESSENGER II or equivalent is a solar powered portable dynamic message sign. It consists of a sign display panel, a supporting structure for the display panel, a photovoltaic array, a battery power supply, an energy management system control unit, and an Electronic control console, all mounted on a heavy duty trailer frame.

C. The Contractor shall turn the message board along with the title over to the City and the City will register the message board.

1.02 QUALITY ASSURANCE:

A. Comply with the requirements specified in Section 01400.

B. All manufacturing shall be carried out in a facility with a completely implemented and properly maintained ISO 9001:2015 certified quality management system.

C. All units shall bear the CE Mark indicating acceptable EMC (Electromagnetic Compatibility). The units shall not be susceptible to nor produce any electromagnetic interference.

D. Manufacturer shall have a factory authorized service center located within 150 miles of point of delivery. An authorized service center shall receive all units from factory in order to inspect for any shipping damage and verify proper operation prior to final delivery. Delivery directly from the manufacturer's facility without inspection by an authorized service center shall not be permitted. Additionally, the authorized service center shall be capable of performing warranty service and repairs, and shall provide on-site training on the proper use and maintenance of all equipment delivered.

1.03 DELIVERY STORAGE AND HANDLING:

A. Comply with the requirements specified in Section 01610.

1.04 SUBMITTALS

A. Shop drawings in accordance with 01300

B. Operation and Maintenance Manual

C. Assembly Diagrams and Parts Lists

D. Command Center - User's Manual

E. User Guide - Hard Copy - attached to unit with PVC coated stainless steel lanyard

F. Pre-transport checklist

G. Job site setup checklist

H. Basic programming instructions

I. Basic system status evaluation

J. Weatherproof card attached to unit with Nylon-coated stainless steel lanyard.

K. Proprietary Protocol Documentation for Custom System Integrators

L. NTCIP (National Transportation Communications for Intelligent Transportation System Protocol) Support Documentation for NTCIP System Integrators

M. Web-Server Protocol Documentation for Web Based Application System Integrators

PART 2 - PRODUCTS

2.01 PERFORMANCE OBJECTIVES:

A. Visibility up to 1 mile.

B. Legibility up to ½ mile.

C. Minimal glare from sunlight and headlights.

D. Continuous, uninterrupted operation on solar power.

E. One month minimum, three month typical maintenance interval.

2.02 PHYSICAL DIMENSIONS:

A. General:

1. Length Overall: Standard trailer - towing - 112 in. (284 cm)

2. Standard trailer - storage/operating - 112 in. (284 cm)

3. Lift & Rotate trailer - towing - 152 in. (386 cm)

4. Lift & Rotate trailer - storage/operating - 108 in. (274 cm)

B. Width:

1. Overall:

a. Standard trailer - 92 in. (234 cm)

b. Lift & Rotate trailer - 77 in. (196 cm)

2. Across fenders:

a. Standard trailer - 75 in. (190 cm)

b. Lift & Rotate trailer - 77 in. (196 cm)

C. Height:

1. Sign in transport position: Standard trailer - 92 in. (234 cm), Lift & Rotate trailer - 101 in. (257 cm)

2. Sign in operating position: Standard trailer - 142 in. (360 cm), Lift & Rotate trailer - 142 in. (360 cm)

3. Ground Clearance: All Units - 13 in. (33 cm) (minimum)

4. Weight:

a. Standard trailer - 1,560 lbs. (708 kg) (approx.)

b. Lift & Rotate trailer - 2,000 lbs. (907 kg) (approx.)

D. Environmental:

1. Temperature, operating and storage: -40 to +185°F (-40 to +85°C)

2. Relative Humidity: 20% to 98%, non-condensing

3. Wind:

a. Transport position, maximum trailering speed: 70 MPH (112 KPH)

b. Operating position, max. height, outriggers in place 80 MPH (128 KPH) sustained

4. Electrical Interference: Unaffected by RFI (Radio Frequency Interference) and EMI (Electromagnetic Interference).

E. Trailer Chassis and Sign Support:

1. Trailer frame shall be constructed of welded 7 Gauge (3/16-inch) CNC formed steel plate and structural steel tubing with either a 3 x 3 x 3/16 inch structural steel tubing receiver, reinforced and welded to the front crossmember (standard trailer) or 7 gauge formed steel plate reinforced and welded to front crossmember for pivoting tongue (lift & rotate trailer).

2. Trailer shall be equipped with a 2 1/2 x 2 1/2 x 3/16 inch structural steel tubing receiver capable of accepting a standard Class II (2) drawbar and hitch pin to accommodate tandem towing. The rear hitch receiver shall be reinforced and welded to a 7 Gauge (3/16-inch) CNC formed steel plate rear cross member. Tandem trailer towing using rear hitch receiver is intended for off road use only and is subject to local laws and regulations.

3. The trailer tongue shall consist of 2 1/2 x 2 1/2 x 3/16 inch structural steel tubing. The tongue shall either bolt into the tongue receiver to facilitate easy removal of the tongue for repair, transportation, or security purposes (standard trailer) or bolt to formed steel plate assembly with an additional removable hitch pin to allow for easy pivoting upward into the storage position (lift & rotate trailer). The trailer tongue shall be equipped with a 2,000-pound capacity swivel-type top wind screw jack with a formed steel footpad (standard trailer only).

4. Trailer frame shall be equipped with tie down points to facilitate securing unit to utility trailer or truck deck for transport.

F. Suspension:

1. Trailer shall be equipped with an independent suspension, torsion-type axle with a 2,200 pound overall capacity. Axle load capacity shall be set at 1,400 pounds nominal.

2. Axle wheel spindles shall be equipped with grease fittings to accommodate wheel bearing lubrication.

G. Coupler:

1. Trailer tongue shall be capable of accepting a 2-inch ball coupler, a 2 1/2 -inch (or 3-inch) pintle ring, an optional removable combination coupler.

2. Trailer shall be equipped with 1/4-inch safety chains with snap-type hooks for secure attachment to tow vehicle hitch.

3. All coupler and safety chain configurations shall comply with SAE J684 standards for Class II (2) trailers.

H. Surface Preparation and Finishing:

1. Trailer chassis and superstructure shall be completely cleaned and deburred prior to finishing. All metal surfaces shall be prepared for finishing using an iron phosphate wash-down process.

2. A polyamide epoxy primer shall be applied to a dry film thickness of 1.5 mils.

3. A high gloss federal safety orange aliphatic acrylic urethane finish shall be applied to a dry film thickness of 1.25 mils.

I. Lighting:

1. Trailer shall be equipped with sealed flush-mounted combination stop, tail and turn lights.

2. Trailer shall be equipped with a lighted license plate holder.

3. Trailer wiring harness shall be completely sealed and water resistant.

J. Fenders:

1. Trailer shall be equipped with unbreakable, molded, solid color, UV-stabilized HDPE (High Density Polyethylene) fenders, completely closed on the inner side to protect trailer frame.

2. Fenders shall be secured to trailer frame with zinc-plated Steel thread forming screws and fender washers so as to facilitate easy repair or replacement.

K. Leveling Jacks:

1. Standard Trailer:

a. Trailer shall be equipped with four telescoping jacks consisting of 2 x 2 inch x 12 gauge perforated galvanized steel tubing equipped with a 3 x 3 x 3/16 inch x 6 inch wide steel foot plate.

b. Jack stands shall be inserted into 2 1/4 x 2 1/4 inch x 12 gauge galvanized steel tubing, welded to the trailer frame at a 45 degree angle.

c. Jack stands shall be locked into position by 3/8-inch zinc-plated steel tab lock pins secured to trailer frame by nylon-coated stainless steel lanyards.

d. Jack stands and tongue jack shall be configured such that unit can be set up on jack stands, level, in operating position, with the trailer wheels raised completely off the ground, permitting removal of wheels and tires for additional security.

e. Jack stands shall be configured such that, when in the operating position, they create a footprint of at least 93 inches, front to rear, and 56 inches, side to side, to provide adequate stability of unit in high winds.

2. Lift & Rotate Trailer:

    a. Trailer shall be equipped with four swivel type screw jacks, minimum capacity rating of 2,000 pounds, mounted at each corner of the trailer frame.

    b. The outrigger jacks shall be capable of lifting the trailer frame so trailer wheels and tires can be removed for additional security.

    c. Trailer shall be constructed such that the outrigger jacks are protected by 7 Gauge (3/16-inch) CNC formed steel plate guards when the jacks are in the travel position to prevent damage to jacks during transport.

L. Tires and Wheels:

1. Tires shall be B78-13 Load Range C (standard trailer) or ST205/75R14 Load Range C (lift & rotate trailer).

2. Wheels shall be 13-inch x 4 1/2-inch, 5-lug pattern (4 1/2-inch bolt circle), white spoke dress wheel (standard trailer) or 14-inch x 4 1/2-inch, 5-lug pattern (4 1/2-inch bolt circle), white spoke dress wheel (lift & rotate trailer).

3. Wheels and tires shall be sized according to load Requirements of trailer and axle.

M. Spare tire and rim: Provide spare tire and rim.

N. Sign Panel Support:

1. Standard Trailer:

    a. Trailer superstructure shall provide complete support of the sign panel in the transport (down) position. Cantilevered support of sign panel is not acceptable.

    b. Trailer superstructure shall be completely assembled with removable fasteners to accommodate quick, easy maintenance and repair.

    c. All fasteners shall be rust resistant and equipped with all metal (Stover) lock nuts to prevent loosening of fasteners during normal transportation and operation.

    d. All aluminum to steel attachments shall be made with stainless steel hardware and stainless Steel or nylon spacers so as to minimize galvanic corrosion.

O. Sign Panel Lifting Mechanism:

1. Sign panel lifting mechanism shall consist of a 1,000-pound capacity, automatic brake type winch with 1/4-inch wire rope capable of holding the sign panel in any position from full upright to the travel (down) position.

2. Lifting mechanism, through a series of pulleys, shall provide for balanced pull on both sides of sign panel support frame during raising of sign panel into the operate position.

3. Winch shall be zinc-plated to minimize rust and corrosion.

4. Winch shall be designed such that the handle can be removed, for added security, without interfering with the operation of the automatic brake.

5. Sign panel shall be secured in the operating (up) position by two stainless steel, spring-loaded, locking pins.

6. Trailer superstructure shall provide for support and operation of solar array, with solar array positioned to accommodate charging in both the operating and the traveling positions.

7. Solar array shall fold flat and flush onto back of sign panel when sign panel is in the transport (Down) position so as to minimize wind resistance without the need for an air deflector or spoiler.

8. Trailer superstructure shall be equipped with a formed steel upper rear crossmember and formed steel upper side members to reinforce the sign panel and solar array support frame.

9. Trailer superstructure shall be equipped with an integral sighting device, welded in place, to accommodate proper alignment of the sign panel with oncoming traffic, during setup.

P. Lift & Rotate Trailer:

1. Sign panel shall be attached to a telescoping mast Assembly to facilitate raising and rotating the Display panel from the transport position to the operating position safely and quickly by an Unassisted operator.

2. The mast shall consist of a lower assembly and an upper assembly with an electric 12VDC linear actuator mounted inside to provide for raising and lowering the message display panel.

3. An electric 12VDC linear actuator shall be installed within the sign mast assembly capable of raising the sign panel to the full operating position in less than thirty (30) seconds. The linear actuator shall be equipped with a manual override to permit lowering of the mast in the event of a total loss of electrical power. The linear actuator shall be of a lead-screw and ball drive type equipped with an automatic clutch mechanism to prevent damage to the actuator, mast assembly and sign panel if actuator is operated past the fully raise position, fully lowered position or sign panel assembly is obstructed while being raised or lowered.

4. Linear actuator shall be easily removable from mast assembly for repair and or replacement without disassembly of mast.

5. The lower mast shall be fabricated from 4 x 4 x 3/16-inch structural steel tubing inserted through a 5\16-inch steel plate secured to the trailer frame with eight 5\8-inch diameter steel bolts. The lower mast assembly shall be reinforced with 5/16-inch steel gusset plates located below the trailer deck.

6. The upper mast shall be fabricated from 6 1/2- inch diameter x 3/16-inch wall thickness structural steel round tubing.

7. The mast assembly shall be equipped with a dual cam locking mechanism located at the bottom of the upper mast. The dual cam locking mechanism shall secure the message display panel in the appropriate viewing position. The locking cam mechanism shall automatically tighten to resist turning in windy conditions. Friction type (disc or band brake) locking mechanisms are not acceptable as slippage can occur in high wind conditions.

8. The message display panel support mechanism shall be capable of being rotated through 360 degrees and locked into position, at any angle.

9. The message display panel rotation locking mechanism shall permit the operator to lock the message display into position, safely, at ground level, prior to elevation to full operating height.

10. The message display panel shall be equipped with a sighting device to facilitate proper alignment during setup.

11. The upper and lower mast assemblies shall be equipped with Nylatron wear pads to provide for smooth easy movement and to avoid metal to metal contact. The message display support mast shall be capable of extended operation without lubrication. Nylatron wear pads shall be adjustable to compensate for normal wear.

12. Message display panel support structure shall be of non-welded, modular construction to facilitate quick easy repair in the event of accidental damage.

13. Message display panel shall be secured to a steel superstructure with stainless steel hardware and nylon spacers to minimize the effects of corrosion.

14. All mounting hardware shall be locking-type. Heavy gauge steel cradles equipped with rubber bumpers and HDPE wear pads shall securely support sign panel against vertical and lateral movement during transport. No locking pins or latches will be permitted. Sign panel shall automatically lock into the transport position, without operator intervention, when the sign panel upper mast is fully retracted.

Q. Message Display Panel Dimensions:

1. Width Overall - 92 in. (234 cm)

2. Height Overall - 54 in. (137 cm)

3. Depth Overall - 6 in. (15 cm)

R. Display Characteristics:

1. The message display area shall be approximately 84 inches in width by 48 inches in height.

2. The display area shall consist of a continuous (full) matrix of 48 pixels or dots in width by 27 pixels in height.

3. The pixels or dots shall consist of three (3) LEDs (Light Emitting Diodes) arranged in a triangular pattern so as to produce the appearance of a round image or dot at normal viewing distances.

4. The display color shall be amber (592 nanometer wavelength).

5. The display shall produce a brightness greater than 10,000 candela per square meter at maximum intensity.

6. The display shall produce a minimum viewing angle of 24 degrees, with consistent intensity and color across the entire display panel.

7. The message display shall be capable of displaying one, two or three lines of alphanumeric characters or text with a nominal character height ranging from a minimum of 12 inches (30.5 cm) to a maximum of 38 inches (97 cm).

8. The message display panel shall be capable of displaying three lines of text with a minimum of three pixels (6 inches / 15 cm) between lines.

9. The message display shall also be capable of displaying graphic images and symbols using the Full 48 pixel width and 27 pixel height.

S. Display Modules:

1. Display modules shall be mounted in the sign panel using captive 1/4-turn wing-head fasteners to permit quick, easy module replacement without the need for any tools.

2. Display modules shall be mounted on rubber cushions to provide shock absorption during transport and to accommodate thermally-induced expansion and contraction of message display panel during operation.

3. Display module control circuitry shall include a fail-safe device, also known as a watchdog timer, to automatically monitor the performance of the display module and provide a reset / restart command to the on-board microcontroller in the event of any disruption of normal operation.

4. Display module control circuitry shall be designed to accommodate “hot swapping” - exchange of display modules while sign is operating.

5. The message display shall consist of an array of identical display modules capable of functioning in any position without the need for switch or jumper setup or special programming.

6. Display modules and message display panel shall accommodate complete service and exchange of display modules without the need for any tools.

7. Display modules shall be equipped with locking-type electrical / electronic connectors to provide secure, reliable operation while permitting quick, easy service and repair of message display.

2.03 POWER SYSTEM:

A. General:

1. Operating Voltage - 12 Volts DC nominal

2. Operating Energy Requirement - 60 Amp Hours per day nominal (maximum) at Spring or Fall Equinox (i.e. 12 hours of daylight, 12 hours of darkness)

3. Main Power Switch - Main power switch shall be a combination switch and electromagnetic, thermal circuit breaker to provide complete electrical system protection without the inconvenience of conventional fuses. Main power switch shall be splash proof and weather resistant.

B. Battery Bank:

1. Number of batteries - Eight (8)

2. Battery type - 6-Volt, heavy duty, AGM deep cycle Energy capacity - 520 Amp Hours nominal (8-batteries).

3. Sufficient energy capacity to operate the message sign, displaying typical three-line normal size character messages for 14 days, without any energy input from the solar array.

4. Battery / Equipment Compartment(s)

a. Battery / Equipment Compartment(s) shall be constructed of molded HMWPE (High Molecular Weight Polyethylene), color impregnated with Federal Safety Orange with 0.5% UV stabilizer added to prevent fading.

b. Compartment(s) shall be designed to completely contain spills from a failed or damaged battery case.

c. Compartment(s) shall be capable of supporting an operator standing on top of the battery / equipment compartment to service unit.

d. Compartment(s) shall be designed such that the lid automatically latches in the closed position and holds the batteries in place. Lid shall be capable of being locked in the closed position with a standard padlock.

e. Lid shall be secured to compartment by an integral plastic hinge that permits the lid to be completely removed from the compartment for service. Lid on the compartment containing the control console shall be automatically supported in the open position by a telescoping lid support.

f. Compartment(s) shall be designed to provide adequate ventilation for the batteries during charging yet prevent the ingress of water during use or transport.

g. Compartment(s) shall be capable of housing four (4) BCI Group GC-2 batteries.

C. Solar Array:

1. Photovoltaic module type - Single crystal (monocrystalline) silicon

2. Number of solar cells per module – 36

3. Solar array power output 160 Watts peak (min.)

4. Entire trailer (standard trailer) or Solar Array (lift & rotate trailer) shall tilt, with sign panel in the down or transport position to allow for fast, easy cleaning and maintenance of the solar array.

5. Solar array energy output shall be sufficient to operate the changeable message sign, under normal operating conditions, with the solar array in a flat, horizontal position. It shall not be necessary to tilt or rotate the solar array to provide sufficient energy output from the solar array to operate the message sign continuously.

6. Photovoltaic module junction boxes shall be equipped with watertight strain reliefs at all cable entry points.

D. Wiring and cabling:

1. All power and control wiring and cables shall be in nonmetallic, flexible, liquid tight conduits.

2. All conduit fittings shall be sealed at bulkheads or enclosure entry points.

3. All wiring shall be marine grade, multi-strand, tin-plated copper with PVC insulation rated for outdoor use.

4. All power system wire terminals shall be tin-plated copper to minimize the effects of galvanic corrosion.

5. Main power wiring shall be 10 AWG minimum.

6. Battery terminations shall consist of 5/16-18 UNC marine stud with stainless steel split lock washer and hex nut with 5/16 tin-plated copper ring terminal.

7. Solar panel terminations shall consist of stainless steel screws with #8 tin-plated copper snap spade terminal.

8. All other terminations shall consist of locking-type quick-disconnect connectors with tin-plated terminals for power connections and gold-plated terminals for signal connections. Terminal strips, screw or compression type, shall not be permitted.

E. Energy Management System:

1. Solar energy management system control unit shall include a completely solid state charge controller capable of operating in an outdoor environment. No mechanical or electromechanical switching to control charging current is permitted.

2. All wiring connections to the energy management system control unit shall be made with locking type multi-pin connectors to facility quick, easy servicing of the control unit without the need of any tools. Electrical connections shall include an auxiliary 12-Volt power connection to provide power for accessory devices.

3. Energy management system control unit shall monitor solar array voltage, solar array current, battery voltage, battery current and ambient temperature.

4. Energy management system control unit shall regulate energy flow from the solar array into the battery bank based on ambient temperature so as to avoid over charging of the batteries and minimize the consumption of electrolyte.

5. Energy management system control unit shall provide for the controlled periodic pulsing of the solar array current to assist in minimizing sulfate deposit buildup on the battery plates.

6. Energy management system control unit shall provide for remote monitoring of the battery bank voltage, at the terminals of one of the batteries, to assist in optimizing the transfer of power into the battery bank.

7. Energy management system control unit shall be equipped with a 2-line by 16-character LCD (Liquid Crystal Display) displaying sequentially, solar array

voltage, solar array current, battery voltage, and battery current. In addition, the energy management system control unit shall display a low battery voltage warning message whenever the battery bank voltage drops below 10.9 Volts.

8. Energy management system control unit shall automatically switch current to the message sign off whenever the battery bank voltage drops below 10.7 Volts to prevent damage to the battery bank due to over-discharging the batteries.

9. Energy management system control unit shall provide for automatic reverse polarity protection, including reverse polarity indicator lamps, for the solar array and the battery bank.

10. Energy management system control unit shall provide for automatic fault protection without the need for fuses. The use of fuses for fault protection shall not be permitted.

11. Energy management system shall monitor and report to control console battery bank voltage, battery bank load current, solar array voltage and solar array charge current once every 15 seconds.

12. Energy management system shall have an integrated watchdog timer that is continuously reset by the control console during normal operations such that if the control console were to become unresponsive due to a software failure/lockup, upon expiration of the timer the energy management system will completely power down and re-start the entire system (including control console and all accessories such as modem, sign panel compass, etc.) in an attempt to recover the system from a temporary software failure/lockup.

F. Battery Charger:

1. Charger type - Switching regulator, constant voltage with automatic switch to maintenance or trickle charge.

2. Input Voltage - 110 VAC 50/60 Hz (specify 220 VAC 50 Hz for international use)

3. Available models with typical recharge times. 24 hours (8 batteries),

4. Battery charger unit shall install in the field with minimum effort.

G. Remote Control:

1. The remote control option shall provide for complete control of all dynamic message sign functions. The remote control option shall, at a minimum, provide for:

a. Simultaneously geographically tracking, managing, operating and maintaining a minimum of 1,000 remotely located portable changeable message board (PCMS) units including setting up automatic e-mail

notifications/alerts for unit movement, change of displayed message, low estimated runtime, low battery condition, sign panel failures, and pixel failures.

b. Sending a message to one or more remote PCMS for immediate display.

c. Receiving the message currently displayed on all remote PCMS.

d. Managing the message libraries and message schedules & events on all remote PCMS.

e. Checking the operating status, including sign panel status, system date & time, battery voltage, estimated autonomy, temperature, unit Up-Time, Current Run-Time, Life-Time Run-Time, and ambient light level of all remote PCMS.

f. Reporting and managing National Transportation Communications for Intelligent Transportation System Protocol (NTCIP) status of all PCMS.

2. Provide for the ability to perform various system resets including a complete re-boot/restart of the system for all PCMS.

3. Communication Protocol:

   a. Proprietary with complete Cyclic Redundancy Check (CRC) error detection and correction and full challenge-response password authentication.

4. Data Format:

   a. Data is encrypted and compressed for added security and reliability.

5. All operating software for message sign control console and host computer shall be included with basic message sign package.

6. TCP/IP Network Communications (Dynamic or Static IP Address)

   a. Data rate: 10/100 Base-T Ethernet

   b. Remote control of any networked (IP addressable) PCMS may be achieved from any host computer with Internet connectivity (either with standard NTCIP commands via SNMP or STMP, or with Command Center). Remote control software (Command Center) shall be provided free of charge with unit and function on any host computer, independent of operating system. Control console and remote control software shall incorporate a challenge/response encrypted type password security system to prevent unauthorized access of any networked PCMS.

7. IP Addressable Cellular Transceiver Operation.

a. Wireless modem with up to a 3-Watt cellular transceiver.

b. MNP 2-4 Error Control: Automatic error detection and correction.

c. MNP 5 Data Compression: Higher data rates, shorter connection times.

d. MNP 10EC: Enhanced performance over noisy cellular connections.

e. Detection Distance: 1,500 Feet (Automobile-size target)

f. All necessary software features shall be included with the basic message sign package.

H. Cellular Transceiver & GPS Receiver Module:

1. Integrated into Control Console

I. Sign Panel Flux-Gate Digital Compass:

1. Operating Voltage: 8-28 Vdc

2. Input Current: 40 mA @ 12 Vdc maximum

3. Operating Temperature Range: -40C to +65C (-40F to +150F)

4. Shock/Vibration: meets MIL-STD-810 requirements

5. Altitude: 40,000 ft. maximum

6. Reliability: MTBF > 30,000 hours

7. Accuracy: +/-0.5 degrees

8. Repeatability: +/-0.2 degrees

9. Resolution: 0.1 degrees

10. Dip Angle: +/-80 degrees

11. Tilt Angle: +/-16 degrees

12. Response Time: 1 second

2.04 WARRANTY:

A. In accordance with Section 01740.

B. Bumper to Bumper - Full warranty five (5) years - consult factory for terms & conditions

C. Solar Panels - Ten years

PART 3 - EXECUTION

3.01 MESSAGE DISPLAY PANEL CASE CONSTRUCTION:

A. The message display panel case shall be constructed of heavy duty aluminum extrusion secured at each corner by a molded, fiberglass-reinforced plastic corner and black powered coated stainless steel torx head screws and nylon insert locknuts.

B. The back of the message display panel case shall be constructed of aluminum sheet bonded and riveted to the case frame.

C. The interior of message display panel case shall be equipped with extruded aluminum channels to reinforce the display case and to support internal wiring and cables.

D. The display panel case shall be equipped with four breather filter vents, designed to allow the flow of vapor but not fluid, located at the top and bottom of the case frame to provide adequate ventilation to minimize condensation and fogging of the display panel door.

3.02 MESSAGE DISPLAY PANEL DOOR CONSTRUCTION:

A. The display panel door shall be constructed of heavy duty extruded aluminum secured at the corners with glass fiber reinforced molded plastic inserts and black powered coated stainless steel torx head screws and nuts.

B. The door shall fit within a flange around the perimeter of the message display panel case frame to provide for a secure weatherproof enclosure.

C. A rubber seal shall be located inside of the flange on the case frame to provide a water tight, dust tight closure.

D. The message display panel shall be enclosed over the display area by a 3/16-inch thick clear UV resistant, scratch resistant, acrylic coated polycarbonate material with a non-glare outer surface to reduce reflection of ambient light and oncoming vehicle head lamps.

E. The polycarbonate material shall be secured in the door frame with an extruded rubber channel to provide a cushioned, weatherproof seal.

F. The message display panel door shall be secured in the open position for servicing by a pair of zinc-plated steel telescoping lid supports equipped with automatic latches. The door supports shall be located completely inside of the display panel housing, protected from weather.

G. The display panel door shall be secured in the closed position with adjustable, positive locking, stainless steel draw latches.

H. The message display panel door and case shall be equipped with stainless steel locking hasps capable of accepting standard padlocks to secure the door in the closed position.

3.03 SURFACE PREPARATION AND FINISHING:

A. Message display panel case and door shall be completely cleaned and deburred prior to finishing. All metal surfaces shall be prepared for finishing using an iron phosphate wash-down process.

B. A wash primer shall be applied to all prepared metal surfaces prior to applying final finish.

C. A matte black acrylic urethane finish shall be applied to a dry film thickness of 2.5 mils.

3.04 CABLE AND WIRING:

A. All message display panel wiring and cables shall be equipped with modular power and signal connectors to permit repairs without the need for any tools.

B. All power circuit connectors shall use tin or silver plated contacts.

C. All signal circuit connectors shall use gold plated or gold flashed contacts.

D. All system wiring, power and signal, shall consist of marine grade wire and cable, with multistrand, tin-plated conductors.

E. All power and sign panel signal wiring and cables shall be installed in nonmetallic, flexible, liquidtight conduits. All conduit fittings shall be installed with rubber sealing rings to maintain liquid-tight characteristics.

3.05 MAIN CONTROL CONSOLE:

A. Control console shall be enclosed in a weather resistant, lockable, molded HDPE (High Density Polyethylene) enclosure secured to the trailer chassis.

B. Control console shall be completely sealed to accommodate operation in all types of weather.

C. Control console shall be mounted on heavy duty slides which allow the control console to slide up and pivot into a position enabling the operator to program the unit while facing traffic from a comfortable standing position. A controller location which requires the operator to stoop, bend or kneel for operation such that the operator cannot see approaching traffic shall not be permitted. Slide mechanism shall permit quick, easy removal of control console without the need for any tools.

D. Control console power and control cables shall include sealed, locking-type connectors to permit quick, easy removal of control console without the need for any tools.

E. Control console front panel shall consist of a backlit full color LCD (liquid Crystal Display) with integrated industrial grade touch-screen, sealed and waterproof, to provide a reliable and user-friendly interface for the operator under any weather condition.

3.06 GENERAL OPERATION:

A. Control console shall provide for full local and remote (via integrated cellular transceiver and antenna) control of the dynamic message sign including dynamic message sign geographic location monitoring (via integrated GPS module and antenna), radar speed monitoring and statistical data collection (when equipped with radar speed monitor) and sign panel orientation monitoring (when equipped with digital flux-gate compass), without the need for additional hardware, software, external computers or hand-held control devices.

B. Control console shall include all necessary hardware and software to operate the dynamic message sign locally (via integrated full color LCD display and touch-screen) and remotely (via integrated cellular transceiver and antenna), including geographic location monitoring (via integrated GPS module and antenna), radar speed monitoring and statistical data collection (when equipped with radar speed monitor), and sign panel orientation monitoring (when equipped with digital flux-gate compass). Full remote control (including GPS mapping) via internet accessible server based remote control software shall be included free of charge for life of the unit (i.e. cellular service shall be included free from date of original purchase).

C. Control console, in conjunction with the message display panel, shall have the capability of monitoring and detecting sign panel communication loop failures. In the event of a sign panel communication loop failure, the control console, in the case of soft errors (temporary disruption of message display), shall have the ability to correct the failure immediately and in the case of hard errors (hardware failure), shall have the ability to completely blank the sign panel so as to prevent the display of incorrect and/or potentially misleading messages. Additionally, control console, in conjunction with the message display panel, shall have the capability of continuously and dynamically (as well as on command) testing and reporting the operational status of every individual pixel in the sign panel. Nonoperational pixels shall be indicated as such on both local and remote user interfaces. Control console shall have the capability of reporting complete sign panel operational status remotely (including web access, NTCIP, and UTMC). Additionally, control console shall have multiple diagnostic modes (manual & automatic with both local and remote controls) for troubleshooting sign panel (including a graphical representation of all modules with non-operational pixels) to enable an operator to quickly track down and replace faulty display modules in the sign panel.

D. Control console embedded CPU shall incorporate an ARM based microprocessor design to provide future hardware and software compatibility through upgrades provided by manufacturer free for life of the machine. Operating system shall be Linux based and

include multiple watchdog timers to provide automatic system restarts in the event that any critical function stops working properly or communication with remote control servers is interrupted.

E. Control console shall be capable of connection to any standard IBM or compatible desktop or portable (lap-top) computer via a standard serial interface (COM) or Ethernet port to facilitate routine service or repair, extensive diagnostics, and the analysis of user files or operating programs.

F. Control console shall be equipped with at least one USB port, one Ethernet port, two (2) serial ports (DB-9 connector), two (2) digital outputs, six (6) digital inputs, and two (2) analog inputs.

G. Control console shall be capable of simultaneously driving more than one sign panel for dual sign panel installations.

H. Control console operating processor, firmware and software shall be field (locally) upgradeable with a standard USB flash-drive (memory key) or remotely upgradeable over an IP addressable network connection - wire-line or wireless via IP addressable modem. Additionally, upgrades shall be provided by manufacturer free of charge for life of machine and automatically applied via integrated cellular transceiver and included remote control service.

I. Full color LCD display shall be equipped with an automatic backlight with automatic dimming capability to accommodate both direct sunlight daytime and low ambient light level night time operation.

J. Backlighting shall automatically activate upon any touch-screen activity and remain on for five minutes following the last touch-screen activity. Additionally, an automatic log-out feature shall be incorporated to provide security of the unit when left unattended. Automatic log-out feature shall be capable of being disabled by the operator as desired (i.e. for vehicle mounted applications).

K. Main power to the sign panel and the control console shall be controlled by a combination switch and circuit breaker in order to provide electrical protection without the need for fuses. All connections to controller and Energy Management System shall be made with locking type quick disconnect connectors. The use of fuses and/or terminal strips for connections shall be strictly forbidden.

3.07 PROGRAMMING:

A. Control console:

1. Control console shall provide an intuitive icon-driven graphical user interface (GUI) along with step by step instructions to the operator, via the LCD display, as the various programming functions are performed, for simple easy programming and operation. On-screen help files shall be included in all languages. Control console shall support a minimum of six (6) standard operating languages (English,

Spanish, French, Dutch, German and Portuguese) and four (4) standard keyboards (English, French, Portuguese/Spanish, and Arabic) along with associated font sets. Controller shall be capable of being setup for either a Standard US DOT, Power-Miser US DOT, Standard US 3-Line DOT, French Canadian, Ontario MTO- 2, Quebec Road Safety, MTQ, or an International font set by an operator with Administrator access to prevent unauthorized use of inappropriate fonts by operators with User access.

2. Control console shall be capable of storing all messages in alphabetical order by the first letter of the first word of the name assigned to the message to permit quick recall of messages without the need for maintaining a numeric listing of pages and/or messages. Messages shall be automatically named and sorted any time messages are added to or deleted from the library. Because of difficulty in locating and retrieving stored pages and/or messages via numerical codes, number coded storage of pages and/or messages requiring any form of a lookup table/directory shall be strictly forbidden.

3. Control console shall accommodate a minimum of fifty (50) full alphanumeric passwords each providing one of four levels of access to various control console functions. Each password shall allow access to only the functions required by that particular dynamic message sign operator. The four levels of access are as follows:

    a. Quick-Picks:

        (1) Select from up to six (6) pre-programmed messages with no programming required.

        (2) Simply touch a message for display.

        (3) No access to any permanent data files.

    b. User Menu:

        (1) Create, Edit, Delete, Save, Display, and Schedule messages.

        (2) Create, Assign and Edit Quick-Picks.

        (3) Check System Status and perform basic diagnostics.

    c. Supervisor Menu:

        (1) All User Menu Functions.

        (2) Create and delete Quick-Picks and User passwords.

        (3) Set system operating parameters.

    d. Administrator Menu:

(1) All Supervisor Functions.

(2) Create and delete Administrator and Supervisor passwords.

(3) Set controller operating parameters.

4. Control console shall be capable of displaying a message on the message sign display panel during such time as the operator may be adding, editing or deleting messages from the control console user files. Blanking of the message sign display panel during normal operator activity is considered unsafe and shall be strictly forbidden.

5. Control console shall be capable of monitoring ambient light conditions and making appropriate adjustments to the intensity of the sign panel to maintain an acceptable display contrast during all ambient lighting conditions. The control console shall provide a minimum of sixteen (16) intensity levels between minimum and maximum display brightness. An operator with Supervisor access shall be capable of adjusting the upper and lower photocell set-points as to adjust the overall range for the automatic brightness control to accommodate any local variations in ambient lighting. Manual control of sign panel intensity shall be provided as well enabling an operator with Supervisor access to override automatic sign panel intensity control and set sign panel intensity manually from 1% to 100% in 1% increments.

6. Control console shall be equipped with a Scheduler that utilizes a real time clock and calendar feature to accommodate automatic, unattended changing of messages at predetermined dates and times.

7. Scheduler shall support unique, single event schedules along with recurrent schedules such that messages may be easily scheduled for daily, weekly or monthly repetition. Recurrent schedules shall be capable of incorporating a start and stop date as desired. Scheduler shall also be capable of displaying messages based upon data driven events such as input from a radar gun, photocell, battery voltage, temperature and/or switch closures (up to six). Data driven events shall also be capable of being restricted to specific dates and times. Scheduler shall incorporate a priority system for resolution of conflicting schedules and/or events to permit one schedule/event to override another based upon level of importance (i.e. priority). Additionally, the control console shall have the capability to create and display on the sign panel an Override Message that takes priority and overrides all programmed Schedules and Events until cleared to enable an operator to display a message continuously on the sign panel regardless of programmed schedules and/or events.

8. Control console shall provide special function buttons to provide access to common user functions in a single step including (from the main log-on screen) Managing Messages, Scheduling Messages, Blanking the Sign Panel, creating an Instant Message, and selecting from Quick Picks.

9. Control console shall provide a system status page that enables an operator to quickly and easily determine the unit's current time, date, photocell reading, photocell set-points, battery bank voltage, battery bank current, solar array voltage, solar array current, temperature, MAC address, IP address, run-time since last re-boot, current run-time (resettable timer), lifetime run-time, and serial modem type along with modem signal strength and quality, latitude & longitude and sign panel heading.

10. Control console shall be capable of storing a minimum of 5,000 messages, each message capable of accommodating a minimum of 500 pages (text or graphic images).

11. Control console shall provide a minimum of twelve (12) font sizes (with full uni-code support for each font) including an adaptive font that automatically and dynamically sizes text to fit on a page as it is typed such that the largest font is always used for a given amount of text on a page to ensure maximum visibility and legibility. One of the included font sizes shall be a standard 5x7 DOT pixel font.

12. Control console shall support the incorporation of multiple dynamic data sources per page during message creation such that multiple pages within a message can include output from multiple dynamic data sources. Pages containing dynamic data sources shall be automatically refreshed and updated prior to each display such that the most recent data is always displayed on the sign panel. System shall include, as a minimum, the following data sources: radar gun (if equipped), real-time clock (time and date - day, month, year and time in various formats), photocell (ambient light level), battery voltage, and countdown & count-up features from a specified date and/or time. System shall also provide operator with the ability to create and incorporate additional dynamic data sources for display and scheduler control for maximum flexibility during system integration.

13. Control console shall be capable of page display times from 0.1 seconds to a minimum of 99 seconds in 0.1 second increments.

14. Control console shall be capable of displaying messages in a preview screen, during message creation, editing or selection, exactly as they will appear on the message display panel including an exact graphical representation of all non-operational/failed pixels on sign panel.

15. Control console shall permit the editing of messages that are currently being displayed, showing the revised message as soon as message editing has been completed.

16. Control console shall enable an operator to create, copy, add/insert, move about, edit and delete/remove pages to/from a message dynamically during message creation and/or editing. It shall not be necessary to create pages first and then assemble the pages into a message. Control console shall have the ability to insert pages and/or messages from a master library into a new message and move them

about within the message. Control console shall also accommodate the creation and editing of graphic images directly from the GUI during message creation. Additionally, control console shall provide the operator with the ability to easily flash a page within a message, flash a line(s) within a page and/or add static or dynamic arrows/chevrons to a page within a message through the use of page annotations. Control console shall have the capability (if enabled by an operator with Supervisory access) to create pages with scrolling text.

17. Control console shall provide a selection of standard highway work zone sign graphic images, including but not limited to: flagman, fixed left and right arrow images, moving or sequential left and right arrow images, and moving or sequential left and right chevrons, etc.

18. Control console shall provide the capability to display Battery Bank Voltage to 0.1 Volt accuracy, Battery Bank Current to 0.1 Amp accuracy, Solar Array Voltage to 0.1 Volt accuracy and Solar Array Current to 0.1 Amp accuracy directly on the control console display. Additionally, control console shall have the capability to calculate and display an estimated run-time (autonomy) based on current battery bank status and historical system energy (generation vs. consumption) trends to provide the operator with an estimated number of days system is capable of operating prior to shutting down on a low-battery condition.

19. Control console shall provide for a user selectable low-battery-voltage caution message when the battery voltage drops to a user specified level (above the low-battery automatic shutdown voltage). The low-battery-voltage caution message shall be user programmable by an operator with Supervisor access. Additionally, control console shall incorporate a feature known as Adaptive Blanking that will as necessary, based upon current battery bank voltage and/or recorded battery bank voltage trends, automatically insert variable length blanks between pages (0.25s to 0.50s) of messages to reduce overall power consumption and extend run-time. An operator with Supervisory access shall be capable of either enabling or disabling the Adaptive Blanking feature.

20. Control console shall be equipped with three (3) Run-Time counters: an Up-Time counter that indicates total number of days, hours and minutes since last re-boot, a Current Run-Time counter that indicates total hours of operation since last reset of the counter (resettable run-time counter), and a Lifetime Run-Time counter that indicates total hours of control console operation (non-resettable).

21. Control console shall include the ability to reset the Current Run-Time counter, Message Library, Scheduler, and all Factory Settings automatically, individually or all at once through performing a variety of Master Resets which will clear all memory and reset all settings to original factory set-points to various levels.

22. Control console, in addition to an integrated GSM transceiver, shall support both dynamic and static IP address network connections along with direct serial communications to support legacy NTCIP installations.

23. Control console shall provide a method for setting a battery offset and temperature offset to calibrate battery voltage and temperature readings.

24. Control console shall provide a method for switching radar gun output from MPH to KPH directly from control console GUI or remotely via remote control software.

25. Control console shall be NTCIP compatible. The following NTCIP standards must be supported:

    a. NTCIP 1201 (v3.15r) - Global Object Definitions

    b. NTCIP 1203 (v2.39b) - Object Definitions for Dynamic Message Signs

    c. NTCIP 2101 (v1.19) - Subnetwork Profile: PMPP over RS232

    d. NTCIP 2104 (v1.11) - Subnetwork Profile: Internet

    e. NTCIP 2201 (v1.15) - Transport Profile: Transportation

    f. NTCIP 2202 (v1.05) - Transport Profile: Internet

B. Unit:

1. Unit shall support an administrator community string along with 255 other communities. Each community shall be capable of being assigned read-only or read-write access.

2. Unit shall support up to 65,535 user-defined permanent messages.

3. Unit shall support a configurable number of changeable (persistent) messages. This number shall be configurable between 1 and 65,535 and shall default to 32.

4. Unit shall support a configurable number of volatile (nonpersistent) messages. This number shall be configurable between 1 and 65,535 and shall default to 32. Each message shall support at least 16 pages. Unit shall support a scheduler with support for up to 16 schedules, 16 day plans, and 96 day plan events.

5. Unit shall support at least 255 graphics via the monochrome 1 bit color scheme.

6. Unit shall support a configurable number of user-definable fonts. This number shall be configurable between 1 and 127 and shall default to 32.

C. Web-Interface (Smart-Phone Control):

1. Control console shall function as a Web-Server which enables an operator (via username and password access) through any standard Web-Browser to:

    a. Create a unique Web-Name for the unit for Browser ID

b. View the current status of the unit to include current message displayed on sign panel, battery voltage, photocell reading, date & time, and NTCIP control Status

c. Blank the unit's sign panel

d. Select, preview, edit and activate any message from the unit's message library

e. Create, edit, preview and activate a new multi-page text message (up to 6 pages)

f. Turn NTCIP control on/off if NTCIP control is enabled on control console

2. Access to the Web-Server shall be through any standard web browser over a standard network connection and/or public IP address (i.e. IP addressable modem).

3. Access shall be protected by a user name and password created by the operator through the manufacturer's proprietary remote control software to ensure security is maintained at all times. The Web-Server shall be capable of being controlled (i.e. turned on and off) via manufacturer's proprietary remote control software. Web-Access to the control console shall not require access to a central server. All access to the Web-Server shall be logged and recorded.

3.08 CLOSEOUT ACTIVITIES:

A. Provide in accordance with Section 01700.

END OF SECTION

“Page Intentionally Left Blank”

SECTION 02900

PLANTING

PART 1 - GENERAL

1.01 DESCRIPTION:

A. Include GENERAL CONDITIONS and applicable parts of Division 1 as part of this Section.

B. Examine all other Sections of the specifications for requirements which affect Work of this Section whether or not such work is specifically mentioned in this Section.

C. Coordinate work with that of all other trades affecting, or affected by Work of this Section. Cooperate with such trades to assure the steady progress of all Work under the Contract.

1.02 SUMMARY:

A. This Section specifies requirements for the following types of Work and related items, but is not limited to:

1. Providing and installing specified planting soil using imported soil materials where indicated on the Drawings;

2. Amending existing soil;

3. Fine grading of planting areas;

4. Supplying and installing trees, shrubs, and perennials;

5. Guying trees;

6. Providing and installing mulch;

7. Seeding, including seeding of all disturbed areas at Engineer's direction and according to the Drawings;

8. Providing and installing erosion control matting;

9. Fertilizing plantings and turf;

10. Maintaining plantings through 1-year guarantee period;

11. Maintaining and protecting turf areas through the time of acceptance.

1.03 RELATED SECTIONS:

A. Section 02150: Tree Protection and Pruning

1.04 REFERENCES AND STANDARDS:

A. Where references are made in these Specifications to standard specifications, codes, etc., of the U.S. Government, State or local authorities, or professional and industrial societies and associations, the applicable portions thereof shall govern as fully as if they were recited at length herein, and shall include all revisions thereto issued as of the date of the Notice to Contractors pertaining hereto.

1. AAN: American Association of Nurserymen "American Standard for Nursery Stock," ANSI Z60.1, latest edition.

2. AJCHN: American Joint Committee on Horticultural Nomenclature. "Standardized Plant Names," latest edition.

3. AOAC: Association of Official Agricultural Chemists.

4. TCIA: Tree Care Industry Association (formerly National Arborist Association), Pruning Standards - "Standards for Pruning Shade Trees," and Pesticide Application - "Standards for Pesticide Application Operations," latest editions, 3 Perimeter Road, Unit 1, Manchester, NH 03103.

5. USDA: United States Department of Agriculture, Agricultural Research Service, "USDA Plant Hardiness Zone Map," Miscellaneous Publication No. 1475, latest edition.

6. NHDOT: State of New Hampshire Department of Transportation "Standard Specifications for Highways and Bridges," latest edition and all supplements.

7. ASTM: American Society of Testing Materials.

8. AASHTO: American Association of State Highway and Transportation Officials.

9. ANSI/NFPA: American National Standards Institute, National Fire Protection Act.

11. DES: Department of Environmental Services, State of New Hampshire

12. USEPA: United States Environmental Protection Agency

13. New Hampshire Administrative General Rule 3800

14. ANSI A300 (Part 6) – 2012

1.05 QUALITY ASSURANCE:

A. Contractor shall have at least five years of experience in Landscape Work similar in materials, design, and extent to that indicated for this project and with a record of successful landscape establishment. Installer shall maintain an experienced supervisor on the project site during all times that landscape construction is in progress. Provide written qualification data for firms and persons to be responsible for Work, to demonstrate their capabilities and experience. Include lists of completed projects, with project names, addresses, phone numbers, and names and address of designers and owners.

B. Contractor shall attend a pre-landscape construction conference at Project Site, and as directed by the Engineer, to review landscape construction procedures, site conditions, and submittal requirements required in the Work of this Section, especially the requirements for Planting Soil and requirements for underdrainage testing, before any products are submitted for review and approval, or landscape construction commences.

C. To extent possible, provide each plant material species or variety from single source.

D. Select compatible products where options are provided, provide each material from a single source and only with review and approval of the Engineer.

1.06 SUBMITTALS:

A. Refer to Section 01300 – SUBMITTALS for procedures and general requirements for submittals. Submit the number of copies of each document required as directed by the Engineer per General Requirements of the Contract for submittals.

B. Do not order or deliver materials until required samples, certifications, manufacturers' literature and test results have been reviewed by the Engineer. Delivered materials shall closely match the samples, as judged by the Engineer. If any deviations from specified materials are proposed, submit written request explaining differences and reasons for request.

C. Soil Additives and amendments: Product or testing certificates signed by manufacturers certifying that their products comply with specified requirements:

1. Manufacturers' certified analysis for all products specified.

2. Analysis for other amendments, such as organic compost, by a University of New Hampshire Agricultural Extension Service made according to methods established by the AOAC, where applicable, and as required in this Specification.

3. Sieve and soluble salt analysis of sand proposed as a planting soil amendment or component.

D. Chemicals and Pesticides: Manufacturers' literature.

E. Plant Materials: Labels and nursery certificates substantiating that trees, shrubs, vines, ground covers, and perennials comply with specified requirements and were grown within USDA hardiness zones specified.

F. Tagging and planting schedule: Proposed dates for tagging plants at nurseries, and for planting each type of planting, with consideration for fall-hazard species, work coordination, etc.

G. Seed Mix: Manufacturer's Certificate of Compliance with the specifications for each type of seed. These certificates shall include seed producer's statement of composition, the guaranteed percentage of purity; weed content and germination percentages of the seed, the net weight and date of shipment, pounds per acre sowing rate, and germination of each variety and production location. No seed may be sown until the Contractor has submitted the certificates.

H. Soil tests: Contractor shall have existing soils and proposed planting soils and soil components tested. Tests indicating and interpreting test results for existing topsoil and complete planting soil and soil components, including all amendments and additives required to meet Specifications herein, shall be performed by the University of New Hampshire Cooperative Extension Service, in accordance with current standards of Association of Official Agricultural Chemists or other testing laboratory as approved by the Engineer. All samples of soil shall be collected, prepared and shipped according to UNH procedures. "Crop Code" shall be listed as 4 (New Lawn) and 9 (Deciduous Shrubs, Trees and Vines). Submit reports at least one month before any delivery of materials. Contractor shall deliver test samples to laboratory, and have test results sent directly to the Engineer. All costs shall be paid by Contractor. Testing reports shall include the following for the finished planting soil:

1. Mechanical gradation (sieve analysis) and USDA soil classification;

2. Percent organic matter, determined by loss on ignition of samples oven-dried to constant weight at 230 degrees F, plus or minus 9 degrees;

3. Chemical analyses for elements specified herein;

4. Chemical analysis for soluble salts;

5. Chemical analysis for carbon-nitrogen ratio;

6. Chemical analysis for acidity (pH);

7. Recommendations for soil additives to correct soils deficiencies as necessary to accomplish particular planting operations of Project;

8. Chemical analysis for toxic elements in planting soil as specified herein;

9. Testing for heavy metals as required by the USEPA.

Refer to Article 2.02, Planting Soil Testing Program, for additional requirements.

I. Organic Material: Submit a letter certifying source and composition of organic material proposed for use as a soil amendment which shall give description of product and recommendations for use as a planting soil component or amendment in proportion required to meet minimum percent organics for loam.

J. Samples:

1. Planting Soil, complete with any necessary amendments and additives: Following initial testing and certification by the Contractor, provide two ten-pound representative samples from each proposed source for testing and analysis. Provide a two-pound sample for the Engineer's inspection, to be retained by the Engineer for comparison with delivered soil. The Engineer may examine each planting soil delivery to the site, and may request further testing be performed at the Contractor's expense. No planting soil shall be delivered until the review of samples and test results by the Engineer and approval by the USEPA for the use on the project, but such review shall not constitute final acceptance. The Engineer reserves the right to reject on or after delivery any material which does not meet specifications or match approved samples. Use of unapproved planting soil will result in rejection by the Engineer and removal by the Contractor at no additional cost to the Engineer.

2. Provide at least 10 samples of existing soil from throughout the planting areas. Samples are to be taken at the direction of and given directly to the Engineer for the Project.

3. Fertilizer: One sample packet of planting fertilizer; One-pound sample of slow-release pelletized fertilizer; certificate showing composition and analysis; purchasing receipt showing the total quantity purchased for the Project.

4. Organic Material: Two-pound sample and source.

5. Shredded, Aged Hemlock or Pine Mulch: Two-pound sample and source.

K. Seed fertilizer will not be applied within wetland buffer designated on the Drawings.

L. Chemicals and Insecticides (lawn and tree herbicides, fungicides, pesticides): While these should not be used, if it is determined that specific needs require them, obtain a written statement from the Engineer and then submit manufacturer's literature and analyses for products intended for use.

M. Manufacturer's literature for temporary silt fence materials or shop drawings for typical hay bale installation.

N. Maintenance by Contractor: Provide watering and fertilizing schedule to Engineer for approval.

O. Maintenance Instructions for Turf: Submit recommended turf maintenance procedures to be approved by the Engineer for routine year-round maintenance of turf for use by the Owner beyond the acceptance period.

P. Maintenance Instructions for Plantings: Submit recommended planting maintenance procedures to be approved by the Engineer for routine year-round maintenance of plantings for use by the Owner beyond the Contractor's maintenance period. Submit instructions as a condition for Substantial Completion of the Project by the Engineer.

Q. If spraying seed, submit the type of spray machine and number of pounds of seed, fertilizer, and limestone per 100 gallons of water.

1.07 EXAMINATION OF EXISTING CONDITIONS:

A. Inspect all areas to be planted before starting Work and report any defects, such as drainage problems and existing plant locations to remain, to the Engineer prior to beginning Work. Commencement of Work shall indicate acceptance of filled subgrade areas to be planted, and Contractor shall assume responsibility for Work. Inspect areas to be fine graded and seeded before starting work. Report any defects such as incorrect grading, etc. to the Engineer prior to beginning work. The commencement of work by the Contractor shall indicate acceptance of the areas to be fine graded, planted, and seeded, and he shall assume full responsibility for the Work of this Section.

B. The Contractor shall be solely responsible for judging the full extent of Work requirements involved, including but not limited to the potential need for storing and maintaining plants temporarily and rehandling plants prior to final installation.

C. Determine location of above-grade and underground utilities and perform Work in a manner which will avoid damage. Review the locations of utilities with Engineer before proceeding. Contact all relevant utility companies, public or private, prior to beginning work; contact DIG SAFE 1-888-344-7233 (serves five N. E. states). Report any conflicts to the Engineer in writing before excavating. Hand excavate as required. Maintain grade stakes until removal is approved by the Engineer.

D. Coordinate installation of planting materials to assure installation during normal planting seasons for each type of plant material required and as specified in planting schedule.

E. Coordinate planting Work with other Work of this contract being performed on site, or work being performed by others.

F. Coordinate maintenance of landscape areas installed at different times. Protect completed Work as sequence of planting proceeds.

1.08 TRAFFIC MANAGEMENT:

A. Truck access for materials and equipment deliveries to Peirce Island is affected by traffic, narrow streets, pedestrians, and tight intersections. The Contract Documents have detailed construction traffic routes which apply to all construction traffic on this project and the Contractor is required to adhere to. Refer to Section 01500 and the Contract Drawings for a full description of the traffic management requirements.

B. Tractor-trailers longer than an AASHTO WB-50 may have difficulty turning from State St. onto Marcy St. To facilitate this turn, parking has been prohibited at this intersection between the hours of 12AM and 8AM.

PART 2 - PRODUCTS

2.01 PLANTING SOIL:

A. Planting Soil Source:

1. Contractor shall be responsible for providing, screening, and mixing (if required) planting soil and loam amendments to create suitable planting soil that meets specification in quantities and locations shown in the Drawings at their expense. If necessary, Contractor shall also provide additional and alternative sources of planting soil components such as organic compost and amendments as required and requested by the Engineer, based on soil tests performed on an on-going basis throughout the construction period in order to meet specifications. Contractor shall screen topsoil with a 1/2-inch screen prior to reuse or blending to create planting soil as specified herein.

2. Planting soil delivered and installed shall be consistent throughout the project. If source or component changes at any time during construction, Contractor shall obtain new mechanical sieve, heavy metals, chemical, and nutrient tests of new source samples, remix components and resubmit test results of new planting soil mixture to the Engineer for review and approval.

B. Planting Soil:

1. Planting soil shall be stripped natural topsoil from sites scheduled for construction, but not from USDA-classified prime farmland. Planting soil may also be manufactured soil, produced by a commercial processing facility specializing in production of loam, sands, gavels, and stone. Stripped topsoil shall be free from subsoil. Natural topsoil shall be from well-drained sites where topsoil occurs at

least 6" deep; do not use topsoil or organic matter obtained from bogs or marshes. It shall conform to the following:

2. Planting soil shall be a "sandy loam" as determined by mechanical analysis (ASTM D-422) and based on the USDA Classification system, conforming to the following grain size distribution:

U.S. Sieve No.	Percent Passing By Weight	
	Maximum	Minimum
4	100	97
10	95	90
40	85	60
100	60	38
200	35	22
0.002 mm	5	0

3. Maximum grain size of any soil material shall be 1" in the largest dimension. Test shall be by combined hydrometer and wet sieving in compliance with ASTM D422 after destruction of organic matter by ignition.

4. Planting soil as amended and proposed for use shall contain between 4% and 6% organic matter by weight as determined by the loss on ignition of samples which have been oven-dried to a constant weight at a temperature of 105 degrees C. Compost for use as organic matter shall conform to the specifications of UMTC, and shall be mature compost.

5. The acidity range of planting soil shall be 5.5 to 6.5 pH.

6. Planting soil shall be screened and free of plants and roots, clay lumps, stones or debris one inch or larger in any dimension.

7. Soluble salt content shall be less than 75 ppm.

8. Carbon-nitrogen ratio shall be between 10 and 14 to 1.

9. Nutrient content of prepared planting soil and levels of toxic elements and compounds in complete planting soil shall be within the following ranges, measured in ppm:

Substance	Acceptable Range	Unacceptable Level
	ppm (=mg/kg)	ppm (=mg/kg)
Aluminum	40 – 400	>400
Ammonium	6 - 24	>24
Arsenic	<1	30+
Boron	<0.3	1.0+
Cadmium	<0.2	5.0+

Calcium	300 - 1600	>1600
Chromium		50+
Cobalt		50+
Copper	0.3	6.0+
Iron	3 - 20	>20
Lead	33-110	>110
Magnesium	20 – 150	15
Manganese	3 - 15	>15
Mercury		2+
Molybdenum	0 - 15	40+
Nickel		100+
Nitrate	30 - 235	235+
Phosphorus	3 - 18	18+
Potassium	25 – 110	110+
Selenium		36+
Zinc	3 - 70	500+
PCBs	0	1+

10. Planting soil shall be free of viable parts of prohibited invasive plants listed in Table 3800.1 of New Hampshire Administrative General Rule 3800.

11. Planting soil (loam) in areas of existing known invasive species populations shall not be reused as planting soil. Planting soil (loam) from these areas shall be buried under a minimum of six inches of invasive-free planting soil or legally disposed of off-site in accordance with all local, state and federal requirements.

2.02 PLANTING SOIL TESTING PROGRAM:

A. Contractor shall be responsible for mixing and obtaining planting soil samples and submitting for testing samples to ensure that proposed and installed planting soil materials and any stockpiled topsoil, conform to the specifications as stated herein. All costs for testing will be paid for by the Contractor. Submit prototype planting soil mixes to Laboratory at least 60 days before intended use on site, to allow for reformulation and retesting if test results are rejected.

B. All planting soil and planting soil products brought to or bulk mixed on site, even if previously approved by test results, shall be submitted for testing conformance and as required in the on-site planting soil sampling program. Tests shall be combined hydrometer and wet sieving in compliance with ASTM C422 after destruction of organic matter by ignition and according to additional requirements of this Section. Samples for tests shall be taken from stockpiles and source within one day of delivery to the site in the presence of the Engineer.

C. Prior to delivery or spreading, Contractor shall submit a minimum of two approved sample test results of planting soil from each proposed location or source.

D. Contractor shall deliver samples to Engineer and testing laboratory, have testing report sent directly to the Engineer, and shall pay all costs. Contractor shall furnish additional amendments of fertilizer, lime and organic matter at his/her own expense that may be required by test results and required by specifications.

E. Sieve, heavy metals, and chemical analyses shall be performed by the University of New Hampshire, in accordance with the current standards of the "Association of Official Agricultural Chemists" and as required to meet requirements for chemical compositions as specified. Incomplete testing or test results will result in rejection and requirement for retesting by the Contractor at his/her expense.

F. Soil samples of mixed and fully amended planting soil shall be tested for Nitrate, Nitrogen, Ammonium Nitrogen, Phosphorus, Potassium, Calcium Aluminum, Soluble Salts and show the acidity of the soil and other values for compounds as indicated in Article 2.01 paragraph B. Tests of all sands and organic matter proposed for use as soil amendments shall also be tested for the requirements specified for those items and submitted for review and approval.

G. Based on the initial and delivered and/or on-site mixed planting soil test results, the planting soil shall be identified as acceptable, acceptable with certain fertilizer and limestone amendments, or unacceptable and requiring resubmission. If sand, organic compost, or other major planting soil components are required to be added to meet specification, additional samples with new formulations shall be required to be submitted for testing, review, and approval. If the planting soil is found unacceptable or can not be amended to meet specifications, the Contractor shall be responsible for identifying another source of planting soil and soil ingredients, and/or remix and reblend as many planting soil component mixtures required to produce a planting soil approved by the Engineer that meets specifications. Contractor shall incur all expenses associated with testing and mixing additional samples required for approval.

H. All planting soil installed shall match the samples approved by the Engineer. The Engineer may require Contractor to furnish additional testing of planting soil delivered to the site if it does not appear to be consistent with previously tested samples.

2.03 SOIL ADDITIVES FOR PLANTING SOIL:

A. Aluminum sulfate for adjustment of planting soil pH shall be commercial sulfur, unadulterated, delivered in containers with the name of the manufacturer, material analysis and net weight appearing on each container.

A. Pelletized limestone for agricultural purposes may be used for adjustment of planting soil pH shall be agricultural grade ground dolomite limestone containing at least 85% calcium carbonate equivalent, with 50% passing the 100 mesh and 95% passing the 20 mesh sieve.

B. Fertilizer (10-10-10) at the rate of 5 pounds per 1,000 square feet, or more, as recommended by U. Mass Extension Service from the soil test results. Fertilizer may be applied hydraulically in one operation with hydroseeding and fiber mulching.

D. Organic Compost:

1. Organic compost shall be natural mature, composted organic material. Reed peat, sedge peat, composted leaves or brewers waste may be proposed for this use. Compost manufactured from sewer sludge or manure will not be permitted.

2. Organic compost shall be material originating from mature leaf compost, or other aged, composted vegetable materials such as brewer's waste, composted with wood products, safe for plants, humans and soil organisms (Class A or Type I). Raw (uncomposted or unprocessed) or incompletely composted organic matter shall be rejected.

3. Organic compost shall contain no uncomposted bulking agents, such as uncomposted wood chips, and shall be free from hard lumps and free water when handled (at least 60% dry solids). It may be shredded or granular in form. No plastic shall be present. It shall be free from excessive amounts of zinc or unpleasant odor. 100% of material shall pass a 1/2" sieve.

4. Each and every source of organic material proposed for use as a soil amendment or component of planting soil must be tested on the criteria specified herein and results submitted for review and approval by the Engineer before construction. Each delivery of organic material must match samples tested by Contractor and approved by the Engineer or delivered material will be rejected. Each delivery of compost shall require testing and approval, per specifications, to insure compliance with previously approved test submittals. Contractor shall provide sufficient quantities of composted organic material to meet requirements of the planting soil specified and detailed in the Drawings after mixing, spreading, and compaction, and may obtain this material from various sources, if material and test results have been reviewed and approved by the Engineer.

5. Other requirements and test results for specific characteristics of the organic matter and results issued for the following criteria shall be:

   a. According to the methods of testing of A.O.A.C., latest edition, the acidity range shall be approximately 5.5 pH minimum to 8.0 pH maximum.

   b. The organic matter shall not be less than 40% as determined by loss on ignition and may be higher for other compost types.

   c. The water absorbing ability shall be 200% minimum by weight on an oven dry basis for organic compost other than peat moss.

d. The carbon/nitrogen ratio shall be between 10/1 to maximum 25/1 without the addition of nitrogen.

e. The degree of maturity should be between Grades IV and V, 'curing compost' and 'very stable compost' as measured in a colorimetric-based maturity test. The stability shall be, on the 02 evolution test, < 7 mg C02 - C/g BVS (biodegradable volatile solids) day or deWar self-heating test < 15 degrees C above room temperature.

f. There should be no unpleasant or detectable odor of ammonia or hydrogen sulfide which would indicate immature compost.

g. Total salinity should be less than 4.0 mmhos/cm (Ds/m) or less than 2560 ppm salt (NaCl)

h. The material shall contain some nitrogen, phosphorus, copper, boron, manganese, and molybdenum in horticulturally and agriculturally appropriate proportions to prevent ion antagonisms.

i. Concentrations of arsenic, cadmium, chromium, copper, lead, mercury, molybdenum, nickel, and selenium must be below EPA (EPA CFR Part 503 Regulations, Table 3, p. 93392, Vol. 58 No.32, 1993) and the State of New Hampshire standards for application to soils with human activity. No pesticide residues or chlorinated hydrocarbons of any kind should be present.

j. Peat moss shall be composed of partly decomposed stems and leaves of any or several species of sphagnum moss. It shall be free from wood, decomposed colloidal residue and other foreign matter. It shall have an acidity range of 3.5 pH to 5.5 pH as determined in accordance with the methods of testing by A.O.A.C., latest edition. Its water absorbing ability shall be a minimum of 1,000% by weight on an oven dry basis.

k. Maturity and age of composted organic material, other than peat, intended for use on this project shall be verified in writing by supplier as part of test results.

D. Sand for use as planting soil additive or component:

1. Sand for use as ingredient or amendment in planting soil shall be a medium sand with angular (not round) sand particles (beach sand is not acceptable). Sand shall be clean, inert, hard, durable grains of quartz or other hard durable rock, free from loam or clay, surface coatings and deleterious materials. The allowable amount of material passing a No. 200 sieve as determined by AASHTO – T11 shall not exceed 10% by weight. Sand may be used if the material is not self-compacting or overly gravelly, according to the Engineer.

2. Sand sources and requirements of sand as a planting soil component or amendment may require adjustment at the request of the Engineer, depending on the characteristics and proportions of the other planting soil components (stripped topsoil, borrow, organic component) used to mix the approved planting soil.

2.04 SEED:

A. Contractor shall furnish the Engineer with the dealer's certificate of the mixture composition for review and approval before seeding operations begin. Seed mixture shall be fresh, clean, new crop seed of the previous year's crop, mixed off site by the seed dealer. Weed seed content shall not exceed 1% by weight. The seed shall be furnished and delivered in the proportion specified below in new, clean, sealed and properly labeled containers. All seed shall comply with State and Federal seed laws; seed which has become wet, moldy or otherwise damaged will be rejected.

B. Seed Mix shall be:

Botanical Name/ Common Name	Proportion By Weight Minimum	Germination Minimum	Purity Minimum
Poa pratensis Kentucky Bluegrass 'Blackstone	20%	85%	90%
Poa pratensis Kentucky Bluegrass 'Blue Star'	15%	85%	90%
Poa pratensis Kentucky Bluegrass 'Midnight'	20%	85%	90%
Poa pratensis Kentucky Bluegrass 'North Star'	15%	85%	90%
Lolium perenne Perennial Ryegrass 'Majesty'	10%	90%	90%
Lolium perenne Perennial Ryegrass 'Inspire'	10%	90%	90%
Lolium perenne Perennial Ryegrass 'Bright Star II'	10%	90%	90%

2.05 SEED FOR OVERSEEDING:

A. Submit seed mix to the Engineer for approval if the Owner or Engineer determines that overseeding is necessary for any reason.

2.06 CHEMICALS AND INSECTICIDES:

A. Chemicals and insecticides shall not be used except with written permission from the Engineer.

2.07 WATER:

A. Contractor shall provide all labor and materials required to furnish water to seeded areas, trees and shrubs until Final Acceptance at Contractor's expense. Contractor shall supply soaker hoses, hose connections, and any other appurtenances necessary to connect and draw from existing or proposed water lines, water trucks, or irrigation system. Contractor shall not cause damage to turf lawns or any vegetation during the watering operation. Water shall potable, free of salt and other impurities injurious to vegetation.

2.08 PLANT MATERIALS:

A. Provide quality, size, genus, species, and variety of trees indicated on the Drawing complying with applicable requirements of AJCHN and AAN. No substitutions will be permitted without prior written approval from the Engineer. All plants shall be nursery grown, not collected from natural vegetated areas.

B. The Engineer, accompanied by the Contractor, will tag plants at their place of growth, after pre-tagging by Contractor, prior to preparation for transplanting. At least one month prior to the expected planting date, request, in writing, that the Engineer schedule tagging trip(s). The Engineer's time spent to locate plant material shall be paid for by Contractor only if the Engineer is sent to nursery where satisfactory plant materials are not located. If plant material is tagged by the Engineer, only these plants shall be delivered to the Project site with these tags.

C. The Engineer's selection shall not impair the right of inspection and rejection upon delivery at the site or during the progress of the Work. Contractor shall pay cost of replacement of materials rejected by the Engineer at the site.

D. Each tree shall be labeled with securely attached, waterproof tag bearing legible designation of botanical and common name according to AJCHN.

E. Only plant stock obtained from and grown between latitudes 40-49 degrees north and USDA hardiness Zones 1 through 5, will be accepted.

F. Plants shall be in accordance with AAN as a minimum requirement for acceptance. Plants shall be typical of their species or variety, have a normal habit of growth, and meet the size and form requirements indicated by the Engineer. The trunk of each tree shall be a single trunk growing from a single intact crown of roots. Trees not indicated as "multi-stemmed" in the Plant List will not be accepted with double leaders or twin heads without the written approval of the Engineer.

G. Measure trees according to AAN with branches and trunks or canes in their normal position. Take caliper measurements 6 inches above ground for trees up to 4-inch caliper size, and 12 inches above ground for larger sizes.

H. The height of trees (measured from the crown of the roots to the tip of the top branch) shall be not less than the minimum size directed by the Engineer or as required by AAN based upon caliper size designated. Lateral branching of deciduous trees is to begin at no less than 7 feet height.

I. Trees of a larger size may be used if acceptable to the Engineer with a proportionate increase in size of roots or balls. Do not cut root balls to size of smaller plants to fit limited planting area. Do not prune to obtain required sizes.

J. Trunks shall be free from sunscald, frost cracks, or wounds resulting from abrasions, fire, or other causes. No tree shall have evidence of ever having had basal suckers. The plants must be in a moist vigorous condition, free from dead wood, bruises or other root, bark or branch injuries.

K. Trees shall not be pruned in preparation for transplanting. No wounds from previous pruning shall be present having a diameter exceeding two inches; such wounds shall show vigorous scar tissue on all edges.

L. All plant parts shall be moist and show active cambium when cut. Plants shall be sound, healthy, and vigorous, well-branched and densely foliated when in leaf. They shall be certified by the grower as free of disease, insect pests, eggs or larvae.

M. Balled and burlapped plants shall be moved with root systems as solid units with balls of earth firmly wrapped with untreated natural eight-ounce burlap, firmly held in place by a stout cord or wire. Plants prepared with plastic or other non-biodegradable wrappings will not be accepted except when directed by the Engineer to be container grown. All plastic products must be removed before planting is accepted. Diameter and depth of the balls of earth on balled and burlapped plants must be sufficient to encompass the fibrous root feeding system necessary for healthy development of plant, according to AAN standards. Top of root ball shall be actual finish grade of tree as grown in nursery; excess soil shall be removed from top of ball prior to delivery. No plant will be accepted when ball of earth surrounding its roots has been cracked or broken prior to or during process of planting or after burlap, staves, ropes, container, or platform required in connection with its transplanting have been removed.

N. Trees delivered by truck and plants requiring storage on site shall be properly wrapped and covered to prevent drying of branches, leaves, or buds. Plant root balls shall be firmly bound, unbroken, and reasonably moist to indicate watering prior to delivery and during storage, and tree trunks shall be free from fresh scars and damage in handling.

2.09 FERTILIZER PACKETS:

A. Trees and shrubs installed by the Contractor shall be provided with fertilizer through the use of slow-release fertilizer packets which are designed and certified by the manufacturer to provide controlled release of nutrients over a minimum three-year period. Packets shall remain sealed at delivery to site and until installation. Each packet shall consist of four ounces of water-soluble fertilizer with a minimum guaranteed analysis of available elements by weight as follows:

Nutrient	Deciduous Plants
Nitrogen	16%
Phosphoric Acid	8%
Potash	16%

2.10 FERTILIZER PELLETS:

A. Perennials and ground covers installed by the Contractor shall be provided with fertilizer through the use of slow-release 10-10-10 pellets designed to release nutrients over a 3-4 month period.

2.11 BARK MULCH:

A. Bark mulch shall be shredded, pine or hemlock aged at least six months and not longer than two years. The mulch shall be dark brown in color, free of chunks and pieces of wood thicker than one-quarter inch. Mulch shall be free of stringy material over four inches in length, and free of chunks over three inches in width. It shall not contain, in the judgment of the Engineer, an excess of fine particles, overly composted or soggy compost material. Hemlock mulch shall not have an unpleasant odor nor have any evidence of fungus growth.

2.12 GUYING AND ANCHORING MATERIALS:

A. Use guying tape, such as “Arbortape” or equal approved by the Engineer, to tie trees to stakes, driven at angle flush with finished grade, using expanding knots as indicated in manufacturer's instructions. Do not use cable encased in hose.

2.13 TREE WRAP:

A. Do not use tree wrap of any type after trees are planted.

PART 3 - EXECUTION

3.01 SITE PREPARATION PRIOR TO COMMENCING PLANTING AND SEEDING:

A. Before starting, locate existing underground utilities; call DIG SAFE and other sources of information as necessary. Should uncharted, or incorrectly charted, piping or other utilities be encountered during excavation, notify the Engineer. Cooperate with the Engineer and utility companies in keeping respective services and facilities in operation. Repair damaged utilities to satisfaction of utility owners. Do not interrupt existing utilities serving facilities occupied or used by the Engineer and others, during occupied hours, except when permitted in writing by the Engineer and then only after acceptable temporary utility services have been provided. Provide minimum of 48-hour notice to the Engineer, and obtain written notice to proceed before interrupting any utility.

B. During planting operations, protect all existing structures, trees and plants to remain, utilities, pavements, lawns, planting and other site improvements from damage due to grading Work.

C. Submit to the Engineer any requests for adjustments in grades and alignments found necessary to avoid interference with special conditions encountered. Existing grades shall be maintained at end of construction as closely as possible to former existing grades.

D. If considered to be necessary by the Engineer, remove existing soil to depths indicated in Engineer's report at seeded areas and existing soil at plant pits per Drawings and remove legally offsite. Scarify all subgrade surfaces. Replace with approved planting soil per specifications.

E. Protect subgrade areas scheduled for planting from traffic and erosion. Keep free of trash and debris. Repair and re-establish grades in settled, eroded and rutted areas to specified tolerances. Where completed compacted areas are disturbed by subsequent construction operations or adverse weather, scarify surface, reshape and compact to required density prior to further construction.

3.02 PLANTING SOIL PREPARATION, PLACEMENT, AND FINE GRADING:

A. Testing Requirements:

1. Components and additives for planting soil shall be tested as specified before delivery to site, amended if required at rates indicated by testing, delivered and utilized for planting soil when testing indicates conformity to specifications herein. Mix all approved soil components and additives to make a complete planting soil prior to planting.

B. Planting Soil Placement and Finished Grading:

1. Subgrade, Proposed Grades, and Finished Grade Inspections: Contractor shall request inspections by the Engineer of the finished subgrade, proposed finished grades as indicated by grade stakes, and finished grade planting soil for approval.

2. Tolerances: Compacted, finished grades in planting and seeded areas shall deviate no more than 1" from indicated finish grade. Slopes shall be evenly graded with smooth lines and grades, to maintain finished grade to match existing grades as closely as possible.

3. Placement:

    a. Planting soil shall be screened with 1/2" inch screen before spreading. After planting soil has been spread, it shall be carefully prepared by scarifying or harrowing and hand raking. The whole surface shall then be raked to a smooth, uniform surface to lines and grade as shown on the Drawings to existing grade.

    b. Finished grading work shall not be done during wet, inclement, or freezing weather.

    c. All depressions caused by settlement shall be filled with additional planting soil that matches approved planting soil and the surface shall be regraded and raked until a smooth and even finished grade is created.

    d. Unless otherwise approved by the Engineer, approved planting soil shall be placed to minimum depths after compaction and to rates as specified herein and as shown in the Drawings.

    e. Spread the first 6" inch lift or layer of planting soil on prepared subgrade as described in Section 641 and disk or harrow the subsoil and planting soil layers a minimum of 4 inches into the subgrade and lightly roll. Spread the remaining planting soil in 6-inch lifts in plant pits or beds, with care not to allow for overcompaction after rolling of soil lifts.

    f. Planting soil structure shall not be destroyed through excessive and unnecessary handling or compaction or deterioration of soil structure will result in rejection of planting soil for use. Compaction of planting soil shall be between 80 - 85% maximum dry density as verified by soil compaction tests as required by the Engineer. Compaction shall be obtained by light rolling, dragging or other method approved by the Engineer. The compaction of the soil shall be adjusted by soil type within the required maximums, with less compaction preferred in finer soils.

C. Soil Additive Installation:

1. Soil additives shall be spread and thoroughly incorporated into the planting soil by harrowing or other methods approved by the Engineer. The following soil additives shall be incorporated:

   a. Pelletized limestone is required by soil analysis to achieve a ph of 6.0 to 6.5, but the maximum amount applied shall be 1 pound per square yard. Limestone may not be mixed with fertilizer for application and shall be applied a minimum of two weeks prior to fertilizer application.

   b. Fertilizer (10-10-10) at the rate of 5 pounds per 1,000 square feet, or more, as recommended by the soil analysis. Fertilizer may be applied hydraulically in one operation with hydroseeding and fiber mulching.

   c. Superphosphate at the rate of 20 pounds per 1,000 square feet, as required by soil tests.

   d. Slow-release Pelletized Fertilizer for ground cover and perennial beds shall be incorporated to the full depth of the planting soil at rate of 2.5 lbs. per cubic yard.

2. Lime and fertilizer shall be spread mechanically rather than in one operation with hydroseeding:

   a. After the planting soil is placed and before it is raked to true lines and rolled, limestone shall be spread evenly over planting soil surface and thoroughly incorporated with planting soil by heavy raking to a least on-half depth of planting soil.

   b. Fertilizer shall be uniformly spread and immediately mixed with the upper 2-in of topsoil.

2. Organic material and other bulk amendments (such as sand and organic compost) required to be added to topsoil or mixed to make manufactured planting soil shall be thoroughly mixed in soil stockpile locations as specified in Article 3.04 or in a commercial facility, according to proportions determined by soil testing and approved mixing and test results, and not on grade after spreading.

3.03 SCHEDULING OF PLANTING:

A. Locate plant material sources and ensure that plants are shipped in timely fashion for installation. All trees shall be planted during the same planting season they are dug. Balled and burlapped and potted plant materials from cold storage shall be rejected.

B. Seasons for Planting in New Hampshire, Zone 5 and 6

Spring:	Deciduous and evergreen materials - April 1 through June 15. Ground Covers – March 15 through June 1
Fall:	Deciduous materials - Aug. 15 through October 31. Evergreen materials - Sept. 1 through Nov. 1.

3.04 PLANT MATERIAL DELIVERY, STORAGE AND HANDLING:

A. Deliver and plant only freshly dug trees. Do not use plants "heeled-in" from previous season. Balled and burlapped plant materials from cold storage shall be rejected. Do not prune before delivery, except as approved by the Engineer. Protect bark, branches, and root systems from sunscald, drying, sweating, whipping, and other handling and tying damage. Do not bend or bind-tie trees or shrubs in such a manner as to destroy natural shape. Provide protective covering during delivery.

B. Contractor shall be present at time of delivery of all plants to the site. Remove all tree wrapping at delivery and inspect tree trunks for damage. Report damaged plants immediately to the Engineer. Wrap shall not be replaced except as specified herein.

C. Handle balled and burlapped stock by root ball, not by trunk or branches.

D. Deliver trees after preparations for planting have been completed and install immediately. If planting is delayed more than six hours after delivery, set plants vertically in their natural growing orientation in shade, protect from weather, dust and mechanical damage, and keep roots moist. Set balled stock on ground or heeled into ground, and cover ball with soil, mulch, or as approved by the Engineer. Storage for more than 2 weeks shall not be allowed without permission from the Engineer. Plant damage due to Contractor's planting delay shall be the responsibility of the Contractor.

E. Water root systems of trees stored on site with a fine-mist spray. Water as often as necessary to keep root systems moist during storage and planting.

F. Deliver packaged materials in containers showing weight, analysis, and name of manufacturer. Protect materials from damage during delivery and while stored at site.

G. Bulbs shall be kept in open, aerated, containers in a cool, dry location until brought to the site for planting. Do not leave unplanted bulbs in the sun, rain, or in freezing temperatures but return all unplanted bulbs to storage location until next available scheduled planting time.

3.05 TREE AND SHRUB PLANTING:

A. Stake locations for all plants for review by the Engineer before any plant pits or beds are dug, and before plant delivery to site. Stake locations with stakes or flagging, outline planting areas for massed planting, and obtain the Engineer's review and acceptance before the start of planting work. The Engineer reserves the right to determine the exact

location of every tree and to change the location of any plant to an area of similar conditions.

B. Excavate planting pits and beds with sloped sides according to the Drawings. Notify the Engineer if unexpected rock, utilities or obstructions are encountered in excavations for trees or if ground water is present in bottom of pits. Where mounded soil is to be used for plantings, scarify existing soil, add new planting soil, compact to 90% prior to excavating for plantings.

C. Take care not to disturb any adjacent site improvements. If, in the opinion of the Engineer, any damage to adjacent materials occurs as a result of planting operations, repair the damaged materials at no cost to the Engineer.

D. Keep plant roots and earth balls moist and protect from sun and wind during entire planting operation.

E. Set balled and burlapped stock or root ball plumb in staked location. If top of rootball needs to be raised to conform to proposed finished grade, use leveling bed of crushed stone (not planting soil or organic material) to set ball. Set top of root ball for trees slightly higher than surrounding grade, judging planting height to allow for settling, to meet grade after settling as plant grew in nursery; refer to detail drawing. Scarify soils on sides of pit to facilitate integration of backfill with existing soil for better root penetration as plants grow. Roll back top 12" of burlap and remove wire baskets from tops and sides of ball but do not remove materials from under balls. Planting stock with root balls cracked or broken before or during planting operation will be cause for rejection. Remove all non-biodegradable wrapping or binding material at time of planting.

F. Place planting soil around ball in six-inch layers, tamping to settle backfill and eliminate air pockets. When pit is approximately half backfilled, water thoroughly until no more is absorbed. Water again after placing and tamping final layer of backfill. Compact planting soil and planting soil mix to approximately 85% maximum dry density. Do not overcompact planting areas; the Engineer reserves the right to reject overcompacted soil installation and request removal and replacement of soil and plants.

G. Fertilizer packets: For trees, install one-half of the fertilizer packets at a depth of six to eight inches equally spaced around the plant 12 inches from the tree ball, as planting soil is placed. Place the other half of the packets approximately six inches away from tree ball. Packets shall not be cut, ripped or damaged. If it becomes necessary to remove and replace dead or unhealthy plants, used packets shall be replaced with new packets. The application rates for fertilizer packets shall be as follows:

Type of Plant	Rate
Deciduous Shade Tree	One packet for each inch of caliper or four packets, minimum for 3 1/2-4" cal. tree.

Shrub	One packet

H. Within one day of planting, place mulch as indicated on detail drawings, over saucer areas of individual trees and over area of planting beds to a depth of 3 inches after settlement. No mulch shall be spread within 4-inch diameter from tree trunk.

I. All plants shall be watered immediately following planting as necessary to thoroughly moisten rootball and planting soil and thereafter shall be inspected frequently for watering needs and watered, as required, to provide adequate moisture in the planting pit. Inspect tree pits 24 hours after initial watering to confirm that they are draining properly. If surface water or excessively saturated plant pit soils exist, immediately notify the Engineer.

3.06 TREE PRUNING:

A. Pruning shall be done only to ameliorate minor damage to branches incurred during shipping and planting; any plants with major damage shall be replaced as directed by the Engineer. Remove only dead wood, damaged branches, crossed branches, and suckering shoots, in accordance with TCIA standards, minimizing amount of live growth removed. Shape trees only if additional direction is given by the Engineer, maintaining natural form. Tree pruning shall be consistent to full height of tree to avoid uneven appearance and structural imbalance. Do not apply tree wound dressing. Prune in accordance with TCIA Standards for Class I, "Fine Pruning," to preserve natural character of the plant.

B. Never cut tree leader, unless permitted by the Engineer.

3.07 TREE WRAPPING:

A. Trees shall not be kept wrapped after planting, unless specifically requested by the Engineer, to avoid accumulation of moisture on bark which increases vulnerability to hidden insect infestation, fungus and mold.

3.08 GUYING:

A. Install arbortape guys according to manufacturer's instructions, with ties that allow for tree growth (specified manufacturer’s knots) and to allow for some movement.

3.09 PERENNIAL AND GROUND COVER PLANTING:

A. Excavate planting beds to depth indicated on the Drawings, scarifying the base material. Install specified planting soil, mixing in fertilizer pellets at the rate of 2.5 lbs. per cubic yard of planting soil. Compact to 85% max., dig holes for perennials or ground cover plants and firm soil around plants. When containers are removed, if there are any densely matted roots, scarify outer root ball surface before planting. Under no circumstances shall any type of container be planted with a perennial or ground cover. Tamp and rake soil in entire planting bed and apply mulch as indicated on the Drawings. Shake any

mulch from leaves or stems of plants.

3.10 TREE PRUNING:

A. Pruning shall be done only to ameliorate minor damage to branches incurred during shipping and planting; any plants with major damage shall be replaced as directed by the Engineer or Owner. Remove only dead wood, damaged branches, crossed branches, and suckering shoots, in accordance with NAA standards, minimizing amount of live growth removed. Shape trees only if additional direction is given by the Engineer or Owner, maintaining natural form. Tree pruning shall be consistent to full height of tree to avoid uneven appearance and structural imbalance. Do not apply tree wound dressing. Prune in accordance with NAA Standards for Class I, "Fine Pruning," to preserve natural character of the plant.

3.11 SEEDING:

A. Limits of seeding shall be designated on plans as all non-paved disturbed areas and as directed by the Engineer. All areas disturbed outside of the limit of tree and shrub planting shall also be seeded. Stake limits of areas before seeding, for review by the Engineer, to insure that proper seed mix is being installed to appropriate limits.

B. The planting of seed shall be done only during periods within the season which is normal for such work as determined by weather conditions without additional compensation, but subject to the Engineer's approval of time and methods.

1. Seeding dates for mown lawns shall be approximately April 1 - June 1 or August 15 - September 30.

2. Seeding Mown Lawns outside of season shall occur only with permission of the Engineer, and may result in the requirement for re-preparing of seed bed and reseeding the following season until specifications requirements are met. Acceptance will not be given to seed outside of season until all the requirements of the specifications have been fulfilled and the lawns or meadow have met all grow-in requirements. Out-of-season seeding during hot weather will require shade mulching with netted hay-type erosion control fabric as specified in article 2.0 of this Section.

C. Seed only when the bed is in friable condition, not muddy, dried, or frozen, and not in windy weather or in weather where temperatures are expected to be less than 45 or higher than 75 degrees F. during and for two weeks after seeding. After seeding, the seed bed shall be thoroughly and evenly watered with a fine spray to penetrate the soil to a depth of at least 6", and the seed bed kept evenly moist until germination and acceptance.

D. Seed for new lawns and meadows may be applied by hydrospray with hydromulch (meadows hydromulch must be sprayed separately after hand or mechanical seeding of meadow seed) or by drill or Brillion seeders, augmented with hand broadcasting.

Meadow seed shall be augmented with clean, slightly moist salt free sand used as a bulking agent in Drill or Brillion seeders to reduce flyaway of light seed and for a more consistent application.

E. Newly seeded bed shall be protected with flagging and protective barriers and seeded lawn areas that do not have hydromulch shall be lightly covered with light straw mulch, applied by hand or sprayed by machine during the spring season.

F. Seeding by spray machine:

1. A hydraulic spray machine, approved by the Engineer and designed specifically for lawn seed dissemination, may be utilized. The application of seed, fertilizer, limestone, fiber mulch, and tackifier may be accomplished in one operation. The materials shall be mixed with water in the machine and kept in an agitated state in order that the materials may be uniformly suspended in the water. The spraying equipment shall be so designed that when the solution is sprayed over an area, the resulting deposits of seed, fertilizer, limestone, fiber mulch, and tackifier shall be equal to quantities specified.

2. A certified statement shall be furnished, prior to start of Work, to the Engineer by the Contractor as to the number of pounds of seed, fertilizer, and limestone per 100 gallons of water. This statement should also specify the number of square yards of seeding that can be covered with the solution specified above.

3. If the results of the spray operation are unsatisfactory, the Contractor will be required to abandon this method and to apply the seed, fertilizer, limestone, fiber mulch, and tackifier by other means.

4. All seeded lawn slopes steeper than four-to-one must be seeded by spray machine. Slopes gentler than four-to-one may also be seeded with lawn seed by spray machine or other methods specified.

3.12 OVERSEEDING:

A. Until the time of turf acceptance, any seeded area within the project shall be overseeded with an approved seed mix if grass fails to grow in any new or existing lawn turf areas for whatever reason. Engineer shall determine limits of overseeding.

B. Contractor shall scarify affected areas and reseed according to “Brillion” drill seeding procedures specified herein.

3.13 TURF AREA PROTECTION AND MAINTENANCE:

A. Completed seeded turf areas shall be protected by a 3' high barrier constructed of 2" x 2" wood stakes set 18 inches in the ground at 8 foot spacing supporting plastic snow fencing. Barriers must be raised immediately after seeding and shall be maintained until

acceptance. Barriers must be removed at the request of the Engineer and not later than two weeks after acceptance. If grass within fencing is damaged for any reason and fencing has not been kept taut and secure by the Contractor, Contractor shall replace grass within two weeks, if during the growing season for that grass, within first two weeks of next growing season.

B. Maintenance:

1. Maintain turf areas at least 60 days or until Final Acceptance, whichever occurs later. Grass maintenance, reseeding and repair to turf areas shall be required during the one-year guarantee period for planting.

2. Watering: Apply no less than 2 inches of water per week within a given area, reduced by amount of natural rainfall at installation and between the months of April through October. Provide for daily watering of all grass areas to maintain moist soil to depth of at least 6". Apply one complete coverage in an 8-hour period. Water shall not be applied within three hours of dusk unless specifically approved by the Engineer. Prevent erosion due to excessive watering. Prevent damage to seeded areas by watering equipment. All Work injured or damaged due to over- or under-watering shall be Contractor's responsibility to correct and at Contractor's expense.

3. Fertilizing: No additional fertilizing shall be required other than that recommended by soil tests.

4. Acceptance/ Reseeding/ Weeding: After growth begins, areas with fail to show uniform stand of grass shall be reseeded with specified grass mix at specified rates until all areas are satisfactory. Acceptance will not occur until at least 60 days after initial acceptance of seed turf and after weeding and not until seedbed displays dense growth of specified species. Mown at least four times at 3 ½" height to maintain a 2 ½" – 3" height typical. Seeded areas shall be mechanically or hand weeded once (no herbicides) as condition of Final Acceptance with review of Engineer.

5. Reseeding: After growth begins, areas which fail to show uniform stand of grass shall be re-seeded with specified grass mix at specified rates until all areas are satisfactory.

6. Disease and insect control: Application of all preventative and reactive insecticides or fungicides shall be performed by a turf specialist certified by the State of New Hampshire and only after submittal and approval by the Engineer of materials, methods, application rates and schedule. The use of granular materials is preferred over spray applications.

7. Mowing: At the time of the first cutting, mow turf grass not less than 2 1/2" inches high. Grass shall be maintained between 2 1/2 " inches and 3" inches high between

April and October 30. Do not remove more than 1/3 of the grass blade at any one time. The last mowing of the season, typically in late October, shall be shorter, typically 1 1/2" inches high, with all turf areas raked and completely vacuumed of thatch, leaves, and debris. Mowing shall include the mulching of clippings on lawns as well as removal of clippings from pavement surfaces immediately after mowing.

8. Maintenance Instructions: Furnish complete written instructions for maintenance of turf areas to the City at least 10 days prior to the end of the contractual maintenance period to familiarize the Engineer with the recommended maintenance requirements for proper care and development of the lawn.

3.14 EROSION CONTROL FOR SEEDED AREAS

A. The seeded turf areas indicated for erosion control on the drawings shall be covered with erosion control matting after seeding. Matting shall be applied only following written permission by the Engineer stating that fine grading and seeding is acceptable.

B. Matting shall be installed perpendicular to slopes (laid up and down) and shall extend at least three feet above slope crest. Fibers shall be placed in contact with the soil for the entire length of the mat. Provide check slope at top of slope and anchor slot at bottom of slope.

C. Roll out matting from top to bottom of the slope after seeding without stretching fabric. Lay matting parallel to the slope in drainage swales, centering fabric along flow line. Install matting in a check slot at top and bottom of slope and at edges of area to be covered. Check slots shall be six inches deep and six inches wide. Fabric shall extend down one wall of check slot and across full width of base. Overlap edges of matting rolls four inches minimum and overlap ends 18 inches minimum.

D. Install staples in check slots, edges, center and ends of rolls by driving specified staples two feet on center over the entire area to be covered, except at check slots and ends of rolls, where staples shall be placed six inches on center.

E. Fill check slots with planting soil and tamp firmly.

F. Following matting installation, roll the entire area with a smooth drum roller weighing between 50 and 75 pounds per linear foot of roller. The finished installation of matting shall be firmly in contact with the soil and provide a smooth, finished appearance free from lumps or depressions.

3.15 CLEANUP AND PROTECTION:

A. Protect work from damage due to landscape operations, operations by other contractors and trades, and trespassers. Maintain protection during installation and maintenance periods. Treat, repair, or replace damaged Work as directed by the Engineer.

B. Remove excess planting soil, waste material, and excess subsoil, unsuitable soil, trash, and debris, and legally dispose of material off site.

C. Repair damage to site or structures to restore them to their original condition at no cost to the Owner.

3.16 MAINTENANCE REQUIREMENTS FOR PLANTINGS:

A. Begin maintenance immediately after each area is planted and continue until the end of the guarantee period after Final Acceptance.

B. Maintenance shall consist of keeping plants in healthy growing condition and shall include but not be limited to watering, weeding saucers, grass areas and planting beds, mowing, cultivating, re-mulching, tightening and repairing of guys, removal of trash, injured and dead material, resetting plants to proper grades or upright position, and maintaining mulched planting saucer.

1. Inspect plants for watering needs at least twice each week and water as required to promote plant growth and vitality.

2. Keep planting and grass areas free of weeds, and maintain mulched saucers at required depths and size.

3. Remove and replace immediately plants that die during the maintenance period and repair, or reseed as required through the one-year guarantee period.

4. Tighten guy tapes as required.

5. Chemicals, pesticides, fungicides, insecticides or herbicides within planted areas shall be applied by personnel licensed to do so in the State of New Hampshire and only after obtaining written permission from the Engineer or Engineer, indicating the materials and dispensing methods allowed, the dates, time and weather conditions under which procedures will occur, and traffic control, resident and pedestrian protection plan proposed. Spraying for insects, pests and diseases shall conform to the NAA Standards under the section entitled "Standards for Pesticide Application Operations", as currently adopted.

6. Remove trash from all planted areas weekly or as directed by the Engineer.

C. During the maintenance period, any decline in the condition of plantings shall require the Contractor to take immediate action to identify potential problems and undertake corrective measures. If required, the Contractor shall engage professional arborists and horticulturists to inspect plant materials and to identify problems and recommend corrective procedures. The Engineer shall be immediately advised of such actions. Inspection and recommendation reports shall be submitted to the Engineer.

3.17 ACCEPTANCE INSPECTION PROCEDURES AND PLANT GUARANTEE:

A. Requirements of Division I shall apply to this Section.

B. The Engineer shall inspect work upon written request of Contractor, which shall be received by the Engineer at least ten days before the anticipated dates of inspection. Request inspection for acceptance of the plantings only after all aspects of planting operations are completed and maintained according to Specifications, all pertaining test results are acceptable, all irrigation and underdrainage systems are operating properly, and all extraneous equipment, materials and debris are removed from the project site. Do not request inspections for partially completed work.

C. The Engineer shall inspect work with Contractor present. At time of inspection if, in the Engineer's opinion, a substantial amount of planting, materials or workmanship is deficient, Contractor's responsibility for maintenance of all work shall be extended until plant replacements are made or other deficiencies are corrected.

D. A written report, or "punch list," issued by the Engineer shall indicate to Contractor remedial items to be corrected before Final Acceptance is given.

E. Acceptance: Acceptable plants are those that are to size and species as shown on the Drawings or accepted by the Engineer, which show at least 85% live growth, actively growing or possessing live buds, with no indication of injury, disease, insect infestation, or decline due to environmental or other factors, which are be plumb, mulched, guyed (if just planted) and balls moist.

F. All unsatisfactory plants shall be removed promptly. Replacement plants shall conform in all respects to Specifications for the originals and shall be planted and maintained in same manner until initial acceptance is made.

G. Inspection request and procedure shall be repeated when remedial items are completed. Date of final acceptance of completed remedial work shall establish end of installation and initial maintenance period and commencement of guarantee period.

H. Submit typed maintenance instructions for all plantings for the Owner's use.

3.18 GUARANTEE PERIOD:

A. Guarantee specified herein shall not deprive the Engineer of other rights it may have under other provisions of Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of Contract Documents.

B. The Contractor shall guarantee the plantings for one year after substantial completion. During the guarantee period, inspect plant material once every 3 months during April

through November to document condition of plants. Continue maintenance as specified herein. Submit inspection reports to the Engineer. Dead plants and plants with less than 85% live wood noted in inspections shall be replaced with new plants of same size and species within one month or in first month of next growing season, whichever comes first, as permitted by specifications. Replacement plants in rows shall match current size of row if growth has occurred since planting. Replacement plants shall be installed according to the Specifications. Replacement plants shall be replaced by Contractor until they have lived through two years from the time of installation.

C. Notify the Engineer at least 10 days in advance of requested date of inspection at end of guarantee period. Submit to the Engineer, before inspection, a list of plants replaced during guarantee period with species, location, and replacement dates.

D. All replacements shall be plants of the same kind specified in the Plant List, and the size to which replaced plant would have grown by time of replacement. The cost of plants and replanting due to disease, insects, or any natural causes shall be borne by the Contractor, except for possible replacements due to external damage beyond the control of the Contractor.

E. At end of the guarantee period, all guying material shall be removed from plants, all saucers flattened, mulch areas re-mulched and weeded, dead wood pruned and removed and all replacements completed and dead or unsatisfactory grass areas repaired and reseeded as a condition of completion of all Work at final inspection.

END OF SECTION

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SECTION 02956

SEWER FORCE MAIN LINING (SLIPLINING)

PART 1 - GENERAL

1.01 DESCRIPTION:

A. Provide all labor, equipment, and materials necessary to complete the lining of the existing 24-in. Class 53 glass-lined ductile iron sewer force main with fusible polyvinylchloride (PVC) pipe by sliplining, as indicated on the drawings and specified.

B. Provide all labor, equipment, and materials necessary to complete CCTV inspection, cleaning, and testing, as specified.

1.02 RELATED WORK:

A. Section 02210: Earth Excavation, Backfill, Fill and Grading

B. Section 02615: Ductile Iron Pipe and Fittings

1.03 REFERENCES:

A. American Society for Testing and Materials (ASTM) Publications:

1. ASTM C495: Standard Test Method for Compressive Strength of Lightweight Insulating Concrete

2. ASTM D1784: Rigid Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds

3. ASTM D1785: Poly (Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120

4. ASTM D2152: Test Method for Degree of Fusion of Extruded Poly(Vinyl Chloride) (PVC) Pipe and Molded Fittings by Acetone Immersion

5. ASTM D2241: Poly (Vinyl Chloride) (PVC) Plastic Pipe (SDR-PR)

6. ASTM D2665: Poly (Vinyl Chloride) (PVC) Plastic Drain, Waste, and Vent Pipe and Fittings

7. ASTM D3034: Standard Specification for Type PSM Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings

8. ASTM F477: Elastomeric Seals (Gaskets) for Joining Plastic Pipe

9. ASTM F1057: Standard Practice for Estimating the Quality of Extruded Poly (Vinyl Chloride) (PVC) Pipe by the Heat Reversion Technique

10. ASTM F1417: Standard Test Method for Installation Acceptance of Plastic Gravity Sewer Lines Using Low-Pressure Air

B. American Water Works Association (AWWA) Standards:

1. AWWA C605: Standard for Underground Installation of Polyvinyl Chloride (PVC) Pressure Pipe and Fittings for Water

2. AWWA C900: Standard for Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings, 4 in. through 12 in., for Water Distribution

3. AWWA C905: Standard for Polyvinyl Chloride (PVC Pressure Pipe and Fabricated Fittings, 14 in. through 48 in., for Water Distribution and Transmission

1.04 SUBMITTALS:

A. Submit the following to the Engineer in accordance with Section 01300:

1. Shop drawings, including specifications, catalog cuts, data sheets, drawings and other descriptive material for the pipe, joints, seals, grout, and other items specified under this Section.

2. PVC Pipe (DR 18):

a. DR 18 fusible polyvinylchloride (FPVC) pipe shall be utilized in accordance with AWWA C900, AWWA C905, for standard dimensions, and hydrostatically tested in accordance with AWWA standards for applicable pressure class

b. The following PRODUCT DATA is required from the pipe supplier and/or fusion provider:

(1) Pipe Size

(2) Dimensionality

(3) Pressure Class per applicable standard

(4) Color

(5) Recommended Minimum Bending Radius

(6) Recommended Maximum Safe Pull Force

(7) Fusion technician qualification indicating conformance with this specification

c. The following AS-RECORDED DATA is required from the contractor and/or fusion provider to the Engineer:

(1) Approved datalogger device reports

(2) Fusion joint documentation containing the following information:

(a) Pipe Size and Thickness

(b) Machine Size

(c) Fusion Technician Identification

(d) Job Identification

(e) Fusion Joint Number

(f) Fusion, Heating, and Drag Pressure Settings

(g) Heat Plate Temperature

(h) Time Stamp

(i) Heating and Cool Down Time of Fusion

(j) Ambient Temperature

3. Grout:

b. Grout design mixes, installation plan, and contingency plan for the annular space grout to be used.

c. Grout testing reports

4. Work Plan:

a. At least 2 weeks prior to the beginning of work, provide a Work Plan detailing information regarding cleaning equipment, size and location of access pits, pipe insertion techniques, pipe fusion techniques, non-fusion pipe joining techniques, connection of new sanitary force main to existing sanitary force main, and operations schedule proposed to complete the sliplining work.

1.05 QUALITY ASSURANCE:

A. Contractor Requirements: The Contractor shall have at least five years of directly related experience in sliplining work. All work shall be performed under the constant supervision of an experienced foreman who has completed at least 5 similar sliplining projects.

B. The Fusion Technician shall be fully qualified by the pipe supplier to install fusible polyvinylchloride pipe of the type(s) and size(s) being used. Qualification shall be current as of the actual date of fusion performance on the project.

C. CCTV Inspection: The condition of the existing 24-inch glass-lined ductile iron sanitary force main shall be confirmed through pre-lining inspections with color CCTV equipment. The Contractor shall provide a video recording and written summary of each length of pipe surveyed. Each such recording shall be a continuous record of the camera's measured position in the pipeline along with any other data which will, when viewed with the written summary sheet, enable the exact location of any fitting, blockage, fault or feature to be easily identified within a particular scheme. The recording shall be labeled with the location, date and time of survey and shall be submitted to the Engineer.

D. The Contractor shall be permitted to subcontract the sliplining works to an alternative contractor as long as such an organization is able to fully comply with the requirements of the specification and is fully approved in writing by the Engineer. The Engineer reserves the right to reject any such contracting organization prior to the contract commencing. The Contractor shall be liable for any malpractice or failure to comply with the specification carried out by the subcontractor.

E. Opening and Closing Sanitary Force Main Sections: Existing sanitary force main pipes and fittings shall not be reused as closure pieces.

1.06 TRAFFIC MANAGEMENT:

A. Truck access for materials and equipment deliveries to Peirce Island is affected by traffic, narrow streets, pedestrians, and tight intersections. The Contract Documents have detailed construction traffic routes which apply to all construction traffic on this project and the Contractor is required to adhere to. Refer to Section 01500 and the Contract Drawings for a full description of the traffic management requirements.

B. Tractor-trailers longer than an AASHTO WB-50 may have difficulty turning from State St. onto Marcy St. To facilitate this turn, parking has been prohibited at this intersection between the hours of 12AM and 8AM.

PART 2 - MATERIALS

2.01 FUSIBLE PVC LINER (DR 18):

A. PVC Pipe:

1. DR 18 fusible polyvinylchloride (FPVC) pipe shall be utilized in accordance with AWWA C900, AWWA C905, for standard dimensions, and hydrostatically tested in accordance with AWWA standards for applicable pressure class

2. Fusible polyvinylchloride pipe shall conform to AWWA C900, AWWA C905, ASTM D2241 or ASTM D1785 for standard dimensions, as applicable. Testing shall be in accordance with the referenced AWWA standards for all pipe types.

3. Fusible polyvinylchloride pipe shall be extruded with plain ends. The ends shall be square to the pipe and free of any bevel or chamfer. There shall be no bell or gasket of any kind incorporated into the pipe.

4. Fusible polyvinylchloride pipe shall be manufactured in a standard 40' nominal length, or custom lengths as specified.

5. Fusible polyvinylchloride pipe shall be green in color for wastewater use.

6. Pipe shall be marked as follows:

   a. Nominal pipe size

   b. PVC

   c. Dimension Ratio, Standard Dimension Ratio, or Schedule

   d. AWWA pressure class, or standard pressure rating for non-AWWA pipe, as applicable

   e. AWWA standard designation number, or pipe type for non-AWWA pipe, as applicable

   f. Extrusion production-record code

   g. Trademark or trade name

   h. Cell Classification 12454 and/or PVC material code 1120 may also be included

7. Pipe shall be homogeneous throughout and be free of visible cracks, holes, foreign material, blisters, or other visible deleterious faults.

B. Fusion Joints:

1. Unless otherwise specified, fusible polyvinylchloride pipe lengths shall be assembled in the field with butt-fused joints. The Contractor shall follow the pipe supplier's written guidelines for this procedure. All fusion joints shall be completed as described in this specification.

C. Grout:

1. Grout for use as a filler of the annular space between the fusible polyvinylchloride pipe and the host pipe shall be a low-density (40-60 lbs/ft^3), cementitious, highly flowable mix.

D. Expansion Joints:

1. Expansion joints shall be manufactured of ductile iron conforming to the material properties of ANSI/AWWA C153/A21.53.

2. All expansion joints shall be for 20” nominal pipe size and capable of 16” expansion capacity.

3. Separation beyond the maximum extension of the expansion joint shall be prevented without the use of external tie rods. Each expansion joint shall be pressure rated against its own restraint to a minimum of 350 psi.

4. Megalug joint restraint, or approved equal, shall be provided with each mechanical joint connection per Section 02615.

5. All pressure containing parts shall be lined with a minimum of 15 mils of fusion bonded epoxy, conforming to the applicable requirements of ANSI/AWWA C213, and shall be tested with a 1500-volt spark test conforming to stated specification.

6. All expansion joints shall be EX-TEND 200, as manufactured by EBAA Iron, Inc., or approved equal with 316L SS bolts and hardware.

E. Sleeve Couplings:

1. Sleeve couplings shall be manufactured meeting or exceeding AWWA C219, NSF 61, NSF 372.

2. Sleeve couplings shall be for 20” nominal pipe size.

3. Gaskets shall be EPDM.

4. The end rings and center rings of sleeve couplings shall conform with ASTM A283/A283M Grade C Steel. Bridges, spherical spacers, nuts and bolts shall conform with AISI 304 stainless steel.

5. All sleeve couplings shall be coated with 100% fusion bonded epoxy for enhanced corrosion protection. Average thickness shall be 14 mil.

6. Working pressure shall be 232 psi for nominal pipe diameter 18” to 24”.

7. All sleeve coupling shall be Hymax Large Diameter Coupling, as manufactured by Hymax, or approved equal.

F. Tapping Saddles:

1. Tapping shall be performed using standard tapping saddles designed for use on PVC piping in accordance with AWWA C605. Tapping shall be performed only with use of tap saddles or sleeves. NO DIRECT TAPPING WILL BE PERMITTED.

2. All connections requiring a larger diameter than that recommended by the pipe supplier, shall be made with a pipe connection as specified and indicated on the drawings.

3. Equipment used for tapping shall be made specifically for tapping PVC pipe:

   a. Tapping bits shall be slotted “shell” style cutters, specifically made for PVC pipe. ‘Hole saws’ made for cutting wood, steel, ductile iron, or other materials are strictly prohibited.

   b. Manually operated or power operated drilling machines may be used.

4. Taps may be performed while the pipeline is filled with water and under pressure (‘wet’ tap,) or when the pipeline is not filled with water and not under pressure (‘dry’ tap).

PART 3 - INSTALLATION

3.01 DELIVERY, HANDLING & STORAGE:

A. All pipe shall be bundled or packaged in such a manner as to provide adequate protection of the ends during transportation to the site. Any pipe damaged in shipment shall be replaced as directed by the owner or engineer.

B. Each pipe shipment should be inspected prior to unloading to see if the load has shifted or otherwise been damaged. Notify owner or engineer immediately if more than immaterial damage is found. Each pipe shipment should be checked for quantity and proper pipe size, color, and type.

C. Pipe should be loaded, off-loaded, and otherwise handled in accordance with pipe supplier’s guidelines.

D. Off-loading devices such as chains, wire rope, chokers, or other pipe handling implements that may scratch, nick, cut, or gouge the pipe are strictly prohibited.

E. During removal and handling, be sure that the pipe does not strike anything. Significant impact could cause damage, particularly during cold weather.

F. If appropriate unloading equipment is not available, pipe may be unloaded by removing individual pieces. Care should be taken to ensure that pipe is not dropped or damaged. Pipe should be carefully lowered, not dropped, from trucks.

G. Any length of pipe showing a crack, or which has received a blow that may have caused an incident fracture, even though no such fracture can be seen, shall be marked as rejected and removed at once from the work. Damaged areas, or possible areas of damage may be removed by cutting out and removing the suspected incident fracture area. Limits of the acceptable length of pipe shall be determined by the owner or engineer.

H. Any scratch or gouge greater than 10% of the wall thickness will be considered significant and can be rejected unless determined acceptable by the owner or engineer.

I. Pipe lengths should be stored and placed on level ground. Pipe should be stored at the job site in the unit packaging provided by the manufacturer. Caution should be exercised to avoid compression, damage, or deformation to the ends of the pipe. The interior of the pipe, as well as all end surfaces, should be kept free from dirt and foreign matter.

J. Pipe shall be handled and supported with the use of woven fiber pipe slings or approved equal. Care shall be exercised when handling the pipe to not cut, gouge, scratch or otherwise abrade the piping in any way.

K. The pipe should be shaded or otherwise shielded from direct sunlight. Covering of the pipe which allows for temperature build-up is strictly prohibited. Pipe should be covered with an opaque material while permitting adequate air circulation above and around the pipe as required to prevent excess heat accumulation.

L. Pipe shall be stored and stacked per the pipe supplier's guidelines.

3.02 PREPARATION:

A. All rust, tubercles, deposits, loose materials and all other foreign materials shall be removed from the interior of the existing pipelines by use of mechanical scraping cleaning devices or other approved methods. The Contractor shall pass the machine through the mains as many times as may be necessary and to employ such other supplementary means as may be required to clean the pipe surfaces and to remove all foreign matter, rust and dust from the pipe surfaces. It shall be the responsibility of the Contractor to employ approved methods and to do all work necessary to obtain clean pipe surfaces. The Contractor shall be responsible for locating and restarting the cleaning unit if it should become lodged in the pipe.

B. Perform pre-lining CCTV inspection.

1. Inspect for satisfactory cleaning, defects in the force main, and possible need for repair or replacement before installation. Notify Engineer at once if any defects are found during inspection.

C. Remove or repair dropped joints, protruding services, or collapsed pipe that will prevent insertion of liner.

D. If the Contractor determines that a defect in the existing force main will prevent proper liner insertion, the Contractor shall notify the Engineer at once, and propose a method to address the defect in order to advance the liner insertion properly.

E. Flow Control: Bypass is not required. The Contractor shall coordinate with Owner to verify flow isolation before the start of work.

3.03 FUSION PROCESS:

A. Fusible polyvinylchloride pipe will be handled in a safe and non-destructive manner before, during, and after the fusion process and in accordance with this specification and pipe supplier's guidelines.

B. Fusible polyvinylchloride pipe will be fused by qualified fusion technicians, as documented by the pipe supplier.

C. Each fusion joint shall be recorded and logged by an electronic monitoring device (data logger) connected to the fusion machine.

D. Only appropriately sized and outfitted fusion machines that have been approved by the pipe supplier shall be used for the fusion process. Fusion machines must incorporate the following elements:

1. HEAT PLATE - Heat plates shall be in good condition with no deep gouges or scratches. Plates shall be clean and free of any debris or contamination. Heater controls shall function properly; cord and plug shall be in good condition. The appropriately sized heat plate shall be capable of maintaining a uniform and consistent heat profile and temperature for the size of pipe being fused, per the pipe supplier's guidelines.

2. CARRIAGE – Carriage shall travel smoothly with no binding at less than 50 psi. Jaws shall be in good condition with proper inserts for the pipe size being fused. Insert pins shall be installed with no interference to carriage travel.

3. GENERAL MACHINE - Overview of machine body shall yield no obvious defects, missing parts, or potential safety issues during fusion.

4. DATA LOGGING DEVICE – An approved datalogging device with the current version of the pipe supplier's recommended and compatible software shall be used. Datalogging device operations and maintenance manual shall be with the unit at all times. If fusing for extended periods of time, an independent 110V power source shall be available to extend battery life.

E. Other equipment specifically required for the fusion process shall include the following:

1. Pipe rollers shall be used for support of pipe to either side of the machine

2. A weather protection canopy that allows full machine motion of the heat plate, fusion assembly and carriage shall be provided for fusion in inclement, extreme temperatures, and /or windy weather, per the pipe supplier's recommendations.

3. An infrared (IR) pyrometer for checking pipe and heat plate temperatures.

4. Fusion machine operations and maintenance manual shall be kept with the fusion machine at all times.

5. Facing blades specifically designed for cutting fusible polyvinylchloride pipe shall be used.

F. Each fusion joint shall be recorded and logged by an electronic monitoring device (data logger) connected to the fusion machine. The fusion data logging and joint report shall be generated by software developed specifically for the butt-fusion of fusible polyvinyl chloride pipe. The software shall register and/or record the parameters required by the pipe supplier and these specifications. Data not logged by the data logger shall be logged manually and be included in the Fusion Technician's joint report.

3.04 INSTALLATION:

A. Excavate insertion pits as indicated on the drawings. Contractor to determine final location and size of access pits required to complete the work. Excavations shall be of suitable size to adequately gain clear access to the force main. The Contractor, at his option, may choose to excavate both insertion pits, or only the insertion pit on Peirce Island.

B. Within the western bridge crossing excavation, as indicated on the drawings, the existing 24" gate valve shall be restrained with a split Megalug to secure it through the duration of the slip lining work, reinstatement of service, and restoration of the site.

C. If the Contractor opts to excavate the western bridge crossing excavation, the excavation will be monitored by an archaeologist to be provided by the Engineer. Coordinate the schedule of this excavation with the Engineer. The Contractor shall not undertake this excavation until the archaeologist is present.

D. Insertion pits shall be excavated to a depth at least 8 inches below the main. Pumps shall be available throughout the lining process to prevent any water present in the excavated area from entering the open ends of the main.

E. If additional insertion pits are required, the Engineer shall review and accept the location and size of the pits.

F. Assemble and conduct a low pressure air test of the entire fused PVC liner for leakage prior to insertion into existing force main.

G. Insertion:

1. Pipe sections shall be lowered into the trench and set in place in such a manner so as to prevent damage or injury to the pipe or to any persons or property in the vicinity of the pipe. The Contractor shall use rollers to adequately support the PVC pipe as it is being drawn into the entry pit for the slip lining. The Contractor shall use slings, straps, or other approved means to adequately support the DI fittings and expansions joints as they are being lifted and lowered into the trench. Pipe shall not be dropped from trucks onto the ground or into the trench. Any pipe so dropped shall be immediately rejected and removed from the job site by the Contractor.

2. Take precautions to prevent ragged edges of broken pipe from scoring liner pipe as it is being pulled into force main.

3. Take all necessary precautions to prevent debris from falling below during lining work.

H. Whenever pipe installation work is not in progress, the end(s) of the pipe being installed shall be satisfactorily plugged to prevent intrusion of soil, stones, water, debris, animals, or other such materials into the pipe. When pipe laying operations resume, the end(s) of the pipe shall be thoroughly cleaned, and the temporary plugs removed.

I. Expansion joints shall be installed according to manufacturer's recommendations, with adjustable portions exposed to accommodate the 20" end of the 20"x24" reducing end seal.

J. Field verify location, size, piping material of the existing ductile iron force main, and connect liner to ductile iron pipe as indicated on the drawings

3.05 ANNULAR SPACE GROUTING

A. The annular space between the outside of the fusible polyvinylchloride pipe and the inside of the existing host pipe shall be filled with a low density (40-60 lbs/ft^3), cementitious, flowable grout.

B. Grouting of the annular space shall be done in such a manner as to prevent damage, floating, or collapse of the fusible polyvinylchloride pipe. Grouting operations shall be properly vented. If the distance between grout points exceeds the Contractor's pumping capability additional grouting points shall be excavated. The fusible polyvinylchloride pipe at access pits, service connections, and grouting points shall not be grouted above the spring line of the existing host pipe.

C. The fusible polyvinylchloride pipe shall be filled with water prior to the grouting procedure. This shall aid in keeping the fusible polyvinylchloride pipe from floating or collapsing during grouting operation and also aid in dissipating the heat of hydration and its effects on the fusible polyvinylchloride pipe as the grout cures.

3.06 FIELD QUALITY CONTROL:

A. Low Pressure Leakage Testing (Prior to Insertion):

1. All completed liners shall be pressure tested for leakage due to damage or vandalism prior to insertion into the host pipe.

2. The low-pressure air test shall be completed on the fused liner at grade surface in accordance with ASTM F1417.

3. Air pressure shall be 4 psi, but never exceed 9 psi throughout the testing.

4. Leaks and loss in test pressure constitute defects that must be repaired.

B. Hydrostatic Testing (Post Insertion):

1. Hydrostatic testing for piping systems that contain mechanical jointing as well as fused PVC jointing shall comply with AWWA C605.

2. In preparation for hydrostatic pressure testing the following parameters must be followed:

a. All air must be vented from the pipeline prior to pressurization. This may be accomplished with the use of the air relief valves or corporation stop valves, vent piping in the testing hardware or end caps, or any other method which adequately allows air to escape the pipeline at all high points. Venting may also be accomplished by 'flushing' the pipeline in accordance with the parameters and procedures as described in AWWA C605.

b. The pipeline must be fully restrained prior to pressurization. This includes complete installation of all mechanical restraints per the restraint manufacturer's guidelines, whether permanent or temporary to the final installation. This also includes the installation and curing of all required thrust blocking. All appurtenances included in the pressure test, including valves, blow-offs, and air-relief valves shall be checked for proper installation and restraint prior to beginning the test.

3. Unless agreed to or otherwise designated by the owner or engineer, for a hydrostatic test following installation, a pressure equal to 150% of working pressure at point of test, but not less than 125% of normal working pressure at highest elevation shall be applied. The duration of the pressure test shall be for two (2) hours.

C. If the liner fails to pass the leakage or hydrostatic pressure test, the Contractor shall do everything necessary to locate, uncover, and repair or replace the defective pipe, fitting, or joint, all at no additional cost to the Owner and without extension of time for completion of the work. Additional tests and repairs shall be made until the section passes the specified test.

3.07 CONTRACT CLOSEOUT:

A. Provide in accordance with Section 01700.

3.08 WARRANTY:

A. The pipe shall be warranted for one year from substantial completion per the pipe supplier's standard terms.

END OF SECTION

SECTION 03200

CONCRETE REINFORCEMENT

PART 1 - GENERAL

1.01 DESCRIPTION:

A. Provide concrete reinforcement as indicated and specified:

1. Section Includes:

a. Reinforcement bars.

b. Welded wire reinforcement.

c. Reinforcement accessories.

B. Provide concrete reinforcement for civil work as shown on the drawings or specified under the discipline.

1.02 REFERENCES:

A. ASTM International (ASTM):

1. A184: Standard Specification for Fabricated Deformed Steel Bar Mats for Concrete Reinforcement.

2. A615: Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.

3. A616: Standard Specification for Rail-Steel Deformed and Plain Bars for Concrete Reinforcement.

4. A617: Standard Specification for Axle-Steel Deformed and Plain Bars for Concrete Reinforcement.

5. A706: Standard Specification for Low-Alloy Steel Deformed and Plain Bars for Concrete Reinforcement.

6. ASTM A1064/A1064M - Standard Specification for Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete

B. American Concrete Institute (ACI):

1. 301: Standard Specification for Structural Concrete.

2. 315: Details and Detailing of Concrete Reinforcement.

3. 318: Building Code Requirements for Structural Concrete.

4. 350: Building Code Requirements for Environmental Engineering Concrete Structures

C. Concrete Reinforcing Steel Institute (CRSI):

1. Manual of Standard Practice.

2. Placing Reinforcing Bars.

D. American Welding Society (AWS):

1. D1.4: Structural Welding Code, Reinforcement Steel.

E. Where reference is made to one of the above standards, the version in effect at the time of bid opening shall apply.

1.03 SUBMITTALS:

A. Shop Drawings:

1. Submit bar lists and placing drawings for all reinforced concrete structures in accordance with Section 01300.

2. Detail reinforcement in conformance with ACI 315.

3. Clearly indicate bar sizes, spacing, locations, quantities and total weight of reinforcement steel and wire reinforcement, bending schedules, and supporting and spacing devices.

4. Coordinate bar splicing and placement with Contractor's concrete placing schedule

5. Show location and size of all penetrations greater than 12-inches in diameter or least dimension of the opening with the corresponding added reinforcement around the penetrations.

6. Clearly show marking for each reinforcement item.

B. Submit certified copies of mill test reports of reinforcement analysis dated within the last three months for each shipment of reinforcement with specific lots in shipments identified.

C. Chemical composition of reinforcement steel: Ladle analysis indicating percentage of carbon, phosphorous, manganese and sulfur present in steel.

1.04 QUALITY ASSURANCE:

A. Comply with requirements in Section 01400 and as specified.

B. Do not fabricate reinforcement until shop and placement drawings have been reviewed and accepted by the Engineer.

C. Perform concrete reinforcement work in accordance with CRSI Manual of Practice and ACI 315**.**

1.05 INSPECTION AND TESTING:

A. In no case shall any reinforcement steel be covered with concrete until the installation of the reinforcement has been observed by the Engineer and the Engineer's authorization to proceed with the concreting has been obtained. The Engineer shall be given a minimum of 48 hours prior notice of the readiness of placed reinforcement for observation. The forms shall be kept open until the Engineer has finished observations of the reinforcement steel.

B. Provide Engineer with access to fabrication plant to facilitate inspection of reinforcement. Notify Engineer of commencement and duration of shop fabrication, in sufficient time to allow for proper inspection.

1.06 DELIVERY STORAGE AND HANDLING:

A. Comply with the requirements in Section 01610.

B. Keep reinforcement steel free from mill scale, rust, dirt, grease or other foreign matter.

C. Ship and store reinforcement steel with bars of the same size and shape fastened in bundles with durable tags, marked in a legible manner with waterproof markings showing the same "mark" designations as those shown on the submitted placing drawings.

D. Store reinforcement steel off the ground, protected from moisture and kept free from dirt, oil or other injurious contaminants.

PART 2 - PRODUCTS

2.01 REINFORCEMENT STEEL:

A. Reinforcement Steel: ASTM A615/A615M, 60 ksi yield grade; deformed billet steel bars.

B. Reinforcement shall be clean and free from loose mill scale, dirt, grease, oil, form release agent, dried concrete or any material reducing bond with concrete.

C. Welded Wire Reinforcement:

1. Provide welded wire reinforcement conforming to ASTM A1064 in flat sheets.

2. Provide deformed welded wire reinforcement conforming to ASTM A1064 in flat sheets.

3. Provide support bars and reinforcement bar supports as specified herein to obtain the concrete cover indicated.

2.02 ACCESSORY MATERIALS:

A. Tie Wire: Minimum 16 gage annealed type.

B. Chairs, Bolsters, Bar Supports, and Spacers: sized and shaped for strength and support of reinforcement during concrete placement including load bearing pad on bottom of base slabs and slabs on grade to prevent puncturing the vapor retarder.

C. Special Chairs, Bolsters, Bar Supports, and Spacers Adjacent to Weather Exposed Concrete Surfaces: plastic coated steel, stainless steel or plastic type; size and shape as required.

D. Provide 3-inch by 3-inch plain precast concrete blocks, precast concrete doweled blocks or concrete brick for support of bottom reinforcement in concrete elements. Provide block thickness to produce concrete cover of reinforcement as indicated.

2.03 FABRICATION:

A. Fabricate concrete reinforcement in accordance with CRSI Manual of Standard Practice, ACI 315 and ASTM A184/A184M.

B. Cold bend bars. Do not straighten or rebend bars.

C. Do not heat reinforcement steel to bend or straighten.

D. Bend bars around a revolving collar having a diameter of not less than that recommended by ACI 318.

PART 3 - EXECUTION

3.01 INSTALLATION:

A. Place, support and secure reinforcement against displacement. Do not deviate from required position. Place reinforcement a minimum of 2 inches clear of any metal pipe or fittings.

B. Do not displace or damage vapor retarder.

C. Bars additional to those indicated that may be found necessary or desirable by the Contractor for the purpose of securing reinforcement in position shall be provided by the Contractor at no additional cost to the Owner.

D. Support reinforcement steel in accordance with CRSI “Placing Reinforcement Bars” with maximum spacing of 4’-0”.

E. Tie reinforcement steel at intersections in accordance with CRSI “Placing Reinforcement Bars”:

1. Maximum tie spacing for footings, walls and columns: every third intersection or 3 feet.

2. Maximum spacing for slabs and other work: every fourth intersection or 3 feet.

3. Tie a minimum of 25 percent of all intersecting bars in foundation mats, base slabs, footings, pile caps, slabs on grade and elevated slabs.

4. Secure all dowels in place before placing concrete.

5. Tie wires shall be bent away from the forms and from finished concrete surfaces in order to provide the required concrete coverage.

F. Locate reinforcement to avoid interference with items drilled in later, such as concrete anchors.

G. Extend welded wire reinforcement to within 2 inches of edges of slab or section. Lap sheets at least 12 inches or two wire spaces, whichever is greater, at ends and edges and wire tightly together. Stagger end laps.

H. Unless shown otherwise on Drawings, place welded wire reinforcement in slabs on grade between the upper third point and mid-point of slab. Placing welded wire reinforcement on the subgrade and pulling it up during concrete placement is not permitted.

I. Support welded wire reinforcement placed over the ground on wired concrete blocks spaced not more than 3 feet on centers in any direction.

J. Support welded wire reinforcement placed over horizontal forms on slab bolsters spaced not more than 30 inches on center.

K. Securely support and tie reinforcement steel to prevent movement during concrete placement.

L. Unless otherwise shown on the Drawings or permitted by the Engineer, do not bend reinforcement bars that project from in-place concrete.

M. Do not weld reinforcement steel bars (including tack welded) either during fabrication or erection.

N. Reinforcement steel interfering with the location of other reinforcement steel, conduits or embedded items may be moved up to 3 inches. Make greater displacement of bars to

avoid interference only with the permission of the Engineer. Do not cut reinforcement to install inserts, conduits, mechanical openings or other items without the prior permission from the Engineer.

O. Setting bars and welded wire reinforcement on layers of fresh concrete as the work progresses or adjusting reinforcement during the placement of concrete is prohibited.

P. Provide and place safety caps on all exposed ends of vertical reinforcement that pose a danger to injury or life safety.

3.02 REINFORCEMENT AROUND OPENINGS AND PENETRATIONS:

A. Accommodate placement of formed openings and penetrations.

B. Unless specific additional reinforcement around openings and penetrations is shown on the Drawings, provide additional reinforcement steel on each side of opening or penetration equivalent to one half of the cross-sectional area of the reinforcement steel interrupted by an opening or penetration. The bars shall have sufficient length to be fully developed at each end beyond the opening or penetration.

C. Refer to details on Drawings for additional diagonal bars around openings or penetrations and bar extension length on each side of openings or penetrations.

3.03 ACCESSORIES:

A. Provide accessories such as chairs, chair bars and the like in sufficient quantities and strength to adequately support the reinforcement and prevent its displacement during the erection of the reinforcement and the placement of concrete.

B. Use precast concrete blocks where the reinforcement steel is to be supported over soil.

C. Do not use metal chairs, ferrous clips, nails, etc. that extend to the surfaces of the concrete. Do not use stones, brick or wood block supports.

3.04 FIELD QUALITY CONTROL:

A. Remove reinforcement with kinks or bends not shown on shop or placement drawings. Remove such reinforcement from job site and replace with new fabricated steel. Do not field bend of reinforcement unless reinforcement is indicated or specified to be field bent.

B. Protect reinforcement from rusting, deforming, bending, kinking and other injury. Clean in-place reinforcement that has rusted, or been splattered with concrete using sand or water blasting prior to incorporation into the Work.

3.05 CONTRACT CLOSEOUT:

A. Provide in accordance with Section 01700.

END OF SECTION

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SECTION 03300

CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.01 DESCRIPTION:

A. Provide all labor, materials, equipment, and incidentals necessary to furnish and install cast-in-place concrete as specified and as shown on contract drawings.

1.02 REFERENCES:

A. American Concrete Institute (ACI):

1. ACI 211.1: Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete

2. ACI 301: Specifications for Structural Concrete

3. ACI 304R: Guide for Measuring, Mixing, Transporting and Placing Concrete

4. ACI 304.2R: Placing Concrete by Pumping Methods

5. ACI 305.1: Specification for Hot Weather Concreting

6. ACI 306.1: Standard Specification for Cold Weather Concreting

7. ACI 308.1: Specification for Curing Concrete

8. ACI 318: Building Code Requirements for Structural Concrete

B. ASTM International (ASTM) Publications:

1. A 123: Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products

2. A 153: Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware

3. C 31: Standard Practice for Making and Curing Concrete Test Specimens in the Field

4. C 33: Standard Specification for Concrete Aggregates

5. C 39: Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens

6. C 40: Standard Test Method for Organic Impurities in Fine Aggregates for Concrete

7. C 42: Standard Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete

8. C 87: Standard Test Method for Effect of Organic Impurities in Fine Aggregate on Strength of Mortar

9. C 88: Standard Test Method for Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate

10. C 94: Standard Specification for Ready-Mixed Concrete

11. C 109: Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in or (50-mm) Cube Specimens)

12. C 123: Standard Test Method for Lightweight Particles in Aggregate

13. C 136: Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates

14. C 138: Standard Test Method for Unit Weight, Yield, and Air Content (Gravimetric) of Concrete

15. C 143: Standard Test Method for Slump of Hydraulic Cement Concrete

16. C 150: Standard Specification for Portland Cement

17. C 157: Standard Test Method for Length Change of Hardened Hydraulic Cement, Mortar and Concrete

18. C 171: Standard Specification for Sheet Materials for Curing Concrete

19. C 172: Standard Practice for Sampling Freshly Mixed Concrete

20. C 192: Standard Practice for Making and Curing Concrete Test Specimens in the Laboratory

21. C 231: Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method.

22. C 260: Standard Specification for Air-Entraining Admixtures for Concrete

23. C 295: Standard Guide for Petrographic Examination of Aggregates for Concrete

24. C 309: Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete

25. C 311: Standard Test Methods for Sampling and Testing Fly Ash or Natural Pozzolans for Use as a Mineral Admixture in Portland Cement Concrete

26. C 494: Standard Specification for Chemical Admixtures for Concrete

27. C 595: Standard Specification for Blended Hydraulic Cements

28. C 1064: Standard Test Method for Temperature of Freshly Mixed Portland Cement Concrete

29. C 1107: Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink)

30. C 1260: Standard Test Method for Potential Alkali Reactivity of Aggregates (Mortar-Bar Method)

31. C 1293: Standard Test Method for Determination of Length Change of Concrete Due to Alkali-Silica Reaction

32. C 1567: Standard Test Method for Determining the Potential Alkali-Silica Reactivity of Combinations of Cementitious Materials and Aggregate (Accelerated Mortar-Bar Method)

33. C 1602: Standard Specification for Mixing Water Used in the Production of Hydraulic Cement Concrete

34. D 75: Standard Practice for Sampling Aggregates

35. E 329: Standard Specification for Agencies Engaged in the Testing and/or Inspection of Materials used in Construction

C. American Association of State Highway and Transportation Officials (AASHTO):

M182: Standard Specification for Burlap Cloth Made from Jute or Kenaf and Cotton Mats

1.03 SUBMITTALS:

A. Comply with the requirements specified in Section 01300.

B. Product Data:

1. Manufacturer's specifications and instructions for all admixtures and curing materials. Manufacturer’s certification of compatibility of all admixtures.

C. Shop Drawings:

1. Provide certification that cement used complies with ASTM C150 and these specifications.

2. Provide certification that aggregates comply with ASTM C33. Submit gradation analysis with concrete mix designs.

3. Provide certification of compliance with these specifications from the manufacturer of the concrete admixtures.

4. Prepare mix designs in accordance with ACI 318, except as modified herein.

   a. Submit concrete mix designs, laboratory 7-day and 28-day compressive test results and laboratory shrinkage test results for review and approval by the Engineer.

   b. Alternatively, submit test reports of 7- and 28-day compressive tests and shrinkage test results of the proposed mix where that same mix has been used on two previous projects in the past twelve months.

   c. Do not use any concrete mixes in the work that have not been approved by the Engineer.

D. Field Quality Control Submittals

1. Provide delivery tickets for ready-mix concrete or weigh masters certificate per ASTM C94, including weights of cement and each size aggregate and amount of water added at the plant and record of placements. Record the amount of water added on the job on the delivery ticket. Water added at the plant shall account for moisture in both coarse and fine aggregate and liquid admixtures.

2. Batch tickets shall include the following information:

   a. Load number, truck number and driver's name

   b. Strength of concrete (compression strength)

   c. Amount of concrete (cu. yds.)

   d. Time truck was charged with cement

   e. Type, brand and amount of cement

   f. Type, brand and amount of admixtures

   g. Amount of water withheld at the plant (if any)

   h. Information necessary to calculate total mixing water

   i. Maximum size of aggregate

   j. Weights of fine and coarse aggregates

   k. Signature of ready-mix representative

   l. Concrete temperature at batching plant

1.04 QUALITY ASSURANCE:

A. Provide in accordance with Section .

B. Concrete not meeting the minimum specified 28-day design strength shall be cause for rejection and removal from the work.

C. Perform concrete work in conformance with ACI 301 unless otherwise specified.

D. Do not use calcium chloride or admixtures containing calcium chloride.

E. Do not place concrete until design mix, material tests and trial concrete batch mix compression and shrinkage test results are approved by the Engineer. Approvals shall be obtained at least 30 days prior to the need for use on the job site.

F. The Contractor shall employ an independent testing laboratory, acceptable to the Engineer, to develop concrete mix designs and testing.

G. The Contractor shall employ an independent testing laboratory, acceptable to the Engineer, to test the conformity of materials proposed for use in the concrete mixes to the project specifications and to design and test concrete mixes proposed for use. Concrete testing shall be performed by an ACI Concrete Field Technician, Grade I or equivalent. The Contractor shall allow free access to obtain test samples.

H. The Engineer shall employ an independent testing laboratory to test conformity of materials placed into the work during construction. Concrete testing shall be performed by an ACI Concrete Field Technician, Grade I or equivalent. The Contractor shall allow free access to obtain test samples.

I. Methods of Sampling and Testing:

1. Fresh Concrete Sampling: ASTM C 172

2. Specimen Preparation: ASTM C 31

3. Compressive Strength: ASTM C 39

4. Air Content: ASTM C 231

5. Slump: ASTM C 143

6. Temperature: ASTM C 1064

7. Unit Weight: ASTM C 138

8. Obtaining Drilled Cores: ASTM C 42

9. Drying Shrinkage: ASTM C 157

J. Acceptance of Structure: Acceptance of completed concrete work requires conformance with dimensional tolerances, appearance and strength as indicated or specified.

K. Hot weather concrete to conform to ACI 305 and as specified herein.

L. Cold weather concrete to conform to ACI 306 and as specified herein.

M. Reject concrete delivered to job site that exceeds the time limit specified.

N. Reject concrete delivered to job site that exceeds the concrete temperature limitations specified.

O. Do not place concrete in water or on frozen or uncompacted ground.

1.05 WORKABILITY:

A. Concrete shall be of such consistency and composition that it can be worked readily into the forms and around the reinforcement without excessive vibrating and without permitting the materials to segregate or free water to collect on the surface.

1.06 DELIVERY, STORAGE, AND HANDLING:

A. Provide in conformance with Section 01610 and as specified herein.

B. Deliver concrete to discharge locations in watertight agitator or mixer trucks without altering the specified properties of water-cementitious materials ratio, slump, air entrainment, temperature, and homogeneity.

C. Reject concrete not conforming to specification, unsuitable for placement, exceeding the time or temperature limitations or not having a complete delivery batch ticket.

1.07 SITE CONDITIONS:

A. Do not place concrete until conditions and facilities for making and curing control test specimens are in compliance with ASTM C 31 and as specified herein.

1.08 TRAFFIC MANAGMENT

A. Truck access for materials and equipment deliveries to Peirce Island is affected by traffic, narrow streets, pedestrians, and tight intersections. The Contract Documents have detailed construction traffic routes which apply to all construction traffic on this project and the Contractor is required to adhere to. Refer to Section 01500 and the Contract Drawings for a full description of the traffic management requirements.

B. Tractor-trailers longer than an AASHTO WB-50 may have difficulty turning from State St. onto Marcy St. To facilitate this turn, parking has been prohibited at this intersection between the hours of 12AM and 8AM.

PART 2 - PRODUCTS

2.01 MATERIALS:

A. Cement:

1. Portland cement, ASTM C150, Type II; or blended hydraulic cement, ASTM C595, Type IP (MS).

2. Use no cement that has become damaged, partially set, lumpy, or caked. Reject the entire contents of the sack or container that contains such cement. Use no salvaged or reclaimed cement.

3. Maximum tricalcium aluminate shall not exceed 8 percent. The maximum percent alkalis shall not exceed 0.6 percent.

B. Fine Aggregates:

1. Clean, sharp, natural sand conforming to requirements of ASTM C33 with a fineness modulus between 2.50 and 3.0.

2. Confirm aggregates intended for use in concrete do not contain pyrrhotite or other deleterious materials by petrographic testing.

3. Test conformity of aggregate and confirm that aggregates intended for use in concrete are potentially non-reactive when tested in conformance with ASTM C1260, ASTM C1293 or ASTM C1567.

4. Coarse aggregates shall be supplied to an ANSI accredited lab, accompanied by the appropriate chains-of-custody and tested for regulated metals and gross alpha radionuclides. Testing shall be conducted by an ANSI accredited product certification body for Drinking Water Quality.

C. Coarse Aggregate:

1. Well graded crushed stone, natural rock conforming to requirements of ASTM C33.

2. Limit deleterious substances in accordance with ASTM C33, Table 3, Severe Weathering Regions, limit clay lumps not to exceed 5.0 percent by weight, and limit loss when tested for soundness using magnesium sulfate to 12 percent.

3. Test conformity of aggregate and confirm that aggregates intended for use in concrete are potentially non-reactive when tested in conformance with ASTM C1260, ASTM C1293 or ASTM C1567.

4. Confirm aggregates intended for use in concrete do not contain pyrrhotite or other deleterious materials by petrographic testing.

5. Coarse aggregates shall be supplied to an ANSI accredited lab, accompanied by the appropriate chains-of-custody and tested for regulated metals and gross alpha radionuclides. Testing shall be conducted by an ANSI accredited product certification body for Drinking Water Quality.

D. Water and Ice:

1. Use water and ice free from injurious amounts of oil, acid, alkali, salt, organic matter or other deleterious substances and conforms to requirements of ASTM C1602.

2. Water shall not contain more than 500 mg/L of chlorides or more than 500 mg/L of sulfate.

3. Heat or cool water to obtain concrete temperatures specified, and in conformance with ACI 305.1 and ACI 306.1.

E. Concrete Admixtures:

1. Maintain compressive strength and maximum water-cementitious materials ratios specified in Section 2.02 when using admixtures. Include all admixtures in solution form in the water-cementitious materials ratio calculations. Do not use any admixture that contains intentionally added chlorides or other corrosive elements. Admixtures shall be used in compliance with the manufacturer's printed instructions. The manufacturer shall certify the compatibility of multiple admixtures used in the same mix. Do not use admixtures in greater dosages than recommended by manufacturer.

2. Air Entrainment:

a. Air-entraining admixture shall conform to ASTM C260.

b. Products:

(1) BASF Corporation – MasterAir AE 90, MasterAir VR 10, or MasterAir AE 200

(2) Sika Corporation, AER.

(3) WR Grace & Co.; Darex II-AEA

(4) Or accepted equivalent product.

c. Adjust the admixture content to accommodate fly ash or other pozzolan requirements, and other admixtures when used, in order to obtain the specified air content.

3. Water Reducing:

a. Water-reducing admixture shall conform to ASTM C494, Type A and be compatible with the air-entraining admixture.

b. Products:

(1) BASF Corporation; MasterPozzolith Series or MasterPolyHeed Series

(2) Sika Corporation, Plastocrete 161

(3) WR Grace & Co.; Daracem 65

(4) Euclid Chemical Company; Eucon NW

(5) Or accepted equivalent product.

2.01 MIXES:

A. Conform to ASTM C94, except as modified by these specifications.

B. Air content as determined by ASTM C231:

6 ± 1 1/2 percent for concrete using 3/4 inch maximum aggregate size.

C. Provide 560 lb/yd^3 minimum cementitious material content.

D. Provide concrete with 4,000 psi compressive strength at 28 days and 0.44 maximum water/cement ratio and proportion it for strength and quality requirements in accordance with ACI 318.

E. Measure slump in accordance with ASTM C143:

1. Proportion and produce the concrete to have a maximum slump of 4 inches. A tolerance of up to 1 inch above the indicated maximum is allowed for individual batches provided the average for all batches or the most recent 10 batches tested, whichever is fewer, does not exceed the maximum limit. Concrete of lower than usual slump may be used provided it is properly placed and consolidated.

2. Mixes containing water reducers shall have a maximum slump of 6 inches after the addition of a mid-range water reducer.

F. Aggregate Size:

1. The maximum aggregate size shall be: 3/4 inches for all other concrete.

PART 3 - EXECUTION

3.01 INSPECTION:

A. Contractor shall examine the substrate and the conditions under which work is to be performed and notify the Engineer in writing of unsatisfactory conditions. Do not proceed with the work until unsatisfactory conditions are corrected in a manner acceptable to the Engineer.

3.02 MIXING AND TRANSPORTING CONCRETE:

A. General: Conform to concreting procedures set forth in ASTM C 94, ACI 304R and as specified herein.

1. Transport concrete to discharge locations without altering the specified properties of water-cement ratio, slump, air entrainment, temperature, and homogeneity.

2. Discharge concrete into forms within 1-1/2 hours after cement has entered mixing drum or before the drum has revolved 300 revolutions after the addition of water, whichever occurs first.

B. Conveying: Convey concrete from agitator or mixer truck to place of final deposit in forms by one of the following methods:

1. Buckets or hoppers with discharge gates having a clear opening equal to not less than one-third the maximum interior horizontal area or five times the maximum aggregate size being used, whichever is greater, and side slopes of not less than 60 degrees to horizontal.

2. Buggies or wheelbarrows equipped with pneumatic tires.

3. Round bottom, metal, or metal-lined chutes with inclined slope of between two to three feet horizontally to one foot vertically and of sufficient capacity to avoid overflow.

4. Circular drop pipes with a top diameter of at least eight times the maximum aggregate size, but not less than 6 inch, or tapered to not less than six times maximum aggregate size.

3.03 CONCRETE ACCEPTANCE:

A. The Contractor shall accept or reject each batch of concrete delivered to the point of agitator or mixer truck discharge. The signature of a Contractor’s authorized representative on the delivery batch ticket shall indicate concrete acceptance.

B. The Contractor shall reject concrete delivered without a complete concrete delivery batch ticket as specified herein. The concrete supplier will furnish copies of the signed batch ticket to the Contractor and Engineer.

C. The testing agency shall perform field tests at the point of agitator or mixer truck discharge. Accept or reject concrete on the basis of conformity with slump, air content and temperature specified.

D. The testing agency shall inspect concrete transit truck's barrel revolution counter and gauge for measuring water added to the concrete. Reject concrete which exceeds the maximum barrel revolution of 300 or concrete that has water content exceeding the specified water-cement ratio.

E. The Contractor shall reject concrete not conforming to specification before discharging into the forms.

3.04 PREPARATION AND COORDINATION:

A. Contractor shall notify the Engineer or the Engineer's Representative of readiness to place concrete in any portion of the work a minimum of 48 hours prior to concrete placement. Failure to provide this notification will be cause for delay in placing until inspections can be completed and arrangements for testing established.

B. All reinforcement, positioning of embedded items, and condition of formwork shall be inspected by the Engineer or the Engineer's representative prior to concrete placement.

C. Compact the subbase and/or bedding. The subbase and/or bedding shall be uniformly moist at the time of concrete placement. Spraying water on the subbase and/or bedding may be necessary prior to placement of concrete. Concrete shall not be placed on standing water, mud, and foreign matter.

D. Install a granular base beneath slabs on ground where shown on contract drawings. Place granular material on a compacted subgrade and compact the granular base.

3.05 CONCRETE PLACEMENT:

A. Placement shall conform to ACI 304R as modified by these specifications.

B. Do not place concrete until all free water has been removed from the forms, clear of the work. Do not permit free or storm water to flow over surfaces of concrete so as to injure the quality or surface finish.

C. Do not place concrete during inclement weather. Protect concrete placed from inclement weather. Keep sufficient protective covering ready at all times for this purpose.

D. Deposit concrete at or near its final position to avoid segregation caused by rehandling or flowing. Do not deposit concrete in large quantities in one place to be worked along the forms with a vibrator.

E. Deposit concrete continuously and in level layers 1 to 2 feet thick. Avoid inclined layers and cold joints. Place concrete at lower portion of slope first on sloping surfaces.

F. Do not deposit partially hardened concrete in forms. Retempering of partially hardened concrete is not permitted. Remove all partially hardened concrete from site at no additional compensation.

G. Do not allow concrete to fall freely in forms to cause segregation (separation of coarse aggregate from mortar). Limit maximum free fall of concrete to 4 feet. Do not move concrete horizontally more than four feet from point of discharge. Space points of deposit not more than eight feet apart.

H. Consolidate concrete using mechanical vibrators operated within the mass of concrete and/or on the forms conforming to procedures set forth in ACI 309R and as specified herein.

I. Conduct vibration to produce concrete of uniform texture and appearance, free of honeycombing, streaking, cold joints or visible lift lines.

J. Pumping Concrete:

1. Conform to the recommendations of ACI 304.2R except as modified herein.

2. Use equipment and procedures and schedule deliveries to maintain steady flow of concrete at the discharge end of pipe.

3. Maintain concrete properties of slump, air content and temperature. Make adjustments in concrete proportions as necessary to provide concrete properties in accordance with the approved concrete design mix and as specified herein.

4. Use pipe with inside diameter of at least three times the maximum coarse aggregate size, but not less than 4 inches.

5. Do not use aluminum pipes for delivery of concrete to the forms.

6. Take samples at the point of agitator or mixer truck discharge.

7. Furnish labor and assistance as required by the testing laboratory in obtaining and handling test specimens.

3.06 CURING AND PROTECTION:

A. General:

1. Protect concrete from premature drying, hot or cold temperatures, and mechanical injury, beginning immediately after placement and maintain concrete with minimal moisture loss at relatively constant temperature.

2. Comply with curing procedures set forth in ACI 301, ACI 308.1 and as specified herein.

3. Perform hot weather concreting in conformance with ACI 305.1 and as specified herein when the ambient atmospheric temperature is 80 degrees F or above.

4. Perform cold weather concreting in conformance with ACI 306.1 and as specified herein when the ambient atmospheric temperature is 40 degrees F or below.

5. Concrete required to be moist cured shall remain moist for the entire duration of the cure. Repeated wetting and drying cycles of the curing process will not be allowed.

B. Curing Duration:

1. Start initial curing after placing and finishing concrete as soon as free moisture has disappeared from unformed concrete surfaces. Initial curing starts as soon as concrete achieves final set. Forms left tightly in place are considered as part of the curing system, provided that wooden forms are kept continuously moist. Keep continuously moist for not less than 72 hours.

2. Begin final curing procedures immediately following initial curing and before the concrete has dried. Continue final curing for at least 7 days and in accordance with ACI 301 procedures for a total curing period, initial plus final, of at least 10 days.

3. Avoid rapid drying at the end of the final curing period

C. Curing Requirements:

1. Unformed Surfaces: Cover and cure entire surface of newly placed concrete immediately after completing finishing operations and water film has evaporated from surface or as soon as marring of concrete will not occur. Protect finished slabs from direct rays of the sun to prevent checking, crazing and plastic shrinkage.

2. Formed Surfaces: Minimize moisture loss for formed surfaces exposed to heating by the sun by keeping forms wet until safely removed. Keep surface continuously wet by warm water spray or warm water saturated fabric immediately following form removal.

3. Other concrete: Moist cure by moisture-retaining cover curing, or by the use of curing compound.

D. Curing Methods:

1. Water Curing: Use water curing for unformed surfaces. Continuously water cure all exposed concrete for the entire curing period. Provide moisture curing by any of the following methods:

a. Keeping the surface of the concrete continuously wet by ponding or immersion.

b. Continuous water-fog spray or sprinkling.

c. Covering the concrete surface with curing mats, thoroughly saturating the mats with water, and keeping the mats continuously wet with sprinklers or porous hoses. Place curing mats so as to provide coverage of the concrete surfaces and edges, with a 4-inch lap over adjacent mats. Weight down the curing cover to maintain contact with the concrete surface, as necessary.

E. Protection from environmental conditions: Maintain the concrete temperature above 50 degrees F continuously throughout the curing period. Make arrangements before concrete placing for heating, covering, insulation or housing as required to maintain the specified temperature and moisture conditions continuously for the curing period.

1. When the atmospheric temperature is 80 degrees F and above, or during other climatic conditions which will cause too rapid drying of the concrete, make arrangements before the start of concrete placing for the installation of wind breaks or shading, and for fog spraying, wet sprinkling, or moisture-retaining covering.

2. Protect the concrete continuously for the entire curing period.

3. Maintain concrete temperature as uniformly as possible and protect from rapid atmospheric temperature changes.

4. Avoid temperature changes in concrete that exceed 5 degrees F in any one hour and 50 degrees F in any 24-hour period.

F. Protection from physical injury: Protect concrete from physical disturbances such as shock and vibration during curing period. Protect finished concrete surfaces from damage by construction equipment, materials, curing procedures and rain or running water. Do not load concrete in such a manner as to overstress concrete.

G. Protection from Deicing Agents: Do not apply deicing chemicals to concrete.

3.07 FIELD QUALITY CONTROL:

A. Hot Weather Requirements

1. During hot weather, give proper attention to ingredients, production methods, handling, placing, protection, and curing to prevent excessive concrete temperatures or water evaporation in accordance with ACI 305.1 and the following.

2. When the weather is such that the temperature of the concrete as placed would exceed 90 degrees F, use ice or other means of cooling the concrete during mixing and transportation so that the temperature of the concrete as placed will not exceed 90 degrees F.

3. Take precautions when placing concrete during hot, dry weather to eliminate early setting of concrete. This includes protection of reinforcing from direct sunlight to

prevent heating of reinforcing, placing concrete during cooler hours of the day, and the proper and timely application of specified curing methods.

4. There will be no additional reimbursement to the Contractor for costs incurred for placing concrete in hot weather.

B. Cold Weather Requirements

1. Provide adequate equipment for heating concrete materials and protecting concrete during freezing or near-freezing weather in accordance with ACI 306.1 and the following.

2. When the temperature of the surrounding atmosphere is 40 degrees F or is likely to fall below this temperature, use heated mixing water not to exceed 140 degrees F. Do not allow the heated water to come in contact with the cement before the cement is added to the batch.

3. When placed in the forms during cold weather, maintain concrete temperature at not less than 55 degrees F. All materials shall be free from ice, snow, and frozen lumps before entering the mixer.

4. Maintain the air and the forms in contact with the concrete at temperatures above 40 degrees F for the first five days after placing, and above 35 degrees F for the remainder of the curing period. Provide thermometers to indicate the ambient temperature.

5. There will be no additional reimbursement made to the Contractor for costs incurred for placing concrete during cold weather.

C. Concrete Testing

1. Concrete Quality Test Specimen:

a. Perform sampling and curing of test specimen in accordance with ASTM C31.

b. Testing agency personnel will record truck and load number from the delivery batch ticket, the concrete placement location of each specimen, the date, concrete strength, slump, air content and temperature.

c. For each 50 cu. yd. of each mix design of concrete but not less than once a day, the testing agency will cast a minimum of:

(1) One set of four (4) 6”x12” test specimens or

(2) One set of seven (7) 4”x8” test specimens

d. Once a cylinder size has been selected, the size and number of specimens representing a strength test for each concrete mix shall remain constant.

e. For 6”x12” test cylinders:

(1) The testing agency will compression test one (1) of each set of four 6”x12” specimens at 7 days.

(2) Test two (2) of the remaining cylinders at 28 days for concrete strength acceptance.

(3) The fourth cylinder shall be held for testing at 56 days only if the 28 day cylinder strengths are deficient. The fourth cylinder of each set shall be discarded if the 28 day strengths meet or exceed the specified minimum strength.

f. For 4”x8” test cylinders:

(1) The testing agency will compression test two (2) of each set of seven 4”x8” specimens at 7 days.

(2) Test three (3) of the remaining cylinders at 28 days for concrete strength acceptance.

(3) The last two cylinders shall be held for testing at 56 days only if the 28 day cylinder strengths are deficient. The 6^{th} and 7^{th} cylinders of each set shall be discarded if the 28 day strengths meet or exceed the specified minimum strength.

2. The laboratory firm shall immediately notify the Contractor and the Engineer if the seven day strength is deficient.

3. The acceptance test result is the average of the strengths of the two specimens tested at 28 days.

4. The laboratory firm shall submit compression test results to both the Contractor and the Engineer. Concrete acceptance shall be based on the requirements of ACI 318.

3.08 CONCRETE FINISHES:

A. Do not sprinkle with dry cement or add water when finishing concrete surfaces.

B. Finish concrete surfaces in accordance with the following:

1. Finish F-1: Repair defective concrete, fill depressions deeper than 1/2-inch, and fill tie holes.

2. Finish S-3: Steel trowel finish free from trowel marks and all irregularities.

3. Finish S-5: Steel trowel finish without local depressions or high points. Apply a stiff bristle broom finish. Leave broom lines parallel to the direction of slope drainage.

C. Protect finished concrete surfaces from damage by construction equipment, materials, curing procedures and rain or running water.

3.09 FINISHING OF FORMED SURFACES:

A. Cure surfaces until finishing and repairing are completed.

B. Perform F-1 finish work as soon as possible after forms are removed.

3.10 FINISHING OF UNFORMED SURFACES:

A. Provide S-3 steel-trowel finish to all top, horizontal, and inclined surfaces not otherwise specified or indicated.

B. Provide S-5 broom finish to exterior walkways, exterior stairs, entrance platforms and loading docks.

3.11 CLOSEOUT ACTIVITIES:

A. Provide in accordance with Section 01700.

END OF SECTION

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APPENDIX A

CITY OF PORTSMOUTH BLASTING ORDINANCE

PUBLIC WORKS DEPARTMENT
CITY OF PORTSMOUTH
680 Peverly Hill Road
Portsmouth N.H. 03801
(603) 427-1530 FAX (603) 427-1539

CITY OF PORTSMOUTH
BLASTING RULES AND PROCEDURES

1.0 General

All blasting work shall comply with the following regulations:

- City Ordinance Article VII: Section 5:02;
- State of New Hampshire Department of Transportation Standard Specifications for Road and Bridge Construction – 1997
- 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 & 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 Permit Process

3.1 The blasting contractor shall apply in person at the Department of Public Works for a permit to perform blasting operations 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 and extent and purpose of proposed blasting operations

b) Copy of valid Use and Transportation License for the blasting company as required by Article VII, Section 5:702.

c) Copy of valid Insurance Certificate as required by Article VII, Section 5:702 and defined in Section 2 of these rules and procedures.

4.0 Pre-Blast Condition Surveys

4.1 Pre-blast surveys shall be performed as required in City Ordinance Article VII: Section 5:02 and the following procedures.

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 The Pre-Blast Contractor shall send a pre-blast survey letter by regular mail to all abutters within a 500 foot radius of the blasting site, with copies of the letter sent also to:

Deputy Director of Public Works
680 Peverly Hill Rd.
Portsmouth, NH 03801

City Manager
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, Housing Code Inspector
City Hall, Legal Dept.
1 Junkins Avenue
Portsmouth, NH 03801

Chief Building Inspector
City Hall
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, addresses, with tax map and lot numbers of all abutters within the 500-foot radius and the status of the survey, whether completed, refused or non-respondent.

5.0 Blasting Permit

5.1 The blasting contractor shall submit to the Engineering Division of the Public Works Department all items described in sections 2, 3 and 4 of these procedures. The blasting contractor will be authorized to proceed with the mailing blasting notification letter described in Article VII Section 5: 702 B upon approval of the submitted material.

5.2 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 Deputy Director of Public Works, Chief of Police, Building Inspector, and Fire Chief, indicating when the blasting is scheduled to begin.

6.0 Blasting Operations

6.1 All blasting operations shall be conducted in accordance with State of New Hampshire Department of Transportation Standard Specifications for Road and Bridge Construction – 1997.

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 2Hz 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 5 Years.

ARTICLE VII: BLASTING

Section 5:702 BLASTING PERMIT REQUIRED

No person shall perform or cause to be performed any blasting within the City limits unless a Blasting Permit is obtained from the City Engineer. This permit shall not be issued until the following terms and conditions have been satisfied by the applicant:

A. All abutters within five hundred (500) feet of the area where the blasting will occur shall receive notice by certified mail two full business days (excluding Saturday, Sunday and holidays) in advance of the blasting. The term "abutter" shall be defined in the manner used for the notification of zoning abutters. (Amended 9/17/2001)

B. That the City Engineer's office as well as the Building Inspector shall receive the same notice, also sent by certified mail, at least two full business days (excluding Saturday, Sunday and holidays) in advance of the blasting.

C. The name and address of the blasting company be provided.

D. The name of a company representative be provided and the twenty-four (24) hour telephone number of the representative; such representative being a person who is capable of responding to claims and issues arising from the blasting performed.

E. A pre-blast survey shall be completed by the blasting company for an area within five hundred (500) feet of the proposed blasting. (Amended 9/17/2001)

F. Any reports, measurements or video tapes made in connection with this pre-blast survey or with the subsequent blasting shall be made available upon request to all abutters within five hundred (500) feet of the area. (Amended 9/17/2001)

G. That the cost of such a pre-blast survey shall be borne by the blasting company.

H. The Use and Transport License of the hauler shall be designated.

I. The route of removing blasting material shall be designated.

J. The location of the blasting shall be designated.

K. The blasting shall take place within the hours of 8:00 A.M. to 5:00 P.M. Monday through Friday.

L. An Insurance Certificate shall be posted with the City Engineer in an amount and type deemed appropriate by the City Engineer and the City Attorney. (Amended 9/20/93)

M. The Public Works Director is hereby authorized to promulgate blasting rules consistent with the intent of this ordinance, such rules shall become effective on acceptance by the City Council. (Item M. adopted 9/17/2001)

APPENDIX B

GEOTECHNICAL DATA REPORT

GEOTECHNICAL DATA REPORT

Subsurface Investigation Results for the
Peirce Island Force Main and Water Main Replacement
Portsmouth, NH

I. INTRODUCTION

This Geotechnical Data Report (GDR) is prepared in support of the construction and design of the Peirce Island Force Main and Water Main Replacement project located in Portsmouth, NH. New England Boring Contractors Inc. of Derry, NH performed the vacuum explorations on January 30, 2020. The vacuum explorations were observed by an AECOM representative. The locations of the vacuum explorations are shown on the attached Exploration Location Plan.

II. CURRENT EXPLORATION PROGRAM

A total of six (6) vacuum explorations were performed along the proposed alignment of the replacement water main. Three (3) of the vacuum explorations (VB-01, VB-02, and VB-04) encountered bedrock at depths varying between 2.1 and 5 feet below the ground surface. No bedrock was encountered in the remaining explorations. The vacuum explorations depths ranged between 2.1 and 7 feet below the ground surface.

Groundwater was encountered in explorations VB-03 and VB-05 at depths of 5.1 feet and 5 feet, respectively. No groundwater was encountered in the remaining explorations. It should be noted that groundwater levels may fluctuate with the tidal cycles, storm surges, precipitation, season, construction activities, run-off controls, and other factors. As a result, water levels encountered during construction may vary from those observed during the subsurface exploration.

III. HISTORIC SUBSURFACE INFORMATION

A total of seventeen (17) test borings were drilled at the site for various site improvements between September 2013 and September 2016. Six (6) of the borings (borings PB-1 through PB-6) were vacuum cleared from 5.3 to 7.0 feet below the ground surface. The test boring depths ranged from 6.5 to 26.5 feet below the ground surface. Standard split spoon samples were collected as indicated on the boring logs. A minimum of five (5) feet of rock core was collected in eleven (11) of the borings (borings B13-1 through B13-11). Where encountered, depth to groundwater table was estimated during drilling and noted on the boring logs.

In addition, twelve (12) borings (B-1 through B-12) were also performed at the site by New England Boring Contractors of Connecticut, Inc. in July 1985. All borehole logs from the various historic exploration programs are provided in Attachment 1. Rock core photographs are presented in Attachment 2.

Laboratory testing consisting of Grain Size Analyses, Unconfined Compression Tests of rock, Moisture Content, and Atterberg Limit Tests were performed by GeoTesting Express, Inc. of Acton,

MA. The laboratory testing reports are provided in Attachment 3.

A total of forty (40) probes were also completed at the site in July 2014. The probe location plan and log are provided in Attachment 4.

(Date: June 2021)

VB-01: Bedrock @ 5' bgs, dry

VB-02: Bedrock @ 2'-1", dry

VB-03: Groundwater @ 5'-2", hole terminated @ @ 5'-3", no rock

VB-04: Bedrock @ 4' bgs, dry

VB-05: Groundwater @ 5', hole terminated @ 5'-2", no rock

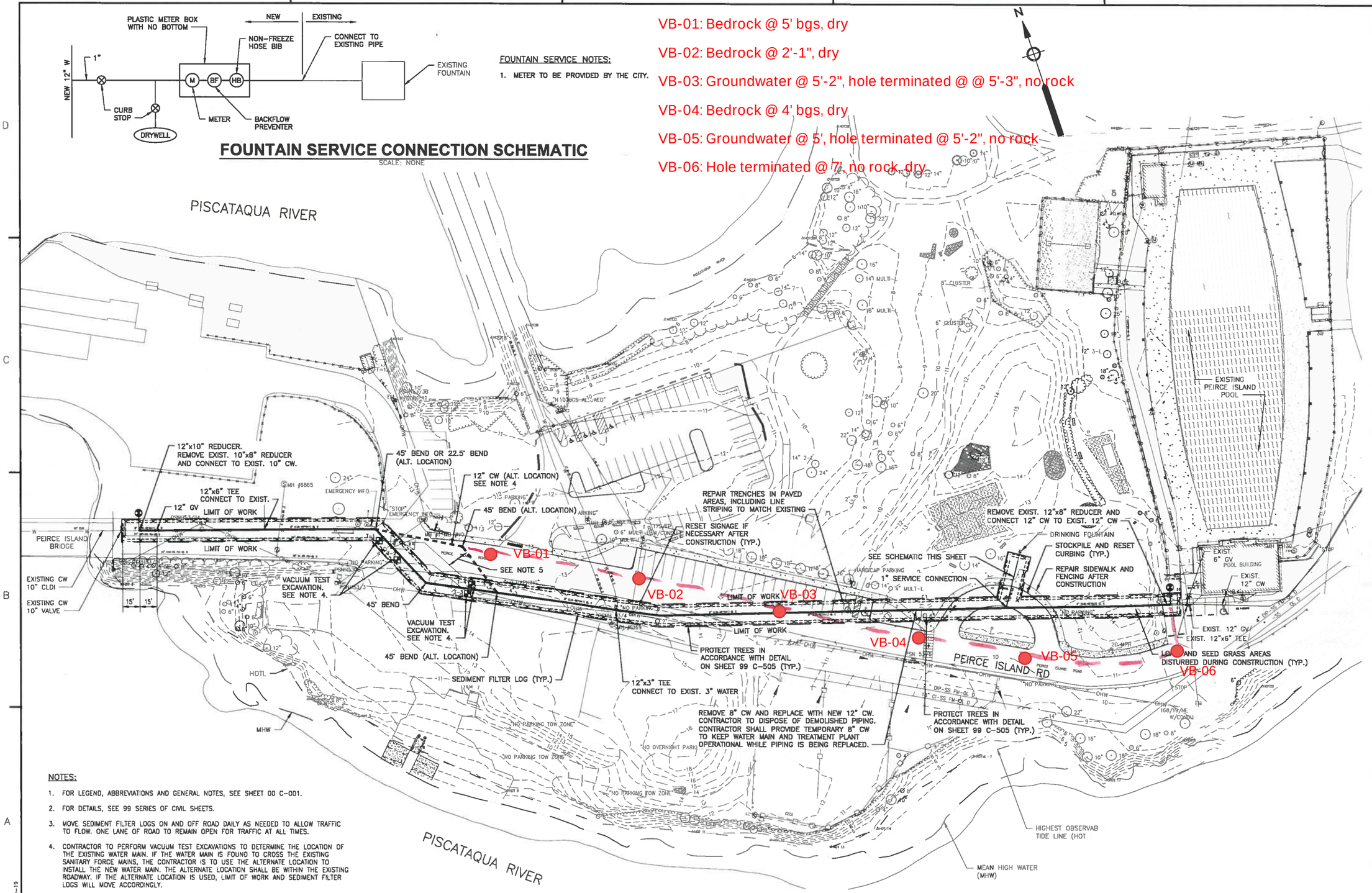
VB-06: Hole terminated @ 7', no rock, dry

FOUNTAIN SERVICE NOTES:

1. METER TO BE PROVIDED BY THE CITY.

FOUNTAIN SERVICE CONNECTION SCHEMATIC

SCALE: NONE



NOTES:

1. FOR LEGEND, ABBREVIATIONS AND GENERAL NOTES, SEE SHEET 00 C-001.
2. FOR DETAILS, SEE 99 SERIES OF CIVIL SHEETS.
3. MOVE SEDIMENT FILTER LOGS ON AND OFF ROAD DAILY AS NEEDED TO ALLOW TRAFFIC TO FLOW. ONE LANE OF ROAD TO REMAIN OPEN FOR TRAFFIC AT ALL TIMES.
4. CONTRACTOR TO PERFORM VACUUM TEST EXCAVATIONS TO DETERMINE THE LOCATION OF THE EXISTING WATER MAIN. IF THE WATER MAIN IS FOUND TO CROSS THE EXISTING SANITARY FORCE MAINS, THE CONTRACTOR IS TO USE THE ALTERNATE LOCATION TO INSTALL THE NEW WATER MAIN. THE ALTERNATE LOCATION SHALL BE WITHIN THE EXISTING ROADWAY. IF THE ALTERNATE LOCATION IS USED, LIMIT OF WORK AND SEDIMENT FILTER LOGS WILL MOVE ACCORDINGLY.
5. CONTRACTOR SHALL MAINTAIN A MINIMUM OF 10 FEET OF SEPARATION BETWEEN EXISTING SANITARY FORCE MAIN AND NEW WATER MAIN WHERE POSSIBLE.

PLAN

SCALE: 1"=40'

40 0 40

SCALE 1" = 40'

MARK	DATE	DESCRIPTION
		REVISIONS

AECOM TECHNICAL SERVICES, INC.
257 SIMMONS ROAD
CHELMSFORD, MA 01824
PHONE (978) 905-2100
www.aecom.com

AECOM

CITY OF PORTSMOUTH, NH - DEPARTMENT OF PUBLIC WORKS

PEIRCE ISLAND WWTF UPGRADE

WATER MAIN DIG AND REPLACE

WATER MAIN 12 INCH

PROJECT NO:	60301525
CAD DWG FILE:	01 C-201
DESIGNED BY:	E. WESERVE
DRAWN BY:	S. NAPOLITANO
DEPT CHECK:	C. BENZIGER
PROJ CHECK:	E. WESERVE
DATE:	NOVEMBER 2019
SCALE:	AS NOTED

01 C-201

PATH/FILENAME: P:\60301525 - PORTSMOUTH WWTF UPGRADE\SHEETS\01 C-201.DWG
LAST UPDATE: Friday, November 08, 2019 7:22:28 AM
PLOT DATE: Friday, November 08, 2019 7:24:35 AM
ANSI D - 8-Nov-19

ATTACHMENT 1

HISTORIC BORING LOGS

Boring Location Plan

Peirce Island Parking Facilities

PB-1
PB-2
PB-3
PB-4
PB-5
PB-6

TBM 3539-D
X-CUT ON LEFT BOLT
OVER MAIN OUTLET
ELEV.=12.75'

TBM 3539-J
MAG. NAIL SET UP
6" IN POLE 53/4
ELEV.=15.12'

TBM 3539-K
MAG. NAIL SET UP
6" IN POLE PSNH53/5
ELEV.=10.87'

PEIRCE ISLAND ROAD

PISCATAQUA RIVER

AECOM

GEOLOGIC LOG

PROJECT: Peirce Island WWTF, Parking Lot, Portsmouth NH		SHEET	BORING NO.
SITE LOCATION:	JOB NO.: 60301525	1 of 1	PB- 1
SEE SKETCH	LOCATION: N: 210912 E: 1229993	Elevation: 10.7	Total Depth: 14.0'
DRILL CONTRACTOR: NE Boring Contr.	ENG/GEO: William Checchi	BEGUN: 9/13/2016	
DRILL RIG: 9/13/16--Vacmaster 4000 9/19/16-Mobile B50 bombardier	DRILLER: Vacmaster: B.Walsh Drill: M.Soucy	FINISHED: 9/19/2016	

Hole Size: 2.25" ID, 6" OD	Weather: 9/13/16 clear, 79 F 9/19/16 cloudy, 71 F	Ground Water (Date/Depth): 9/13/16 = 5.3'
Drilling Method: Vacmaster to 5.5' Hollow Stem Auger	Drilling Fluid: none	Top of Rock (Depth/Elev.): not encountered

Depth (ft)	Sample Type/No.	N Value	Blow Count (per 6 in.) or Drilling Rate(min/ft)	Sample Recovery or REC & RQD	SAMPLE DESCRIPTION	pocket penetro meter (tsf)	STRATIGRAPHIC DESCRIPTION *(dashed where inferred)*
					~2.5" bituminous concrete pavement		parking area
					Dense,Orange-brown,silty, sandy GRAVEL, Dry		
					1.5'		
	GRAB 1				Very dense,Tan,silty,sandy,GRAVEL, occasional red brick pieces, Dry		FILL
					4'		
5					Very dense, Gray, silty,sandy, GRAVEL, occasional Cobble, Dry		
5.3					▽ (9/13/16 - vacuum depth)		
	SS-2	8	3 - 4		Loose,Gray,gravelly,sandy, SILT, Wet		
7			4 - 4	4			
	GRAB 3				Loose, Gray, fine sandy, SILT, Wet		
10							SILT and CLAY
	SS-4	2	woh/12"		Very soft, Gray, fine sandy,silty CLAY, Wet		
12			2 - 2	22			
	SS-5	7	2 - 2		Loose,Gray,fine sandy,clayey SILT, Wet		
14			5 - 14	20	Med.Dense, Gray, fine SAND and SILT, Wet		SAND + SILT
15					bottom of borehole 14'		

Sample Types:		trace	0 to 5%
SS	Split Spoon	few	5 to 10%
ST	Shelby Tube	little	15 to 25%
R	Rock Core	some	30 to 45%
▒	Lab Sample	mostly	>50%

SPT Resistance		Approve/Date
Cohesionless Density:	Cohesive Consistency:	
5-9 Loose, 10-29 Med. Dense 0-4 Very Loose, 30-49 Dense 50+ Very Dense	0-2 Very Soft, 3-4 Soft 5-8 Med. Stiff, 9-15 Stiff 16-30 Very Stiff, 31+ Hard	

AECOM

GEOLOGIC LOG

PROJECT : **Peirce Island WWTF, Parking Lot, Portsmouth NH**		SHEET	BORING NO.
SITE LOCATION:	JOB NO.: **60301525**	1 of 1	**PB- 2**
SEE SKETCH	LOCATION: N: **210860** E: **1229894**	Elevation: **12.00**	Total Depth: **12.0**
DRILL CONTRACTOR : NE Boring Contr.	ENG/GEO : **William Checchi**	BEGUN :	**9/13/2016**
DRILL RIG : **9/13/16-Vacmaster 4000** **9/19/16-Mobile B50 bombardier**	DRILLER : **Vacmaster: B.Walsh** **Drill: M.Soucy**	FINISHED :	**9/19/2016**

Hole Size : **2.25" ID, 6" OD**	Weather : **9/13/16 clear 79 F** **9/19/16 cloudy 71 F**	Ground Water (Date/Depth) : **9/19/16 est 7' [sample]**
Drilling Method : **Vacmaster to 7'** **Hollow Stem Auger**	Drilling Fluid : none	Top of Rock (Depth/Elev.) : not encountered

Depth (ft)	Sample Type/No.	N Value	Blow Count (per 6 in.) or Drilling Rate(min/ft)	Sample Recovery or REC & RQD	SAMPLE DESCRIPTION	pocket penetro meter (tsf)	STRATIGRAPHIC DESCRIPTION *(dashed where inferred)*
					~2" bituminous concrete pavement		parking area
					Very dense,Red-brown,silty, sandy GRAVEL,		
					Very dense,Brown,silty, sandy GRAVEL, occasional cobble		
	GRAB 1						
5					**bituminous concrete pieces**		FILL
7					(9/13/16 vacuum depth)		
	SS-2	27	2 - 4		**Med.stiff,Olive brown,fine sandy,CLAY, moist**	pp 1.75	Sandy CLAY
9			23 - 14	14	**Very stiff,Olive brown,CLAY, moist to wet**	pp 2.5	
10							CLAY
	SS-3	12	5 - 8				
12			4 - 5	12	**Stiff,Olive brown,silty,CLAY, Wet**	pp 1.0	
					bottom of borehole 12'		
15							

Sample Types:		trace	0 to 5%
SS	Split Spoon	few	5 to 10%
ST	Shelby Tube	little	15 to 25%
R	Rock Core	some	30 to 45%
	Lab Sample	mostly	>50%

SPT Resistance		Approve/Date
Cohesionless Density:	Cohesive Consistency:	
5-9 Loose, 10-29 Med. Dense 0-4 Very Loose, 30-49 Dense 50+ Very Dense	0-2 Very Soft, 3-4 Soft 5-8 Med. Stiff, 9-15 Stiff 16-30 Very Stiff, 31+ Hard	

AECOM

GEOLOGIC LOG

PROJECT : **Peirce Island WWTF, Parking Lot, Portsmouth NH**		SHEET	BORING NO.
SITE LOCATION:	JOB NO.: **60301525**	1 of 1	**PB- 3**
SEE SKETCH	LOCATION: N: **210832** E: **1229976**	Elevation: **10.5**	Total Depth: **14.0'**
DRILL CONTRACTOR : NE Boring Contr.	ENG/GEO : **William Checchi**	BEGUN :	**9/13/2016**
DRILL RIG : **9/13/16-Vacmaster 4000** **9/19/16-Mobile B50 bombardier**	DRILLER : **Vacmaster: B.Walsh** **Drill: M.Soucy**	FINISHED :	**9/19/2016**

Hole Size : **2.25" ID, 6" OD**	Weather : **9/13/16 clear 79 F** **9/19/16 cloudy 71 F**	Ground Water (Date/Depth) : **9/13/16 = 6'**
Drilling Method : **Vacmaster to 7'** **Hollow Stem Auger**	Drilling Fluid : none	Top of Rock (Depth/Elev.) : not encountered

Depth (ft)	Sample Type/No.	N Value	Blow Count (per 6 in.) or Drilling Rate(min/ft)	Sample Recovery or REC & RQD	SAMPLE DESCRIPTION	pocket penetro meter (tsf)	STRATIGRAPHIC DESCRIPTION *(dashed where inferred)*
					~6" Grass and root mat		Grass + Topsoil
					Light brown, silty, fine SAND		
					bituminous concrete pieces		
	GRAB 1				Very dense, Orange-brown,silty, sandy,GRAVEL, concrete and red brick pieces, occasional cobble,Dry		FILL
5					Very dense,Olive gray,gravelly,silty,CLAY, moist red brick pieces, occasional cobble		
6					▼		
7					(9/13/16 - vacuum depth)		
	SS-2	5	2 - 2		Med.stiff,Olive gray, mottled CLAY	pp 0.5	
9			3 - 4	22			CLAY
10							
	SS-3	4	1 - 2		Soft,Olive gray,silty,CLAY, Wet	pp 0.1	
12			2 - 2	24			
	SS-4	47	10- 21		Med.Dense,Olive gray, silty,fine SAND, Wet		Silty SAND
14			26 - 32	24	Dense,Olive brown,silty, fine SAND, Wet		
15					bottom of borehole 14'		

Sample Types:		trace	0 to 5%
SS	Split Spoon	few	5 to 10%
ST	Shelby Tube	little	15 to 25%
R	Rock Core	some	30 to 45%
▒	Lab Sample	mostly	>50%

SPT Resistance		Approve/Date
Cohesionless Density:	Cohesive Consistency:	
5-9 Loose, 10-29 Med. Dense 0-4 Very Loose, 30-49 Dense 50+ Very Dense	0-2 Very Soft, 3-4 Soft 5-8 Med. Stiff, 9-15 Stiff 16-30 Very Stiff, 31+ Hard	

AECOM

GEOLOGIC LOG

PROJECT : **Peirce Island WWTF, Parking Lot, Portsmouth NH**		SHEET	BORING NO.
SITE LOCATION:	JOB NO.: **60301525**	1 of 1	**PB- 4**
SEE SKETCH	LOCATION: N: **210633** E: **1230014**	Elevation: **11.0**	Total Depth: **12.0'**
DRILL CONTRACTOR : NE Boring Contr.	ENG/GEO : **William Checchi**	BEGUN :	**9/14/2016**
DRILL RIG : **9/14/16-Vacmaster 4000** **9/19/16-Mobile B50 bombardier**	DRILLER : **Vacmaster: B.Walsh** **Drill: M.Soucy**	FINISHED :	**9/19/2016**

Hole Size : **2.25" ID, 6" OD**	Weather : **9/14/16 clear 79 F** **9/19/16 cloudy 71 F**	Ground Water (Date/Depth) : **9/19/16 est. 8' [sample]**
Drilling Method : **Vacmaster to 7'** **Hollow Stem Auger**	Drilling Fluid : none	Top of Rock (Depth/Elev.) : not encountered

Depth (ft)	Sample Type/No.	N Value	Blow Count (per 6 in.) or Drilling Rate(min/ft)	Sample Recovery or REC & RQD	SAMPLE DESCRIPTION	pocket penetro meter (tsf)	STRATIGRAPHIC DESCRIPTION *(dashed where inferred)*
1					~8" Grass and root mat, light brown, silty fine SAND		Grass + Topsoil
1.5	auger 1				Very dense,Light brown,silty, clayey, gravelly, SAND		Gravellly SAND FILL
2							
2.5	auger 2				Very dense,Red-brown,silty,clayey,gravelly SAND		
					3' Dense,Olive brown,clayey,sandy,SILT, roots, trace moist		SILT
5					5'		
	GRAB 3				Med.dense,Olive, silty,clayey,fine SAND , moist		Clayey SAND
7					(9/14/16 - vacuum depth)		
	SS-4	24	4 - 9			pp	
9			15 - 21	17	Med.dense,Olive brown, silty,clayey, SAND, Wet 9'	0.75	
10							
	SS-5	34	8 - 17		Dense,Olive brown,silty,fine SAND, wet		Silty SAND
12			17 - 17	17			
					bottom of borehole 12'		
15							

Sample Types:		trace	0 to 5%
SS	Split Spoon	few	5 to 10%
ST	Shelby Tube	little	15 to 25%
R	Rock Core	some	30 to 45%
	Lab Sample	mostly	>50%

SPT Resistance		Approve/Date
Cohesionless Density:	Cohesive Consistency:	
5-9 Loose, 10-29 Med. Dense 0-4 Very Loose, 30-49 Dense 50+ Very Dense	0-2 Very Soft, 3-4 Soft 5-8 Med. Stiff, 9-15 Stiff 16-30 Very Stiff, 31+ Hard	

AECOM

GEOLOGIC LOG

PROJECT : **Peirce Island WWTF, Parking Lot, Portsmouth NH**		SHEET	BORING NO.
SITE LOCATION:	JOB NO.: **60301525**	1 of 1	**PB- 5**
SEE SKETCH	LOCATION: N: **210590** E: **1229937**	Elevation: **12.0**	Total Depth: **6.5'**
DRILL CONTRACTOR : NE Boring Contr.	ENG/GEO : **William Checchi**	BEGUN :	**9/14/2016**
DRILL RIG : **9/14/16-Vacmaster 4000** **9/19/16-Mobile B50 bombardier**	DRILLER : **Vacmaster: B.Walsh** **Drill: M.Soucy**	FINISHED :	**9/19/2016**

Hole Size : **2.25" ID, 6" OD**	Weather : **9/14/16 clear 79 F** **9/19/16 cloudy 71 F**	Ground Water (Date/Depth) : not encountered
Drilling Method : **Vacmaster to 6.5'** **Hollow Stem Auger**	Drilling Fluid : none	Top of Rock (Depth/Elev.) : **Vacuum and Auger Refusal 6.5'**

Depth (ft)	Sample Type/No.	N Value	Blow Count (per 6 in.) or Drilling Rate(min/ft)	Sample Recovery or REC & RQD	SAMPLE DESCRIPTION	pocket pewnetr ometer (tsf)	STRATIGRAPHIC DESCRIPTION *(dashed where inferred)*
1					**~6" Grass and root mat**		**Grass + Topsoil**
1.5	**auger 1**				**Loose,Light brown,gravelly, silty, fine SAND**		
2.5					**Very dense, Orange-brown,gravelly,silty,clayey, SAND**		
3	**auger 2**						**FILL**
5					**Very dense,Orange-brown,silty,clayey, sandy, GRAVEL, occasional cobble, Dry**		
5.5	**auger 3**						
6.5					**9/14/16 - vacuum depth, 9/19/16 Auger Refusal bottom off borehole 6.5'**		
10							
15							

Sample Types:		trace	0 to 5%
SS	Split Spoon	few	5 to 10%
ST	Shelby Tube	little	15 to 25%
R	Rock Core	some	30 to 45%
▒	Lab Sample	mostly	>50%

SPT Resistance		Approve/Date
Cohesionless Density:	Cohesive Consistency:	
5-9 Loose, 10-29 Med. Dense 0-4 Very Loose, 30-49 Dense 50+ Very Dense	0-2 Very Soft, 3-4 Soft 5-8 Med. Stiff, 9-15 Stiff 16-30 Very Stiff, 31+ Hard	

AECOM

GEOLOGIC LOG

PROJECT : **Peirce Island WWTF, Parking Lot, Portsmouth NH**		SHEET	BORING NO.
SITE LOCATION:	JOB NO.: **60301525**	1 of 1	**PB- 6**
SEE SKETCH	LOCATION: N: **210571** E: **1230012**	Elevation: **11.4**	Total Depth: **12.0'**
DRILL CONTRACTOR : NE Boring Contr.	ENG/GEO : **William Checchi**	BEGUN :	**9/14/2016**
DRILL RIG : **9/14/16--Vacmaster 4000 9/19/16-Mobile B50 bombardier**	DRILLER : **Vacmaster: B.Walsh Drill: M.Soucy**	FINISHED :	**9/19/2016**

Hole Size : **2.25" ID, 6" OD**	Weather : **9/14/16 clear 79 F** **9/19/16 cloudy 71 F**	Ground Water (Date/Depth) : **9/19/16 est 8' [sample]**
Drilling Method : **Vacmaster to 7' Hollow Stem Auger**	Drilling Fluid : none	Top of Rock (Depth/Elev.) : not encountered

Depth (ft)	Sample Type/No.	N Value	Blow Count (per 6 in.) or Drilling Rate(min/ft)	Sample Recovery or REC & RQD	SAMPLE DESCRIPTION	pocket penetro meter (tsf)	STRATIGRAPHIC DESCRIPTION *(dashed where inferred)*
					~6" Grass and root mat, light brown, silty SAND		Grass + Topsoil
1							
1.5	auger 1				Dense,Orange-brown,silty, sandy,GRAVEL		
2.0							
2.5	auger 2				Dense,Brown,silty,sandy,GRAVEL,occasional cobble,small boulder, Dry		FILL
					4.5'		
5					Med.dense,Gray,sandy,SILT,with,roots, Dry 6'		
6					Med.dense,Olive brown,clayey,sandy,SILT, Dry		SILT
6.5	auger 3				(9/14/16 - vacuum depth)	pp 3.0	
7							
	SS-4	25	5 - 9 / 16 - 26	18	Med.dense,Olive brown,silty,clayey,fine SAND, Wet	pp 0.5	
9							Silty SAND
10							
	SS-5	28	9 - 15 / 13 - 13	14	Med.dense,Yellow-brown,silty,fine SAND, Wet		
12							
					bottom of borehole 12'		
15							

Sample Types:		trace	0 to 5%
SS	Split Spoon	few	5 to 10%
ST	Shelby Tube	little	15 to 25%
R	Rock Core	some	30 to 45%
▒	Lab Sample	mostly	>50%

SPT Resistance		Approve/Date
Cohesionless Density:	Cohesive Consistency:	
5-9 Loose, 10-29 Med. Dense 0-4 Very Loose, 30-49 Dense 50+ Very Dense	0-2 Very Soft, 3-4 Soft 5-8 Med. Stiff, 9-15 Stiff 16-30 Very Stiff, 31+ Hard	

PATH/FILENAME: P:\60301525 – PORTSMOUTH WWTF UPGRADE\CIVIL-SITE\SITE PLAN SKETCH 7-9-14\FIGURE 1-1 GEOTECHNICAL INVESTIGATIONS.DWG

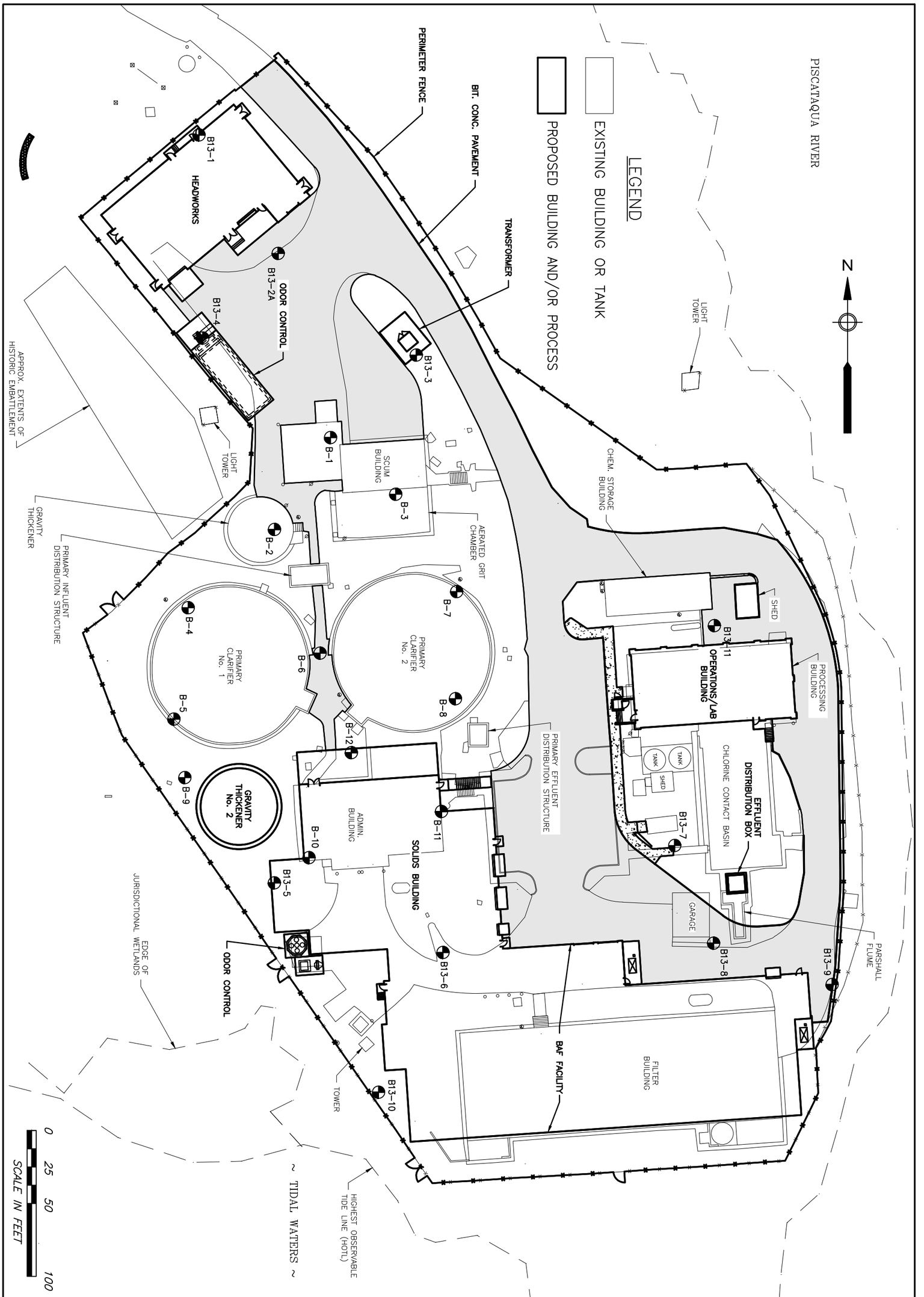


FIGURE 1-1

PEIRCE ISLAND WWTF - PORTSMOUTH, NH

GEOTECHNICAL INVESTIGATIONS

AECOM
701 Edgewater Drive
Wakefield, MA 01880
Ph. (781) 246-5200

GEOLOGIC LOG

AECOM

PROJECT : **Pierce Island WWTP - Portsmouth, NH**		SHEET	BORING NO.
SITE LOCATION:	JOB NO.: **60301525.1.01.2**	1 of 1	B13-1
Pierce Island WWTP Portsmouth, NH	LOCATION: N: E:	Elevation: 34 (est.)	Total Depth: 10'-3"
DRILL CONTRACTOR : NEB	ENG/GEO : W. Song	BEGUN: Sept. 24, 2013	
DRILL RIG : Mobile B-53	DRILLER : Trent Roe	FINISHED : Sept. 24, 2013	
Hole Size : ~4"	Weather : Sunny, bright, ~50s	Ground Water (Depth) : Not Encountered	
Drilling Method : SSA/NW Cased	Drilling Fluid : Potable Water	Top of Rock (Depth) : 5'-3"	

Depth (ft)	Sample Type/No.	N Value	Blow Count (per 6 in.) or Drilling Rate(min/ft)	Sample Recovery or REC & RQD	SAMPLE DESCRIPTION	ASTM Class.	STRATIGRAPHIC DESCRIPTION
	SS-1	39	7-13-26-50	14"	Reddish brown fine to medium SAND, few fine to coarse gravel, little to some fines, trace grass roots.		
	0'-2'						F-M SAND
5							5'3"
	SS-2		50/0"	0	No Recovery.		
	5'						
	RC-1		4	Rec=67%	Gray Quarzite, highly fractured, highly to slightly weathered, hard.		BEDROCK
	5'3"-10'3"		4	RQD=30%			
10			4				10'3"
			7				
			9				EOB @ 10'3"
15							

SAMPLE TYPES:	trace 0 to 5%	SPT Resistance		Approve/Date
S3=3" SPLIT SPOON	few 5 to 10%			
SS=SPLIT SPOON	little 15 to 25%	Cohesionless Density: 0-4 Very Loose	Cohesive Consistency: 0-2 Very Soft	**Sept. 30, 13 WS**
ST=SHELBY TUBE	some 30 to 45%	5-9 Loose 10-29 Med. Dense	3-4 Soft, 5-8 M/Stiff, 9-15 Stiff	
R=ROCK CORE	mostly >50%	30-49 Dense 50+ Very Dense	16-30 V-Stiff, 31+ Hard	

RQD = Rock Quality Designation

GEOLOGIC LOG

AECOM

PROJECT : **Pierce Island WWTP - Portsmouth, NH**		SHEET	BORING NO.
SITE LOCATION:	JOB NO.: **60301525.1.01.2**	1 of 1	B13-2A
Pierce Island WWTP Portsmouth, NH	LOCATION: N: E:	Elevation: 33.5 (est.)	Total Depth: 11'
DRILL CONTRACTOR : NEB	ENG/GEO : W. Song	BEGUN:	Sept. 23, 2013
DRILL RIG : Mobile B-53	DRILLER : Trent Roe	FINISHED :	Sept. 23, 2013

Hole Size : ~4"	Weather : Sunny, bright, ~60s	Ground Water (Depth) : Not Encountered
Drilling Method : SSA/NW Cased	Drilling Fluid : Potable Water	Top of Rock (Depth) : 6'

Depth (ft)	Sample Type/No.	N Value	Blow Count (per 6 in.) or Drilling Rate(min/ft)	Sample Recovery or REC & RQD	SAMPLE DESCRIPTION	ASTM Class.	STRATIGRAPHIC DESCRIPTION
	SS-1	24	16-13-11-15	12"	3" Asphalt Concrete Pavement. Yellowish to reddish brown GRAVELLY SAND, fine to coarse sand, little to some fine to coarse gravel, trace		GRAVELLY SAND
	0.5'-2.5'						
5	SS-2	>50	20-50/3"	8"	Yellowish brown GRAVELLY SAND, fine to coarse sand, little fine to coarse gravel, little fines, moist.		6'
	5'-5'9"						
	RC-1		4	Rec=100%	Gray QUARTZITE, highly fractured to broken with clay seams, moderately weathered to fresh, hard.		BEDROCK
	6'-11'		6	RQD=58%			
10			7				11'
			6				
			7				EOB @ 11'
15							

SAMPLE TYPES:		SPT Resistance		Approve/Date
S3=3" SPLIT SPOON	trace 0 to 5%			
SS=SPLIT SPOON	few 5 to 10%			
ST=SHELBY TUBE	little 15 to 25%	Cohesionless Density: 0-4 Very Loose	Cohesive Consistency: 0-2 Very Soft	**Sept. 30, 13 WS**
R=ROCK CORE	some 30 to 45%	5-9 Loose 10-29 Med. Dense	3-4 Soft, 5-8 M/Stiff, 9-15 Stiff	
	mostly >50%	30-49 Dense 50+ Very Dense	16-30 V-Stiff, 31+ Hard	

RQD = Rock Quality Designation

GEOLOGIC LOG

AECOM

PROJECT : **Pierce Island WWTP - Portsmouth, NH**		SHEET	BORING NO.
SITE LOCATION:	JOB NO.: **60301525.1.01.2**	1 of 1	B13-3
Pierce Island WWTP Portsmouth, NH	LOCATION: N: E:	Elevation: 33 (est.)	Total Depth: 14'-10"
DRILL CONTRACTOR : NEB	ENG/GEO : W. Song	BEGUN: Sept. 24, 2013	
DRILL RIG : Mobile B-53	DRILLER : Trent Roe	FINISHED : Sept. 24, 2013	
Hole Size : ~4"	Weather : Sunny, bright, ~60s	Ground Water (Depth) : Not Encountered	
Drilling Method : SSA/NW Cased	Drilling Fluid : Potable Water	Top of Rock (Depth) : 6'-6"	

Depth (ft)	Sample Type/No.	N Value	Blow Count (per 6 in.) or Drilling Rate(min/ft)	Sample Recovery or REC & RQD	SAMPLE DESCRIPTION	ASTM Class.	STRATIGRAPHIC DESCRIPTION
	SS-1	33	2-9-24-22	8"	Brown GRAVELLY fine to medium SAND, coarse gravel, few fines, moist.		
	0-2'						SAND
5	SS-2	>50	54-50/2"	8"	Top 6": Brown SILTY fine SAND.		6'6"
	5'-5'8"				Bottom 2": Broken, highly weathered rock fragments, dry. Gray QUARTZITE, highly to moderately weathered, broken, hard.		
	RC-1		6	Rec=53%			
	6'6"-9'4"		6	RQD=12%			
10			10				
	RC-2		4	Rec=100%	Gray QUARTZITE, highly weathered, highly fractured.		BEDROCK
	9'4"-10'10"		5/6"	RQD=50%			
	RC-3		5	Rec=100%	Gray QUARTZITE, slightly weathered to fresh, hard.		
	10'10"-14'10"		4	RQD=65%			
15			4				14'10"
			5				EOB @ 14'10"

SAMPLE TYPES:		SPT Resistance		Approve/Date
S3=3" SPLIT SPOON	trace 0 to 5%			
SS=SPLIT SPOON	few 5 to 10%			
ST=SHELBY TUBE	little 15 to 25%	Cohesionless Density: 0-4 Very Loose	Cohesive Consistency: 0-2 Very Soft	**Sept. 30, 13 WS**
R=ROCK CORE	some 30 to 45%	5-9 Loose 10-29 Med. Dense	3-4 Soft, 5-8 M/Stiff, 9-15 Stiff	
	mostly >50%	30-49 Dense 50+ Very Dense	16-30 V-Stiff, 31+ Hard	

RQD = Rock Quality Designation

GEOLOGIC LOG

AECOM

PROJECT : **Pierce Island WWTP - Portsmouth, NH**		SHEET	BORING NO.
SITE LOCATION:	JOB NO.: **60301525.1.01.2**	1 of 1	B13-4
Pierce Island WWTP Portsmouth, NH	LOCATION: N: E:	Elevation: 33 (est.)	Total Depth: 15'-3"
DRILL CONTRACTOR : NEB	ENG/GEO : W. Song	BEGUN: Sept. 23, 2013	
DRILL RIG : Mobile B-53	DRILLER : Trent Roe	FINISHED : Sept. 24, 2013	
Hole Size : ~4"	Weather : Sunny, bright, ~60s	Ground Water (Depth) : Not Encountered	
Drilling Method : SSA/NW Cased	Drilling Fluid : Potable Water	Top of Rock (Depth) : 6'-9"	

Depth (ft)	Sample Type/No.	N Value	Blow Count (per 6 in.) or Drilling Rate(min/ft)	Sample Recovery or REC & RQD	SAMPLE DESCRIPTION	ASTM Class.	STRATIGRAPHIC DESCRIPTION
	SS-1	13	2-6-7-9	10"	Dark brown SILTY SAND, little coarse gravel, fine to medium sand, trace grass roots, moist.		
	0-2'						SAND
					Grinding at 4 ft depth, possible cobbles.		
5							
	SS-2	39	6-5-34-50/2"	20"	Top 16": yellowish brown fine to medium SAND, possible FILL.		
	5'-7'						6'9"
	RC-1		5	Rec=33%	Bottom 4": broken rock fragments. Gray QUARTZITE, highly to moderately weathered, highly fractured to broken, hard.		
	6'9"-10'3"		6	RQD=0			
10			10				
			6				BEDROCK
	RC-2		8	Rec=100%	Gray QUARTZITE, moderately weathered, hard.		
	10'3"-15'3"		8	RQD=50%			
			7				
15			9				15'3"
			9				EOB @ 15'3"

SAMPLE TYPES:		SPT Resistance		Approve/Date
S3=3" SPLIT SPOON	trace 0 to 5%			
SS=SPLIT SPOON	few 5 to 10%			
ST=SHELBY TUBE	little 15 to 25%	Cohesionless Density: 0-4 Very Loose	Cohesive Consistency: 0-2 Very Soft	**Sept. 30, 13 WS**
R=ROCK CORE	some 30 to 45%	5-9 Loose 10-29 Med. Dense	3-4 Soft, 5-8 M/Stiff, 9-15 Stiff	
	mostly >50%	30-49 Dense 50+ Very Dense	16-30 V-Stiff, 31+ Hard	

RQD = Rock Quality Designation

GEOLOGIC LOG

AECOM

PROJECT : **Pierce Island WWTP - Portsmouth, NH**		SHEET	BORING NO.
SITE LOCATION:	JOB NO.: **60301525.1.01.2**	1 of 1	B13-5
Pierce Island WWTP	LOCATION:	Elevation:	Total Depth:
Portsmouth, NH	N: E:	15.5 (est.)	19'-6"
DRILL CONTRACTOR : NEB	ENG/GEO : W. Song	BEGUN:	Sept. 26, 2013
DRILL RIG : Mobile B-53	DRILLER : Trent Roe	FINISHED :	Sept. 26, 2013

Hole Size : ~4"	Weather : Sunny, bright, ~60s	Ground Water (Depth) : 8'-2"
Drilling Method : SSA/NW Cased	Drilling Fluid : Potable Water	Top of Rock (Depth) : 14'-6"

Depth (ft)	Sample Type/No.	N Value	Blow Count (per 6 in.) or Drilling Rate(min/ft)	Sample Recovery or REC & RQD	SAMPLE DESCRIPTION	ASTM Class.	STRATIGRAPHIC DESCRIPTION
	SS-1	27	5-7-20-18	10"	Dark brown SILTY SAND with broken gravel, fine to medium sand, some fines, moist.		
	0-2'						
5	SS-2	21	5-11-10-14	20"	Brown to reddish brown fine SAND, little fines, moist.		SAND
	5'-7'						
10	SS-3	11	3-5-6-17	22"	Brown fine to medium SAND, trace fine gravel, few to little fines, wet.		
	10'-12'						
							14'6"
15	RC-1		5	Rec=90%	Gray QUARTZITE, moderately to slightly weathered, hard.		BEDROCK
	14.5'-19.5'		5	RQD=33%			
			6				
			9				
			9				19'6"
							EOB @ 19'6"

SAMPLE TYPES:		SPT Resistance		Approve/Date
S3=3" SPLIT SPOON	trace 0 to 5%			
SS=SPLIT SPOON	few 5 to 10%			
ST=SHELBY TUBE	little 15 to 25%	Cohesionless Density: 0-4 Very Loose	Cohesive Consistency: 0-2 Very Soft	**Sept. 30, 13 WS**
R=ROCK CORE	some 30 to 45%	5-9 Loose 10-29 Med. Dense	3-4 Soft, 5-8 M/Stiff, 9-15 Stiff	
	mostly >50%	30-49 Dense 50+ Very Dense	16-30 V-Stiff, 31+ Hard	

RQD = Rock Quality Designation

GEOLOGIC LOG

AECOM

PROJECT : **Pierce Island WWTP - Portsmouth, NH**		SHEET	BORING NO.
SITE LOCATION:	JOB NO.: **60301525.1.01.2**	1 of 1	B13-6
Pierce Island WWTP Portsmouth, NH	LOCATION: N: E:	Elevation: 16 (est.)	Total Depth: 12'-6"
DRILL CONTRACTOR : NEB	ENG/GEO : W. Song	BEGUN: Sept. 26, 2013	
DRILL RIG : Mobile B-53	DRILLER : Trent Roe	FINISHED : Sept. 26, 2013	
Hole Size : ~4"	Weather : Sunny, bright, ~60s	Ground Water (Depth) : Not Encountered	
Drilling Method : SSA/NW Cased	Drilling Fluid : Potable Water	Top of Rock (Depth) : 2'-6"	

Depth (ft)	Sample Type/No.	N Value	Blow Count (per 6 in.) or Drilling Rate(min/ft)	Sample Recovery or REC & RQD	SAMPLE DESCRIPTION	ASTM Class.	STRATIGRAPHIC DESCRIPTION
	SS-1	34	2-11-23-27	10"	Brown fine to medium SAND with coarse gravel, broken rock fragments, trace grass roots, few fines, TOPSOIL.		
	0-2'						SAND
							2'6"
	RC-1		5	Rec=70%	Gray QUARTZITE, moderately to slightly weathered, fractured to broken, hard.		
5	2.5'-7.5'		4	RQD=33%			
			10+				
			6				BEDROCK
			4				
	RC-2		10+	Rec=95%	Gray QUARTZITE, fractured to broken, quartz vein invasion observed, moderately to slightly weathered, hard.		
10	7.5'-12.5'		10+	RQD=45%			
			10+				
			7				
			6				12'6"
							EOB @ 12'6"
15							

SAMPLE TYPES:	trace 0 to 5%	SPT Resistance			Approve/Date
S3=3" SPLIT SPOON	few 5 to 10%				
SS=SPLIT SPOON	little 15 to 25%	Cohesionless Density:	0-4 Very Loose	Cohesive Consistency: 0-2 Very Soft	**Sept. 30, 13 WS**
ST=SHELBY TUBE	some 30 to 45%	5-9 Loose	10-29 Med. Dense	3-4 Soft, 5-8 M/Stiff, 9-15 Stiff	
R=ROCK CORE	mostly >50%	30-49 Dense	50+ Very Dense	16-30 V-Stiff, 31+ Hard	

RQD = Rock Quality Designation

GEOLOGIC LOG

AECOM

PROJECT : **Pierce Island WWTP - Portsmouth, NH**		SHEET	BORING NO.
SITE LOCATION:	JOB NO.: **60301525.1.01.2**	1 of 2	B13-7
Pierce Island WWTP	LOCATION:	Elevation:	Total Depth:
Portsmouth, NH	N: E:	22 (est.)	26'-6"
DRILL CONTRACTOR : NEB	ENG/GEO : W. Song	BEGUN:	Sept. 24, 2013
DRILL RIG : Mobile B-53	DRILLER : Trent Roe	FINISHED :	Sept. 25, 2013

Hole Size : ~4"	Weather : Sunny, bright, ~60s	Ground Water (Depth) : Not Encountered
Drilling Method : SSA/NW Cased	Drilling Fluid : Potable Water	Top of Rock (Depth) : 6'-6"

Depth (ft)	Sample Type/No.	N Value	Blow Count (per 6 in.) or Drilling Rate(min/ft)	Sample Recovery or REC & RQD	SAMPLE DESCRIPTION	ASTM Class.	STRATIGRAPHIC DESCRIPTION
	SS-1	6	4-3-3-12	12"	Yellowish brown fine to medium SAND, little fine to coarse gravel, trace fines, moist.		
	0'-2'						
							SAND
					Grinding at 3 to 4 ft depth, possible cobbles.		
5							
	SS-2	>50	53-50/4"	8"	Top 2": brown SILTY fine SAND.		
	5'-5'10"				Bottom 6": highly weathered, broken rock fragments.		6'6"
	RC-1		3	Rec=33%	Gray Quarzite, highly fractured to broken, highly to slightly weathered, hard.		
	6'6"-11'6"		7	RQD=8%			
10			7				
			5				
			6				
	RC-2		4	Rec=100%	Gray QUARTZITE, slightly weathered to fresh, hard.		
	11'6"-16'6"		5	RQD=72%			BEDROCK
15			12				
			4				
			4				
	RC-3		5	Rec=100%	Gray QUARTZITE, slightly weathered to fresh, broken at bottom 12", hard.		
	16'6"-21'6"		5	RQD=63%			
			6				

SAMPLE TYPES:			SPT Resistance		Approve/Date
S3=3" SPLIT SPOON	trace	0 to 5%			
SS=SPLIT SPOON	few	5 to 10%			
ST=SHELBY TUBE	little	15 to 25%	Cohesionless Density: 0-4 Very Loose	Cohesive Consistency: 0-2 Very Soft	**Sept. 30, 13 WS**
R=ROCK CORE	some	30 to 45%	5-9 Loose 10-29 Med. Dense	3-4 Soft, 5-8 M/Stiff, 9-15 Stiff	
	mostly	>50%	30-49 Dense 50+ Very Dense	16-30 V-Stiff, 31+ Hard	

RQD = Rock Quality Designation

GEOLOGIC LOG

AECOM

PROJECT : **Pierce Island WWTP - Portsmouth, NH**		SHEET	BORING NO.
SITE LOCATION:	JOB NO.: **60301525.1.01.2**	2 of 2	B13-7
Pierce Island WWTP Portsmouth, NH	LOCATION: N: E:	Elevation: 22 (est.)	Total Depth: 26'-6"

Depth (ft)	Sample Type/No.	N Value	Blow Count (per 6 in.) or Drilling Rate(min/ft)	Sample Recovery or REC & RQD	SAMPLE DESCRIPTION	ASTM Class.	STRATIGRAPHIC DESCRIPTION
			6				
			8				
	RC-4		5	Rec=100%	Gray QUARTZITE, slightly weathered to fresh, hard.		
	21'6"-26'6"		4	RQD=45%			BEDROCK
25			5				
			5				
			10				
							EOB @ 26'6"
30							
35							
40							

SAMPLE TYPES:			SPT Resistance		Approve/Date
S3=3" SPLIT SPOON	trace	0 to 5%			
SS=SPLIT SPOON	few	5 to 10%			
ST=SHELBY TUBE	little	15 to 25%	Cohesionless Density: 0-4 Very Loose	Cohesive Consistency: 0-2 Very Soft	**Sept. 30, 13 WS**
R=ROCK CORE	some	30 to 45%	5-9 Loose 10-29 Med. Dense	3-4 Soft, 5-8 M/Stiff, 9-15 Stiff	
	mostly	>50%	30-49 Dense 50+ Very Dense	16-30 V-Stiff, 31+ Hard	

RQD = Rock Quality Designation

GEOLOGIC LOG

AECOM

PROJECT : **Pierce Island WWTP - Portsmouth, NH**		SHEET	BORING NO.
SITE LOCATION:	JOB NO.: **60301525.1.01.2**	1 of 1	B13-8
Pierce Island WWTP Portsmouth, NH	LOCATION: N: E:	Elevation: 21 (est.)	Total Depth: 17'
DRILL CONTRACTOR : NEB	ENG/GEO : W. Song	BEGUN:	Sept. 26, 2013
DRILL RIG : Mobile B-53	DRILLER : Trent Roe	FINISHED :	Sept. 26, 2013

Hole Size : ~4"	Weather : Sunny, bright, ~60s	Ground Water (Depth) : Not Encountered
Drilling Method : SSA/NW Cased	Drilling Fluid : Potable Water	Top of Rock (Depth) : 2'

Depth (ft)	Sample Type/No.	N Value	Blow Count (per 6 in.) or Drilling Rate(min/ft)	Sample Recovery or REC & RQD	SAMPLE DESCRIPTION	ASTM Class.	STRATIGRAPHIC DESCRIPTION
	SS-1	21	2-8-13-22	8"	Brown SILTY fine SAND, bottom 2": rock fragments, moist.		SAND
	0-2'						2'
	RC-1		4	Rec=88%	Gray QUARTZITE, fractured to broken, hard.		
	2'-7'		6	RQD=10%			
5			6				
			5				
			6				
	RC-2		6	Rec=95%	Gray QUARTZITE, highly fractured, moderately to slightly weathered, hard.		
	7'-12'		10+	RQD=33%			BEDROCK
10			5				
			6				
			10				
	RC-3		6	Rec=95%	Gray QUARTZITE, highly fractured, moderately to slightly weathered, hard.		
	12'-17'		3	RQD=70%			
15			3				
			4				
			6				17'
							EOB @ 17'

SAMPLE TYPES:	trace 0 to 5%	SPT Resistance		Approve/Date
S3=3" SPLIT SPOON	few 5 to 10%			
SS=SPLIT SPOON	little 15 to 25%	Cohesionless Density: 0-4 Very Loose	Cohesive Consistency: 0-2 Very Soft	**Oct. 1, 13 WS**
ST=SHELBY TUBE	some 30 to 45%	5-9 Loose 10-29 Med. Dense	3-4 Soft, 5-8 M/Stiff, 9-15 Stiff	
R=ROCK CORE	mostly >50%	30-49 Dense 50+ Very Dense	16-30 V-Stiff, 31+ Hard	

RQD = Rock Quality Designation

GEOLOGIC LOG

AECOM

PROJECT : **Pierce Island WWTP - Portsmouth, NH**		SHEET	BORING NO.
SITE LOCATION:	JOB NO.: **60301525.1.01.2**	1 of 1	B13-9
Pierce Island WWTP Portsmouth, NH	LOCATION: N: E:	Elevation: 20 (est.)	Total Depth: 10'-9"
DRILL CONTRACTOR : NEB	ENG/GEO : W. Song	BEGUN:	Sept. 27, 2013
DRILL RIG : Mobile B-53	DRILLER : Trent Roe	FINISHED :	Sept. 27, 2013

Hole Size : ~4"	Weather : Sunny, bright, ~50s	Ground Water (Depth) : Not Encountered
Drilling Method : SSA/NW Cased	Drilling Fluid : Potable Water	Top of Rock (Depth) : 5'-9"

Depth (ft)	Sample Type/No.	N Value	Blow Count (per 6 in.) or Drilling Rate(min/ft)	Sample Recovery or REC & RQD	SAMPLE DESCRIPTION	ASTM Class.	STRATIGRAPHIC DESCRIPTION
	SS-1	7	2-3-4-4	14"	Brown to dark brown fine to medium SAND, little fine to coarse gravel, little to some fines, moist.		
	0'-2'						F-M SAND
5	SS-2		50/3"	3"	Yellowish brown fine SAND, little coarse gravel and rock fragments, dry.		5'9"
	5'-5'3"						
	RC-1		5	Rec=90%	Gray Quarzite, fractured to broken, moderately weathered to fresh, hard.		BEDROCK
	5'9"-10'9"		3	RQD=52%			
10			3				10'9"
			7				
			7				EOB @ 10'9"
15							

SAMPLE TYPES:	trace 0 to 5%	SPT Resistance		Approve/Date
S3=3" SPLIT SPOON	few 5 to 10%			
SS=SPLIT SPOON	little 15 to 25%	Cohesionless Density: 0-4 Very Loose	Cohesive Consistency: 0-2 Very Soft	**Oct. 1, 13**
ST=SHELBY TUBE	some 30 to 45%	5-9 Loose 10-29 Med. Dense	3-4 Soft, 5-8 M/Stiff, 9-15 Stiff	**WS**
R=ROCK CORE	mostly >50%	30-49 Dense 50+ Very Dense	16-30 V-Stiff, 31+ Hard	

RQD = Rock Quality Designation

GEOLOGIC LOG

AECOM

PROJECT : **Pierce Island WWTP - Portsmouth, NH**		SHEET	BORING NO.
SITE LOCATION:	JOB NO.: **60301525.1.01.2**	1 of 1	B13-10
Pierce Island WWTP Portsmouth, NH	LOCATION: N: E:	Elevation: 15 (est.)	Total Depth: 11'-3"
DRILL CONTRACTOR : NEB	ENG/GEO : W. Song	BEGUN:	Sept. 26, 2013
DRILL RIG : Mobile B-53	DRILLER : Trent Roe	FINISHED :	Sept. 26, 2013

Hole Size : ~4"	Weather : Sunny, bright, ~60s	Ground Water (Depth) : Not Encountered
Drilling Method : SSA/NW Cased	Drilling Fluid : Potable Water	Top of Rock (Depth) : 3'-9"

Depth (ft)	Sample Type/No.	N Value	Blow Count (per 6 in.) or Drilling Rate(min/ft)	Sample Recovery or REC & RQD	SAMPLE DESCRIPTION	ASTM Class.	STRATIGRAPHIC DESCRIPTION
	SS-1	17	2-8-9-8	8"	Dark brown SILTY SAND, fine to medium sand, little fine to coarse gravel, some fines, moist.		
	0-2'						SILTY SAND
	RC-1		4	Rec=86%	Gray QUARTZITE, fractured to broken, highly to slightly weathered, hard.		3'9"
5	3'9"-8'9"		7	RQD=10%			
			4				
			6				
			7				BEDROCK
	RC-2		6	Rec=57%	Gray QUARTZITE, fractured to intact, moderately to slightly weathered, hard.		
10	8'9"-11'3"		6	RQD=18%			
			9/6"				11'3"
							EOB @ 11'-3"
15							

SAMPLE TYPES:	trace	0 to 5%	SPT Resistance		Approve/Date
S3=3" SPLIT SPOON	few	5 to 10%			
SS=SPLIT SPOON	little	15 to 25%	Cohesionless Density: 0-4 Very Loose	Cohesive Consistency: 0-2 Very Soft	**Oct. 1, 13**
ST=SHELBY TUBE	some	30 to 45%	5-9 Loose 10-29 Med. Dense	3-4 Soft, 5-8 M/Stiff, 9-15 Stiff	**WS**
R=ROCK CORE	mostly	>50%	30-49 Dense 50+ Very Dense	16-30 V-Stiff, 31+ Hard	

RQD = Rock Quality Designation

GEOLOGIC LOG

AECOM

PROJECT : **Pierce Island WWTP - Portsmouth, NH**		SHEET	BORING NO.
SITE LOCATION:	JOB NO.: **60301525.1.01.2**	1 of 1	B13-11
Pierce Island WWTP Portsmouth, NH	LOCATION: N: E:	Elevation: 16.5 (est.)	Total Depth: 7'-6"
DRILL CONTRACTOR : NEB	ENG/GEO : W. Song	BEGUN: Sept. 27, 2013	
DRILL RIG : Mobile B-53	DRILLER : Trent Roe	FINISHED : Sept. 27, 2013	
Hole Size : ~4"	Weather : Sunny, bright, ~60s	Ground Water (Depth) : Not Encountered	
Drilling Method : SSA/NW Cased	Drilling Fluid : Potable Water	Top of Rock (Depth) : 2'-6"	

Depth (ft)	Sample Type/No.	N Value	Blow Count (per 6 in.) or Drilling Rate(min/ft)	Sample Recovery or REC & RQD	SAMPLE DESCRIPTION	ASTM Class.	STRATIGRAPHIC DESCRIPTION
	SS-1	27	4-7-20-50/3"	14"	6" bituminous concrete pavement Top 10": brown fine to coarse SAND, little fine gravel trace fines, moist; bottom 4": broken rock fragments with sand.		SAND
	3"-2'3"						2'6"
	RC-1		4	Rec=77%	Gray QUARTZITE, fractured to broken, highly to slightly weathered, hard.		
	2.5'-7.5'		5	RQD=13%			BEDROCK
5			10+				
			7				7'6"
			5				EOB @ 7'6"
10							
15							

SAMPLE TYPES:		SPT Resistance		Approve/Date
S3=3" SPLIT SPOON	trace 0 to 5%			
SS=SPLIT SPOON	few 5 to 10%			
ST=SHELBY TUBE	little 15 to 25%	Cohesionless Density: 0-4 Very Loose	Cohesive Consistency: 0-2 Very Soft	**Oct. 1, 13**
R=ROCK CORE	some 30 to 45%	5-9 Loose 10-29 Med. Dense	3-4 Soft, 5-8 M/Stiff, 9-15 Stiff	**WS**
	mostly >50%	30-49 Dense 50+ Very Dense	16-30 V-Stiff, 31+ Hard	

RQD = Rock Quality Designation

MATCH LINE

N 210.400 (TO DWG. LA-1)

MATCH LINE (TO DWG. LA-1)

N 210.400

N 210.200

N 210.000

E 747.000

E 747.200

E 747.400

E 747.600

APPROXIMATE LIMITS OF HISTORICAL EMBATTLEMENT TO BE LOCATED IN FIELD

EXISTING BIT. CONC. PVMT TO BE SCARIFIED AND REMOVED (SEE GENERAL NOTE 9, DWG LA-1)

DEMOLITION OF EXISTING GRIT CHAMBER REQ'D. (SEE STRUCT. DWG. S)

REFINISH ROOF, DEMOLITION OF EXISTING PIPING REQ'D (SEE ARCH. & MECH. DWG.S)

REMOVE FLAGPOLE AND BIT. CONC.

REMOVE UNDERGROUND OIL TANK

REMOVE SIDEWALK AND CURB

EXISTING BIT. CONC. PVMT. TO BE SCARIFIED AND REMOVED (SEE GENERAL NOTE 9, DWG. LA-1)

EXISTING CONTROL BUILDING

FIRST FL. EL. = 27.04

GARAGE FL. EL. = 15.51

GRIT CHAMBER

CONC. PAD

MONORAIL

OIL TANK

FLAGPOLE

EXISTING PRIMARY SETTLING TANKS

SHED

B.M.

BENCH MARK EL. 26.00 DRILL HOLE ON CONC. WALKWAY NEAR CENTERLINE EXIST. TANKS

DEMOLITION OF EXISTING TROUGH REQ'D (SEE STRUCT. DWG.S)

SEE STORM DRAINAGE PLAN FOR DEMOLITION OF EXIST. STORM DRAIN STRUCTURES

SEE ELECTRICAL & MECHANICAL DWGS. FOR DEMOLITION OF EXISTING UTILITY RAN. SITE

REMOVE ALL CHAIN LINK FENCE (TYP.)

PISCATAQUA RIVER

NORTH

B-1 32.4
B-2 32.3
B-3 32.4
B-4 27.2
B-5 21.9
B-6 28.2
B-7 30.8
B-8 28.1
B-9 18.3
B-10 15.9
B-11 24.5
B-12 24.5

BI-1
BI-2
BI-3
BI-4
BI-5
BI-6
BI-7
BI-8
BI-9

PP 299/PSA
PP 299/4
PP 72A/3

NO.	DESCRIPTION	DATE
	REVISIONS	
2	REVISED TO RECORD PLAN	9-93
1	Drawing Revised	9/89

WHITMAN & HOWARD, INC.

45 WILLIAM STREET, WELLESLEY, MASS.

THE STATE OF NEW HAMPSHIRE — STEPHEN E. SEIGAL — No. 4594 — REGISTERED PROFESSIONAL ENGINEER

ORIGINAL FULL SIZE DRAWING = 4"

REPRODUCTIONS MAY BE REDUCED SIZE

APPROVED Stephen E. Seigal

DESIGNED	DRAWN	CHECKED	SCALE	DATE
G.B.W.	G.B.W.	E.R.C.	1" = 20'	SEPT. 1985

DRAWING NO. LA-2

JOB NO. 85-163

CONTRACT NO. 3

SHEET 4 OF 106 SHEETS

WASTEWATER TREATMENT FACILITY

PORTSMOUTH, N. H.

EXISTING CONDITIONS AND DEMOLITION PLAN

FOTOBEAM/BROOKSIDE 267-24x36

NEW ENGLAND BORING CONTRACTORS OF CONN. INC.
Glastonbury, CT 06033 — Springfield, MA 01103
203-633-4640 — 413-733-1232

CLIENT: Geotechnical Engineers Inc.
PROJECT NAME: Portsmouth Treatment Plant
LOCATION: Portsmouth, NH

BORING NUMBER: B-1
SHEET No. 1 of 1

DRILLER: T. Roe
INSPECTOR: C. Conlon
DATE START: 7/23/85
DATE FINISH: 7/23/85

ARCHITECT ENGINEER:

	Casing	Sampler	Core Barrel
TYPE	NW	SS	NXD4
SIZE I.D.	3"	1-3/8"	2-1/8"
HAMMER WT.	300	140	
HAMMER FALL	24"	30"	

FILE NO.:
SURFACE ELEV.: 32.4 ft*
LINE & STATION:
OFFSET:

SAMPLE NO.	DEPTH RANGE	BLOWS PER 6" ON SAMPLER 0-6	6-12	12-18	REC.	COL. A	STRATA CHANGE	FIELD CLASSIFICATION AND REMARKS
S1	0-1.5	17	16	10	4"			Light Br. Fine Sand, Some Silt, Little Med.-Crs. Sand, Gravel, Few Cobbles, Pieces of Concrete
S2	5.0	100/0			0"			
R1	6.5-8.5	Cored			15"	3	6.0	
						3	6.5	Roller Bit Through Rock
R2	8.5-11.5	Cored			45"	8		Refusal @ 6.0
						9	8.5	Run #1 6.5-8.5 Quartzite*
						7½		Rec. 15" Gray ~~Phyllite~~ Few Fracture
								Run #2 8.5-11.5 Quartzite*
							11.5	Rec. 45" Gray ~~Phyllite~~ Very Fracture
								Bottom of Boring 11.5
								*Log modified by GEI.

SAMPLE IDENTIFICATION
- SS SPLIT SPOON
- TW THIN WALL TUBE
- UP UNDISTURBED PISTON
- OE OPEN END ROD
- WS WASH SAMPLE
- AS AUGER SAMPLE

PENETRATION RESISTANCE
140 lb. Wt. falling 30" on 2" O.D. Sampler

Cohesionless Density		Cohesive Consistency	
0-4	Very Loose	0-2	Very Soft
5-9	Loose	3-4	Soft
10-29	Med. Dense	5-8	M/Stiff
30-49	Dense	9-15	Stiff
50 +	Very Dense	16-30	V-Stiff
		31 +	Hard

PROPORTIONS USED

trace	0 to 10%
little	10 to 20%
some	20 to 35%
and	35 to 50%

REMARKS:

COL. A: Coring Time/Ft.

NEW ENGLAND BORING CONTRACTORS OF CONN. INC.
Chesterbury, CT 06033 — Springfield, MA 01103
203-632-4640 — 413-733-1232

CLIENT Geotechnical Engineers Inc.
PROJECT NAME Portsmouth Treatment Plant
LOCATION Portsmouth, NH

BORING NUMBER B-2
SHEET No. 1 of 1

DRILLER T. Roe
INSPECTOR C. Conlon
DATE START 7/24/85
DATE FINISH 7/24/85

ARCHITECT ENGINEER

	Casing	Sampler	Core Barrel
TYPE	NW	SS	NXD4
SIZE I.D.	3"	1-3/8"	2-1/8"
HAMMER WT.	300	140	
HAMMER FALL	24"	30"	

FILE NO.
SURFACE ELEV. 32.3 ft*
LINE & STATION
OFFSET

SAMPLE NO.	SAMPLE DEPTH RANGE	BLOWS PER 6" ON SAMPLER 0-6	6-12	12-18	REC.	COL. A	STRATA CHANGE	FIELD CLASSIFICATION AND REMARKS
S1	.5-2.0	6	9	19	12"			Br. Fine Sand, Some Silt, Med.-Crs. Sand, Fine Gravel, Occasional Cobbles
							2.5	
R1	2.5-6.0	Cored			42"	5		Run #1 2.5-6.0 *Quartzite*
						4		Rec. 42" Very Fractured Gray ~~Phyllite~~
						5½		
							6.0	
R2	6.0-9.5	Cored			42"	7		Run #2 6.0-9.5 *Quartzite**
						10		Rec. 42" Fractured Gray ~~Phyllite~~
						9		
						10		
							9.5	
								Bottom of Boring 9.5
								Log modified by GEI.

SAMPLE IDENTIFICATION
- SS SPLIT SPOON
- TW THIN WALL TUBE
- P UNDISTURBED PISTON
- OE OPEN END ROD
- W WASH SAMPLE
- A AUGER SAMPLE

PENETRATION RESISTANCE
140 lb. Wt. falling 30" on 2" O.D. Sampler

Cohesionless Density		Cohesive Consistency	
0-4	Very Loose	0-2	Very Soft
5-9	Loose	3-4	Soft
10-29	Med. Dense	5-8	M/Stiff
30-49	Dense	9-15	Stiff
50 +	Very Dense	16-30	V-Stiff
		31 +	Hard

PROPORTIONS USED

trace	0 to 10%
little	10 to 20%
some	20 to 35%
and	35 to 50%

REMARKS:

COL. A Coring Time/Ft.

NEW ENGLAND BORING CONTRACTORS OF CONN. INC.
Chesbury, CT 06033 — Springfield, MA 01103
203-453-4640 413-733-1232

CLIENT Geotechnical Engineers Inc.
PROJECT NAME Portsmouth Treatment Plant
LOCATION Portsmouth, NH

BORING NUMBER B-3
SHEET No. 1 of 1

ARCHITECT ENGINEER

DRILLER T. Roe
INSPECTOR C. Conlon
DATE START 7/23/85
DATE FINISH 7/23/85

	Casing	Sampler	Core Barrel
TYPE	HW	SS	NXD4
SIZE I.D.	3"	1-3/8"	2-1/8"
HAMMER WT.	300	140	
HAMMER FALL	24"	30"	

FILE NO.
SURFACE ELEV. 32.4 ft*
LINE & STATION
OFFSET

SAMPLE NO.	SAMPLE DEPTH RANGE	BLOWS PER 6" ON SAMPLER 0-6	6-12	12-18	REC.	COL. A	STRATA CHANGE	FIELD CLASSIFICATION AND REMARKS
S1	0-1.5	6	8	6	4"			Br. Fine Sand, Some Silt, Little Med. Crs. Sand, Fine Gravel
S2	5.0-6.5	15	32	39	14"			
							7.0	
R1	7.5-12.5	Cored			60"	8	7.5	Roller Bit Through Fractured Rock
						5½		Run #1 7.5-12.5
						3½		Rec. 60" Gray ~~Phyllite~~ Very Fractured
						4		7.5-8.5 *Quartzite**
						4½	12.5	
								Bottom of Boring 12.5
								*Log modified by GEI.

SAMPLE IDENTIFICATION
SS SPLIT SPOON
TW THIN WALL TUBE
PS UNDISTURBED PISTON
OE OPEN END ROD
RS RUSH SAMPLE
AS AUGER SAMPLE

PENETRATION RESISTANCE
140 lb. Wt. falling 30" on 2" O.D. Sampler

Cohesionless Density		Cohesive Consistency	
0-4	Very Loose	0-2	Very Soft
5-9	Loose	3-4	Soft
10-29	Med. Dense	5-8	M/Stiff
30-49	Dense	9-15	Stiff
50 +	Very Dense	16-30	V-Stiff
		31 +	Hard

PROPORTIONS USED

trace	0 to 10%
little	10 to 20%
some	20 to 35%
and	35 to 50%

REMARKS:

COL. A Coring Time/Ft.

NEW ENGLAND BORING CONTRACTORS OF CONN. INC.

Glastonbury, CT 06033 — Springfield, MA 01103
203-633-4640 — 413-733-1232

CLIENT: Geotechnical Engineers Inc.
PROJECT NAME: Portsmouth Treatment Plant
LOCATION: Portsmouth, NH

BORING NUMBER: B-4
SHEET No. 1 of 1

ARCHITECT ENGINEER

FILE NO.

DRILLER: T. Roe
INSPECTOR: C. Conlon
DATE START: 7/29/85
DATE FINISH: 7/29/85

	Casing	Sampler	Core Barrel
TYPE	NW	SS	NXD4
SIZE I.D.	3"	1-3/8"	2-1/8"
HAMMER WT.	300	140	
HAMMER FALL	24"	30"	

SURFACE ELEV.: 27.2 ft*
LINE & STATION:
OFFSET:

SAMPLE NO.	SAMPLE DEPTH RANGE	BLOWS PER 6" ON SAMPLER 0-6	6-12	12-18	REC.	COL. A	STRATA CHANGE	FIELD CLASSIFICATION AND REMARKS
S1	.5-2.0	6	10	8	11"			Br. Fine-Crs. Sand, Some Silt, Little Med.-Crs. Sand, Fine Gravel, Occasional Cobbles
							2.5	
R1	2.5-9.0	Cored			60"	4		Run #1 2.5-9.0
						3½		Rec. 60" Cored Boulder @ 2.5
						4		Top of Rock @ 4.0 Very Fractured
						6½		Gray ~~Phyllite~~
						7		*Quartzite**
							9.0	
								Bottom of Boring 9.0
								*Log modified by GEI.

SAMPLE IDENTIFICATION
- SS SPLIT SPOON
- TW THIN WALL TUBE
- UP UNDISTURBED PISTON
- OE OPEN END ROD
- WS WASH SAMPLE
- AS AUGER SAMPLE

PENETRATION RESISTANCE
140 lb. Wt. falling 30" on 2" O.D. Sampler

Cohesionless Density		Cohesive Consistency	
0-4	Very Loose	0-2	Very Soft
5-9	Loose	3-4	Soft
10-29	Med. Dense	5-8	M/Stiff
30-49	Dense	9-15	Stiff
50 +	Very Dense	16-30	V.Stiff
		31 +	Hard

PROPORTIONS USED

trace	0 to 10%
little	10 to 20%
some	20 to 35%
and	35 to 50%

REMARKS:

COL. A: Coring Time/Ft.

NEW ENGLAND BORING CONTRACTORS OF CONN. INC.

Glastonbury, CT 06033 — 203-633-4640

Springfield, MA 01103 — 413-733-1232

CLIENT: Geotechnical Engineers Inc.

PROJECT NAME: Portsmouth Treatment Plant

LOCATION: Portsmouth, NH

BORING NUMBER: B-5

SHEET No. 1 of 1

DRILLER: T. Roe

INSPECTOR: C. Conlon

DATE START: 7/25/85

DATE FINISH: 7/25/85

ARCHITECT ENGINEER:

FILE NO.:

	Casing	Sampler	Core Barrel
TYPE	NW	SS	NX
SIZE I.D.	3"	1-3/8"	2-1/8"
HAMMER WT.	300	140	
HAMMER FALL	24"	30"	

SURFACE ELEV.: 21.9 ft*

LINE & STATION:

OFFSET:

DEPTH	SAMPLE NO.	SAMPLE DEPTH RANGE	BLOWS PER 6" ON SAMPLER 0-6	6-12	12-18	REC.	COL. A	STRATA CHANGE	FIELD CLASSIFICATION AND REMARKS
	S1	0-2.0	11	16					
				24	33	12"			Light Br. Fine Med.- Crs. Sand and Gravel, Some Silt
	R1	4.5-9.5	Cored			45"		4.5	
5'									Run #1 4.5-9.5 Rec. 45"
									Gray ~~Shale~~
									*Amphibolite(?)**
10'								9.5	
									Bottom of Boring 9.5
									*Log modified by GEI.

SAMPLE IDENTIFICATION
- SS — SPLIT SPOON
- TW — THIN WALL TUBE
- UP — UNDISTURBED PISTON
- OE — OPEN END ROD
- WS — WASH SAMPLE
- AS — AUGER SAMPLE

PENETRATION RESISTANCE
140 lb. Wt. falling 30" on 2" O.D. Sampler

Cohesionless Density		Cohesive Consistency	
0-4	Very Loose	0-2	Very Soft
5-9	Loose	3-4	Soft
10-29	Med. Dense	5-8	M/Stiff
30-49	Dense	9-15	Stiff
50 +	Very Dense	16-30	V Stiff
		31 +	Hard

PROPORTIONS USED

trace	0 to 10%
little	10 to 20%
some	20 to 35%
and	35 to 50%

REMARKS:

COL. A

NEW ENGLAND BORING CONTRACTORS OF CONN. INC.
Chesnabury, CT 06033 — Springfield, MA 01103
203-633-4640 — 413-733-1232

CLIENT Geotechnical Engineers Inc.
PROJECT NAME Portsmouth Treatment Plant
LOCATION Portsmouth, NH

BORING NUMBER B-6
SHEET No. 1 of 1

DRILLER T. Roe
INSPECTOR C. Conlon
DATE START 7/25/85
DATE FINISH 7/25/85

ARCHITECT ENGINEER

	Casing	Sampler	Core Barrel
TYPE	NW	SS	NXD4
SIZE I.D.	3"	1-3/8"	2-1/8"
HAMMER WT.	SPIN	140	
HAMMER FALL		30"	

FILE NO.
SURFACE ELEV. 28.2 ft*
LINE & STATION
OFFSET

DEPTH	SAMPLE NO.	SAMPLE DEPTH RANGE	BLOWS PER 6" ON SAMPLER 0-6	6-12	12-18	REC.	COL. A	STRATA CHANGE	FIELD CLASSIFICATION AND REMARKS
	S1	.5-2.0	8	15	90	11"	4		Br. Fine Sand, Some Silt Med.-Crs Sand, Fine Gravel, Occasional Cobbles
	R1	1.9-6.5	Cored			56"	5½	1.9	
							4½		Run #1 1.9-6.9 Rec. 56"
							6 3/4		Fractured Gray ~~Phyllite~~
							5½		*Quartzite**
	R2	6.9-11.9	Cored			60"	4½	6.9	
							8		Run #2 6.9-11.9 Rec. 60"
							8		Gray ~~Phyllite~~ Few Seams
							9½		*Quartzite**
							7	11.9	
	R3	11.9-16.9	Cored			60"	10		Run #3 11.9-16.9 Rec. 60"
							10+		Fractured Gray ~~Phyllite~~
							10+		*Quartzite**
							10+		
							10+	16.9	
	R4	16.9-20.3	Cored			42"	7½		Run #4 16.9-20.3 Rec. 42"
							7		Fractured Gray ~~Phyllite~~ Few Seams
							7	20.3	*Quartzite**

Bottom of Boring 20.3
Water @ 14.0 @ Completion

Monitor Well Set @ 20.0
Materials: 10.0' - 1½" PVC Screen
10.0' - 1½" PVC Riser
1 - Bag #10 Sand
10 lbs- Bentonite
1 - Screw Cap

*Log modified by GEI.

SAMPLE IDENTIFICATION
SS — SPLIT SPOON
TW — THIN WALL TUBE
PS — UNDISTURBED PISTON
OE — OPEN END ROD
WS — WASH SAMPLE
AS — AUGER SAMPLE

PENETRATION RESISTANCE
140 lb. Wt. falling 30" on 2" O.D. Sampler

Cohesionless Density		Cohesive Consistency	
0-4	Very Loose	0-2	Very Soft
5-9	Loose	3-4	Soft
10-29	Med. Dense	5-8	M/Stiff
30-49	Dense	9-15	Stiff
50 +	Very Dense	16-30	V-Stiff
		31 +	Hard

PROPORTIONS USED

trace	0 to 10%
little	10 to 20%
some	20 to 35%
and	35 to 50%

REMARKS:
Development Time - 15 min

COL. A Coring Time/Ft.

NEW ENGLAND BORING CONTRACTORS OF CONN. INC.

Glastonbury, CT 06033 — Springfield, MA 01103
203-633-4640 — 413-733-1232

CLIENT Geotechnical Engineers Inc.

PROJECT NAME Portsmouth Treatment Plant

LOCATION Portsmouth, NH

BORING NUMBER B-7

SHEET No. 1 of 1

DRILLER T. Roe

INSPECTOR C. Conlon

DATE START 7/24/85

DATE FINISH 7/25/85

ARCHITECT ENGINEER

	Casing	Sampler	Core Barrel
TYPE			NXD4
SIZE I.D.			2-1/8"
HAMMER WT.			
HAMMER FALL			

FILE NO.

SURFACE ELEV. 30.8 ft*

LINE & STATION

OFFSET

SAMPLE NO.	SAMPLE DEPTH RANGE	BLOWS PER 6" ON SAMPLER 0-6	6-12	12-18	REC.	COL. A	STRATA CHANGE	FIELD CLASSIFICATION AND REMARKS
S1	GRAB SAMPLE						.8	Br. Fine Sand, Some Silt, Med.-Crs. Sand and Gravel, Occasional Cobbles
						3		
R1	.8-5.8	Cored			60"	3½		Run #1 .8-5.8 Rec. 60"
						5		
						4½		Very Fractured Gray ~~Phyllite~~
						5½	5.8	*Quartzite**

Bottom of Boring 5.8

*Log modified by GEI.

SAMPLE IDENTIFICATION
SS SPLIT SPOON
TW THIN WALL TUBE
PS UNDISTURBED PISTON
OE OPEN END ROD
WS WASH SAMPLE
AS AUGER SAMPLE

PENETRATION RESISTANCE
140 lb. Wt. falling 30" on 2" O.D. Sampler

Cohesionless Density		Cohesive Consistency	
0-4	Very Loose	0-2	Very Soft
5-9	Loose	3-4	Soft
10-29	Med. Dense	5-8	M/Stiff
30-49	Dense	9-15	Stiff
50 +	Very Dense	16-30	V-Stiff
		31 +	Hard

PROPORTIONS USED
trace 0 to 10%
little 10 to 20%
some 20 to 35%
and 35 to 50%

REMARKS:

COL. A Coring Time/Ft.

NEW ENGLAND BORING CONTRACTORS OF CONN. INC.

Glastonbury, CT 06033 — 203-633-4640

Springfield, MA 01103 — 413-733-1232

CLIENT Geotechnical Engineers Inc.

PROJECT NAME Portsmouth Treatment Plant

LOCATION Portsmouth, NH

BORING NUMBER B-8

SHEET No. 1 of 1

DRILLER T. Roe

INSPECTOR C. Conlon

DATE START 7/24/85

DATE FINISH 7/24/85

ARCHITECT ENGINEER

	Casing	Sampler	Core Barrel
TYPE	NW	SS	NXD4
SIZE I.D.	3"	1-3/8"	2-1/8"
HAMMER WT.	300	140	
HAMMER FALL	24"	30"	

FILE NO.

SURFACE ELEV. 28.4 ft*

LINE & STATION

OFFSET

DEPTH	SAMPLE NO.	SAMPLE DEPTH RANGE	BLOWS PER 6" ON SAMPLER 0-6	6-12	12-18	REC.	COL. A	STRATA CHANGE	FIELD CLASSIFICATION AND REMARKS
	S1	.5-2.0	4	5	5	7"			Br. Fine Sand, Some Silt, Med.-Crs. Sand, Fine Gravel, Occasional Cobbles
							4		
							53/4	4.5	
5'	R1	4.5-9.0	Cored			43"	8		Run #1 4.5-9.0 Rec. 43"
							10		Very Fractured Gray ~~Phyllite~~ Quartzite*
							10+		Few Seams
							10+	9.0	
10'	R2	9.0-11.0	Cored			17"	10+		Run #2 9.0-11.0 Rec. 17"
								11.0	Very Fractured Gray ~~Phyllite~~ Quartzite* Few Seams Quartz Vein @ 10.5
15'									Bottom of Boring 11.0

*Log modified by GEI.

SAMPLE IDENTIFICATION
- SS SPLIT SPOON
- TW THIN WALL TUBE
- UP UNDISTURBED PISTON
- OE OPEN END ROD
- WS WASH SAMPLE
- AS AUGER SAMPLE

PENETRATION RESISTANCE
140 lb. Wt. falling 30" on 2" O.D. Sampler

Cohesionless Density		Cohesive Consistency	
0-4	Very Loose	0-2	Very Soft
5-9	Loose	3-4	Soft
10-29	Med. Dense	5-8	M/Stiff
30-49	Dense	9-15	Stiff
50 +	Very Dense	16-30	V-Stiff
		31 +	Hard

PROPORTIONS USED
- trace 0 to 10%
- little 10 to 20%
- some 20 to 35%
- and 35 to 50%

REMARKS:

COL. A Coring Time/Ft.

NEW ENGLAND BORING CONTRACTORS OF CONN. INC.
Chesebro, CT 06033 203-633-4640
Springfield, MA 01103 413-733-1232

CLIENT Geotechnical Engineers Inc.
PROJECT NAME Portsmouth Treatment Plant
LOCATION Portsmouth, NH

BORING NUMBER B-9
SHEET No. 1 of 1

DRILLER G. Wishart
INSPECTOR C. Conlon
DATE START 7/29/85
DATE FINISH 7/29/85

ARCHITECT ENGINEER

	Casing	Sampler	Core Barrel
TYPE	NW	SS	NX
SIZE I.D.	3"	1-3/8"	2-1/8"
HAMMER WT.		140	
HAMMER FALL		30"	

FILE NO.
SURFACE ELEV. 18.3 ft*
LINE & STATION
OFFSET

DEPTH	SAMPLE NO.	SAMPLE DEPTH RANGE	BLOWS PER 6" ON SAMPLER 0-6	6-12	12-18	REC.	COL. A	STRATA CHANGE	FIELD CLASSIFICATION AND REMARKS
	S1	0-2.0	4	7					
				9	18	14"		2.0	Light Br. Fine-Crs. Sand and Gravel
	R1	2.0-6.5	Cored			23"			Run #1 2.0-6.5 Rec. 23"
									Cobbles and Boulders
5'	R2	6.5-9.5	Cored			24"		6.5	
									Run #2 6.5-9.5 Rec. 24"
								9.5	Gray ~~Shale~~ *Quartzite**
10'									Bottom of Boring 9.5
									*Log modified by GEI.

SAMPLE IDENTIFICATION
- SPLIT SPOON
- THIN WALL TUBE
- UNDISTURBED PISTON
- OPEN END ROD
- WASH SAMPLE
- AUGER SAMPLE

PENETRATION RESISTANCE
140 lb. Wt. falling 30" on 2" O.D. Sampler

Cohesionless Density		Cohesive Consistency	
0-4	Very Loose	0-2	Very Soft
5-9	Loose	3-4	Soft
10-29	Med. Dense	5-8	M/Stiff
30-49	Dense	9-15	Stiff
50 +	Very Dense	16-30	V-Stiff
		31 +	Hard

PROPORTIONS USED
- trace 0 to 10%
- little 10 to 20%
- some 20 to 35%
- and 35 to 50%

REMARKS:

COL. A

02011-11

NEW ENGLAND BORING CONTRACTORS OF CONN. INC.
Glastonbury, CT 06033 — Springfield, MA 01103
203-633-4640 — 413-733-1232

CLIENT Geotechnical Engineers Inc.
PROJECT NAME Portsmouth Treatment Plant
LOCATION Portsmouth, NH

BORING NUMBER B-10
SHEET No. 1 of 1

DRILLER T. Roe
INSPECTOR C. Conlon
DATE START 7/25/85
DATE FINISH 7/26/85

ARCHITECT ENGINEER

	Casing	Sampler	Core Barrel
TYPE	NW	SS	NX
SIZE I.D.	3"	1-3/8"	
HAMMER WT.		140	
HAMMER FALL		30"	

FILE NO.
SURFACE ELEV. 15.9 ft*
LINE & STATION
OFFSET

SAMPLE NO.	DEPTH RANGE	BLOWS PER 6" ON SAMPLER 0-6	6-12	12-18	REC.	COL. A	STRATA CHANGE	FIELD CLASSIFICATION AND REMARKS
S1	0-2.0	5	9					
			9	11	12"			Light Br. Fine Med.-Crs. Sand and Gravel, Some Silt
S2	6.0-8.0	6	6					
			14	18	14"			
R1	11.0-14.2	Cored			38"		11.0	
								Run #1 11.0-14.1 Rec. 38" Gray Shale
R2	14.2-16.0	Cored			22"			Run #2 14.1-16.0 Rec. 22" Gray ~~Shale~~ *Amphibolite(?)**
							16.0	
								Bottom of Boring 16.0
								Monitor Well Set @ 14.5 Materials: 7.5' - 1½" Riser; 10.0' - 1½" Screen; 1 Bag- Ottawa Sand; 12 lbs- Bentonite Pellets
								Log modified by GEI.

SAMPLE IDENTIFICATION
SS SPLIT SPOON
TW THIN WALL TUBE
PS UNDISTURBED PISTON
OE OPEN END ROD
WS WASH SAMPLE
AS AUGER SAMPLE

PENETRATION RESISTANCE
140 lb. Wt. falling 30" on 2" O.D. Sampler

Cohesionless Density		Cohesive Consistency	
0-4	Very Loose	0-2	Very Soft
5-9	Loose	3-4	Soft
10-29	Med. Dense	5-8	M/Stiff
30-49	Dense	9-15	Stiff
50 +	Very Dense	16-30	V-Stiff
		31 +	Hard

PROPORTIONS USED

trace	0 to 10%
little	10 to 20%
some	20 to 35%
and	35 to 50%

REMARKS:

COL. A

02011-12

NEW ENGLAND BORING CONTRACTORS OF CONN. INC.

Glastonbury, CT 06033 — 203-633-4640

Springfield, MA 01103 — 413-733-1232

CLIENT Geotechnical Engineers Inc.

PROJECT NAME Portsmouth Treatment Plant

LOCATION Portsmouth, NH

BORING NUMBER B-11

SHEET No. 1 of 1

DRILLER T. Roe

INSPECTOR C. Conlon

DATE START 7/24/85

DATE FINISH 7/24/85

ARCHITECT ENGINEER

	Casing	Sampler	Core Barrel
TYPE	NW	SS	NXD4
SIZE I.D.	3"	1-3/8"	2-1/8"
HAMMER WT.	300	140	
HAMMER FALL	24"	30"	

FILE NO.

SURFACE ELEV. 24.5 ft*

LINE & STATION

OFFSET

SAMPLE NO.	SAMPLE DEPTH RANGE	BLOWS PER 6" ON SAMPLER 0-6	6-12	12-18	REC.	COL. A	STRATA CHANGE	FIELD CLASSIFICATION AND REMARKS
S1	.5-2.0	7	8	6	10"			
R1	2.5-5.0	Cored			5"	3		Br. Fine Sand, Some Silt, Little Med.-Crs. Sand, Fine Gravel, Occasional Cobbles (Cored Cobbles and Boulders From 2.5' - 5.0' Rec. 5")
S2	5.0-6.5	8	54	50	12"			
						10		
R2	6.5-11.5	Cored			32"	5½	6.5	Run #2 6.5-11.5 Rec. 32"
						5½		Very Fractured Gray ~~Phyllite~~ Many Seams *Quartzite**
						8		
						9		
						6	11.5	
R3	11.5-13.0	Cored			21"	2½	13.0	Run #3 11.5-13.0 Rec. 21"
								Fractured Gray ~~Phyllite~~ *Quartzite**
								Bottom of Boring 13.0
								Log modified by GEI.

SAMPLE IDENTIFICATION

- SPLIT SPOON
- THIN WALL TUBE
- UNDISTURBED PISTON
- OPEN END ROD
- WASH SAMPLE
- AUGER SAMPLE

PENETRATION RESISTANCE

140 lb. Wt. falling 30" on 2" O.D. Sampler

Cohesionless Density		Cohesive Consistency	
0-4	Very Loose	0-2	Very Soft
5-9	Loose	3-4	Soft
10-29	Med. Dense	5-8	M/Stiff
30-49	Dense	9-15	Stiff
50 +	Very Dense	16-30	V-Stiff
		31 +	Hard

PROPORTIONS USED

trace	0 to 10%
little	10 to 20%
some	20 to 35%
and	35 to 50%

REMARKS:

COL. A Coring Time/Ft.

NEW ENGLAND BORING CONTRACTORS OF CONN. INC.
Springfield, MA 01103
413-733-1232

CLIENT Geotechnical Engineers Inc.
PROJECT NAME Portsmouth Treatment Plant
LOCATION Portsmouth, NH

BORING NUMBER B-12
SHEET No. 1 of 1

DRILLER T. Roe
INSPECTOR C. Conlon
START 7/26/85
FINISH 7/26/85

ARCHITECT ENGINEER

	Casing	Sampler	Core Barrel
TYPE	NW	SS	NXD4
SIZE I.D.	3"	1-3/8"	2-1/8"
HAMMER WT.	300	140	
HAMMER FALL	24"	30"	

FILE NO.
SURFACE ELEV. 24.1 ft*
LINE & STATION
OFFSET

SAMPLE NO.	SAMPLE DEPTH RANGE	BLOWS PER 6" ON SAMPLER 0-6	6-12	12-18	REC.	COL. A	STRATA CHANGE	FIELD CLASSIFICATION AND REMARKS
S1	.5-2.0	5	6	6	12"			Br. Fine Sand, Some Silt, Little Med.-Crs. Sand, Fine Gravel, Occasional Cobbles
							4.3	
R1	4.3-9.3	Cored			27"			Run #1 4.3-9.3 Rec. 27" of Boulders Gray ~~Phyllite~~ @ 8.3 *Quartzite**
							9.3	
R2	9.3-14.3	Cored			12"			Run #2 9.3-14.3 Rec. 12" Very Fractured Gray ~~Phyllite~~= *Quartzite**
							14.3	
								Bottom of Boring 14.3
								Log modified by GEI.

IDENTIFICATION
SPT SPOON
TW THIN WALL TUBE
DP DISTURBED PISTON
RR RIPPING END ROD
CS CHUNK SAMPLE
WS WASH SAMPLE

PENETRATION RESISTANCE
140 lb. Wt. falling 30" on 2" O.D. Sampler

Cohesionless Density		Cohesive Consistency	
0-4	Very Loose	0-2	Very Soft
5-9	Loose	3-4	Soft
10-29	Med. Dense	5-8	M/Stiff
30-49	Dense	9-15	Stiff
50 +	Very Dense	16-30	V-Stiff
		31 +	Hard

PROPORTIONS USED

trace	0 to 10%
little	10 to 20%
some	20 to 35%
and	35 to 50%

REMARKS:

COL. A

02011-14

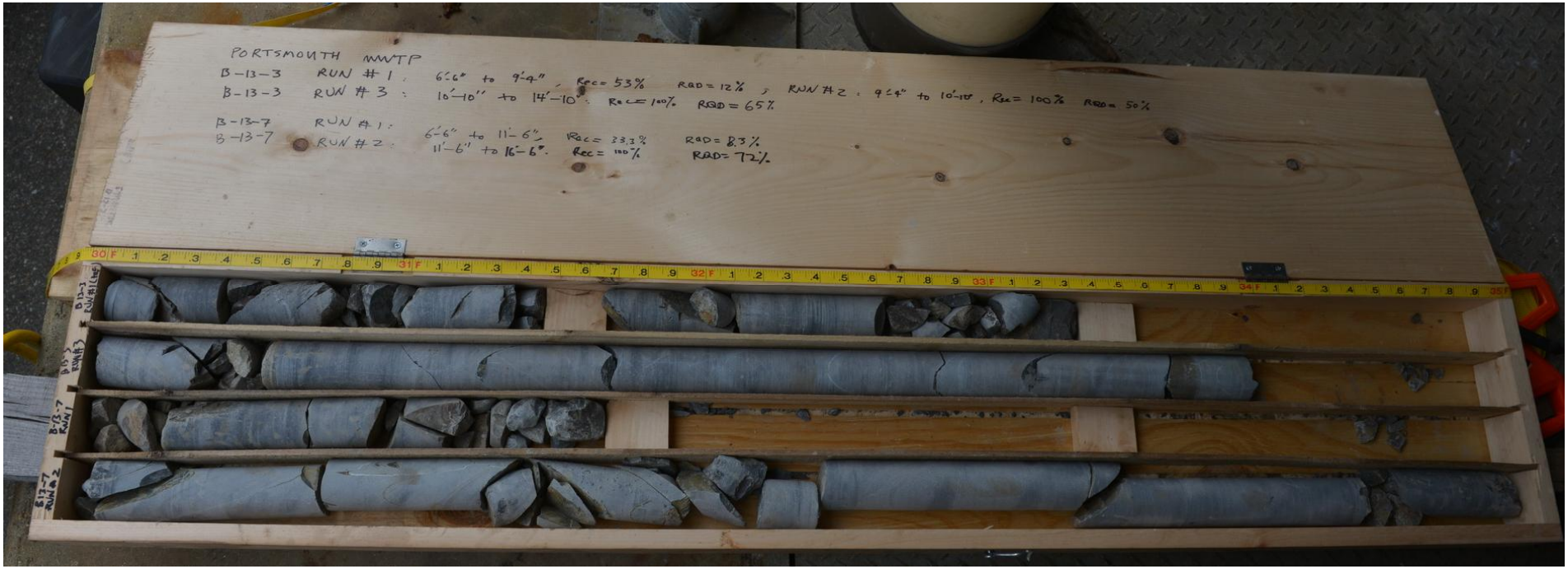
ATTACHMENT 2

ROCK CORE PHOTOS


PORTSMOUTH WWTP
B13-8: RC-3 12'-17'. Rec=95% RQD=70%
B13-9: RC-1 5'9" to 10'9" Rec=10% RQD=52%
B13-11: RC-1 2'-7.5' Rec=77% RQD=13%
AECOM. Sept. 2013


PORTSMOUTH WWTP
B13-6 RC-1 2.5'—7.5' Rec= 70% RQD= 33%
B13-6 RC-2 7.6'—12.5' Rec = 95% RQD = 45%
B13-8 RC-1 2'—7' Rec = 88% RQD = 10%
B13-8 RC-2 7'—12' Rec = 95% RQD = 33%


PORTSMOUTH, NH WWTP
AECOM Sept. 2013
B13-2A : 6'—11' (RC-1) Rec = 100%, RQD = 58%
B13-4 : RC-1 : 6'9" to 10'3" Rec = 33.3% RQD = 0
B13-4 : RC-2 : 10'3" to 15'3" Rec = 100% RQD = 50%
B13-1 : RC-1 : 5'3" to 10'3" Rec = 67%, RQD = 30%


PORTSMOUTH NMTP
B-13-3 RUN #1 : 6'-6" to 9'-4", Rec= 53% RQD = 12% ; RUN #2 : 9'-4" to 10'-10", Rec= 100% RQD = 50%
B-13-3 RUN #3 : 10'-10" to 14'-10". Rec= 100% RQD = 65%
B-13-7 RUN #1 : 6'-6" to 11'-6". Rec= 33.3% RQD = 8.3%
B-13-7 RUN #2 : 11'-6" to 16'-6". Rec= 100% RQD= 72%
B13-3 RUN#1
B13-3 RUN#2
B13-3 RUN#3
B13-7 RUN#1
B13-7 RUN#2


PORTSMOUTH WWTP
B-13-7: RC-3 (18'-6" to 28'-6"), Rec=100% RQD= 63%
B-13-10: RC-1 (3'-9" to 8'-9"), Rec= 86% RQD=10%
B-13-5: RC-1 (13.5'—18.5') Rec=90% RQD= 33%
RC-4 (21'-6" to 26'-6") Rec=100% RQD= 45%
RC-2 (8'-9" to 11'-3") Rec= 17/30 =57% RQD= 11/30 = 37%
AECOM, Sept. 2013
B13-7
B13-7 RC-4
B13-10 RC-1
B13-5 RC-1

ATTACHMENT 3

LABORATORY TESTING RESULTS

GeoTesting EXPRESS

Client:	AECOM				
Project:	Peirce Island Parking Lot				
Location:	Portsmouth, NH			Project No:	GTX-305372
Boring ID:	---	Sample Type:	---	Tested By:	GA
Sample ID:	---	Test Date:	10/04/16	Checked By:	emm
Depth :	---	Test Id:	392883		

USCS Classification - ASTM D2487

Boring ID	Sample ID	Depth	Group Name	Group Symbol	Gravel, %	Sand, %	Fines, %
PB-1	S4	10-12 ft	Silty clay	CL-ML	0.0	9.9	90.1
PB-2	S3	10-12 ft	Lean clay	CL	0.0	2.0	98.0
PB-3	S2	7-9 ft	Lean clay	CL	0.0	0.5	99.5
PB-3	S4	12-14 ft	Silty sand	SM	0.0	73.6	26.4
PB-4	auger 1+2	1-2.5 ft	Silty, clayey sand with gravel	SC-SM	27.3	44.4	28.3
PB-4	S4	7-9 ft	Clayey sand	SC	0.0	59.2	40.8
PB-4	S5	10-12 ft	Silty sand	SM	0.0	86.3	13.7
PB-5	auger 1-3	1-5.5 ft	Silty, clayey sand with gravel	SC-SM	21.1	48.1	30.8
PB-6	auger 1-2	1-2.5 ft	Silty sand with gravel	SM	24.9	54.4	20.7

Remarks: Grain Size analysis performed by ASTM D422 results enclosed
Atterberg Limits performed by ASTM D4318, results enclosed

Client:	AECOM				
Project:	Peirce Island Parking Lot				
Location:	Portsmouth, NH			Project No:	GTX-305372
Boring ID:	---	Sample Type:	---	Tested By:	GA
Sample ID:	---	Test Date:	09/30/16	Checked By:	emm
Depth :	---	Test Id:	392871		

Moisture Content of Soil and Rock - ASTM D2216

Boring ID	Sample ID	Depth	Description	Moisture Content, %
PB-1	S4	10-12 ft	Moist, dark gray silty clay	29.7
PB-2	S3	10-12 ft	Moist, olive brown clay	28.5
PB-3	S2	7-9 ft	Moist, dark olive gray clay	35.6
PB-3	S4	12-14 ft	Moist, olive brown silty sand	21.7
PB-4	auger 1+2	1-2.5 ft	Moist, olive brown silty, clayey sand with gravel	8.4
PB-4	S4	7-9 ft	Moist, olive brown clayey sand	22.5
PB-4	S5	10-12 ft	Moist, olive brown silty sand	20.6
PB-5	auger 1- 3	1-5.5 ft	Moist, olive brown silty, clayey sand with gravel	10.5

Notes: Temperature of Drying : 110° Celsius

Client:	AECOM				
Project:	Peirce Island Parking Lot				
Location:	Portsmouth, NH			Project No:	GTX-305372
Boring ID:	---	Sample Type:	---	Tested By:	GA
Sample ID:	---	Test Date:	10/04/16	Checked By:	emm
Depth :	---	Test Id:	392874		

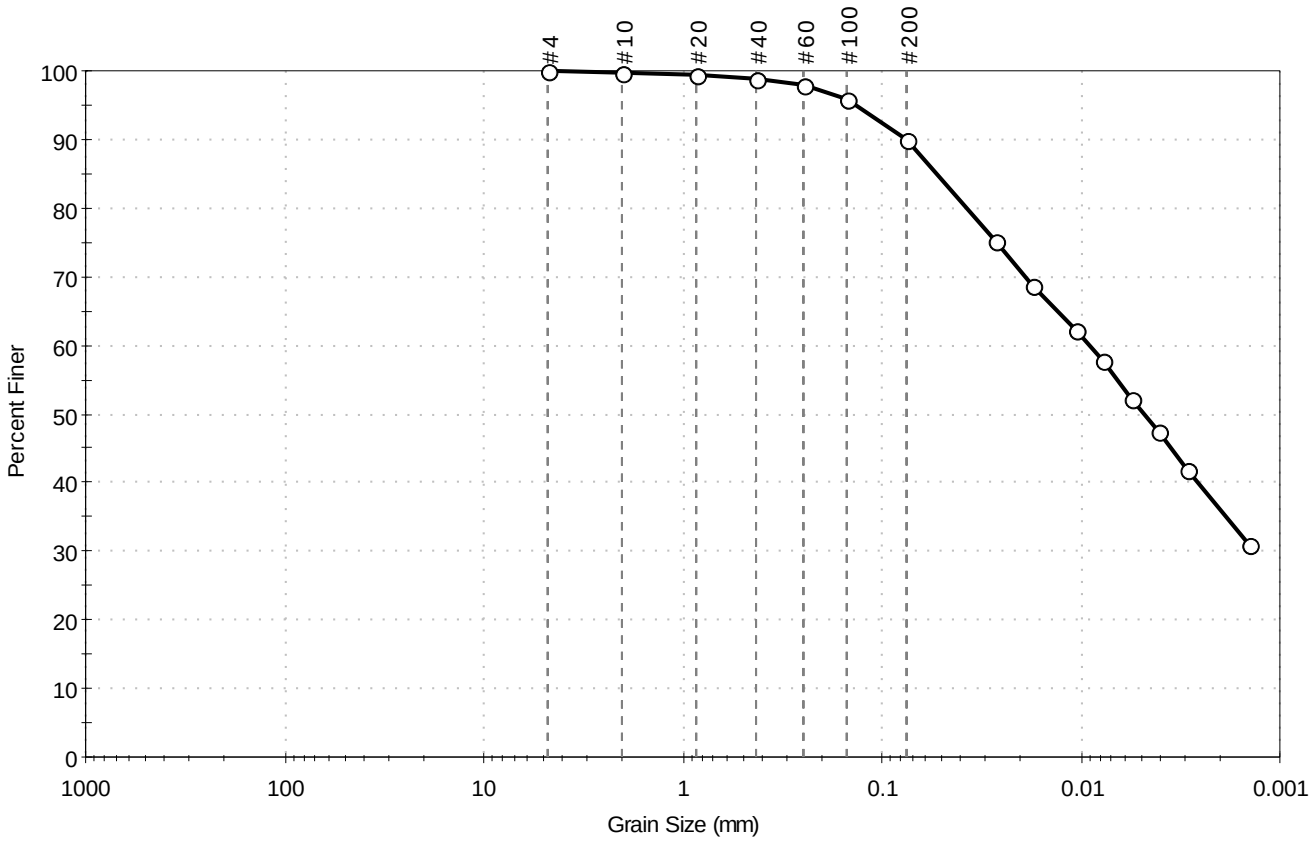
Moisture Content of Soil and Rock - ASTM D2216

Boring ID	Sample ID	Depth	Description	Moisture Content, %
PB-6	auger 1- 2	1-2.5 ft	Moist, dark olive brown silty sand with gravel	7.5
PB-6	S4	7-9 ft	Moist, olive brown silty sand	22.6
PB-6	S5	10-12 ft	Moist, yellowish brown silty sand	19.9

Notes: Temperature of Drying : 110º Celsius

Client:	AECOM				
Project:	Peirce Island Parking Lot				
Location:	Portsmouth, NH			Project No:	GTX-305372
Boring ID:	PB-1	Sample Type:	jar	Tested By:	GA
Sample ID:	S4	Test Date:	10/04/16	Checked By:	emm
Depth :	10-12 ft	Test Id:	392888		
Test Comment:	---				
Visual Description:	Moist, dark gray silty clay				
Sample Comment:	---				

Particle Size Analysis - ASTM D422



%Cobble	%Gravel	%Sand	%Silt & Clay Size
---	0.0	9.9	90.1

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
#4	4.75	100		
#10	2.00	100		
#20	0.85	99		
#40	0.42	99		
#60	0.25	98		
#100	0.15	96		
#200	0.075	90		
---	Particle Size (mm)	Percent Finer	Spec. Percent	Complies
---	0.0269	75		
---	0.0176	69		
---	0.0105	62		
---	0.0078	58		
---	0.0056	52		
---	0.0041	48		
---	0.0029	42		
---	0.0014	31		

Coefficients

D_{85} = 0.0527 mm	D_{30} = N/A
D_{60} = 0.0090 mm	D_{15} = N/A
D_{50} = 0.0048 mm	D_{10} = N/A
C_u = N/A	C_c = N/A

Classification

ASTM Silty clay (CL-ML)

AASHTO Silty Soils (A-4 (3))

Sample / Test Description

Sand/Gravel Particle Shape : ---

Sand/Gravel Hardness : ---

Dispersion Device : Apparatus A - Mech Mixer

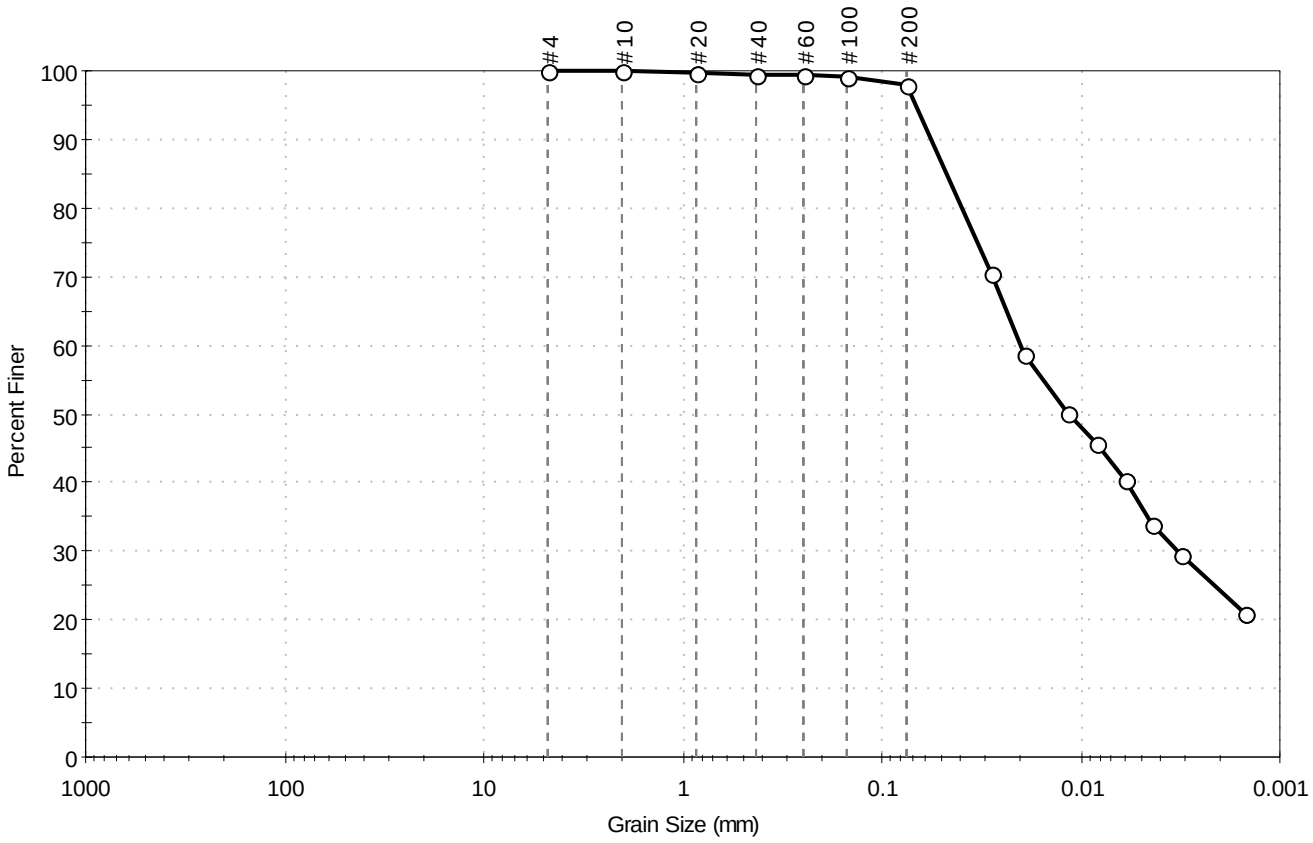
Dispersion Period : 1 minute

Specific Gravity : 2.65

Separation of Sample: #200 Sieve

Client:	AECOM				
Project:	Peirce Island Parking Lot				
Location:	Portsmouth, NH			Project No:	GTX-305372
Boring ID:	PB-2	Sample Type:	jar	Tested By:	GA
Sample ID:	S3	Test Date:	10/04/16	Checked By:	emm
Depth :	10-12 ft	Test Id:	392889		
Test Comment:	---				
Visual Description:	Moist, olive brown clay				
Sample Comment:	---				

Particle Size Analysis - ASTM D422



%Cobble	%Gravel	%Sand	%Silt & Clay Size
---	0.0	2.0	98.0

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
#4	4.75	100		
#10	2.00	100		
#20	0.85	100		
#40	0.42	99		
#60	0.25	99		
#100	0.15	99		
#200	0.075	98		
---	Particle Size (mm)	Percent Finer	Spec. Percent	Complies
---	0.0280	71		
---	0.0191	59		
---	0.0116	50		
---	0.0084	46		
---	0.0060	40		
---	0.0044	34		
---	0.0031	30		
---	0.0015	21		

Coefficients

D_{85} = 0.0471 mm	D_{30} = 0.0032 mm
D_{60} = 0.0199 mm	D_{15} = N/A
D_{50} = 0.0115 mm	D_{10} = N/A
C_u = N/A	C_c = N/A

Classification

ASTM Lean clay (CL)

AASHTO Clayey Soils (A-6 (16))

Sample / Test Description

Sand/Gravel Particle Shape : ---

Sand/Gravel Hardness : ---

Dispersion Device : Apparatus A - Mech Mixer

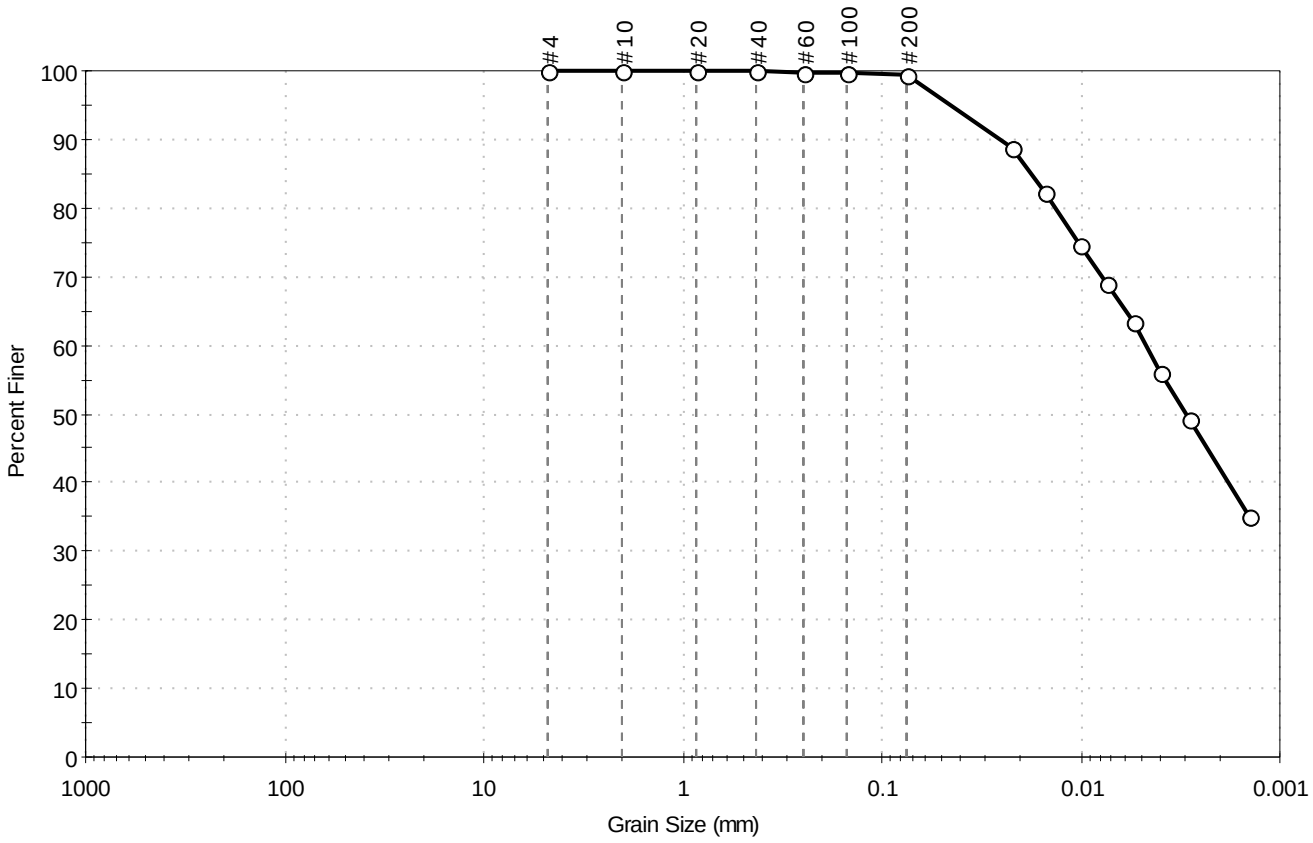
Dispersion Period : 1 minute

Specific Gravity : 2.65

Separation of Sample: #200 Sieve

Client:	AECOM				
Project:	Peirce Island Parking Lot				
Location:	Portsmouth, NH			Project No:	GTX-305372
Boring ID:	PB-3	Sample Type:	jar	Tested By:	GA
Sample ID:	S2	Test Date:	10/04/16	Checked By:	emm
Depth :	7-9 ft	Test Id:	392890		
Test Comment:	---				
Visual Description:	Moist, dark olive gray clay				
Sample Comment:	---				

Particle Size Analysis - ASTM D422



% Cobble	% Gravel	% Sand	% Silt & Clay Size
---	0.0	0.5	99.5

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
#4	4.75	100		
#10	2.00	100		
#20	0.85	100		
#40	0.42	100		
#60	0.25	100		
#100	0.15	100		
#200	0.075	99		
---	Particle Size (mm)	Percent Finer	Spec. Percent	Complies
---	0.0222	89		
---	0.0152	82		
---	0.0101	75		
---	0.0074	69		
---	0.0054	63		
---	0.0039	56		
---	0.0029	49		
---	0.0014	35		

Coefficients

D_{85} = 0.0177 mm	D_{30} = N/A
D_{60} = 0.0047 mm	D_{15} = N/A
D_{50} = 0.0030 mm	D_{10} = N/A
C_u = N/A	C_c = N/A

Classification

ASTM Lean clay (CL)

AASHTO Clayey Soils (A-6 (15))

Sample / Test Description

Sand/Gravel Particle Shape : ---

Sand/Gravel Hardness : ---

Dispersion Device : Apparatus A - Mech Mixer

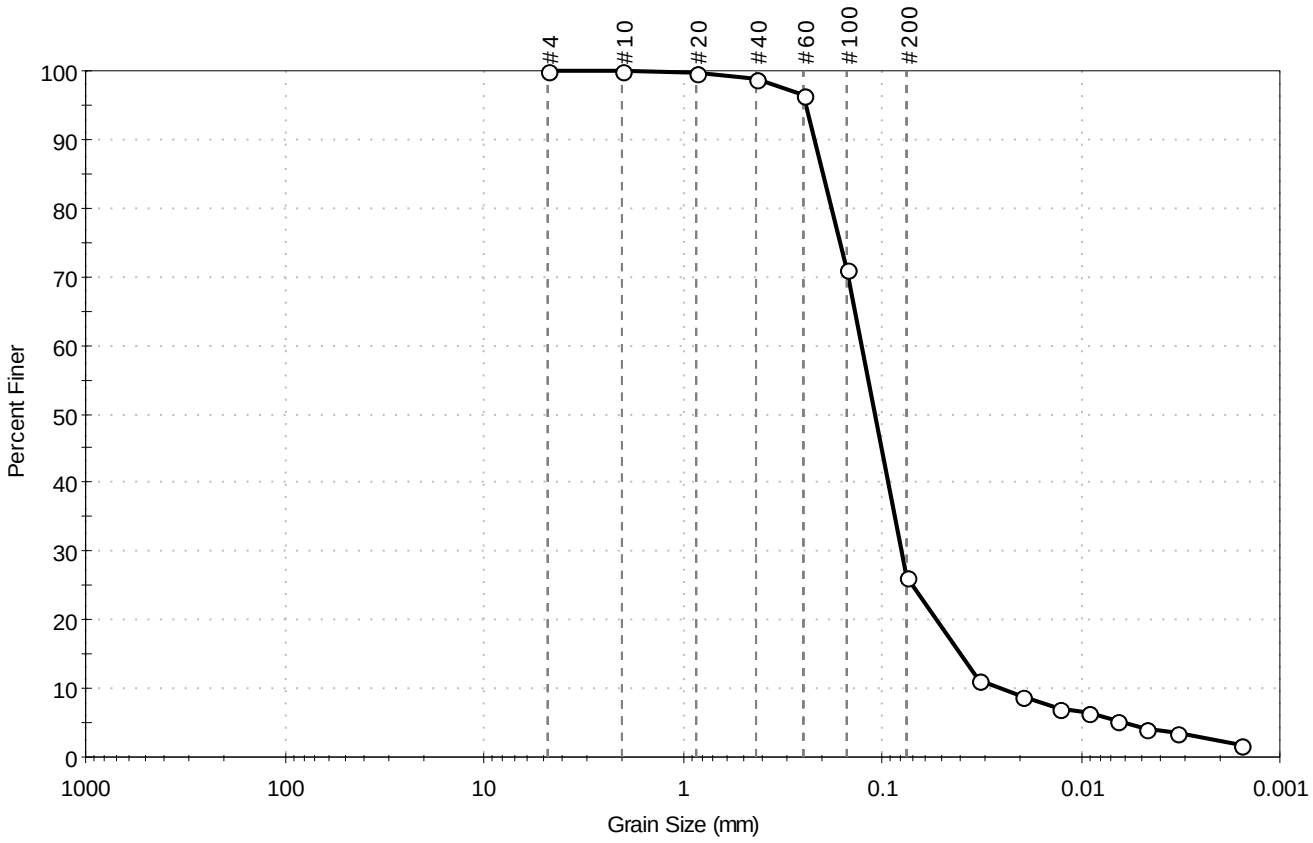
Dispersion Period : 1 minute

Specific Gravity : 2.65

Separation of Sample: #200 Sieve

Client:	AECOM				
Project:	Peirce Island Parking Lot				
Location:	Portsmouth, NH			Project No:	GTX-305372
Boring ID:	PB-3	Sample Type:	jar	Tested By:	GA
Sample ID:	S4	Test Date:	10/04/16	Checked By:	emm
Depth :	12-14 ft	Test Id:	392891		
Test Comment:	---				
Visual Description:	Moist, olive brown silty sand				
Sample Comment:	---				

Particle Size Analysis - ASTM D422



% Cobble	% Gravel	% Sand	% Silt & Clay Size
---	0.0	73.6	26.4

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
#4	4.75	100		
#10	2.00	100		
#20	0.85	100		
#40	0.42	99		
#60	0.25	96		
#100	0.15	71		
#200	0.075	26		
---	Particle Size (mm)	Percent Finer	Spec. Percent	Complies
---	0.0325	11		
---	0.0200	9		
---	0.0129	7		
---	0.0092	6		
---	0.0066	5		
---	0.0047	4		
---	0.0033	4		
---	0.0016	2		

Coefficients

D_{85} = 0.1987 mm	D_{30} = 0.0793 mm
D_{60} = 0.1264 mm	D_{15} = 0.0402 mm
D_{50} = 0.1082 mm	D_{10} = 0.0258 mm
C_u = 4.899	C_c = 1.928

Classification

ASTM Silty sand (SM)

AASHTO Silty Gravel and Sand (A-2-4 (0))

Sample / Test Description

Sand/Gravel Particle Shape : ---

Sand/Gravel Hardness : ---

Dispersion Device : Apparatus A - Mech Mixer

Dispersion Period : 1 minute

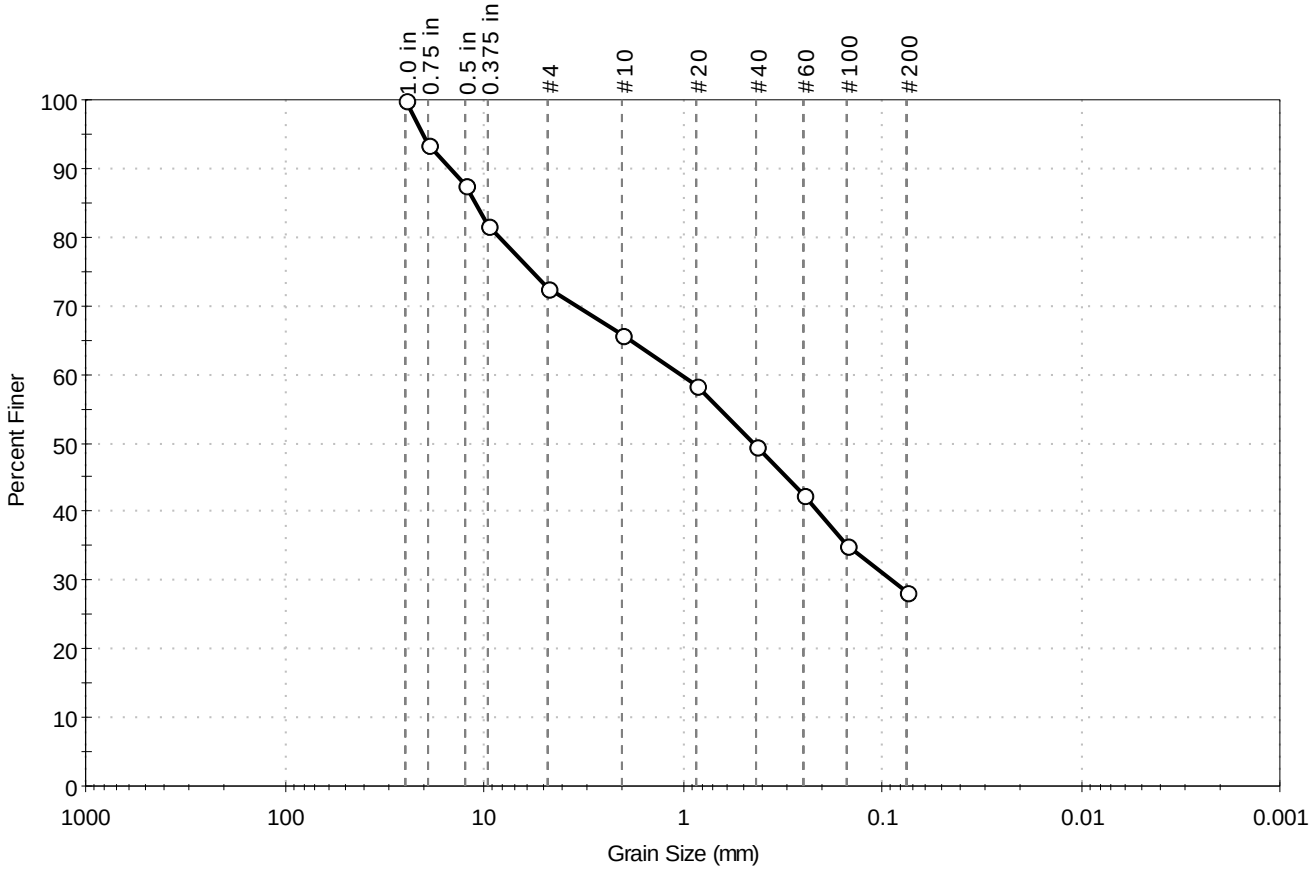
Specific Gravity : 2.65

Separation of Sample: #200 Sieve

Client:	AECOM				
Project:	Peirce Island Parking Lot				
Location:	Portsmouth, NH			Project No:	GTX-305372
Boring ID:	PB-4	Sample Type:	jar	Tested By:	GA
Sample ID:	auger 1+2	Test Date:	09/30/16	Checked By:	emm
Depth :	1-2.5 ft	Test Id:	392896		

Test Comment: ---
Visual Description: Moist, olive brown silty, clayey sand with gravel
Sample Comment: ---

Particle Size Analysis - ASTM D422



%Cobble	%Gravel	%Sand	%Silt & Clay Size
---	27.3	44.4	28.3

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
1.0 in	25.00	100		
0.75 in	19.00	93		
0.5 in	12.50	88		
0.375 in	9.50	82		
#4	4.75	73		
#10	2.00	66		
#20	0.85	58		
#40	0.42	50		
#60	0.25	43		
#100	0.15	35		
#200	0.075	28		

Coefficients

D_{85} = 11.1071 mm	D_{30} = 0.0895 mm
D_{60} = 1.0195 mm	D_{15} = N/A
D_{50} = 0.4379 mm	D_{10} = N/A
C_u = N/A	C_c = N/A

Classification

ASTM Silty, clayey sand with gravel (SC-SM)

AASHTO Silty Gravel and Sand (A-2-4 (0))

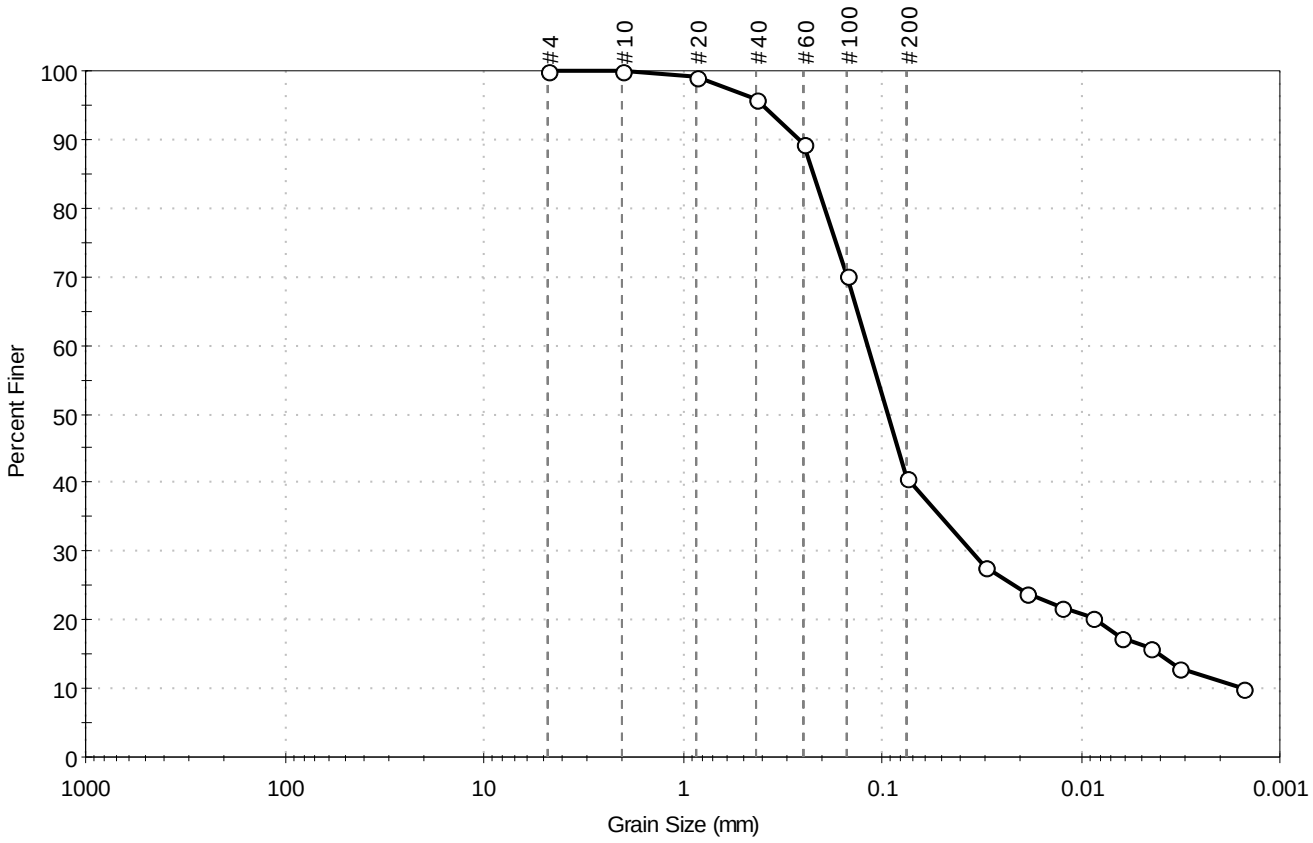
Sample / Test Description

Sand/Gravel Particle Shape : ANGULAR

Sand/Gravel Hardness : HARD

Client:	AECOM				
Project:	Peirce Island Parking Lot				
Location:	Portsmouth, NH			Project No:	GTX-305372
Boring ID:	PB-4	Sample Type:	jar	Tested By:	GA
Sample ID:	S4	Test Date:	10/04/16	Checked By:	emm
Depth :	7-9 ft	Test Id:	392892		
Test Comment:	---				
Visual Description:	Moist, olive brown clayey sand				
Sample Comment:	---				

Particle Size Analysis - ASTM D422



% Cobble	% Gravel	% Sand	% Silt & Clay Size
---	0.0	59.2	40.8

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
#4	4.75	100		
#10	2.00	100		
#20	0.85	99		
#40	0.42	96		
#60	0.25	89		
#100	0.15	70		
#200	0.075	41		
---	Particle Size (mm)	Percent Finer	Spec. Percent	Complies
---	0.0307	28		
---	0.0187	24		
---	0.0124	22		
---	0.0088	20		
---	0.0063	17		
---	0.0045	16		
---	0.0032	13		
---	0.0015	10		

Coefficients

D_{85} = 0.2230 mm	D_{30} = 0.0359 mm
D_{60} = 0.1182 mm	D_{15} = 0.0041 mm
D_{50} = 0.0933 mm	D_{10} = 0.0016 mm
C_u = 73.875	C_c = 6.815

Classification

ASTM Clayey sand (SC)

AASHTO Silty Soils (A-4 (1))

Sample / Test Description

Sand/Gravel Particle Shape : ---

Sand/Gravel Hardness : ---

Dispersion Device : Apparatus A - Mech Mixer

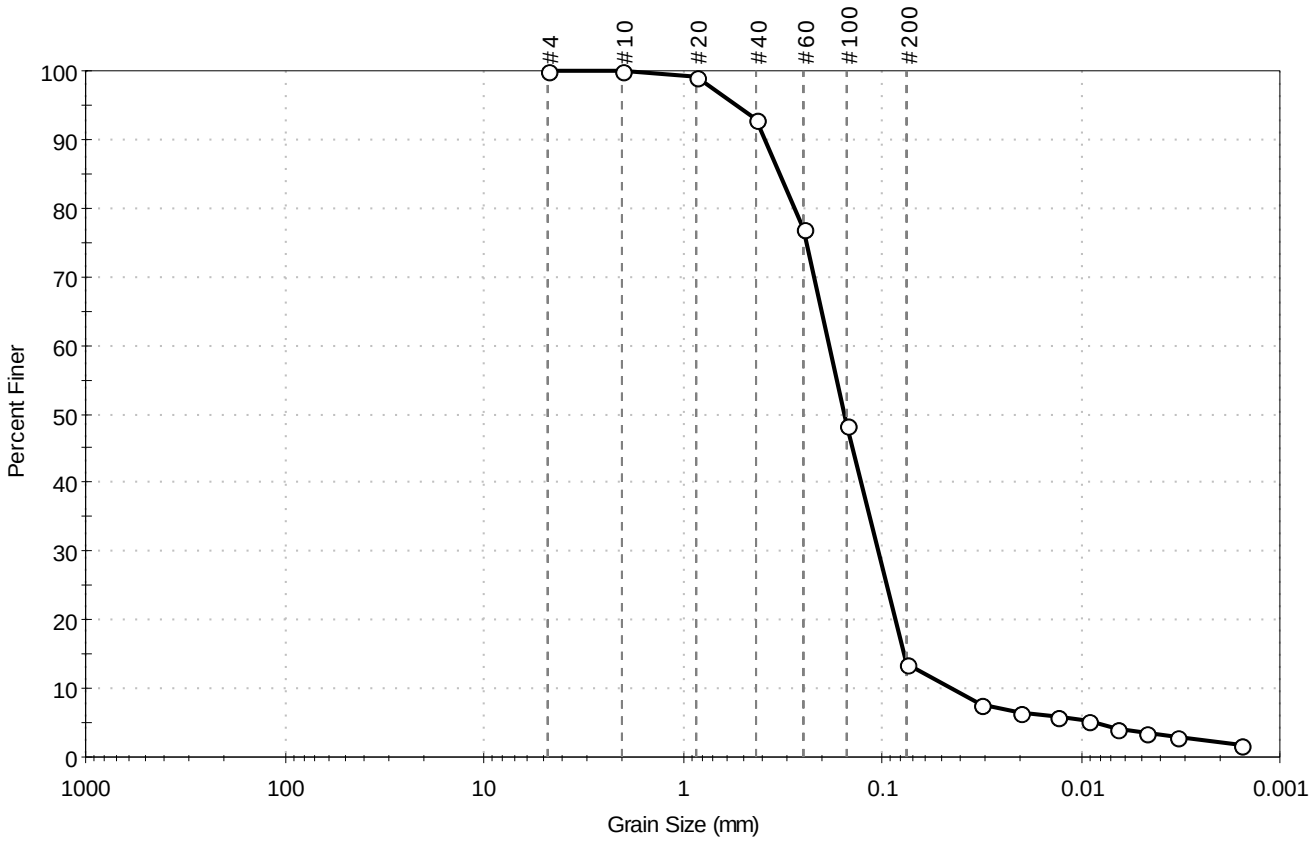
Dispersion Period : 1 minute

Specific Gravity : 2.65

Separation of Sample: #200 Sieve

Client:	AECOM				
Project:	Peirce Island Parking Lot				
Location:	Portsmouth, NH			Project No:	GTX-305372
Boring ID:	PB-4	Sample Type:	jar	Tested By:	GA
Sample ID:	S5	Test Date:	10/04/16	Checked By:	emm
Depth :	10-12 ft	Test Id:	392893		
Test Comment:	---				
Visual Description:	Moist, olive brown silty sand				
Sample Comment:	---				

Particle Size Analysis - ASTM D422



% Cobble	% Gravel	% Sand	% Silt & Clay Size
---	0.0	86.3	13.7

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
#4	4.75	100		
#10	2.00	100		
#20	0.85	99		
#40	0.42	93		
#60	0.25	77		
#100	0.15	48		
#200	0.075	14		
---	Particle Size (mm)	Percent Finer	Spec. Percent	Complies
---	0.0314	8		
---	0.0203	7		
---	0.0130	6		
---	0.0093	5		
---	0.0066	4		
---	0.0047	4		
---	0.0033	3		
---	0.0016	2		

Coefficients

D_{85} = 0.3271 mm	D_{30} = 0.1039 mm
D_{60} = 0.1847 mm	D_{15} = 0.0770 mm
D_{50} = 0.1544 mm	D_{10} = 0.0441 mm
C_u = 4.188	C_c = 1.325

Classification

ASTM Silty sand (SM)

AASHTO Silty Gravel and Sand (A-2-4 (0))

Sample / Test Description

Sand/Gravel Particle Shape : ---

Sand/Gravel Hardness : ---

Dispersion Device : Apparatus A - Mech Mixer

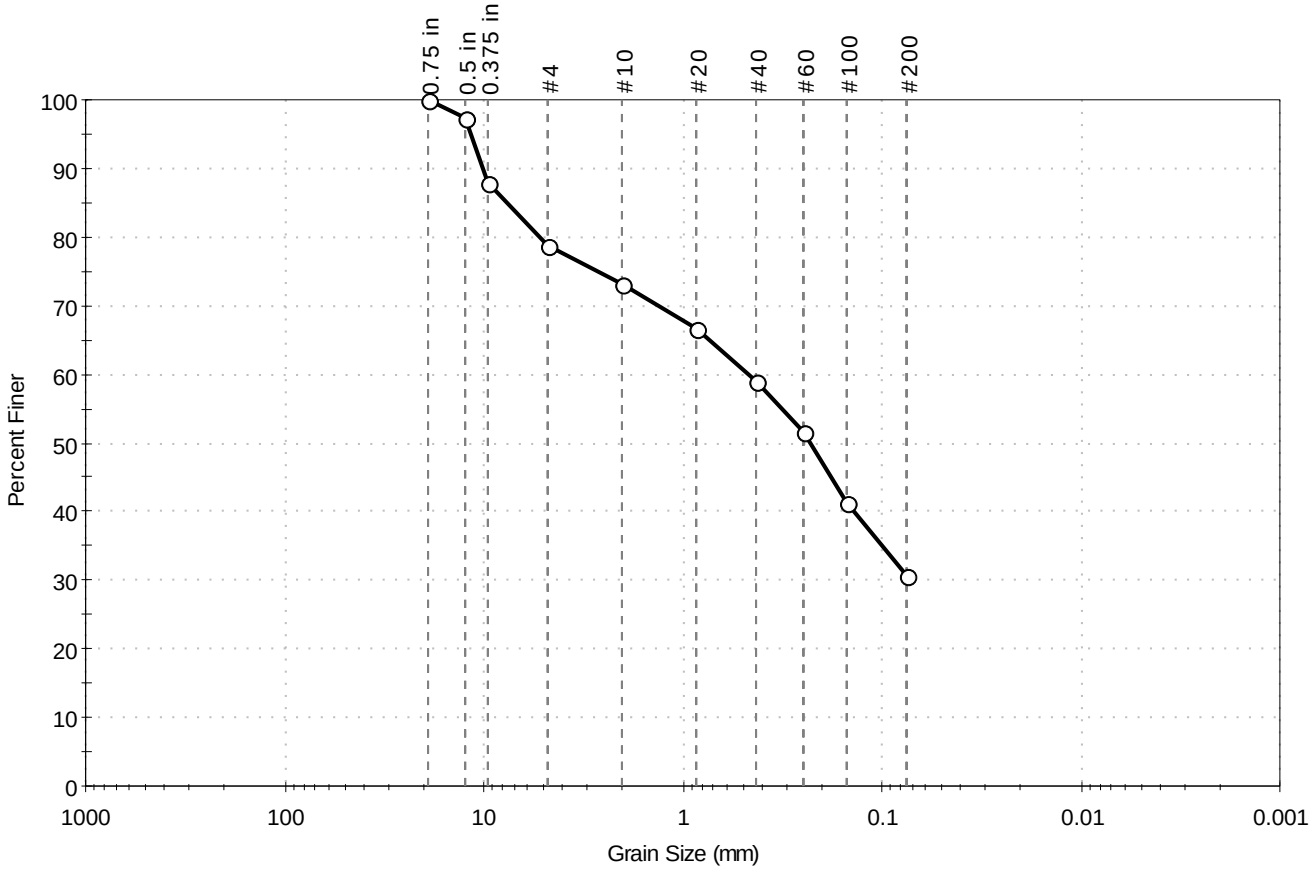
Dispersion Period : 1 minute

Specific Gravity : 2.65

Separation of Sample: #200 Sieve

Client:	AECOM				
Project:	Peirce Island Parking Lot				
Location:	Portsmouth, NH			Project No:	GTX-305372
Boring ID:	PB-5	Sample Type:	jar	Tested By:	GA
Sample ID:	auger 1-3	Test Date:	09/30/16	Checked By:	emm
Depth :	1-5.5 ft	Test Id:	392897		
Test Comment:	---				
Visual Description:	Moist, olive brown silty, clayey sand with gravel				
Sample Comment:	---				

Particle Size Analysis - ASTM D422



%Cobble	%Gravel	%Sand	%Silt & Clay Size
---	21.1	48.1	30.8

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
0.75 in	19.00	100		
0.5 in	12.50	97		
0.375 in	9.50	88		
#4	4.75	79		
#10	2.00	73		
#20	0.85	67		
#40	0.42	59		
#60	0.25	52		
#100	0.15	41		
#200	0.075	31		

Coefficients

D_{85} = 7.5517 mm	D_{30} = N/A
D_{60} = 0.4648 mm	D_{15} = N/A
D_{50} = 0.2299 mm	D_{10} = N/A
C_u = N/A	C_c = N/A

Classification

ASTM Silty, clayey sand with gravel (SC-SM)

AASHTO Silty Gravel and Sand (A-2-4 (0))

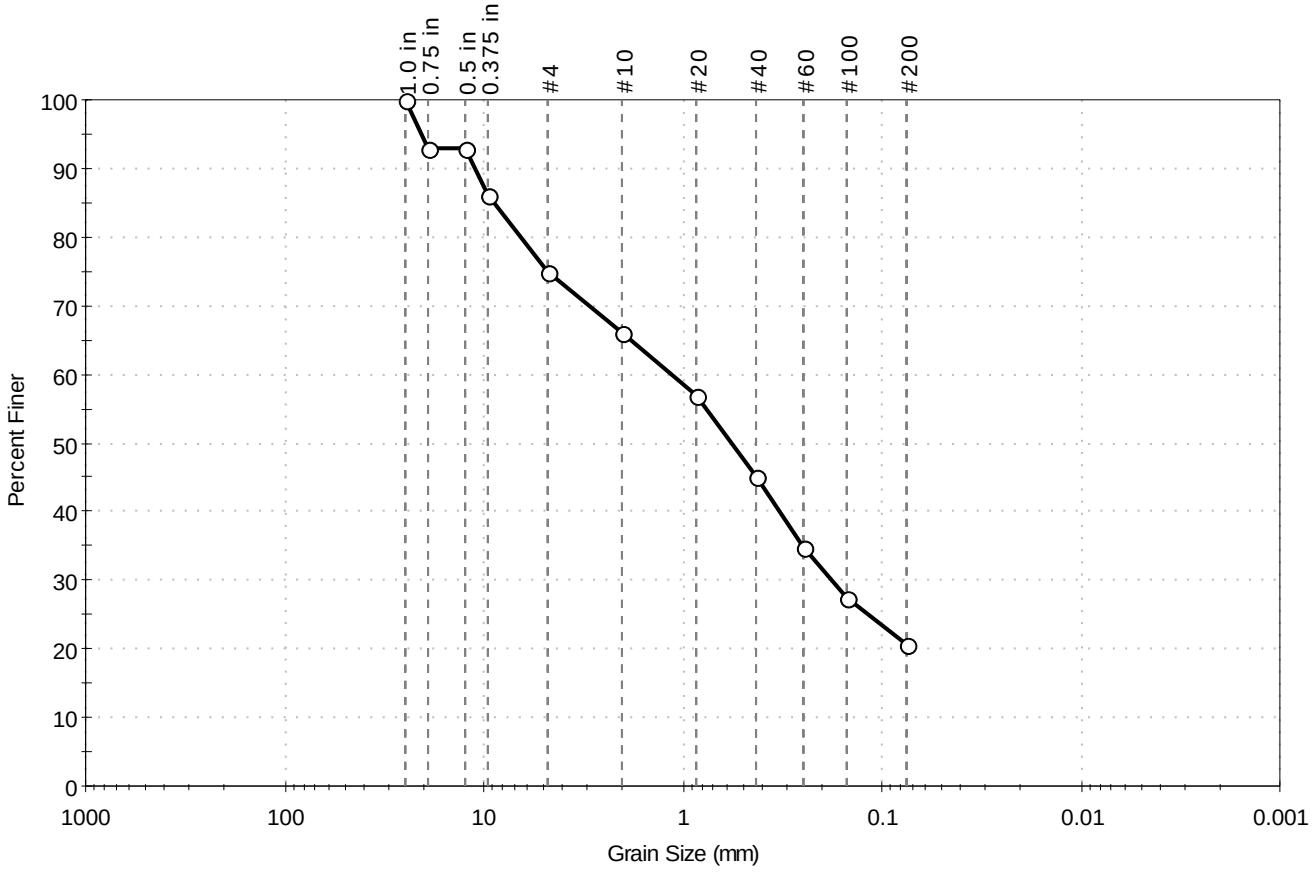
Sample / Test Description

Sand/Gravel Particle Shape : ANGULAR

Sand/Gravel Hardness : HARD

Client:	AECOM				
Project:	Peirce Island Parking Lot				
Location:	Portsmouth, NH			Project No:	GTX-305372
Boring ID:	PB-6	Sample Type:	jar	Tested By:	GA
Sample ID:	auger 1-2	Test Date:	09/30/16	Checked By:	emm
Depth :	1-2.5 ft	Test Id:	392898		
Test Comment:	---				
Visual Description:	Moist, dark olive brown silty sand with gravel				
Sample Comment:	---				

Particle Size Analysis - ASTM D422



%Cobble	%Gravel	%Sand	%Silt & Clay Size
---	24.9	54.4	20.7

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
1.0 in	25.00	100		
0.75 in	19.00	93		
0.5 in	12.50	93		
0.375 in	9.50	86		
#4	4.75	75		
#10	2.00	66		
#20	0.85	57		
#40	0.42	45		
#60	0.25	35		
#100	0.15	27		
#200	0.075	21		

Coefficients

D_{85} = 8.8207 mm	D_{30} = 0.1788 mm
D_{60} = 1.1334 mm	D_{15} = N/A
D_{50} = 0.5670 mm	D_{10} = N/A
C_u = N/A	C_c = N/A

Classification

ASTM — Silty sand with gravel (SM)

AASHTO — Stone Fragments, Gravel and Sand (A-1-b (0))

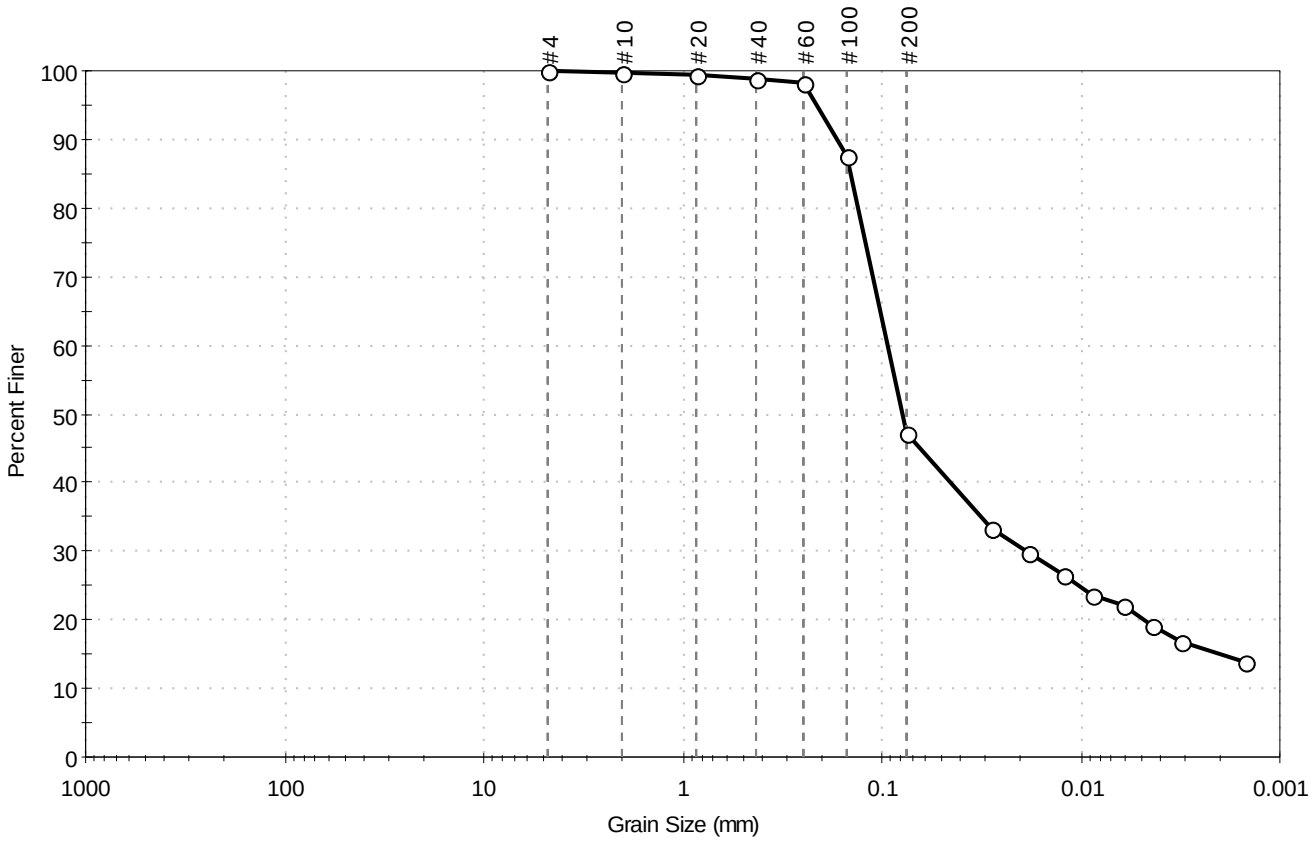
Sample / Test Description

Sand/Gravel Particle Shape : ANGULAR

Sand/Gravel Hardness : HARD

Client:	AECOM				
Project:	Peirce Island Parking Lot				
Location:	Portsmouth, NH			Project No:	GTX-305372
Boring ID:	PB-6	Sample Type:	jar	Tested By:	GA
Sample ID:	S4	Test Date:	10/04/16	Checked By:	emm
Depth :	7-9 ft	Test Id:	392894		
Test Comment:	---				
Visual Description:	Moist, olive brown silty sand				
Sample Comment:	---				

Particle Size Analysis - ASTM D422



% Cobble	% Gravel	% Sand	% Silt & Clay Size
---	0.0	52.8	47.2

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
#4	4.75	100		
#10	2.00	100		
#20	0.85	99		
#40	0.42	99		
#60	0.25	98		
#100	0.15	88		
#200	0.075	47		
---	Particle Size (mm)	Percent Finer	Spec. Percent	Complies
---	0.0285	33		
---	0.0185	30		
---	0.0121	27		
---	0.0087	24		
---	0.0062	22		
---	0.0044	19		
---	0.0032	17		
---	0.0015	14		

Coefficients

D_{85} = 0.1432 mm	D_{30} = 0.0192 mm
D_{60} = 0.0933 mm	D_{15} = 0.0020 mm
D_{50} = 0.0786 mm	D_{10} = N/A
C_u = N/A	C_c = N/A

Classification

ASTM Silty sand (SM)

AASHTO Silty Soils (A-4 (0))

Sample / Test Description

Sand/Gravel Particle Shape : ---

Sand/Gravel Hardness : ---

Dispersion Device : Apparatus A - Mech Mixer

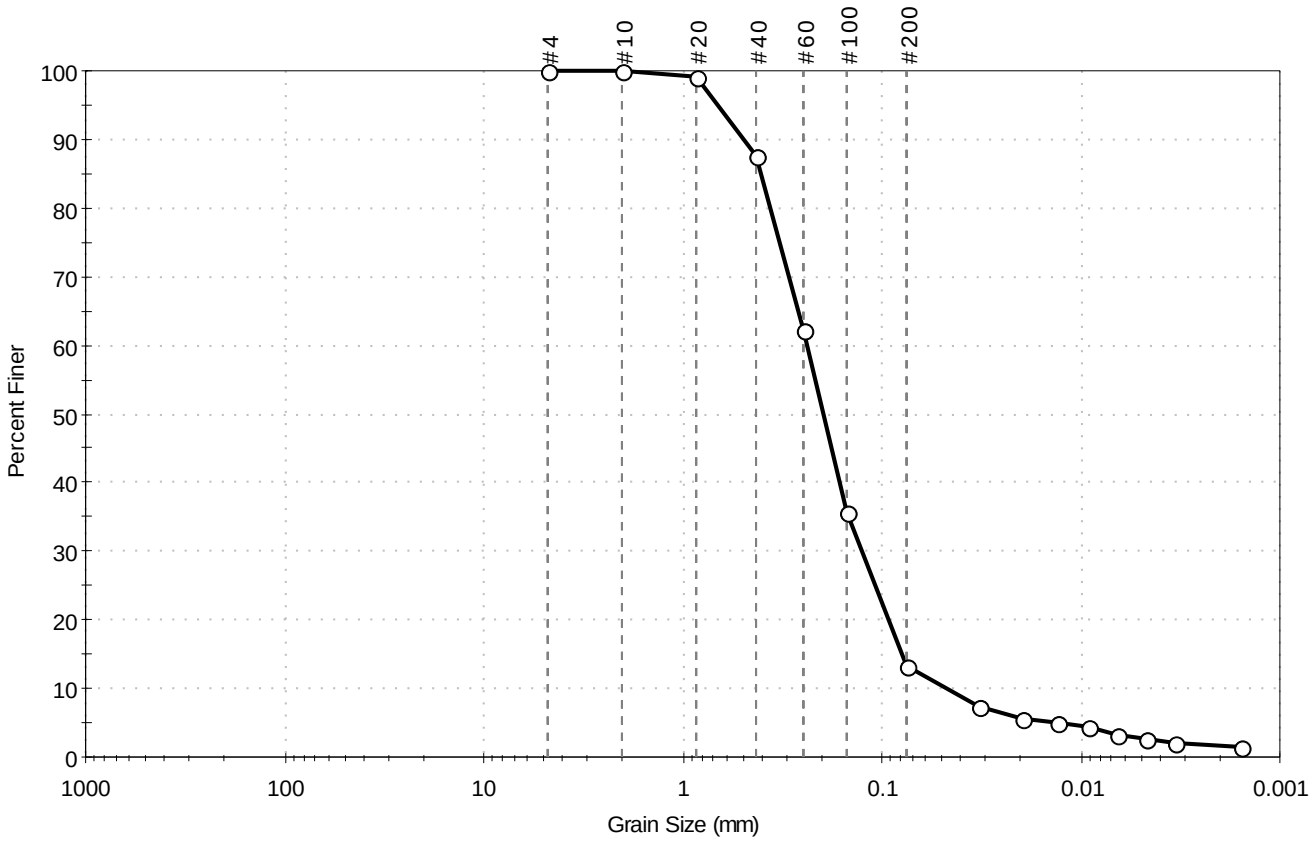
Dispersion Period : 1 minute

Specific Gravity : 2.65

Separation of Sample: #200 Sieve

Client:	AECOM				
Project:	Peirce Island Parking Lot				
Location:	Portsmouth, NH			Project No:	GTX-305372
Boring ID:	PB-6	Sample Type:	jar	Tested By:	GA
Sample ID:	S5	Test Date:	10/04/16	Checked By:	emm
Depth :	10-12 ft	Test Id:	392895		
Test Comment:	---				
Visual Description:	Moist, yellowish brown silty sand				
Sample Comment:	---				

Particle Size Analysis - ASTM D422



% Cobble	% Gravel	% Sand	% Silt & Clay Size
---	0.0	86.8	13.2

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
#4	4.75	100		
#10	2.00	100		
#20	0.85	99		
#40	0.42	88		
#60	0.25	62		
#100	0.15	36		
#200	0.075	13		
---	Particle Size (mm)	Percent Finer	Spec. Percent	Complies
---	0.0324	7		
---	0.0197	6		
---	0.0131	5		
---	0.0093	4		
---	0.0066	3		
---	0.0047	3		
---	0.0033	2		
---	0.0016	1		

Coefficients

D_{85} = 0.4023 mm	D_{30} = 0.1257 mm
D_{60} = 0.2393 mm	D_{15} = 0.0793 mm
D_{50} = 0.1974 mm	D_{10} = 0.0476 mm
C_u = 5.027	C_c = 1.387

Classification

ASTM Silty sand (SM)

AASHTO Silty Gravel and Sand (A-2-4 (0))

Sample / Test Description

Sand/Gravel Particle Shape : ---

Sand/Gravel Hardness : ---

Dispersion Device : Apparatus A - Mech Mixer

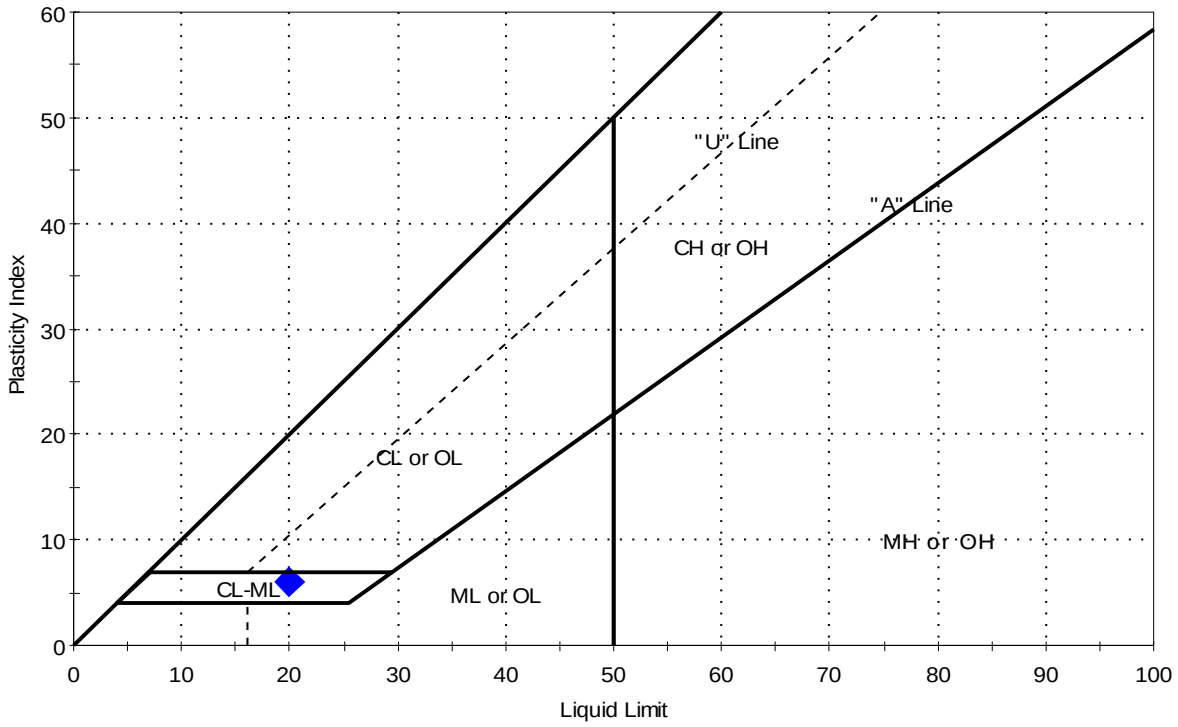
Dispersion Period : 1 minute

Specific Gravity : 2.65

Separation of Sample: #200 Sieve

Client:	AECOM				
Project:	Peirce Island Parking Lot				
Location:	Portsmouth, NH			Project No:	GTX-305372
Boring ID:	PB-1	Sample Type:	jar	Tested By:	GA
Sample ID:	S4	Test Date:	09/30/16	Checked By:	emm
Depth :	10-12 ft	Test Id:	392853		
Test Comment:	---				
Visual Description:	Moist, dark gray silty clay				
Sample Comment:	---				

Atterberg Limits - ASTM D4318



Symbol	Sample ID	Boring	Depth	Natural Moisture Content, %	Liquid Limit	Plastic Limit	Plasticity Index	Liquidity Index	Soil Classification
◆	S4	PB-1	10-12 ft	30	20	14	6	2.6	Silty clay (CL-ML)

Sample Prepared using the WET method

1% Retained on #40 Sieve

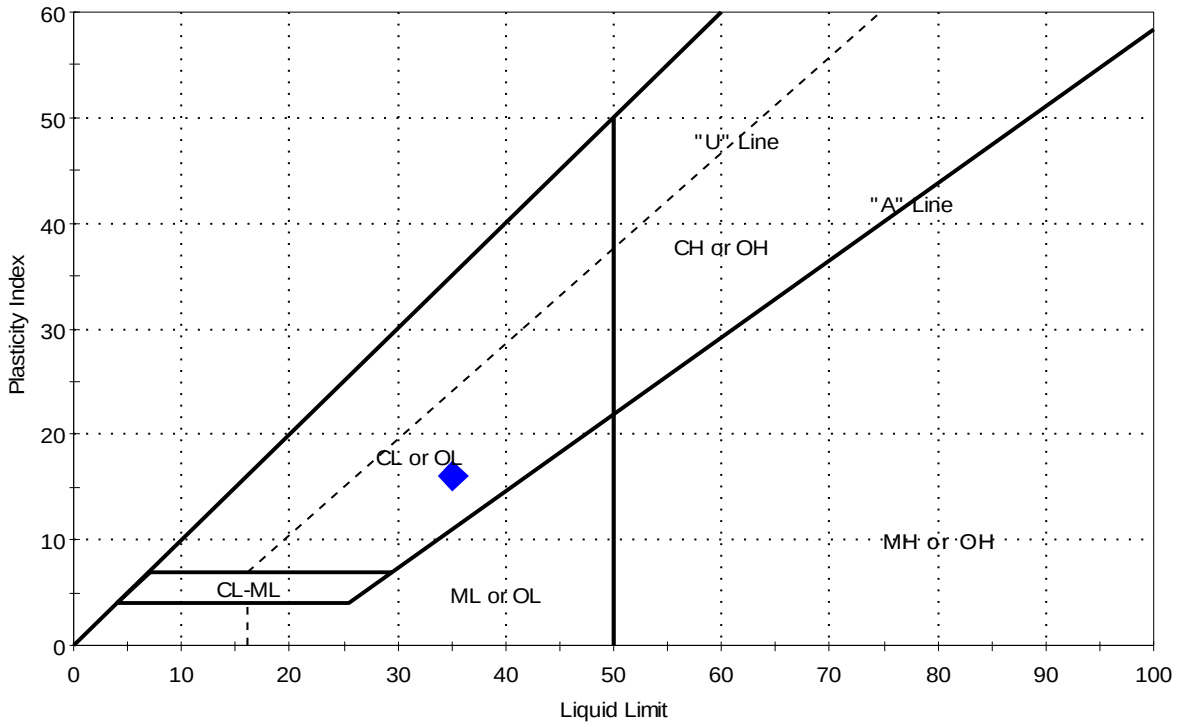
Dry Strength: VERY HIGH

Dilatancy: SLOW

Toughness: MEDIUM

Client:	AECOM				
Project:	Peirce Island Parking Lot				
Location:	Portsmouth, NH			Project No:	GTX-305372
Boring ID:	PB-2	Sample Type:	jar	Tested By:	GA
Sample ID:	S3	Test Date:	09/30/16	Checked By:	emm
Depth :	10-12 ft	Test Id:	392854		
Test Comment:	---				
Visual Description:	Moist, olive brown clay				
Sample Comment:	---				

Atterberg Limits - ASTM D4318



Symbol	Sample ID	Boring	Depth	Natural Moisture Content, %	Liquid Limit	Plastic Limit	Plasticity Index	Liquidity Index	Soil Classification
◆	S3	PB-2	10-12 ft	28	35	19	16	0.6	Lean clay (CL)

Sample Prepared using the WET method

1% Retained on #40 Sieve

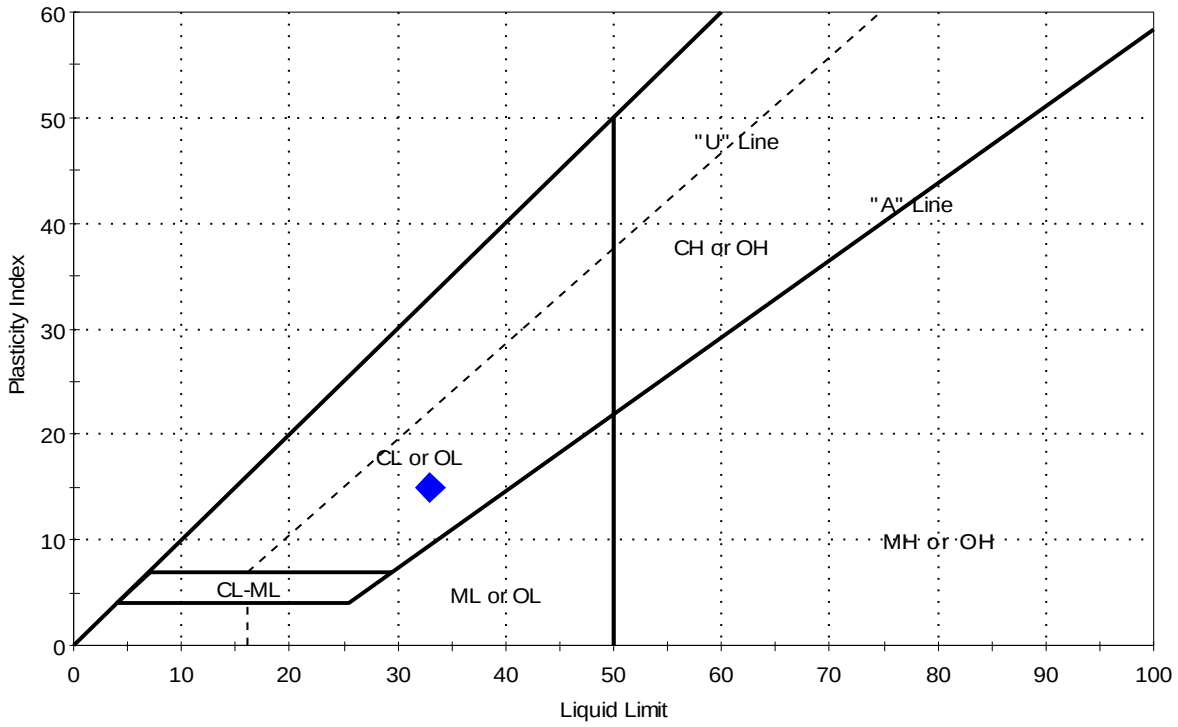
Dry Strength: VERY HIGH

Dilatancy: NONE

Toughness: MEDIUM

Client:	AECOM				
Project:	Peirce Island Parking Lot				
Location:	Portsmouth, NH			Project No:	GTX-305372
Boring ID:	PB-3	Sample Type:	jar	Tested By:	GA
Sample ID:	S2	Test Date:	09/30/16	Checked By:	emm
Depth :	7-9 ft	Test Id:	392855		
Test Comment:	---				
Visual Description:	Moist, dark olive gray clay				
Sample Comment:	---				

Atterberg Limits - ASTM D4318



Symbol	Sample ID	Boring	Depth	Natural Moisture Content, %	Liquid Limit	Plastic Limit	Plasticity Index	Liquidity Index	Soil Classification
◆	S2	PB-3	7-9 ft	36	33	18	15	1.2	Lean clay (CL)

Sample Prepared using the WET method

0% Retained on #40 Sieve

Dry Strength: VERY HIGH

Dilatancy: SLOW

Toughness: MEDIUM

Client:	AECOM				
Project:	Peirce Island Parking Lot				
Location:	Portsmouth, NH			Project No:	GTX-305372
Boring ID:	PB-3	Sample Type:	jar	Tested By:	GA
Sample ID:	S4	Test Date:	09/29/16	Checked By:	emm
Depth :	12-14 ft	Test Id:	392856		
Test Comment:	---				
Visual Description:	Moist, olive brown silty sand				
Sample Comment:	---				

Atterberg Limits - ASTM D4318

Sample Determined to be non-plastic

Symbol	Sample ID	Boring	Depth	Natural Moisture Content, %	Liquid Limit	Plastic Limit	Plasticity Index	Liquidity Index	Soil Classification
◆	S4	PB-3	12-14 ft	22	n/a	n/a	n/a	n/a	Silty sand (SM)

1% Retained on #40 Sieve

Dry Strength: NONE

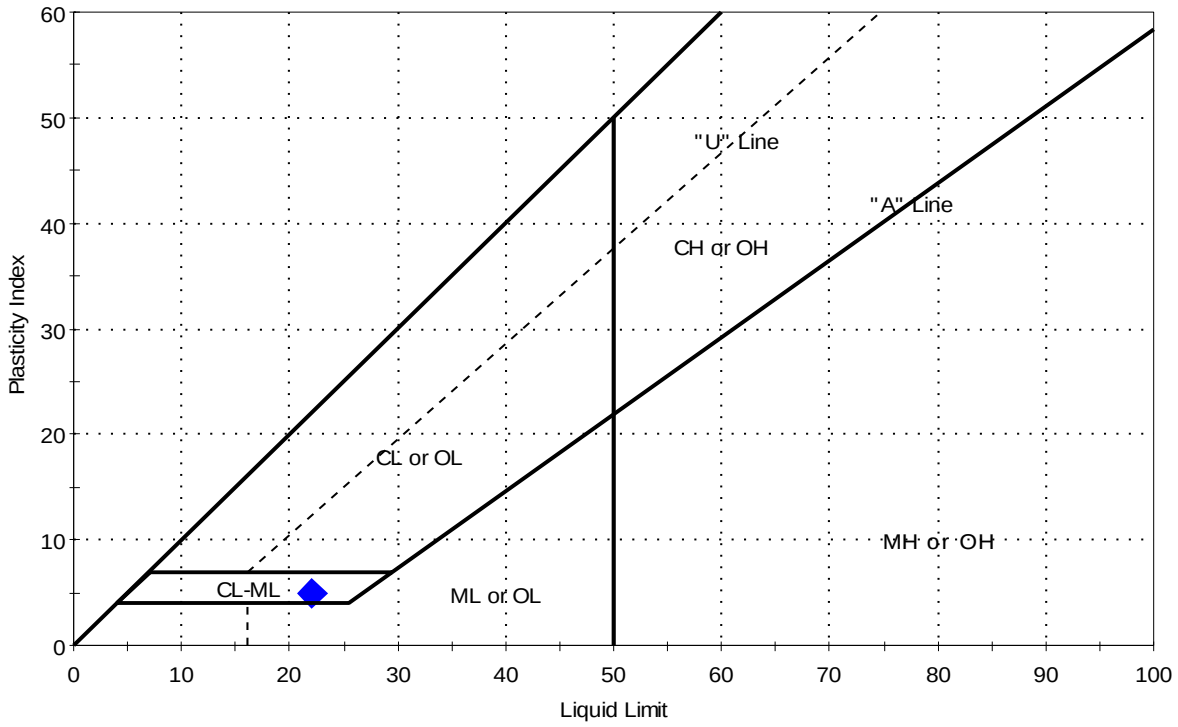
Dilatancy: RAPID

Toughness: n/a

The sample was determined to be Non-Plastic

Client:	AECOM				
Project:	Peirce Island Parking Lot				
Location:	Portsmouth, NH			Project No:	GTX-305372
Boring ID:	PB-4	Sample Type:	jar	Tested By:	GA
Sample ID:	auger 1+2	Test Date:	09/30/16	Checked By:	emm
Depth :	1-2.5 ft	Test Id:	392857		
Test Comment:	---				
Visual Description:	Moist, olive brown silty, clayey sand with gravel				
Sample Comment:	---				

Atterberg Limits - ASTM D4318



Symbol	Sample ID	Boring	Depth	Natural Moisture Content, %	Liquid Limit	Plastic Limit	Plasticity Index	Liquidity Index	Soil Classification
◆	auger 1+2	PB-4	1-2.5 ft	8	22	17	5	-1.7	Silty, clayey sand with gravel (SC-SM)

Sample Prepared using the WET method

50% Retained on #40 Sieve

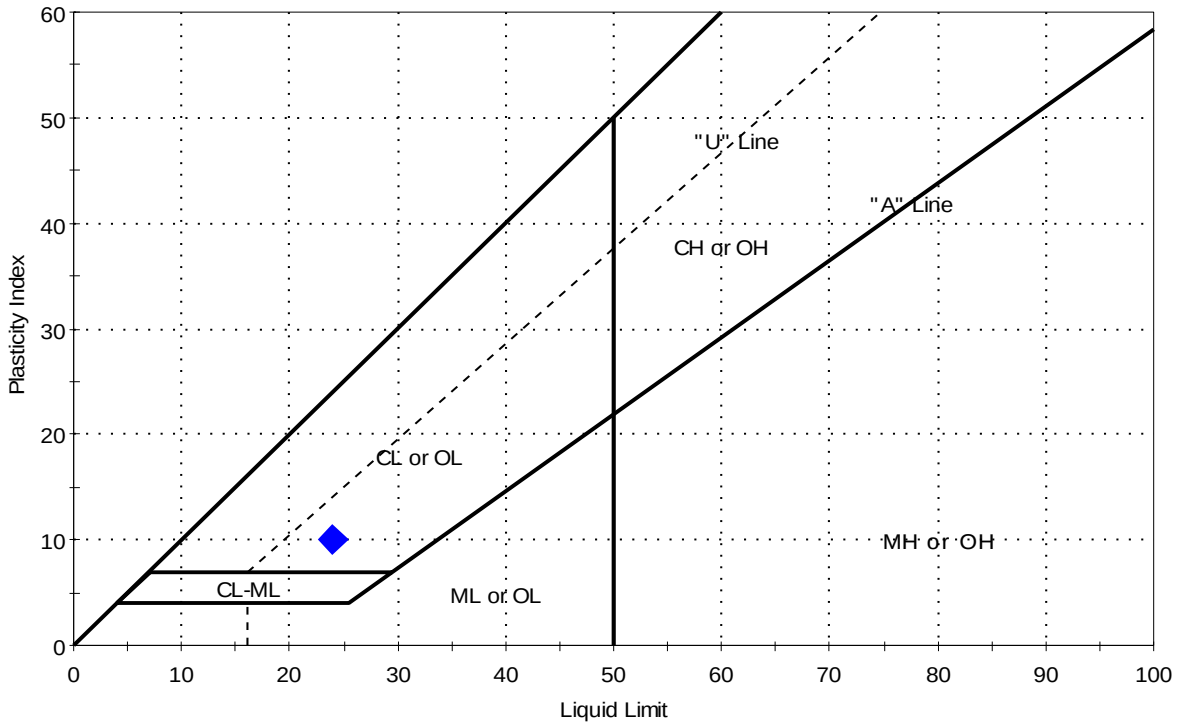
Dry Strength: VERY HIGH

Dilatancy: SLOW

Toughness: MEDIUM

Client:	AECOM				
Project:	Peirce Island Parking Lot				
Location:	Portsmouth, NH			Project No:	GTX-305372
Boring ID:	PB-4	Sample Type:	jar	Tested By:	GA
Sample ID:	S4	Test Date:	09/30/16	Checked By:	emm
Depth :	7-9 ft	Test Id:	392858		
Test Comment:	---				
Visual Description:	Moist, olive brown clayey sand				
Sample Comment:	---				

Atterberg Limits - ASTM D4318



Symbol	Sample ID	Boring	Depth	Natural Moisture Content, %	Liquid Limit	Plastic Limit	Plasticity Index	Liquidity Index	Soil Classification
◆	S4	PB-4	7-9 ft	22	24	14	10	0.8	Clayey sand (SC)

Sample Prepared using the WET method

4% Retained on #40 Sieve

Dry Strength: VERY HIGH

Dilatancy: NONE

Toughness: MEDIUM

Client:	AECOM				
Project:	Peirce Island Parking Lot				
Location:	Portsmouth, NH			Project No:	GTX-305372
Boring ID:	PB-4	Sample Type:	jar	Tested By:	GA
Sample ID:	S5	Test Date:	09/29/16	Checked By:	emm
Depth :	10-12 ft	Test Id:	392859		
Test Comment:	---				
Visual Description:	Moist, olive brown silty sand				
Sample Comment:	---				

Atterberg Limits - ASTM D4318

Sample Determined to be non-plastic

Symbol	Sample ID	Boring	Depth	Natural Moisture Content, %	Liquid Limit	Plastic Limit	Plasticity Index	Liquidity Index	Soil Classification
◆	S5	PB-4	10-12 ft	21	n/a	n/a	n/a	n/a	Silty sand (SM)

7% Retained on #40 Sieve

Dry Strength: NONE

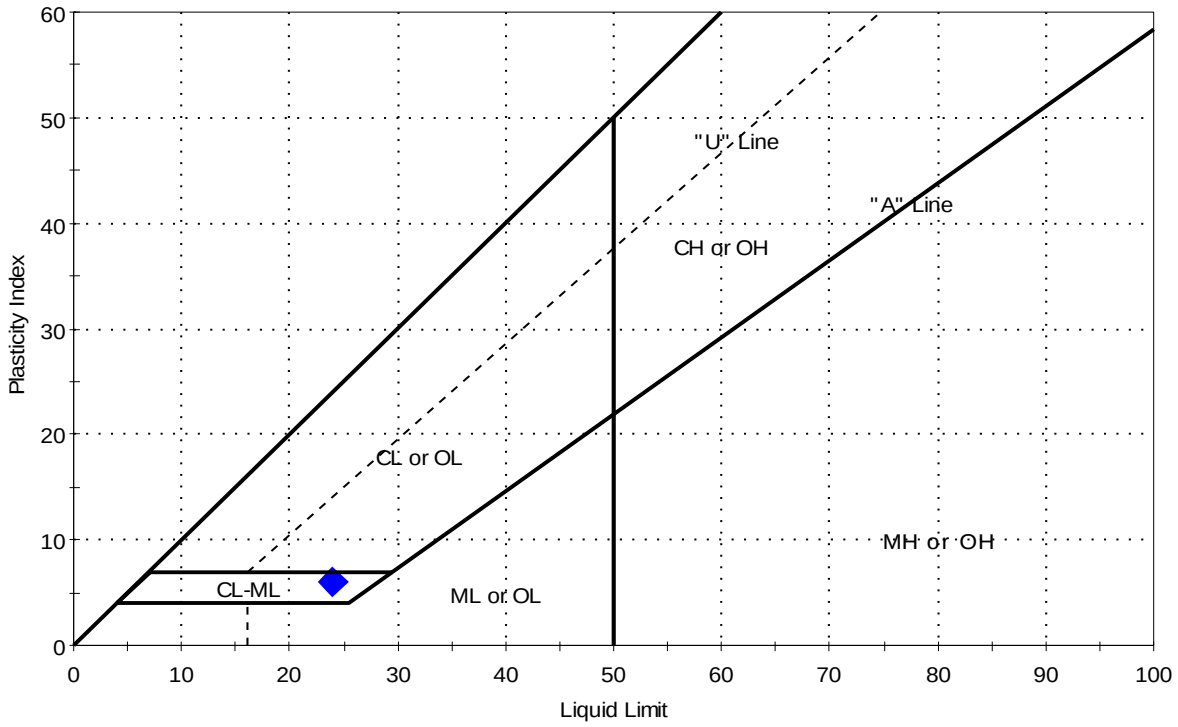
Dilatancy: RAPID

Toughness: n/a

The sample was determined to be Non-Plastic

Client:	AECOM				
Project:	Peirce Island Parking Lot				
Location:	Portsmouth, NH			Project No:	GTX-305372
Boring ID:	PB-5	Sample Type:	jar	Tested By:	GA
Sample ID:	auger 1-3	Test Date:	09/30/16	Checked By:	emm
Depth :	1-5.5 ft	Test Id:	392860		
Test Comment:	---				
Visual Description:	Moist, olive brown silty, clayey sand with gravel				
Sample Comment:	---				

Atterberg Limits - ASTM D4318



Symbol	Sample ID	Boring	Depth	Natural Moisture Content, %	Liquid Limit	Plastic Limit	Plasticity Index	Liquidity Index	Soil Classification
◆	auger 1-3	PB-5	1-5.5 ft	10	24	18	6	-1.3	Silty, clayey sand with gravel (SC-SM)

Sample Prepared using the WET method

41% Retained on #40 Sieve

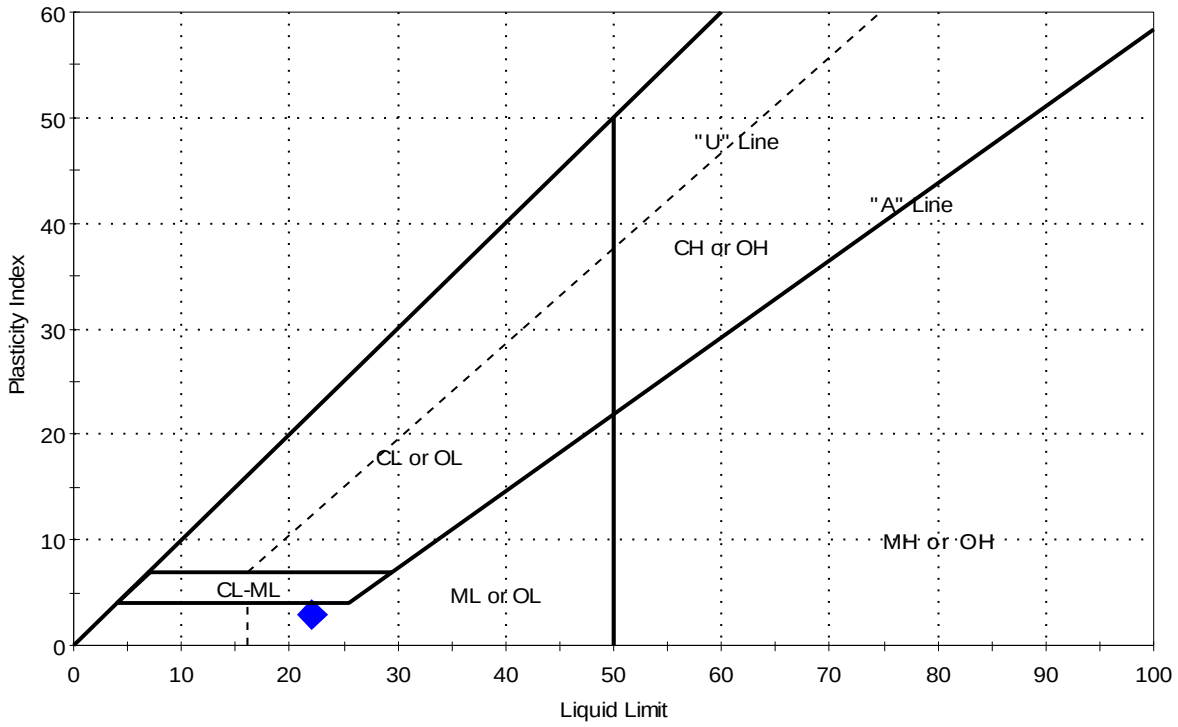
Dry Strength: MEDIUM

Dilatancy: SLOW

Toughness: MEDIUM

Client:	AECOM				
Project:	Peirce Island Parking Lot				
Location:	Portsmouth, NH			Project No:	GTX-305372
Boring ID:	PB-6	Sample Type:	jar	Tested By:	GA
Sample ID:	auger 1-2	Test Date:	09/30/16	Checked By:	emm
Depth :	1-2.5 ft	Test Id:	392861		
Test Comment:	---				
Visual Description:	Moist, dark olive brown silty sand with gravel				
Sample Comment:	---				

Atterberg Limits - ASTM D4318



Symbol	Sample ID	Boring	Depth	Natural Moisture Content, %	Liquid Limit	Plastic Limit	Plasticity Index	Liquidity Index	Soil Classification
◆	auger 1-2	PB-6	1-2.5 ft	8	22	19	3	-3.8	Silty sand with gravel (SM)

Sample Prepared using the WET method
55% Retained on #40 Sieve
Dry Strength: HIGH
Dilatancy: SLOW
Toughness: MEDIUM

Client:	AECOM				
Project:	Peirce Island Parking Lot				
Location:	Portsmouth, NH			Project No:	GTX-305372
Boring ID:	PB-6	Sample Type:	jar	Tested By:	GA
Sample ID:	S4	Test Date:	09/30/16	Checked By:	emm
Depth :	7-9 ft	Test Id:	392862		
Test Comment:	---				
Visual Description:	Moist, olive brown silty sand				
Sample Comment:	---				

Atterberg Limits - ASTM D4318

Sample Determined to be non-plastic

Symbol	Sample ID	Boring	Depth	Natural Moisture Content, %	Liquid Limit	Plastic Limit	Plasticity Index	Liquidity Index	Soil Classification
◆	S4	PB-6	7-9 ft	23	n/a	n/a	n/a	n/a	Silty sand (SM)

1% Retained on #40 Sieve

Dry Strength: NONE

Dilatancy: RAPID

Toughness: n/a

The sample was determined to be Non-Plastic

Client:	AECOM				
Project:	Peirce Island Parking Lot				
Location:	Portsmouth, NH			Project No:	GTX-305372
Boring ID:	PB-6	Sample Type:	jar	Tested By:	GA
Sample ID:	S5	Test Date:	09/29/16	Checked By:	emm
Depth :	10-12 ft	Test Id:	392863		
Test Comment:	---				
Visual Description:	Moist, yellowish brown silty sand				
Sample Comment:	---				

Atterberg Limits - ASTM D4318

Sample Determined to be non-plastic

Symbol	Sample ID	Boring	Depth	Natural Moisture Content, %	Liquid Limit	Plastic Limit	Plasticity Index	Liquidity Index	Soil Classification
◆	S5	PB-6	10-12 ft	20	n/a	n/a	n/a	n/a	Silty sand (SM)

12% Retained on #40 Sieve

Dry Strength: NONE

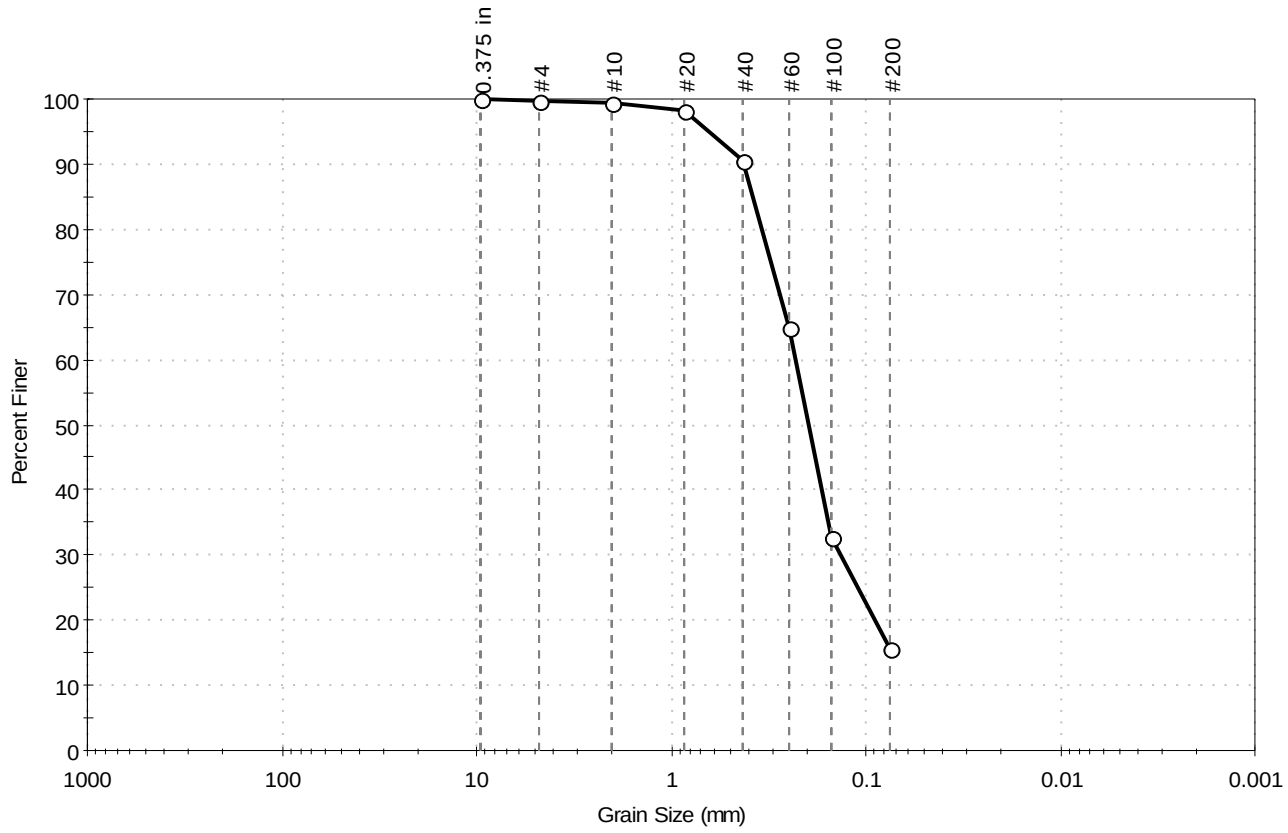
Dilatancy: RAPID

Toughness: n/a

The sample was determined to be Non-Plastic

Client:	AECOM				
Project:	Portsmouth, NH WWTP Upgrades				
Location:	Pierce Island, NH			Project No:	GTX-301103
Boring ID:	B13-5	Sample Type:	jar	Tested By:	jbr
Sample ID:	SS-2	Test Date:	10/30/13	Checked By:	jdt
Depth :	5-7 ft	Test Id:	280024		
Test Comment:	---				
Sample Description:	Moist, light grayish brown silty sand				
Sample Comment:	---				

Particle Size Analysis - ASTM D422



%Cobble	%Gravel	%Sand	%Silt & Clay Size
---	0.1	84.2	15.7

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
0.375 in	9.50	100		
#4	4.75	100		
#10	2.00	99		
#20	0.85	98		
#40	0.42	91		
#60	0.25	65		
#100	0.15	33		
#200	0.075	16		

Coefficients

D_{85} = 0.3783 mm	D_{30} = 0.1348 mm
D_{60} = 0.2312 mm	D_{15} = N/A
D_{50} = 0.1974 mm	D_{10} = N/A
C_u = N/A	C_c = N/A

Classification

ASTM N/A

AASHTO Silty Gravel and Sand (A-2-4 (0))

Sample/Test Description

Sand/Gravel Particle Shape : ---

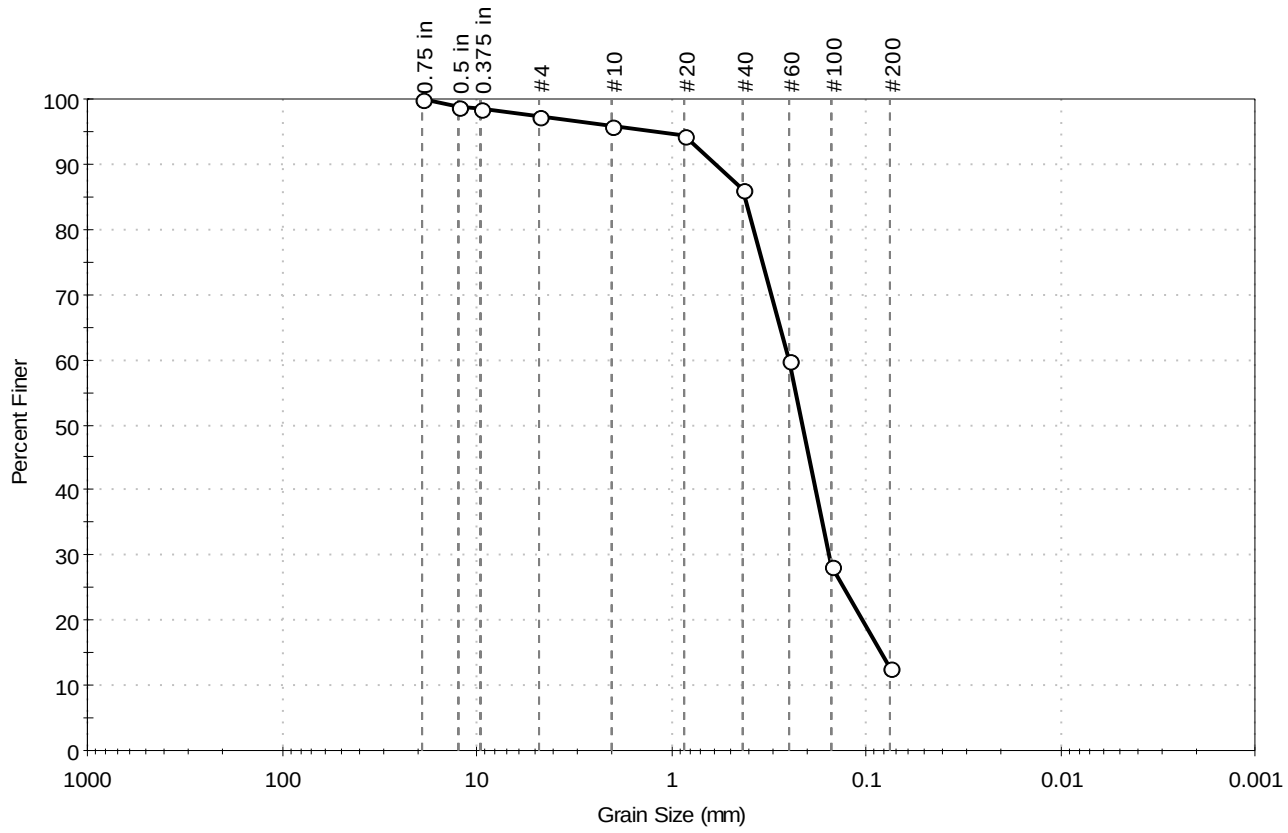
Sand/Gravel Hardness : ---

GeoTesting EXPRESS

Client:	AECOM				
Project:	Portsmouth, NH WWTP Upgrades				
Location:	Pierce Island, NH			Project No:	GTX-301103
Boring ID:	B13-5	Sample Type:	jar	Tested By:	jbr
Sample ID:	SS-3	Test Date:	10/30/13	Checked By:	jdt
Depth :	10-12 ft	Test Id:	280025		

Test Comment: ---
Sample Description: Moist, grayish brown silty sand
Sample Comment: ---

Particle Size Analysis - ASTM D422



%Cobble	%Gravel	%Sand	%Silt & Clay Size
---	2.7	84.5	12.8

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
0.75 in	19.00	100		
0.5 in	12.50	99		
0.375 in	9.50	99		
#4	4.75	97		
#10	2.00	96		
#20	0.85	94		
#40	0.42	86		
#60	0.25	60		
#100	0.15	28		
#200	0.075	13		

Coefficients

D_{85} = 0.4163 mm D_{30} = 0.1539 mm
D_{60} = 0.2507 mm D_{15} = 0.0827 mm
D_{50} = 0.2130 mm D_{10} = 0.0663 mm
C_u = 3.781 C_c = 1.425

Classification

ASTM N/A

AASHTO Silty Gravel and Sand (A-2-4 (0))

Sample / Test Description

Sand/Gravel Particle Shape : ---

Sand/Gravel Hardness : ---

Client:	AECOM
Project Name:	Portsmouth, NH WWTP Upgrades
Project Location:	Pierce Island, NH
GTX #:	301103
Test Date:	10/29/13
Tested By:	daa
Checked By:	mpd

Bulk Density and Compressive Strength of Rock Core Specimens by ASTM D 7012 Method C

Boring ID	Sample ID	Depth, ft	Bulk Density, lb/ft^3	Compressive Strength, psi	Failure Type	In conformance with ASTM D 4543
B13-2A	RC-1	8.45-8.82	170	38,372	1	YES
B13-3	RC-3	12.79-13.16	170	10,281	2	YES
B13-7	RC-2	13.96-14.33	169	44,370	1	YES
B13-7	RC-4	23.70-24.07	170	4,269	2	YES
B13-8	RC-3	13.26-13.63	172	8,684	1 & 2	YES

Notes: Density determined on core samples by measuring dimensions and weight and then calculating.
All specimens tested at the approximate as-received moisture content and at standard laboratory temperature.
Failure Type: 1 = Intact Material Failure; 2 = Discontinuity Failure (See attached photographs)

GeoTesting EXPRESS

Client:	AECOM	Test Date:	10/28/2013
Project Name:	Portsmouth, NH WWTP Upgrades	Tested By:	daa
Project Location:	Pierce Island, NH	Checked By:	mpd
GTX #:	301103		
Boring ID:	B13-2A		
Sample ID:	RC-1		
Depth:	8.45-8.82 ft		
Visual Description:	See photographs		

UNIT WEIGHT DETERMINATION AND DIMENSIONAL AND SHAPE TOLERANCES OF ROCK CORE SPECIMENS BY ASTM D 4543

BULK DENSITY

	1	2	Average
Specimen Length, in:	4.33	4.33	4.33
Specimen Diameter, in:	1.98	1.98	1.98
Specimen Mass, g:	597.56		
Bulk Density, lb/ft^3	170	**Minimum Diameter Tolerence Met?**	YES
Length to Diameter Ratio:	2.2	**Length to Diameter Ratio Tolerance Met?**	YES

DEVIATION FROM STRAIGHTNESS (Procedure S1)

Maximum gap between side of core and reference surface plate:
Is the maximum gap ≤ 0.02 in.? YES

Maximum difference must be < 0.020 in.
Straightness Tolerance Met? YES

END FLATNESS AND PARALLELISM (Procedure FP1)

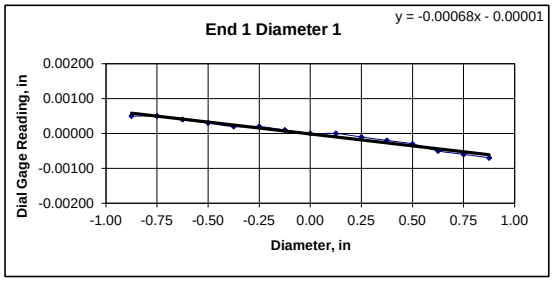
END 1	-0.875	-0.750	-0.625	-0.500	-0.375	-0.250	-0.125	0.000	0.125	0.250	0.375	0.500	0.625	0.750	0.875
Diameter 1, in	0.00050	0.00050	0.00040	0.00030	0.00020	0.00020	0.00010	0.00000	0.00000	-0.00010	-0.00020	-0.00030	-0.00050	-0.00060	-0.00070
Diameter 2, in (rotated 90°)	-0.00060	-0.00060	-0.00050	-0.00040	-0.00030	-0.00020	-0.00010	0.00000	0.00010	0.00020	0.00020	0.00030	0.00030	0.00050	0.00060

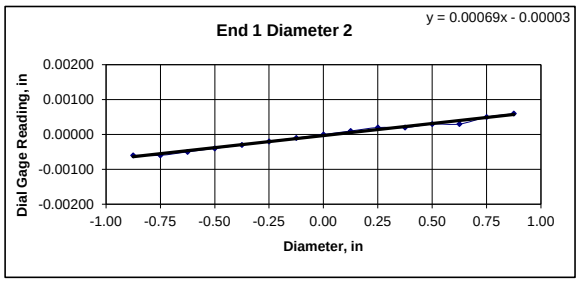
Difference between max and min readings, in:
0° = 0.00120 90° = 0.00120

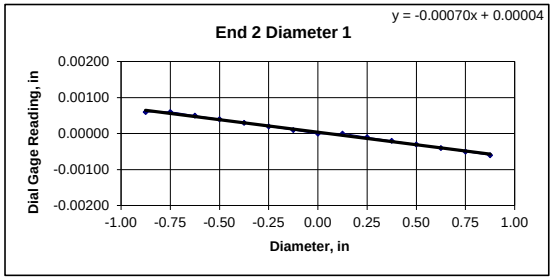
END 2	-0.875	-0.750	-0.625	-0.500	-0.375	-0.250	-0.125	0.000	0.125	0.250	0.375	0.500	0.625	0.750	0.875
Diameter 1, in	0.00060	0.00060	0.00050	0.00040	0.00030	0.00020	0.00010	0.00000	0.00000	-0.00010	-0.00020	-0.00030	-0.00040	-0.00050	-0.00060
Diameter 2, in (rotated 90°)	-0.00060	-0.00060	-0.00050	-0.00040	-0.00030	-0.00020	-0.00010	0.00000	0.00010	0.00020	0.00020	0.00030	0.00030	0.00050	0.00060

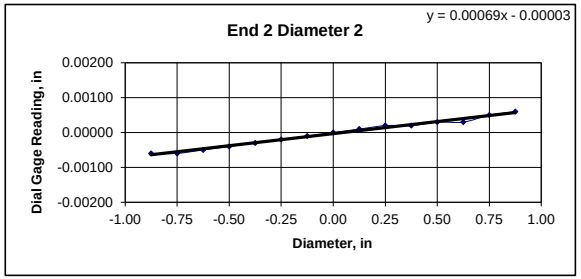
Difference between max and min readings, in:
0° = 0.0012 90° = 0.0012

Maximum difference must be < 0.0020 in. Difference = ± 0.00060
Flatness Tolerance Met? YES









DIAMETER 1

End 1:
Slope of Best Fit Line -0.00068
Angle of Best Fit Line: -0.03896

End 2:
Slope of Best Fit Line -0.00070
Angle of Best Fit Line: -0.04011

Maximum Angular Difference: 0.00115

Parallelism Tolerance Met? YES
Spherically Seated

DIAMETER 2

End 1:
Slope of Best Fit Line 0.00069
Angle of Best Fit Line: 0.03953

End 2:
Slope of Best Fit Line 0.00069
Angle of Best Fit Line: 0.03953

Maximum Angular Difference: 0.00000

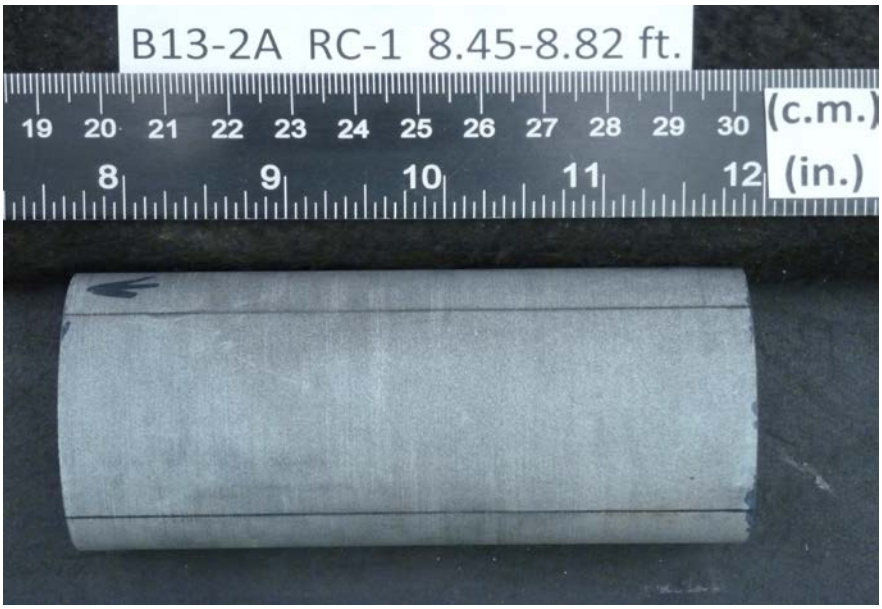
Parallelism Tolerance Met? YES
Spherically Seated

PERPENDICULARITY (Procedure P1) (Calculated from End Flatness and Parallelism measurements above)

END 1	Difference, Maximum and Minimum (in.)	Diameter (in.)	Slope	Angle°	Perpendicularity Tolerance Met?
Diameter 1, in	0.00120	1.980	0.00061	0.035	YES
Diameter 2, in (rotated 90°)	0.00120	1.980	0.00061	0.035	YES
END 2					
Diameter 1, in	0.00120	1.980	0.00061	0.035	YES
Diameter 2, in (rotated 90°)	0.00120	1.980	0.00061	0.035	YES

Maximum angle of departure must be ≤ 0.25°
Perpendicularity Tolerance Met? YES

Client:	AECOM
Project Name:	Portsmouth, NH WWTP Upgrades
Project Location:	Pierce Island, NH
GTX #:	301103
Test Date:	10/29/2013
Tested By:	daa
Checked By:	mpd
Boring ID:	B13-2A
Sample ID:	RC-1
Depth, ft:	8.45-8.82



After cutting and grinding

After break

Client:	AECOM	Test Date:	10/28/2013
Project Name:	Portsmouth, NH WWTP Upgrades	Tested By:	daa
Project Location:	Pierce Island, NH	Checked By:	mpd
GTX #:	301103		
Boring ID:	B13-3		
Sample ID:	RC-3		
Depth:	12.79-13.16 ft		
Visual Description:	See photographs		

UNIT WEIGHT DETERMINATION AND DIMENSIONAL AND SHAPE TOLERANCES OF ROCK CORE SPECIMENS BY ASTM D 4543

BULK DENSITY

	1	2	Average
Specimen Length, in:	4.34	4.34	4.34
Specimen Diameter, in:	1.98	1.98	1.98
Specimen Mass, g:	596.51		
Bulk Density, lb/ft^3	170	**Minimum Diameter Tolerence Met?**	YES
Length to Diameter Ratio:	2.2	**Length to Diameter Ratio Tolerance Met?**	YES

DEVIATION FROM STRAIGHTNESS (Procedure S1)

Maximum gap between side of core and reference surface plate:
Is the maximum gap ≤ 0.02 in.? YES

Maximum difference must be < 0.020 in.
Straightness Tolerance Met? YES

END FLATNESS AND PARALLELISM (Procedure FP1)

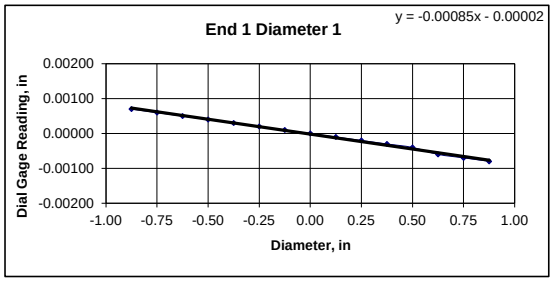
END 1	-0.875	-0.750	-0.625	-0.500	-0.375	-0.250	-0.125	0.000	0.125	0.250	0.375	0.500	0.625	0.750	0.875
Diameter 1, in	0.00070	0.00060	0.00050	0.00040	0.00030	0.00020	0.00010	0.00000	-0.00010	-0.00020	-0.00030	-0.00040	-0.00060	-0.00070	-0.00080
Diameter 2, in (rotated 90°)	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

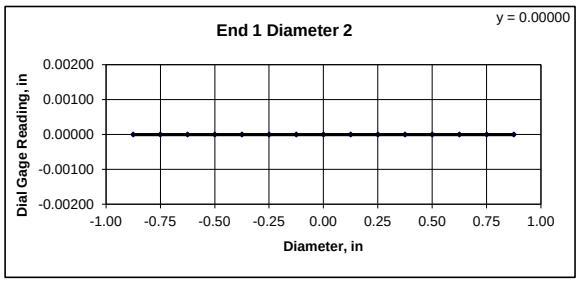
Difference between max and min readings, in:
0° = 0.00150 90° = 0.00000

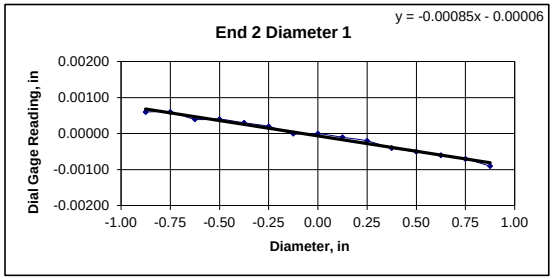
END 2	-0.875	-0.750	-0.625	-0.500	-0.375	-0.250	-0.125	0.000	0.125	0.250	0.375	0.500	0.625	0.750	0.875
Diameter 1, in	0.00060	0.00060	0.00040	0.00040	0.00030	0.00020	0.00000	0.00000	-0.00010	-0.00020	-0.00040	-0.00050	-0.00060	-0.00070	-0.00090
Diameter 2, in (rotated 90°)	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

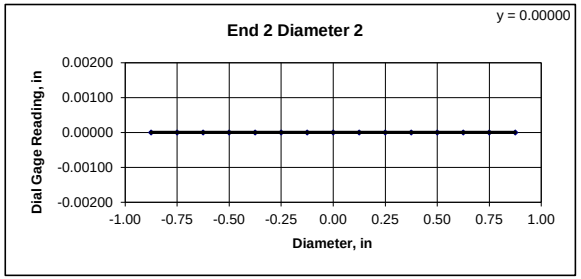
Difference between max and min readings, in:
0° = 0.0015 90° = 0

Maximum difference must be < 0.0020 in. Difference = ± 0.00075
Flatness Tolerance Met? YES









DIAMETER 1

End 1:
Slope of Best Fit Line -0.00085
Angle of Best Fit Line: -0.04870

End 2:
Slope of Best Fit Line -0.00085
Angle of Best Fit Line: -0.04870

Maximum Angular Difference: 0.00000

Parallelism Tolerance Met? YES
Spherically Seated

DIAMETER 2

End 1:
Slope of Best Fit Line 0.00000
Angle of Best Fit Line: 0.00000

End 2:
Slope of Best Fit Line 0.00000
Angle of Best Fit Line: 0.00000

Maximum Angular Difference: 0.00000

Parallelism Tolerance Met? YES
Spherically Seated

PERPENDICULARITY (Procedure P1) (Calculated from End Flatness and Parallelism measurements above)

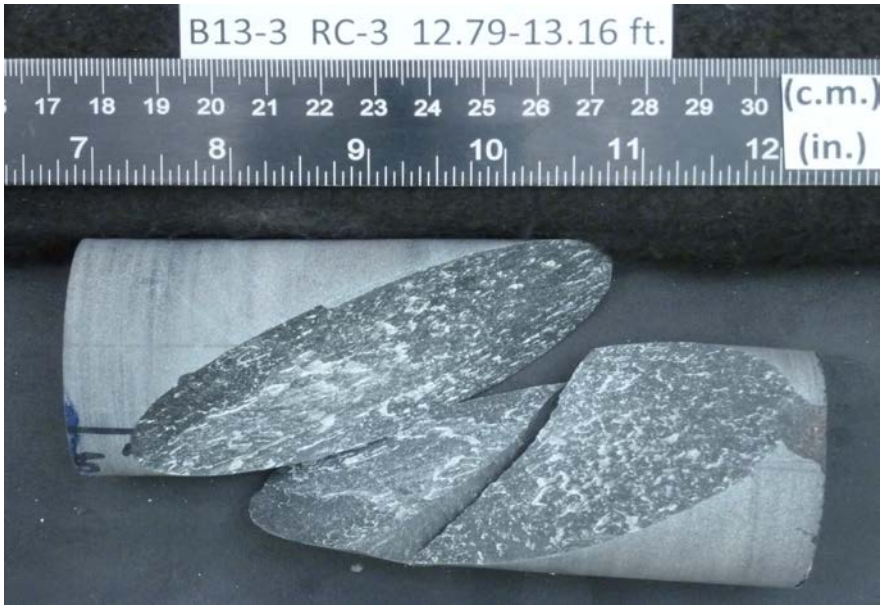
END 1	Difference, Maximum and Minimum (in.)	Diameter (in.)	Slope	Angle°	Perpendicularity Tolerance Met?
Diameter 1, in	0.00150	1.980	0.00076	0.043	YES
Diameter 2, in (rotated 90°)	0.00000	1.980	0.00000	0.000	YES

Maximum angle of departure must be ≤ 0.25°
Perpendicularity Tolerance Met? YES

END 2					
Diameter 1, in	0.00150	1.980	0.00076	0.043	YES
Diameter 2, in (rotated 90°)	0.00000	1.980	0.00000	0.000	YES

Client:	AECOM
Project Name:	Portsmouth, NH WWTP Upgrades
Project Location:	Pierce Island, NH
GTX #:	301103
Test Date:	10/29/2013
Tested By:	daa
Checked By:	mpd
Boring ID:	B13-3
Sample ID:	RC-3
Depth, ft:	12.79-13.16

After cutting and grinding



After break

Client:	AECOM	Test Date:	10/28/2013
Project Name:	Portsmouth, NH WWTP Upgrades	Tested By:	daa
Project Location:	Pierce Island, NH	Checked By:	mpd
GTX #:	301103		
Boring ID:	B13-7		
Sample ID:	RC-2		
Depth:	13.96-14.33 ft		
Visual Description:	See photographs		

UNIT WEIGHT DETERMINATION AND DIMENSIONAL AND SHAPE TOLERANCES OF ROCK CORE SPECIMENS BY ASTM D 4543

BULK DENSITY

	1	2	Average
Specimen Length, in:	4.33	4.33	4.33
Specimen Diameter, in:	1.98	1.98	1.98
Specimen Mass, g:	592.3		
Bulk Density, lb/ft^3	169	**Minimum Diameter Tolerence Met?**	YES
Length to Diameter Ratio:	2.2	**Length to Diameter Ratio Tolerance Met?**	YES

DEVIATION FROM STRAIGHTNESS (Procedure S1)

Maximum gap between side of core and reference surface plate:
Is the maximum gap ≤ 0.02 in.? YES

Maximum difference must be < 0.020 in.
Straightness Tolerance Met? YES

END FLATNESS AND PARALLELISM (Procedure FP1)

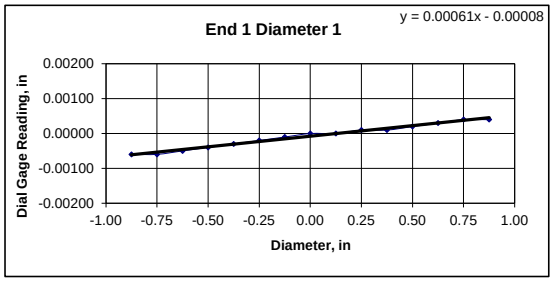
END 1	-0.875	-0.750	-0.625	-0.500	-0.375	-0.250	-0.125	0.000	0.125	0.250	0.375	0.500	0.625	0.750	0.875
Diameter 1, in	-0.00060	-0.00060	-0.00050	-0.00040	-0.00030	-0.00020	-0.00010	0.00000	0.00000	0.00010	0.00010	0.00020	0.00030	0.00040	0.00040
Diameter 2, in (rotated 90°)	0.00060	0.00050	0.00040	0.00030	0.00030	0.00020	0.00010	0.00000	0.00000	0.00000	-0.00020	-0.00040	-0.00050	-0.00060	-0.00070

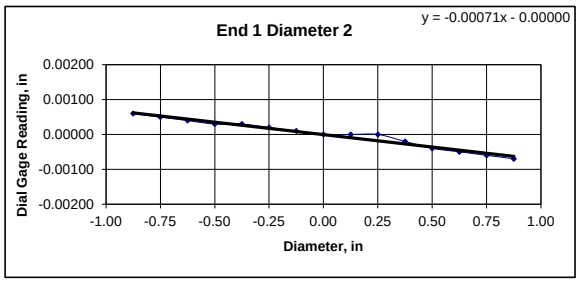
Difference between max and min readings, in:
0° = 0.00100 90° = 0.00130

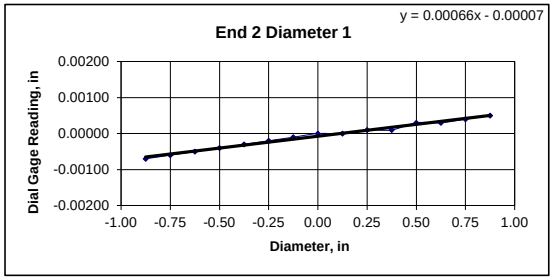
END 2	-0.875	-0.750	-0.625	-0.500	-0.375	-0.250	-0.125	0.000	0.125	0.250	0.375	0.500	0.625	0.750	0.875
Diameter 1, in	-0.00070	-0.00060	-0.00050	-0.00040	-0.00030	-0.00020	-0.00010	0.00000	0.00000	0.00010	0.00010	0.00030	0.00030	0.00040	0.00050
Diameter 2, in (rotated 90°)	0.00060	0.00060	0.00050	0.00040	0.00040	0.00020	0.00010	0.00000	0.00000	-0.00010	-0.00010	-0.00030	-0.00040	-0.00050	-0.00060

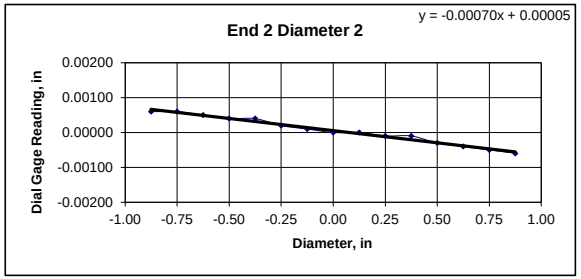
Difference between max and min readings, in:
0° = 0.0012 90° = 0.0012

Maximum difference must be < 0.0020 in. Difference = ± 0.00065
Flatness Tolerance Met? YES









DIAMETER 1

End 1:
Slope of Best Fit Line 0.00061
Angle of Best Fit Line: 0.03495

End 2:
Slope of Best Fit Line 0.00066
Angle of Best Fit Line: 0.03782

Maximum Angular Difference: 0.00286

Parallelism Tolerance Met? YES
Spherically Seated

DIAMETER 2

End 1:
Slope of Best Fit Line -0.00071
Angle of Best Fit Line: -0.04068

End 2:
Slope of Best Fit Line -0.00070
Angle of Best Fit Line: -0.04011

Maximum Angular Difference: 0.00057

Parallelism Tolerance Met? YES
Spherically Seated

PERPENDICULARITY (Procedure P1) (Calculated from End Flatness and Parallelism measurements above)

END 1	Difference, Maximum and Minimum (in.)	Diameter (in.)	Slope	Angle°	Perpendicularity Tolerance Met?
Diameter 1, in	0.00100	1.980	0.00051	0.029	YES
Diameter 2, in (rotated 90°)	0.00130	1.980	0.00066	0.038	YES
END 2					
Diameter 1, in	0.00120	1.980	0.00061	0.035	YES
Diameter 2, in (rotated 90°)	0.00120	1.980	0.00061	0.035	YES

Maximum angle of departure must be ≤ 0.25°
Perpendicularity Tolerance Met? YES

Client:	AECOM
Project Name:	Portsmouth, NH WWTP Upgrades
Project Location:	Pierce Island, NH
GTX #:	301103
Test Date:	10/29/2013
Tested By:	daa
Checked By:	mpd
Boring ID:	B13-7
Sample ID:	RC-2
Depth, ft:	13.96-14.33

After cutting and grinding

After break

Client:	AECOM	Test Date:	10/28/2013
Project Name:	Portsmouth, NH WWTP Upgrades	Tested By:	daa
Project Location:	Pierce Island, NH	Checked By:	mpd
GTX #:	301103		
Boring ID:	B13-7		
Sample ID:	RC-4		
Depth:	23.70-24.07 ft		
Visual Description:	See photographs		

UNIT WEIGHT DETERMINATION AND DIMENSIONAL AND SHAPE TOLERANCES OF ROCK CORE SPECIMENS BY ASTM D 4543

BULK DENSITY

	1	2	Average
Specimen Length, in:	4.32	4.32	4.32
Specimen Diameter, in:	1.98	1.98	1.98
Specimen Mass, g:	595.76		
Bulk Density, lb/ft^3	170	**Minimum Diameter Tolerence Met?**	YES
Length to Diameter Ratio:	2.2	**Length to Diameter Ratio Tolerance Met?**	YES

DEVIATION FROM STRAIGHTNESS (Procedure S1)

Maximum gap between side of core and reference surface plate:
Is the maximum gap ≤ 0.02 in.? YES

Maximum difference must be < 0.020 in.
Straightness Tolerance Met? YES

END FLATNESS AND PARALLELISM (Procedure FP1)

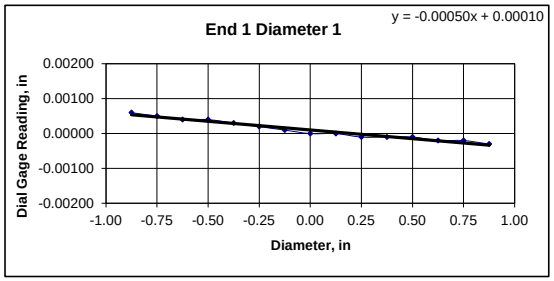
END 1	-0.875	-0.750	-0.625	-0.500	-0.375	-0.250	-0.125	0.000	0.125	0.250	0.375	0.500	0.625	0.750	0.875
Diameter 1, in	0.00060	0.00050	0.00040	0.00040	0.00030	0.00020	0.00010	0.00000	0.00000	-0.00010	-0.00010	-0.00010	-0.00020	-0.00020	-0.00030
Diameter 2, in (rotated 90°)	-0.00050	-0.00050	-0.00030	-0.00020	-0.00010	-0.00010	-0.00010	0.00000	0.00010	0.00020	0.00030	0.00050	0.00060	0.00070	0.00070

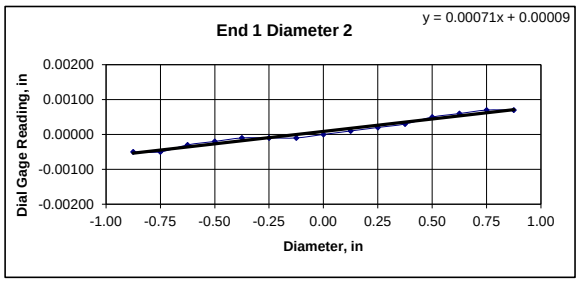
Difference between max and min readings, in:
0° = 0.00090 90° = 0.00120

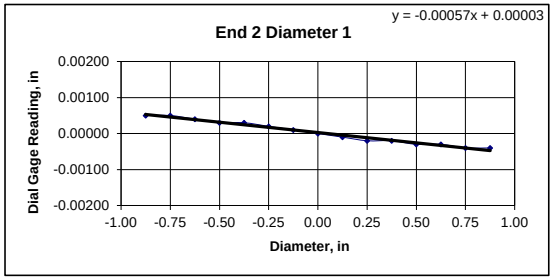
END 2	-0.875	-0.750	-0.625	-0.500	-0.375	-0.250	-0.125	0.000	0.125	0.250	0.375	0.500	0.625	0.750	0.875
Diameter 1, in	0.00050	0.00050	0.00040	0.00030	0.00030	0.00020	0.00010	0.00000	-0.00010	-0.00020	-0.00020	-0.00030	-0.00030	-0.00040	-0.00040
Diameter 2, in (rotated 90°)	-0.00060	-0.00050	-0.00040	-0.00030	-0.00020	-0.00020	-0.00010	0.00000	0.00010	0.00010	0.00020	0.00030	0.00040	0.00050	0.00060

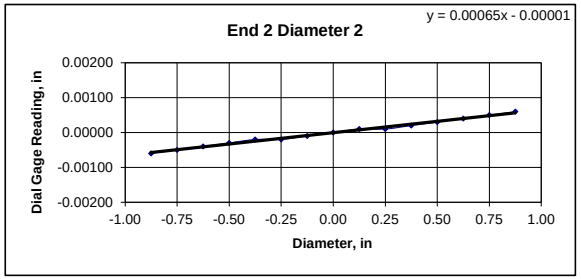
Difference between max and min readings, in:
0° = 0.0009 90° = 0.0012

Maximum difference must be < 0.0020 in. Difference = ± 0.00060
Flatness Tolerance Met? YES









DIAMETER 1

End 1:
Slope of Best Fit Line -0.00050
Angle of Best Fit Line: -0.02865

End 2:
Slope of Best Fit Line -0.00057
Angle of Best Fit Line: -0.03266

Maximum Angular Difference: 0.00401

Parallelism Tolerance Met? YES
Spherically Seated

DIAMETER 2

End 1:
Slope of Best Fit Line 0.00071
Angle of Best Fit Line: 0.04068

End 2:
Slope of Best Fit Line 0.00065
Angle of Best Fit Line: 0.03724

Maximum Angular Difference: 0.00344

Parallelism Tolerance Met? YES
Spherically Seated

PERPENDICULARITY (Procedure P1) (Calculated from End Flatness and Parallelism measurements above)

END 1	Difference, Maximum and Minimum (in.)	Diameter (in.)	Slope	Angle°	Perpendicularity Tolerance Met?
Diameter 1, in	0.00090	1.980	0.00045	0.026	YES
Diameter 2, in (rotated 90°)	0.00120	1.980	0.00061	0.035	YES
END 2					
Diameter 1, in	0.00090	1.980	0.00045	0.026	YES
Diameter 2, in (rotated 90°)	0.00120	1.980	0.00061	0.035	YES

Maximum angle of departure must be ≤ 0.25°
Perpendicularity Tolerance Met? YES

Client:	AECOM
Project Name:	Portsmouth, NH WWTP Upgrades
Project Location:	Pierce Island, NH
GTX #:	301103
Test Date:	10/29/2013
Tested By:	daa
Checked By:	mpd
Boring ID:	B13-7
Sample ID:	RC-4
Depth, ft:	23.70-24.07

After cutting and grinding

After break

Client:	AECOM	Test Date:	10/28/2013
Project Name:	Portsmouth, NH WWTP Upgrades	Tested By:	daa
Project Location:	Pierce Island, NH	Checked By:	mpd
GTX #:	301103		
Boring ID:	B13-8		
Sample ID:	RC-3		
Depth:	13.26-13.63 ft		
Visual Description:	See photographs		

UNIT WEIGHT DETERMINATION AND DIMENSIONAL AND SHAPE TOLERANCES OF ROCK CORE SPECIMENS BY ASTM D 4543

BULK DENSITY

	1	2	Average
Specimen Length, in:	4.33	4.34	4.34
Specimen Diameter, in:	1.98	1.98	1.98
Specimen Mass, g:	604.01		
Bulk Density, lb/ft^3	172	**Minimum Diameter Tolerence Met?**	YES
Length to Diameter Ratio:	2.2	**Length to Diameter Ratio Tolerance Met?**	YES

DEVIATION FROM STRAIGHTNESS (Procedure S1)

Maximum gap between side of core and reference surface plate:
Is the maximum gap ≤ 0.02 in.? YES

Maximum difference must be < 0.020 in.
Straightness Tolerance Met? YES

END FLATNESS AND PARALLELISM (Procedure FP1)

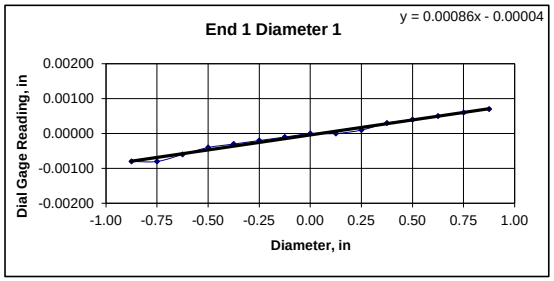
END 1	-0.875	-0.750	-0.625	-0.500	-0.375	-0.250	-0.125	0.000	0.125	0.250	0.375	0.500	0.625	0.750	0.875
Diameter 1, in	-0.00080	-0.00080	-0.00060	-0.00040	-0.00030	-0.00020	-0.00010	0.00000	0.00000	0.00010	0.00030	0.00040	0.00050	0.00060	0.00070
Diameter 2, in (rotated 90°)	-0.00060	-0.00060	-0.00050	-0.00040	-0.00030	-0.00030	-0.00010	0.00000	0.00000	0.00010	0.00010	0.00020	0.00030	0.00040	0.00040

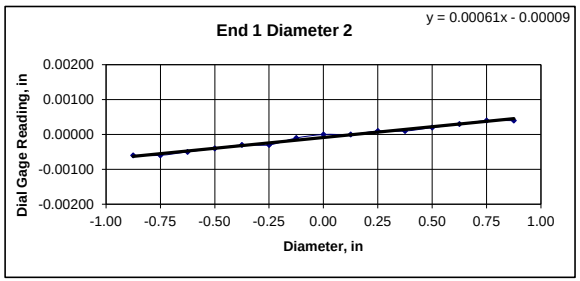
Difference between max and min readings, in:
0° = 0.00150 90° = 0.00100

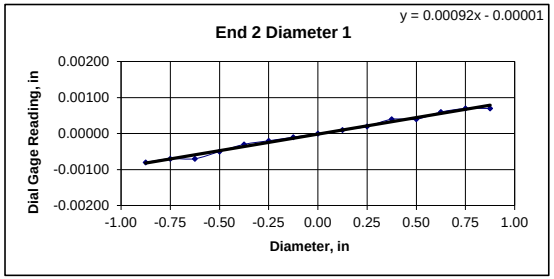
END 2	-0.875	-0.750	-0.625	-0.500	-0.375	-0.250	-0.125	0.000	0.125	0.250	0.375	0.500	0.625	0.750	0.875
Diameter 1, in	-0.00080	-0.00070	-0.00070	-0.00050	-0.00030	-0.00020	-0.00010	0.00000	0.00010	0.00020	0.00040	0.00040	0.00060	0.00070	0.00070
Diameter 2, in (rotated 90°)	-0.00060	-0.00060	-0.00050	-0.00040	-0.00030	-0.00020	-0.00010	0.00000	0.00000	0.00010	0.00020	0.00030	0.00030	0.00040	0.00050

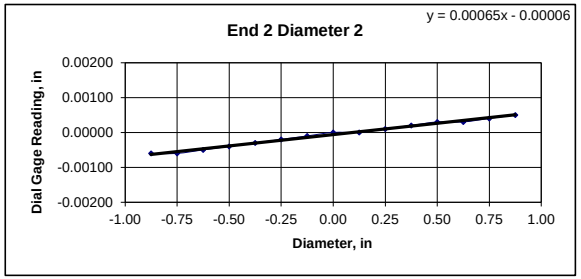
Difference between max and min readings, in:
0° = 0.0015 90° = 0.0011

Maximum difference must be < 0.0020 in. Difference = ± 0.00075
Flatness Tolerance Met? YES









DIAMETER 1

End 1:
Slope of Best Fit Line 0.00086
Angle of Best Fit Line: 0.04927

End 2:
Slope of Best Fit Line 0.00092
Angle of Best Fit Line: 0.05271

Maximum Angular Difference: 0.00344

Parallelism Tolerance Met? YES
Spherically Seated

DIAMETER 2

End 1:
Slope of Best Fit Line 0.00061
Angle of Best Fit Line: 0.03495

End 2:
Slope of Best Fit Line 0.00065
Angle of Best Fit Line: 0.03724

Maximum Angular Difference: 0.00229

Parallelism Tolerance Met? YES
Spherically Seated

PERPENDICULARITY (Procedure P1) (Calculated from End Flatness and Parallelism measurements above)

END 1	Difference, Maximum and Minimum (in.)	Diameter (in.)	Slope	Angle°	Perpendicularity Tolerance Met?
Diameter 1, in	0.00150	1.980	0.00076	0.043	YES
Diameter 2, in (rotated 90°)	0.00100	1.980	0.00051	0.029	YES

Maximum angle of departure must be ≤ 0.25°
Perpendicularity Tolerance Met? YES

END 2					
Diameter 1, in	0.00150	1.980	0.00076	0.043	YES
Diameter 2, in (rotated 90°)	0.00110	1.980	0.00056	0.032	YES

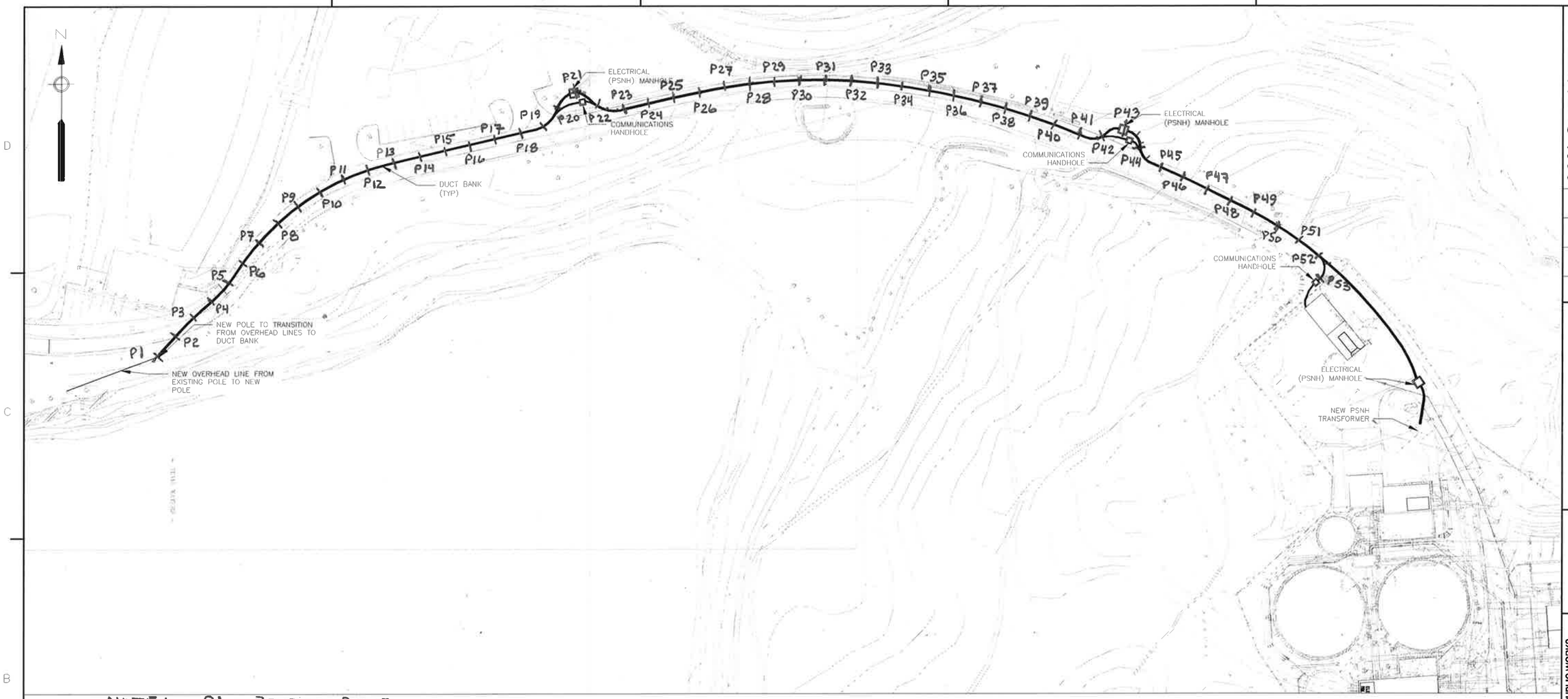
Client:	AECOM
Project Name:	Portsmouth, NH WWTP Upgrades
Project Location:	Pierce Island, NH
GTX #:	301103
Test Date:	10/29/2013
Tested By:	daa
Checked By:	mpd
Boring ID:	B13-8
Sample ID:	RC-3
Depth, ft:	13.26-13.63

After cutting and grinding

After break

ATTACHMENT 4

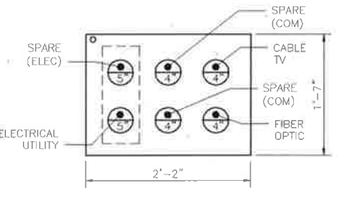
PROBE INVESTIGATION



NOTE: P1 = BEDROCK PROBE

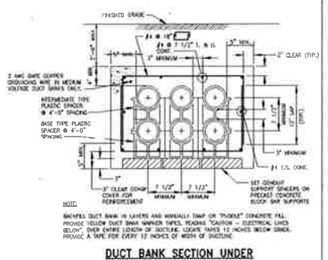
ELECTRICAL AND COMMUNICATION UTILITIES DUCT BANK PLAN

SCALE: 1"=50'



ELECTRICAL AND COM UTILITIES DUCT BANK SECTION

SCALE: NOT TO SCALE

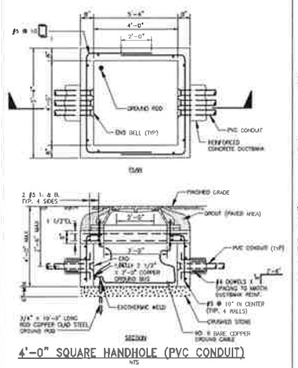


DUCT BANK SECTION UNDER ROADWAY AND PAVED AREA

NTS

UNDER ROAD DUCT BANK DETAIL

SCALE: NOT TO SCALE

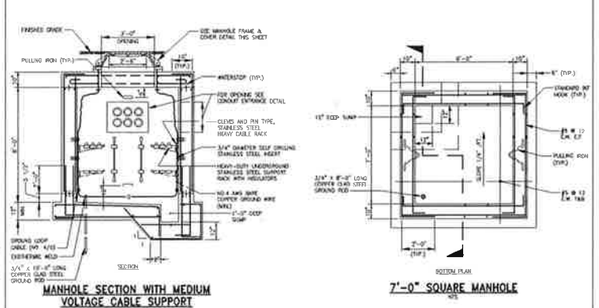


4'-0" SQUARE HANDHOLE (PVC CONDUIT)

NTS

HANDHOLE DETAIL

SCALE: NOT TO SCALE



MANHOLE SECTION WITH MEDIUM VOLTAGE CABLE SUPPORT

NTS

7'-0" SQUARE MANHOLE

NTS

MANHOLE DETAIL

SCALE: NOT TO SCALE

MANHOLE, HANDHOLE AND DUCT BANK NOTES

1. ALL CONCRETE INSERTS, FITTINGS AND ACCESSORIES ARE TO BE FABRICATED FROM HEAVY-DUTY STAINLESS STEEL.
2. ALL CONCRETE FOR MANHOLES AND DUCT RUNS TO BE CLASS "A" (4000 PSI) AS PER THE STRUCTURAL SPECIFICATIONS.
3. ALL CONDUIT AND OTHER EQUIPMENT IN MANHOLES SHALL BE BONDED WITH A NO. 4, STRANDED COPPER CABLE (MINIMUM).
4. ALL 4" OR LARGER STEEL CONDUIT BENDS SHALL HAVE A 36" RADIUS (MINIMUM).
5. ALL CABLES SHALL BE TAGGED WITH A PROTECTED PLASTIC TAG OF DISTINCTIVE COLOR AND MARKING FOR EACH VOLTAGE. THE TAGS WILL GIVE VOLTAGE AND CIRCUIT NUMBER ASSIGNED BY THE CONTRACT DRAWING CONDUIT AND WIRE SCHEDULE.
6. CONTRACTOR TO SIZE THE CIRCULAR OPENINGS IN THE MANHOLE ROOF FROM FRAMES ACTUALLY FURNISHED.
7. PLASTIC DUCT SPACERS SHALL BE INSTALLED ON 4 FT. CENTERS. JOINTS ARE TO BE STAGGARED BETWEEN TIERS TO PROVIDE NOT LESS THAN 12 INCH LONGITUDINAL SEPARATION BETWEEN JOINTS SEPARATION BETWEEN JOINTS IN ANY TWO ADJOINING CONDUITS.
8. THE SIZE OF A MANHOLE WINDOW DEPENDS ON THE NUMBER OF CONDUITS IN THE INCOMING DUCTLINE. TO DETERMINE THE ACTUAL WINDOW SIZE AND LOCATION, SEE THE DUCT SECTION. THE WINDOW OPENING MUST ALSO BE A MINIMUM OF ONE FOOT ABOVE MANHOLE FLOOR AND / OR ONE FOOT BELOW MANHOLE ROOF. EACH MANHOLE WINDOW SHOULD BE OFFSET FROM THE CENTER OF THE WALL SO THAT ONE VERTICAL EDGE IS CLOSE TO THE INTERSECTION OF TWO WALLS.
9. ALL STEEL CONDUIT SHALL BE TERMINATED IN MANHOLES WITH CONDUIT GROUNDING BUSHINGS.
10. MANHOLE COVER SHALL HAVE THE WORD "ELECTRIC" CAST ON THE COVER.
11. INSTALL TWO PULLING-IN IRONS OPPOSITE CENTER OF EACH ENTERING DUCT RUN, ONE 6" BELOW ROOF AND ONE 6" ABOVE FLOOR.
12. ALL DUCTS SHALL DRAIN FROM HIGH POINT TO MANHOLE WITH A SLOPE OF NOT LESS THAN 4" PER 100 FEET.

30% SUBMITTAL

PRELIMINARY COPY

NOTE: this document is preliminary only and is not intended for any purpose except review and comment by the owner and its agents.

MARK	DATE	MADE BY	CHECKED	DESCRIPTION
				REVISIONS

AECOM TECHNICAL SERVICES, INC.
701 ECKNIGHT PARK
MANCHESTER, NH 03801
PHONE: (603) 647-5200

CITY OF PORTSMOUTH, NH - DEPARTMENT OF PUBLIC WORKS

PEIRCE ISLAND WWTF PLANT UPGRADE

ELECTRICAL UTILITY DUCT

ELECTRICAL

PROJECT NO:	60301525
CAD DWG FILE:	00 E-002A
DESIGNED BY:	----
DRAWN BY:	----
DEPT CHECK:	----
PROJ CHECK:	E. MESERVE
DATE:	JUNE 2014
SCALE:	AS NOTED

00 E-002A

PATH/FILENAME: P:\60301525 - PORTSMOUTH WWTF UPGRADE\SHEETS\BP-2\E\00 E-002A.DWG
LAST UPDATE: Wednesday, June 25, 2014 7:53:15 AM
PLOT DATE: Wednesday, June 25, 2014 7:53:26 AM
ANSI D - 25-Jun-14

City of Portsmouth Peirce Island WWTF Plant Upgrade

Summary of Bedrock Probes 07/16/14 and 07/17/14

Probe Number	Est. Layout Station	Estimated Elevation	Refusal Depth (ft)	Bottom Depth (ft)	Remark	LAYOUT
P1	0+0				Not Done	scale off Plan : Exist.U.Pole + Pool Bldg.
P2	0+25				Not Done	
P3	0+50				Not Done	
P4	0+75				Not Done	
P5	1+0				Not Done	3' off northerly road edge
P6	1+25	8.8	3.8		asphalt	4' off northerly road edge
P7	1+50	9.0	6.5		asphalt	5' off northerly road edge
P8	1+75	9.3	4.5		asphalt	6' off northerly road edge
P9	2+0	9.6	3.6		asphalt	7' off northerly road edge
P10	2+25	9.8	3.8		asphalt	8' off northerly road edge
P11	2+50	9.9	9.1		asphalt	8' off northerly road edge
P12	2+75	10.0	-	10.0	asphalt	8' off northerly road edge
P13	3+0	10.2	-	10.0	asphalt	
P14	3+25	10.6	6.9		asphalt	from P12 (8' off) to P17 (5' off)
P15	3+50	11.2	4.3		asphalt	
P16	3+75	12.3	2.7		asphalt	
P17	4+0	13.7	2.5		asphalt	5' off northerly road edge
P18	4+25	15.1	1.7		asphalt	5' off northerly road edge
P19	4+50	16.0	3.2		asphalt	5' off northerly road edge
P20	4+75	16.1	1.4		grass	9.5' north of northerly road edge
P21	5+0	16.0	2.8		EMH	22' north of northerly road edge
P22	5+30	16.1	2.8		grass	6' north of northerly road edge
P23	5+50	15.6	1.6		asphalt	5' off northerly road edge
P24	5+75	14.4	3.6		asphalt	5' off northerly road edge
P25	6+0	12.9	3.5		asphalt	5' off northerly road edge
P26	6+25	11.4	3.5		asphalt	5' off northerly road edge
P27	6+50	10.1	-	10.0	asphalt	5' off northerly road edge
P28	6+75	9.0	-	10.0	asphalt	5' off northerly road edge
P29	7+0	8.1	-	10.0	asphalt	5' off northerly road edge
P30	7+25	7.8			Not Done	
P31	7+50	7.7			Not Done	Water Main Crossing (2' east of P31)
P32	7+75	8.0			Not Done	
P33	8+0	8.2	-	10.0	asphalt	5' off northerly road edge
P34	8+25	8.5	10.0		asphalt	5' off northerly road edge
P35	8+50	8.8			Not Done	
P36	8+75	9.0			Not Done	Water Main Crossing (5' east of P36)
P37	9+0	9.4			Not Done	
P38	9+25	10.0	3.8		asphalt	5' off northerly road edge
P39	9+50	11.0	7.5		asphalt	5' off northerly road edge
P40	9+75	12.0	-	10.0	asphalt	5' off northerly road edge
P41	10+0	13.1	-	10.0	asphalt	5' off northerly road edge
P42	10+25	14.0	-	10.0	asphalt	5' off northerly road edge
P43	10+64	14.7	11.7		EMH	15' north of northerly road edge
P44	11+03	18.6	4.4		asphalt	5' off northerly road edge
P45	11+28	21.0	2.2		asphalt	5' off northerly road edge
P46	11+53	24.0	0.7		asphalt	5' off northerly road edge
P47	11+78	27.2	2.8		asphalt	5' off northerly road edge
P48	12+03	30.7	3.1		asphalt	5' off northerly road edge
P49	12+28	33.7	5.8		asphalt	5' off northerly road edge
P50	12+53	34.4	4.2		asphalt	5' off northerly road edge
P51	12+78	34.0	5.8		asphalt	5' off northerly road edge

APPENDIX C

CITY OF PORTMOUTH NOISE ORDIANCE

ARTICLE IV: NOISE CONTROL

Section 3.401:

It is found and declared that:

A. The making and creation of excessive, unnecessary loud noises within the limits of the City of Portsmouth is a condition which has existed for some time and the extent and volume of such noises is increasing;

B. The making, creation or maintenance of such excessive unnecessary, unnatural or unusually loud noises which are prolonged, unusual and unnatural in their time, place and use, affect and are a detriment to public health, comfort, convenience, safety, welfare and prosperity of the residents of the City of Portsmouth and;

C. The necessity in the public interest for the provisions and prohibitions hereinafter contained and enacted, is declared as a matter of legislative determination and public policy, and it is further declared that the provisions and prohibitions hereinafter contained and enacted are in pursuance of and for the purpose of securing and promoting the public health, comfort, convenience, safety, welfare and prosperity and the peace and quiet of Portsmouth and its inhabitants.

Section 3.402:

It shall be unlawful for any person to make, continue or cause to be made or continued any excessive, unnecessary or unusually loud noise or any noise which either annoys, disturbs, injures, or endangers the comfort, repose, health, peace or safety of others, within the limits of the City.

Section 3.403: NOISES PROHIBITED - UNNECESSARY NOISE STANDARD

The following acts, among others, are declared to be loud disturbing and unnecessary noises in violation of this Ordinance, but said enumeration shall not be deemed to be exclusive, namely:

A. Horns, Signaling Devices, Etc.: The sounding of any horn or signaling device on any automobile, motorcycle, street car or other vehicle on any street or public place of the City, except as a danger warning; the creation by means of any such signaling device of any unreasonable loud or harsh sound; and the sounding of any device for an unnecessary and unreasonable period of time. The use of any signaling device except one operated by hand or electricity; the use of any horn, whistle or other device operated by engine exhaust; and the use of any such signaling device when traffic is for any reason being held up.

B. Radios, Phonographs, Etc.: The using, operating, or permitting to be played, used or operated any radio receiving set, musical instrument, phonograph, or other machine or device for the producing or reproducing of sound in such manner as to disturb the peace, quiet and comfort of the neighboring inhabitants or any time with louder volume than is necessary for convenient hearing for the person or persons who are in the room, vehicle or chamber in which such machines or device is operated and who are voluntary listeners thereto. The operation of any such set, instrument, phonograph, machine or device between the hours of ll:00 p.m. and 7:00 a.m. in such a manner as to be plainly audible at

a distance of 50 feet from the building, structure or vehicle in which it is located shall be prima facie evidence of a violation of this section.

C. Loud Speakers, Amplifiers for Advertising: The using, operating or permitting to be played, used or operated of any radio receiving set, musical instrument, phonograph, loud speaker, sound amplifier, or other machine or device for the producing or reproducing of sound which is case upon the public streets for the purpose of commercial advertising or attracting the attention of the public to any building or structure.

D. Yelling, Shouting, Etc.: Yelling, shouting, hooting, whistling, or singing on the public street, particularly between the hours of ll:00 p.m. and 7:00 a.m., or at any time or place so as to annoy or disturb the quiet, comfort, or repose of persons in any office, or in any dwelling, hotel, or other type of residence, or of any persons in the vicinity.

E. Animals, Birds, Etc.: The keeping of any animal or bird which by causing frequent or long continued noise shall disturb the comfort or repose of any persons in the vicinity.

F. Steam Whistles: The blowing of any locomotive steam whistle or steam whistle attached to any stationary boiler except to give notice of the time to begin or stop work or as a warning of fire or danger, or upon request of proper City authorities.

G. Exhausts: The discharge into the open air of the exhaust of any steam engine, stationary internal combustion engine, motor boats, or motor vehicle except through a muffler or other device which will effectively prevent loud or explosive noises therefrom.

H. Defect in Vehicle or Load: The use of any automobile, motorcycle or vehicle so out of repair, so loaded or in such a manner as to create loud and unnecessary grating, grinding, rattling or other noise.

I. Loading, Unloading, Opening Boxes: The creation of a loud and excessive noise in connection with loading or unloading any vehicle or ship or the opening and destruction of bales, boxes, crates and containers. The loading or unloading of any sanitation vehicles in any district between the hours of midnight and 7:00 a.m. in such a manner as to be plainly audible in a residential district at a distance of 50 feet from such loading or unloading shall be prima facie evidence of a violation of this Section.

J. Construction or Repairing of Buildings: The erection (including excavation), demolition, alteration or repair of any building other than between the hours of 7:00 a.m. and 6:00 p.m. on weekdays, except in case of urgent necessity in the interest of public health and safety, and then only with a permit from the Building Inspector, which permit may be granted for a period not to exceed three days or less while the emergency continues and which permit may be renewed for periods of three days or less while the emergency continues. If the Building Inspector should determine that the public health and safety will not be impaired by the erection, demolition, alteration or repair of any building or the excavation of streets and highways within the hours of 6:00 p.m. and 7:00 a.m., and if he shall further determine that loss or inconvenience would result to any party in interest, he may grant permission for such work to be done within the hours of 6:00 p.m. and 7:00 a.m. upon application being made at the time the permit for the work is awarded or during the progress of the work.

K. Schools, Courts, Churches, Hospitals: The creation of any excessive noise on streets adjacent to any school, institution of learning, church or court while the same are in use, or adjacent to any hospital which disturbs or unduly annoys patients in the hospital, provided conspicuous signs are displayed in such streets indicating that the same is a school, hospital or court street.

L. Hawkers and Peddlers: The shouting and crying of peddlers, hawkers and vendors which disturbs the peace and quiet of the neighborhood.

M. Drums: The use of any drum or other instrument or device for the purpose of attracting attention by creation of noise to any performance, show or sale.

N. Metal Rails, Pillars and Columns, Transportation Thereof: The transportation of rails, pillars, columns of iron, steel or other material over and along streets and other public places upon cars, trays, cars, trucks or in any other manner to loaded as to cause loud noises or as to disturb the peace and quiet of such streets or other public places.

O. Street Railway Cars, Operation Thereof: The causing, permitting or continuing any excessive, unnecessary and avoidable noise in the operation of a street railway car.

P. Pile Drivers, Hammers, Etc.: The operation between the hours of l0:00 p.m. and 7:00 a.m. of any pile driver, steam shovel, pneumatic hammer, derrick, steam or electric hoist or other appliance, the use of which is attended by loud or unusual noise.

Q. Blowers: The operation of any noise creating blower or power fan or any internal combustion engine, the operation of which causes noise due to the explosion of operating gases or fluids, unless the noise from such blower or fan is muffled and such engine is equipped with a muffler device sufficient to deaden such noise.

R. Engine Compression Brakes: It shall be unlawful for the driver of any vehicle other than police or fire emergency vehicles to use, operate or cause to be used or operated, within the City of Portsmouth, any mechanical exhaust device designed to aid in the stopping or braking of said vehicle, in a manner so as to create excessive, loud, unusual or explosive noise from the vehicle. (Adopted 5/15/2006).

Section 3.404: VIOLATION - MISDEMEANOR

Any person violating any of the provisions of this Ordinance shall be fined in an amount not exceeding One Thousand ($1000) Dollars (Amended 1-7-85). Each day such violation is committed or permitted to continue shall constitute a separate offense and shall be punishable as such hereunder.

Section 3.405: MANNER OF ENFORCEMENT

Violations of this Ordinance shall be prosecuted in the same manner as other violations of the Ordinances of the City of Portsmouth. Complaints may be brought by the Portsmouth Police or the Building Inspector of the City of Portsmouth or his agent.

Section 3.406: ADDITIONAL REMEDY - INJUNCTION

As an additional remedy, the operation or maintenance of any device, instrument, vehicle or machinery in violation of any provision hereof and which causes discomfort or annoyance to the reasonable persons of normal sensitiveness or which endangers the comfort, repose, health or peace of residents in the area shall be deemed, and is declared to be a public nuisance and may be subject to abatement summarily by a restraining order or injunction issued by a court of competent jurisdiction.

Section 3.407: SEPARABILITY

It is the intention of the City Council that each separate provision of this Ordinance shall be deemed independent of all other provisions herein and it is further the intention of the City Council that if any provision of this Ordinance be declared to be invalid, all other provisions thereof shall remain valid and enforceable.

APPENDIX D

CITY OF PORTSMOUTH FLAGGING PERMIT APPLICATION

CITY OF PORTSMOUTH

FLAGGING APPLICATION

Effective 7/1/2013, all applications must be accompanied by a $25.00 application fee. Please make checks payable to the City of Portsmouth.

NAME OF APPLICANT: _____

COMPANY: _____

CONTACT PHONE: _____

DATE: _____

Please submit applications to:
Peter Rice, P.E.
Director of Public Works
680 Peverly Hill Rd.
Portsmouth, NH 03801

It is the sole responsibility of the applicant to schedule and pay for all flagging and/or police details.

BEGIN DATE: _____ END DATE: _____

LOCATION OF PROJECT:	
PROJECT DESCRIPTION:	
TRAFFIC CONTROL PLAN/MUTCD TYPICAL:	

SAFETY PLAN (INDICATE PORTSMOUTH POLICE AND/OR FLAGGERS):

DO NOT WRITE BELOW THIS LINE – FOR OFFICIAL USE ONLY

APPROVED BY: _____ DATE: _____

NOTES:

APPENDIX E

RECORD PLANS

(REFER TO DVD)

APPENDIX F

PORTSMOUTH WATER DIVISION CONSTRUCTION MANUAL

PART C – INSTALLATION OF WATER MAINS

Portsmouth Water Division

Construction Manual

Part C - Installation of Water Mains

Prepared by:

Water Division, Department of Public Works
City of Portsmouth
680 Peverly Hill Road
Portsmouth, NH 03801-5356
(603) 427-1530

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Revision #3	**March, 2011**

All water main extensions shall meet all applicable Water Division design, material, installation, testing and inspection standards and specifications prior to acceptance.

1. Plans and Specifications

All plans for water main extensions or improvements shall be drafted with the following specifications:

A. **Plans** shall be drafted on 24" X 36" (Max.) plan and profile sheets with a horizontal scale of 1" = 20' or I" = 40', and the vertical scale shall be no smaller than I" = 4'. Detail sheets need not be on plan - profile sheets.

B. **Specifications** shall be type written on standard8 1/2" X 11" sheets.

C. Water Division construction, material, installation and testing standards shall be incorporated into the plans and/or the specifications.

D. **Engineering Design.** Once the Portsmouth Water Division or local fire department has determined what the necessary flows are, the Portsmouth Water Division may perform a hydraulic network analysis to determine what the main pipe sizes should be based on present and future domestic and fire demand on the water system. This service shall be performed the expense of the developer. Please see the Portsmouth Water Division Engineering Technician for more information.

2. Review Process

Besides reviews by other state and local regulatory agencies ALL water line extensions shall go through the review process in the following order:

A. An approved site plan, and an approved subdivision plan shall be submitted with the plans in the review process.

B. Plans shall be submitted to local fire department having jurisdiction for review, comment, and approval on the fire protection requirements (ie. hydrant spacing, required fire flows etc.) for the project.

If approved then:

C. Plans shall be submitted to the Portsmouth Water Division for review, comment and approval. If approved then:

D. Plan shall be submitted, by the owner or his engineer, to the N.H. Department of Environmental Services, Water Supply and Pollution Control Division, P.O. Box 95, 6 Hazen Dr. Concord, NH 03301, phone 271-3503 for their review, comment and approval. If approved then;

E. Copies of all approved plans and specifications shall be submitted to the Portsmouth Water Division. Upon receipt of these items the project may begin.

3. Inspection Process

During construction the project will be visited by a city inspector to observe construction practices, inspect materials for compliance with specifications etc. Any deficiencies found in the construction by the inspector shall be corrected and not covered until inspected again and approved.

4. Record Drawings

The owner/contractor shall be responsible for developing a set of as-built, or record drawings of the water system that accurately indicates where the water lines and appurtenances are located with dimensions to all gates, bends, tees, wyes, crosses, service shut-offs, hydrants, and dead ends as well as the depths. It shall also indicate the location of the easement lines if there is an easement, and will be submitted to the Portsmouth Water Division.

5. Disinfection and Testing Water Lines

Any water line installed shall be disinfected and tested according to the section on **"Hydrostatic Testing Water Mains"**.

6. Acceptance Process

No water mains can be activated or accepted until the Portsmouth Water Division is in receipt of the following information:

A. Passed and complete pressure test report.
B. Bacteria test report passed.
C. Local municipality's acceptance of street(s).
D. Record drawings and certification.
E. Project Financial Information
F. Any necessary easements.
G. Any necessary state and local approvals.

Once these requirements have been met then the Portsmouth Water Division can then write a letter of acceptance for the water system.

MATERIAL SPECIFICATIONS

PUSH-ON JOINT WATER. PIPE (4"-16")

100. PIPE

100.1 Pipe shall be cement lined, ductile iron, class 52, "Tyton" or push-on joint, asphalt coated inside and outside. Pipe shall meet or exceed all applicable A.W.W.A. Standards (latest revisions).

100.2 All necessary rubber gaskets and fitting lubricant as required by the manufacturer shall be supplied with the pipe.

MECHANICAL JOINT PIPE FITTINGS (4"-16")

200. FITTINGS

200.1 All fittings shall be ductile iron, cement lined inside and asphalt coated inside and out mechanical joint and shall conform to all applicable A.W.W.A. Standards.

200.2 All fittings shall be supplied with all necessary glands, rubber gaskets, bolts and nuts.

T-BOLTS AND NUTS

201. T-BOLTS AND NUTS

201.1 T-Bolts and Nuts shall be "Car-Blue T-Bolt" as manufactured by NSS Industries, 9075 General Dr., Plymouth, Michigan, 48170, 1-(800)-221-5126, or approved equal.

RETAINER RINGS/GLANDS (4"-16")

202. RETAINER RINGS/GLANDS

202.1 Retainer rings shall be the heavy duty "sprinkler system" type, and shall be asphalt coated for corrosion protection. They shall meet all applicable A.W.W.A. standards and be provided with all necessary set screws. Retainer rings shall be EBBA Iron Series 100; Series 300 Split Ring; Series 800 Coverall; of Eastland, Texas (817) 629-1737 or approved equal.

MECHANICAL JOINT CAPS (4"-16")

203. CAPS

203.1 Caps shall be asphalt coated inside and out, and shall be mechanical joint.

203.2 Caps shall be provided with all necessary glands, rubber gaskets, nuts and bolts.

GATE VALVES (4"-16")

300. GATE VALVES

300.1 All gate valves shall conform to A.W.W.A. Standard C-509 (latest revision) for Resilient Sealed Gate Valves.

300.2 Wedge shall be constructed of ductile iron, fully encapsulated in synthetic rubber except for guide and wedge nut areas.

300.3 Waterway shall be smooth and shall have no depressions in seat where foreign material can accumulate and prevent proper closing and sealing.

300.4 Stem shall be sealed by at least two O-rings and be the non-rising type.

300.5 Valve body and bonnet shall be fusion bonded epoxy coated, inside and out at least 8 mil. thick.

300.6 Valves shall have mechanical joints and be supplied with all rubbers, glands, nuts and bolts.

300.7 Valves shall open right and indicate so on the hub nut. Hub nut shall be standard AWWA 2" operating nut.

300.8 All gate valves installed at the Pease Transport shall be open left.

301. TAPPING GATE VALVES

301.1 Tapping gates shall conform to specification for gate valves except one outlet shall be flanged to fit standard same size tapping sleeve flange.

301.2 Tapping gate valve shall be supplied with all necessary rubber gaskets, nuts and bolts.

301.3 No lead gaskets shall be permitted under any circumstances.

TAPPING SLEEVES (MAIN SIZES 4"-16")

600. TAPPING SLEEVES, MECHANICAL JOINT

600.1 The tapping sleeves shall be a full mechanical joint type fitting, split tee, with branch flange faced and slotted for 125 pound template such as Clow Fig. No.F-5205 or approved equal.

600.2 The tapping sleeve shall be provided with all necessary glands, rubber gaskets, nuts and bolts. (Poured lead gasket joints are not acceptable.)

601. TAPPING SLEEVES, STAINLESS STEEL TYPE

601.1 Stainless steel tapping sleeves shall have a full rubber inside gasket in contact with the pipe such as a Ford "SST" type or Romac type or approved equal.

CAST-COUPLINGS (4"- 16")

700. CAST COUPLINGS

700.1 Cast couplings shall be Rockwell brand type 441 or approved equal.

700.2 Couplings shall be provided with all necessary glands, rubber gaskets, nuts and bolts.

AIR RELEASE VALVES

800. AIR RELEASE VALVES

800.1 Air release valve body and cover shall be constructed of cast on with ail P S female threaded inlet sized by the engineer. Working pressure shall be 3(3{) PSI min.

800.2 The float shall be constructed of stainless steel. All other internal parts shall be constructed of stainless steel unless specified otherwise herein. The linkage shall be Delrin and bronze. The seat shall be Buna-N or approved equal.

800.3 The air release valve shall be a Val-Matie Model #45 as manufactured by G.A. Industries Inc., 1116 Ridge Ave., Pittsburgh, PA, 15233, (412) 321-5050; as distributed by Gil Moore & Co. Inc., 665 Hancock St., Quincy, MA, 02170, (617) 471-7300.

FIRE HYDRANTS

900. FIRE HYDRANTS

900.1 Hydrants shall be Kennedy K-81A Guardian Hydrant with a 5 1/4" valve opening.

900.2 The hydrant drain shall be plugged.

900.3 Joint at base of hydrant shall be a 6" restrained, mechanical joint.

900.4 Opening direction shall be clockwise and indicate so on hydrant. Opening direction for hydrants installed at the Pease Tradeport shall be counter clockwise and indicate so on the hydrant.

900.5 Operating nut shall be standard AWWA pentagon operating nut with 1 1/2" point to flat dimension.

900.6 Nozzles

Two 2 112" National Standard Hose Thread nozzles;

One 4 1/2" National Standard.Hose Thread nozzle.

FLUSHING HYDRANTS

901. FLUSHING HYDRANTS (TYPE I)

901.1 Flushing hydrants shall be as manufactured by Murdock, 2488 River Rd., Cincinnati, Ohio, 45204, (513) 471-7700 Models and sizes listed below.

Size	**Model** Number
3/4"	BFHM 75
1"	BFHM 100
1 1/2"	BFHM 150
2"	BFHM 200

902.0 POST TYPE FLUSHING HYDRANT (TYPE II)

902.1 Flushing hydrants shall be post type hydrants, five foot (5') bury with eight cubic feet (8 C.F.) of crushed stone beneath hydrant to allow drainage.

902.2 All working parts shall be brass, with hydrant main valve opening being 2 3/16" min.

902.3 Inlet connection shall be 2" T.P. with one outlet being 2 1/2" National Standard Hose Thread.

902.4 All operating parts shall be removable from above ground with no special tools.

902.5 The hydrant shall be self draining, non-freezing with a three inch (3") ductile iron barrel and a cast iron top.

902.6 The hydrant shall have a pentagon socket operator and supplied with an appropriate wrench.

902.7 The flushing hydrant shall be an Eclipse Model #2 Hydrant, as manufactured by Kupferle Foundry, 813 Hamstead St., St. Louis, Missouri, 63102, phone: (800) 231-3990.

903.0 FLUSH TYPE FLUSHING HYDRANT (TYPE III)

903.1 Flushing Hydrant shall be a flush mounted box hydrant, 5 foot bury with 8 cubic feet-of crushed stone beneath hydrant to allow drainage of barrel.

903.2 All working parts shall be brass, with hydrant main valve opening being 2 3116".

903.3 Inlet connection shall be 2" IPS with outlet being 2 1/2" NST male thread. 903.4 All operating parts shall be removable from above ground with no special tools.

903.5 The self draining, non-freezing hydrant's barrel shall be made of 3" ductile iron pipe.

903.6 The hydrant shall have a lockable cast iron box.

903.7 The hydrant shall be Eclipse No. 85 Blow-Off hydrant as manufactured by Kupferle Foundry, 813 Hampstead St., St. Louis, Missouri, 63102. Phone (800) 231-3990.

904.0 FLUSHING HYDRANT (TYPE IV)

904.1 Flushing Hydrant shall be a post type blow-off hydrant, 5 foot bury with 8 cubic feet of crushed stone beneath hydrant to allow drainage of barrel.

904.2 All working parts shall be brass, with hydrant main valve opening being 2 3/16". 904.3 Inlet connection shall be 2" IPS with outlet being 2 1/2" NST male thread. 904.4 All operating parts shall be removable from above ground with no special tools.

904.5 The self draining, non-freezing hydrant's barrel shall be made of 3" ductile iron pipe.

904.6 The hydrant shall have a lockable cover for the operator nut.

904.7 The hydrant shall be designed and constructed to break-away easily at the ground level.

904.7 The hydrant shall be a "Mainguard" model No. 77 as manufactured by Kupferle Foundry, 813 Hampstead St., St. Louis, Missouri, 63102. Phone (800) 231-3990.

PIPELINE INSTALLATION STANDARDS

1. MATERIAL

1.1 Material shall meet applicable specifications located in this manual.

1.2 Pipe shall have a minimum cover of 5'-0" and a, maximum of T-0".

1.3 Sand bedding under pipe shall be a minimum of 6" or the diameter of the pipe, whichever is greater.

1.4 A conductive indicator/tracer tape stating "CAUTION WATER LINE BURIED BELOW" shall be placed at a depth of 2' directly over the main. A sample of this tape shall be submitted to Water Division Engineering Technician's office for approval prior to it's use.

1.5 Water lines installed under turnpikes, railroads, or major state highways shall be sleeved and gated on both sides of the crossing.

1.6 Back-fill shall be compacted in 12" lifts with suitable material as approved by the Portsmouth Water Division.

2.0 FITTINGS

2.1 Material shall meet applicable specifications located in this manual.

2.2 All fittings shall be installed with EBBA Iron type retainer glands as specified in the material specifications section of this manual.

3.0 GATES

3.1 Material shall meet applicable specifications located in this manual. 3.2 Gates shall be installed with retainer rings

3.3 There shall be a maximum of 1000 feet between gate valves.

3.4 All gate valves and curb stops shall have proper gate boxes, or curb boxes installed and tops set at finish grade, prior to back-filling.

3.5 All gate boxes and service boxes shall be free from debris.

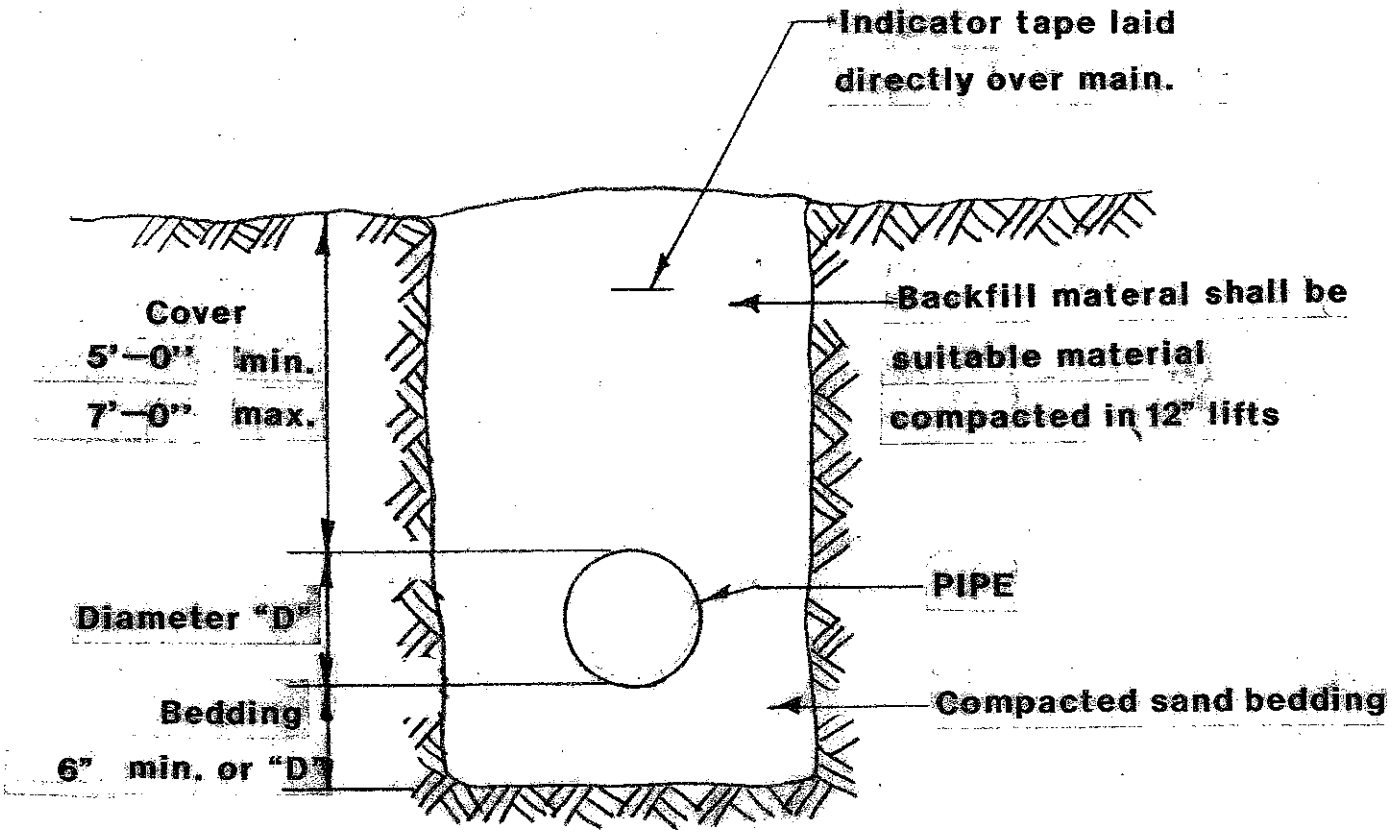
3.6 Any curb-stop or gate valve installed in areas of heavy growth shall be set a minimum of 6" above finish grade and witness stake set.

4.0 SERVICES

4.1 All services, both fire and domestic shall be gated in the public R.O.W. and shall enter the lot as separate services.

5.0 GENERAL

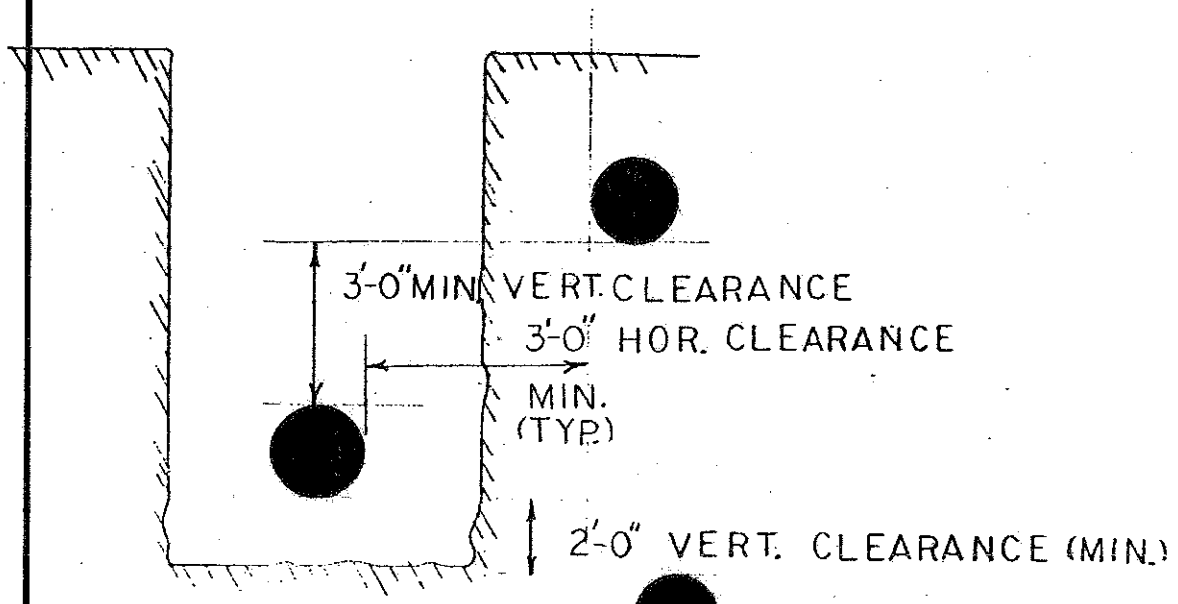
5.1 Where water and sewer lines are in close proximity to each other, the NH Water Supply and Pollution Control Division's Standards for separation or concrete encasement shall apply. Contact NHWSPCD at (603) 271-3503 for latest revised standard.

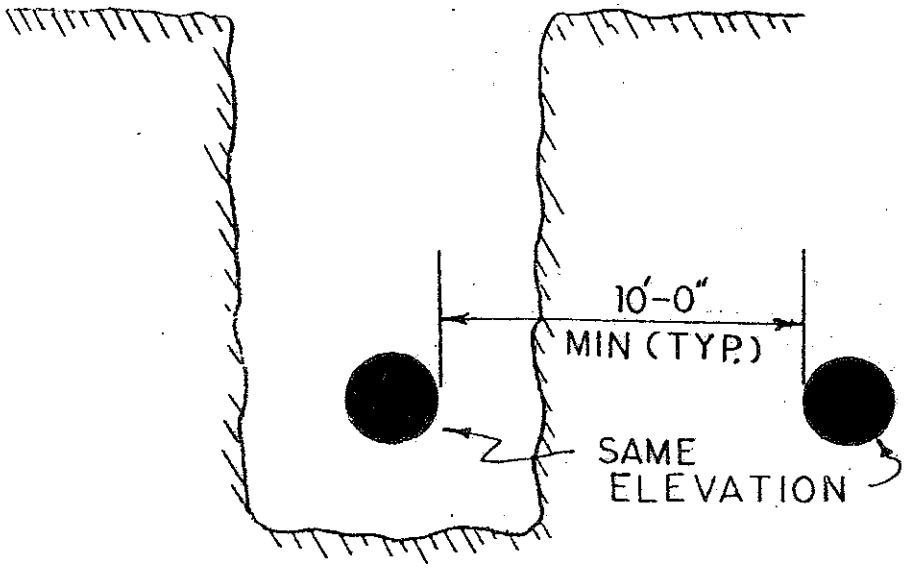


Pipe as specified by Portsmouth Water Division
See specifications

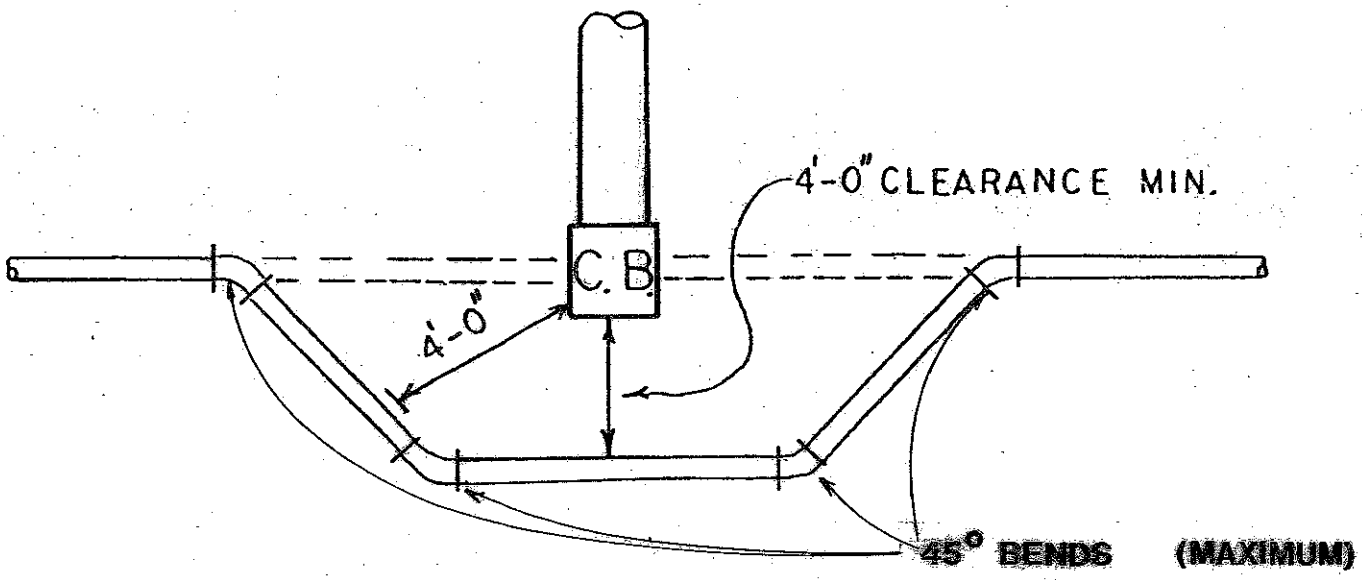
APPROVED: Thomas P. Carson ENGINEERING	PORTSMOUTH WATER DIVISION **PIPE LINE INSTALLATION**	REV. 4 DATE 9/88	STD. NO. 780304-3

TRENCH
X-SECT.





APPROVED: Thomas N. Clarke ENGINEERING	PORTSMOUTH WATER DIVISION **CLEARANCE STD.**	REV. DATE	STD. NO. 780305-0



NOTES

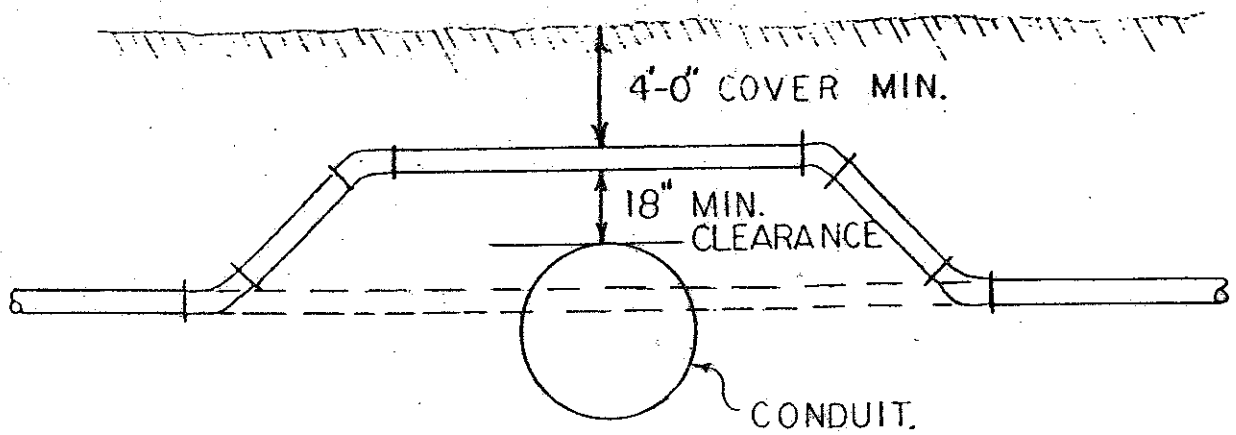
1 ALL FITTINGS SHALL BE M.J. WITH RETAINER GLANDS.

2 ALL PIPE, FITTINGS AND MATERIAL SHALL CONFORM TO PORTSMOUTH WATER WORKS STANDARDS

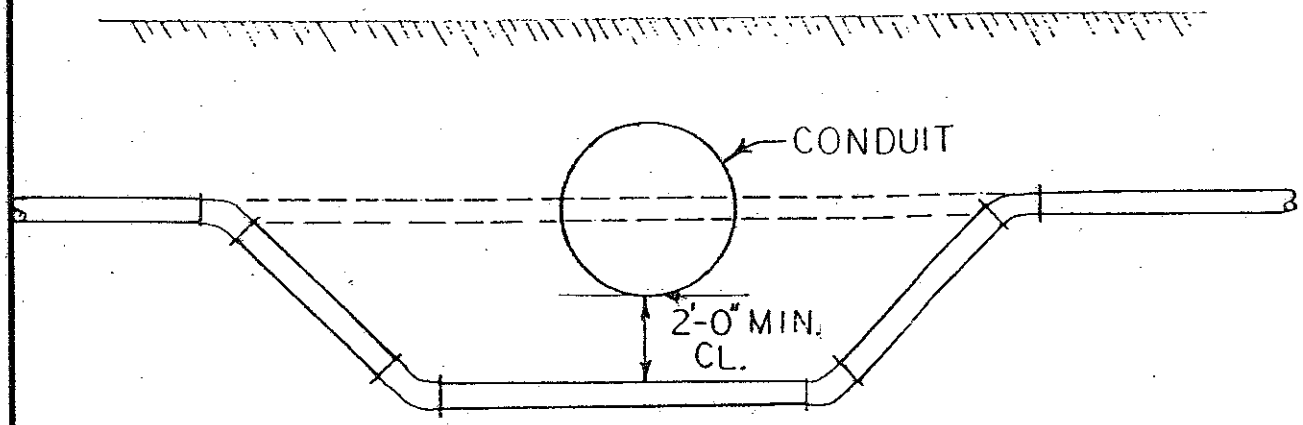
3 ALL WORK AND MATERIALS ARE SUBJECT TO INSPECTION AND APPROVAL BY PORTSMOUTH WATER WORKS PRIOR TO FINAL ACCEPTANCE.

APPROVED: ENGINEERING	PORTSMOUTH WATER DIVISION **HORIZONTAL WATER MAIN RELOCATION**	REV. 2 DATE 9/88	STD. NO. 780306-1

METHOD 1.



METHOD 2. FOR SHALLOW COVER



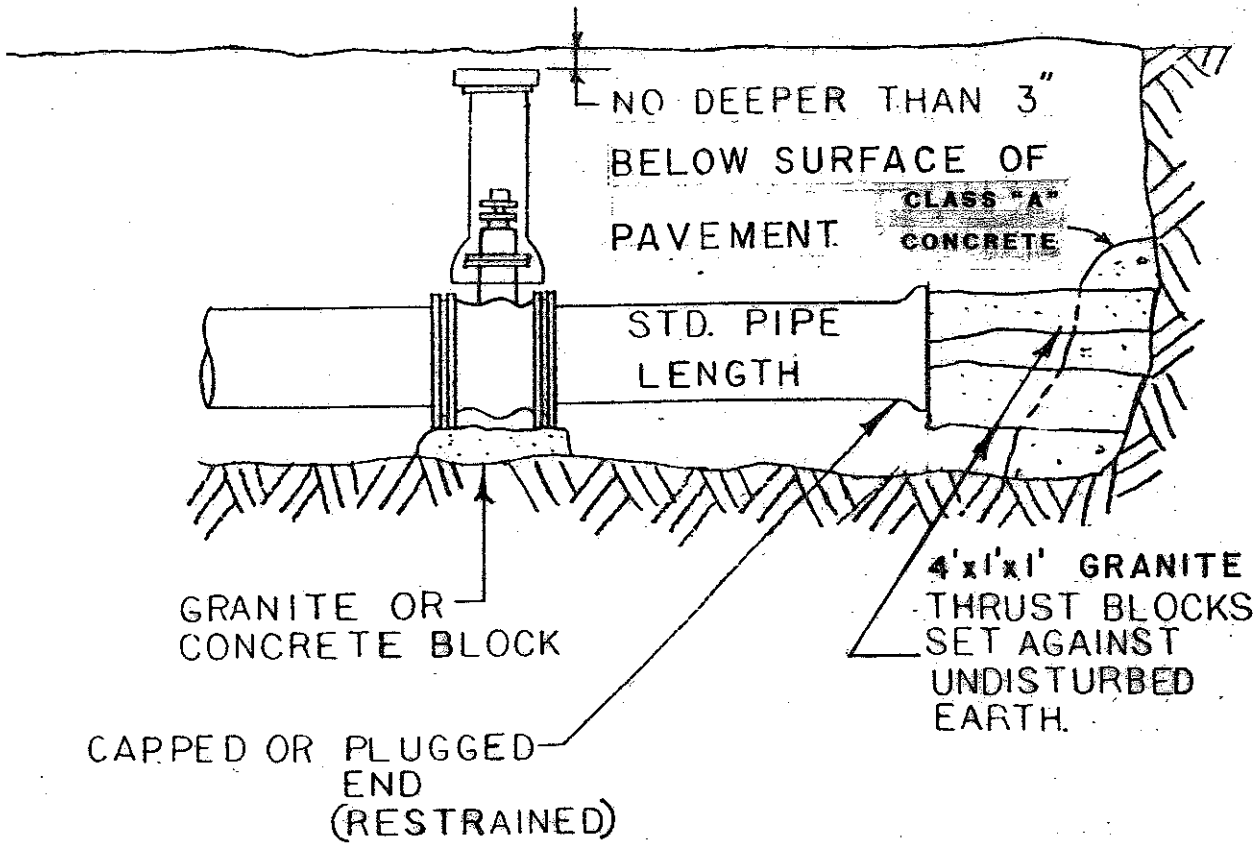
NOTES TYPICAL TO BOTH.

1. ALL FITTINGS SHALL BE MJ WITH RETAINER GLANDS.
2. ALL PIPES SHALL BE CEMENT LINED DUCTILE IRON CLASS 52.

APPROVED:- Thomas Mee ENGINEERING	PORTSMOUTH WATER DIVISION **VERTICAL WATER MAIN RELOCATION**	REV. 1 DATE 9/88	STD. NO. 780307-0

3. ALL PIPE, FITTINGS, AND MATERIAL SHALL CONFORM TO PORTSMOUTH WATER DIVISION STANDARDS.
4. WHEN THE CONDUIT IS A SEWER, METHOD ONE IS THE ONLY ALLOWABLE METHOD. IF COVER IS TO SHALLOW AN APPROVED INSULATION SHALL BE USED TO PREVENT FREEZING.
5. ALL WORK AND MATERIALS ARE SUBJECT TO INSPECTION AND APPROVAL BY PORTSMOUTH WATER DIVISION

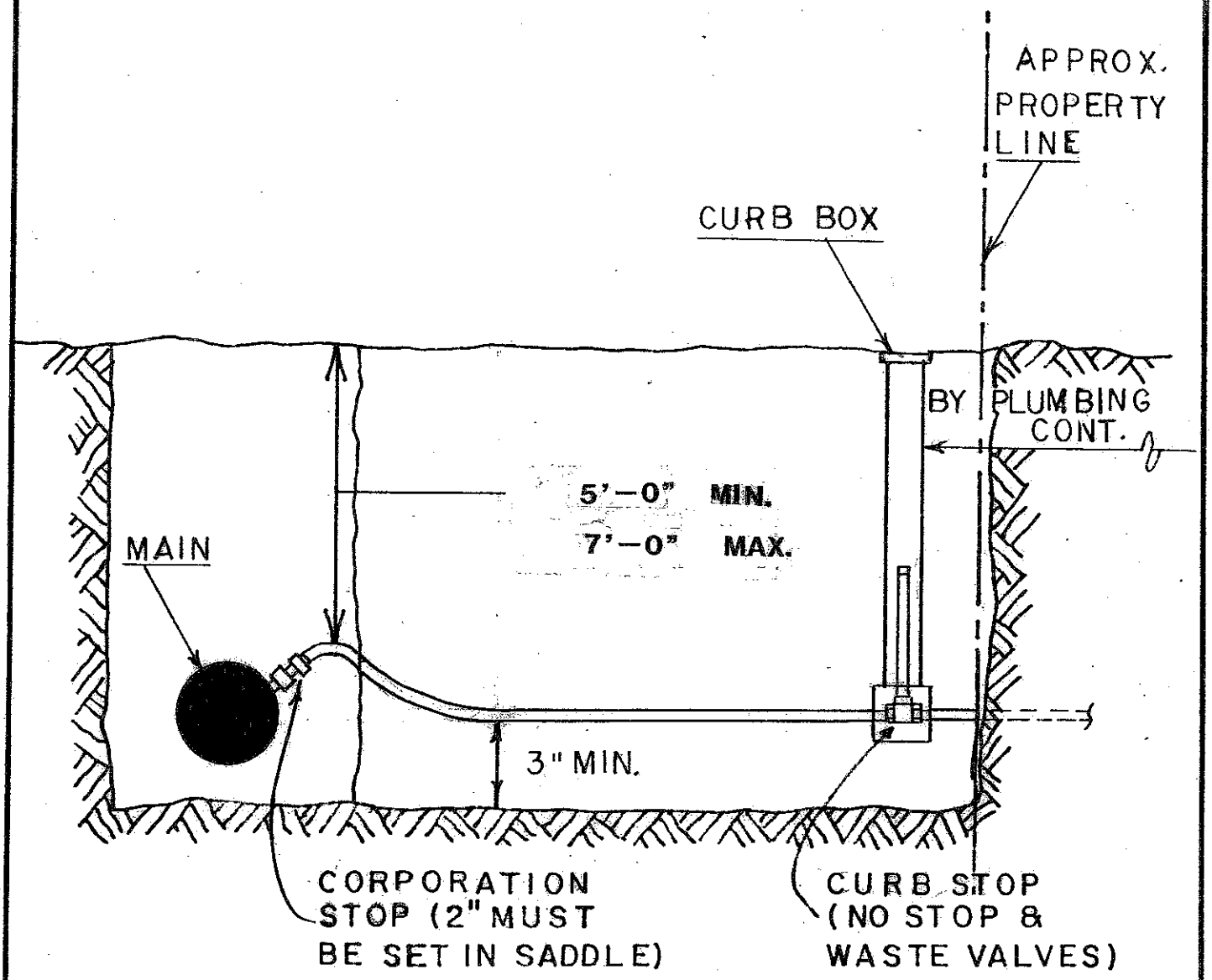
APPROVED: Thomas Hall ENGINEERING	PORTSMOUTH WATER DIVISION **VERTICAL WATER MAIN RELOCATION**	REV. DATE	STD. NO. 780307-0



NOTE:

1. LOCATION OF SUCH GATE VALVE SHALL BE GIVEN TO THE WATER DIVISION.
2. ALL FITTINGS SHALL BE APPROVED BY THE PORTSMOUTH WATER DIVISION PRIOR TO INSTALLATION.
3. PRIOR TO BACKFILLING, THE WATER DIVISION SHALL BE NOTIFIED FOR FINAL VISUAL INSPECTION.

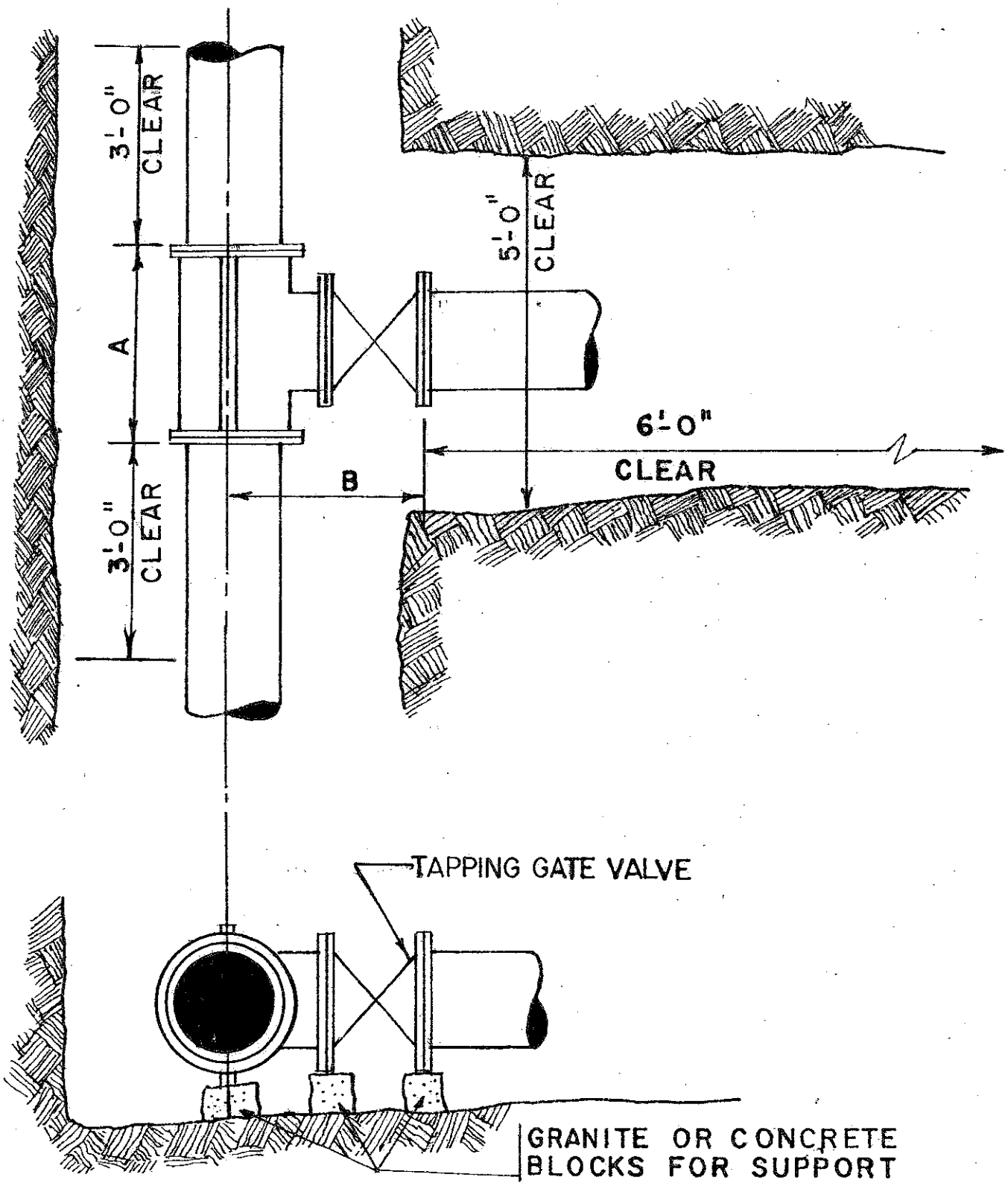
APPROVED: ENGINEERING	PORTSMOUTH WATER DIVISION **DEAD END PIPE DETAIL**	REV. 4 DATE 9/88	STD. NO. 780308-3



NOTES:

1. SKETCH SHOWING LOCATION OF CURB BOX SHALL BE GIVEN TO PORTSMOUTH WATER DIVISION PRIOR TO ACCEPTANCE.
2. CURB BOX COVER IN AREA OF HEAVY GROWTH SHALL BE SET 6" ABOVE GRADE AND WITNESS STAKE SET.
3. CURB BOX SHALL BE SET APPROXIMATELY 1'-0" FROM PROPERTY LINE AS SHOWN ABOVE.
4. MATERIAL SHALL BE AS APPROVED BY WATER DIVISION.

APPROVED: Thomas Hayes ENGINEERING	PORTSMOUTH WATER DIVISION 3/4"- 2" WATER SERVICE	REV. 2 DATE 9/88	STD. NO. 780312-0



APPROVED: Maves ENGINEERING	PORTSMOUTH WATER DIVISION **TAPPING SLEEVE AND GATE**	REV. 5 DATE 12-84	STD. NO. 780311-5

TAPPING SLEEVE & GATE

	A	B		A	B
4 X 4	17	8	12 X 4	17 1/2	12 1/4
6 X 4	16 7/8	8	12 X 6	23 1/2	12 1/4
6 X 6	19 7/8	8	12 X 8	23 1/2	12 1/4
8 / 4	16 3/4	10	12 X 10	29 1/2	12 1/4
8 X 6	22 3/4	10	12 X 12	29 1/2	11 1/2
8 X 8	22 3/4	10	16 X 4	26 1/4	14 1/2
10 X 4	17 5/8	10	16 X 6	26 1/4	14 1/2
10 X 6	26 1/8	10 7/8	16 X 8	26 1/4	14 1/2
10 X 8	26 1/8	10 7/8	16 X 10	26 1/4	14 1/2
10 X 10	26 1/8	10 7/8	16 X 12	26 1/4	14 1/2

STANDARD SPECIFICATIONS

1. ALL MATERIALS SHALL BE APPROVED BY THE PORTSMOUTH WATER DEPT. PRIOR TO INSTALLATION AND USE.

2. ALL JOINTS SHALL BE MECHANICAL.

3. "CLEAR" DIMENSIONS SHOWN ARE REQUIRED FOR WORKSPACE. NO JOINTS ON PIPE BEING TAPPED WITHIN "CLEAR" AREA.

4. FORD TYPE STAINLESS STEEL TAPPING SADDLES OR APPROVED EQUAL ARE ALSO ACCEPTABLE.

APPROVED: ENGINEERING	PORTSMOUTH WATER DIVISION TAPPING SLEEVE AND GATE	REV. 1 DATE 4 - 79	STD. NO. 780311 - 5

1. HYDRANTS SHALL BE INSTALLED A MAXIMUM DISTANCE OF 3'-0" CURB LINE TO OPERATING NUT.

2. THE PUMPER OUTLET NOZZLE SHALL FACE THE STREET.

3. CENTERLINE OF NOZZLES SHALL BE A MINIMUM OF 2'-0" ABOVE FINISHED GRADE OF STREET.

4. AREA AROUND HYDRANT SHALL BE GRADED TO ALLOW ANY SURFACE WATER TO DRAIN AWAY FROM HYDRANT.

5. HYDRANT SHALL BE FIRMLY SUPPORTED UNDERGROUND ALL AROUND THE STANDPIPE.

6. EARTHFILL SHALL BE TAMPED TO GIVE FIRM SUPPORT TO THE HYDRANT BARREL.

7. A GATE VALVE SHALL BE INSTALLED BETWEEN THE HYDRANT AND THE MAIN ON THE LATERAL.

8. HYDRANT LATERALS SHALL BE 6" INSIDE DIAMETER MINIMUM.

9. HYDRANT LATERALS SHALL BE TAKEN FROM WATER MAINS 8" IN DIAMETER OR LARGER.

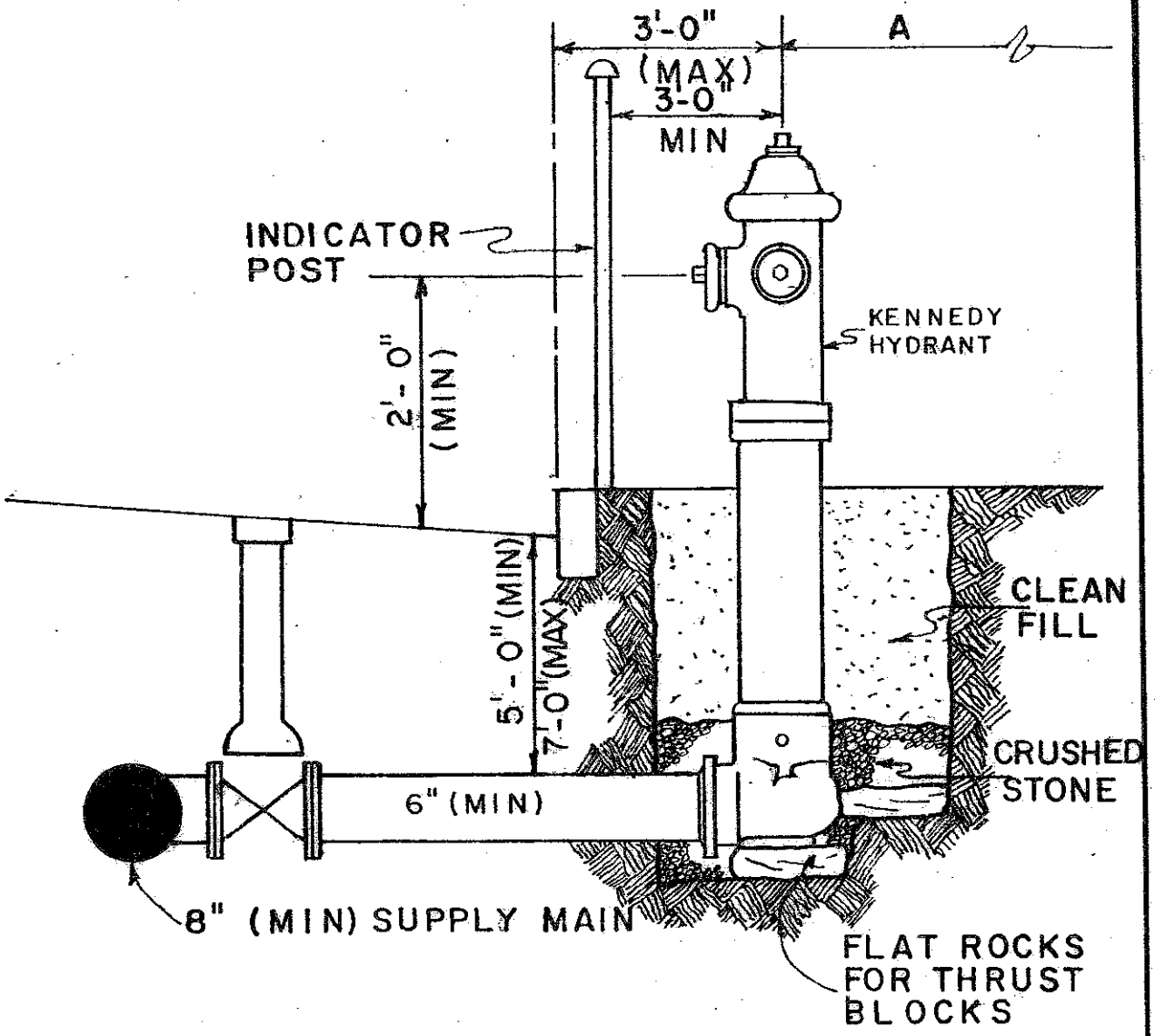
10. ALL JOINTS AT HYDRANT CONNECTION SHALL BE RESTRAINED MECHANICAL JOINT.

11. INSTALLATION OF HYDRANTS IN AREAS OF HEAVY GROWTH SHALL HAVE A 10' RADIUS CLEAR AREA ALL AROUND THE OPERATING NUT OF HYDRANT.

12. THERE SHALL ALSO BE AN INDICATOR POST FABRICATED FROM 2" I.D. GALV. STEEL PIPE, 7'0" ABOVE FINISHED GRADE, AND SET 2'-0" BELOW GRADE IN CLASS "A" CONCRETE 6" ALL AROUND POST. THIS POST SHALL BE PRIMED WITH ZINC CHROMATE PRIMER AND PAINTED WITH HIGH VISIBILITY RED. THE INDICATOR POST SHALL BE NO CLOSER THAN 3'-0" FROM THE OPERATING NUT, AND SET ON SIDE OF HYDRANT THAT IS FACING ONCOMING TRAFFIC. TOP OF POST SHALL BE THREADED AND CAPPED.

13. INSTALLATION OF HYDRANTS IN HEAVY GROWTH AREAS SHALL HAVE GATE BOXES RAISED 6" ABOVE GRADE AND BE PAINTED ORANGE FOR HIGH VISIBILITY.

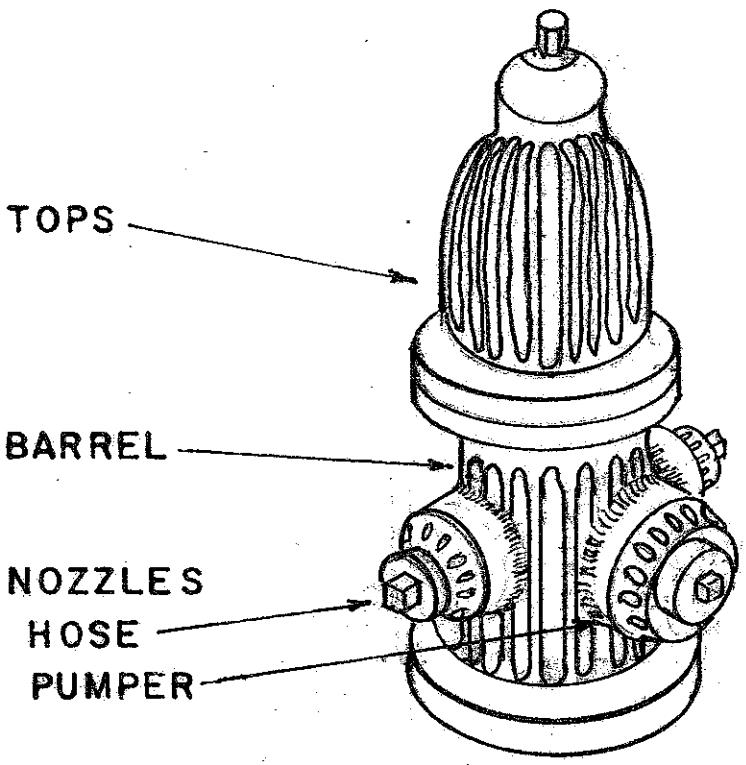
APPROVED: *Mario* ENGINEERING	PORTSMOUTH WATER DIVISION **STANDARD FIRE HYDRANT INSTALLATION**	REV. 2 DATE 12/84	STD. NO. 780309-2



NOTES:

1. HYDRANT TYPE AS SPECIFIED BY PORTS. WATER DIV.
2. "A" SHALL BE 10' CLEAR RADIUS IN HEAVY GROWTH AREAS.
3. INDICATOR POST AS SPECIFIED BY THE PORTSMOUTH WATER DIVISION.

APPROVED: ENGINEERING	PORTSMOUTH WATER DIVISION **STANDARD FIRE HYDRANT INSTALLATION**	REV. 3 DATE 12/84	STD. NO. 780309-2



	PUBLIC	PRIVATE
BARRELS	YELLOW	RED
TOPS	REFLECTIVE WHITE	

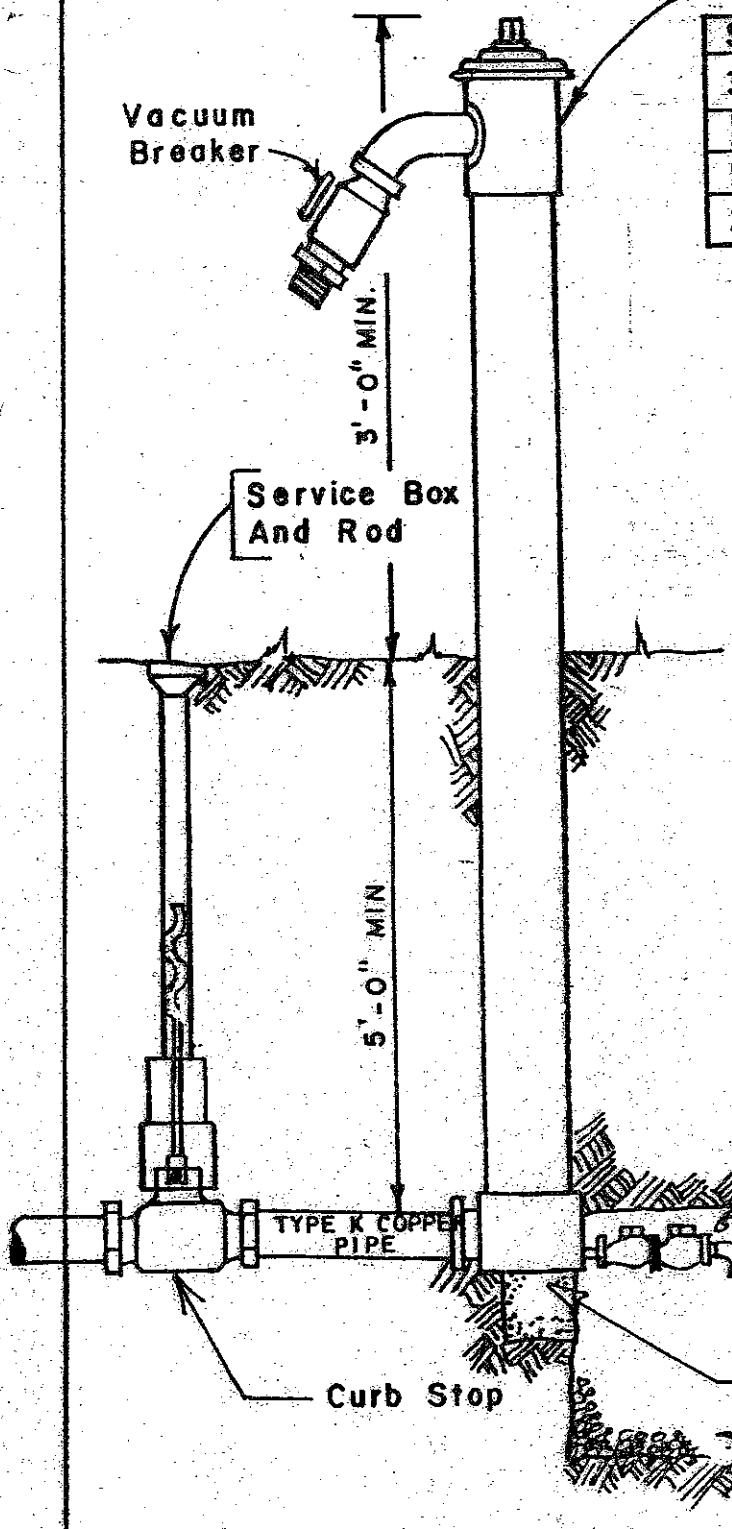
NOZZLE CAPS (HOSE PUMPER)
GREEN 1000 GPM OR GREATER
ORANGE 500 1000 GPM
RED UNDER 500 GPM

GALLONS PER MIN FLOW DETERMINED BY FIRE FLOW TESTS CONDUCTED ON HYDRANTS. UNDER DIRECTION OF WATER DIVISION

APPROVED: ENGINEERING	PORTSMOUTH WATER DIVISION **HYDRANT PAINTING**	REV. 2 DATE 12/84	STD. NO. 780309-2

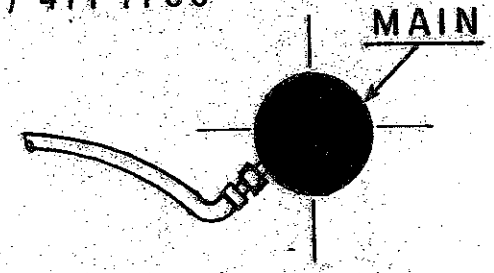
MURDOCK HYDRANT

SIZE	MODEL Nº
3/4"	BFHM- 75
1"	BFHM- 100
1 1/2"	BFHM- 150
2"	BFHM- 200



NOTES:

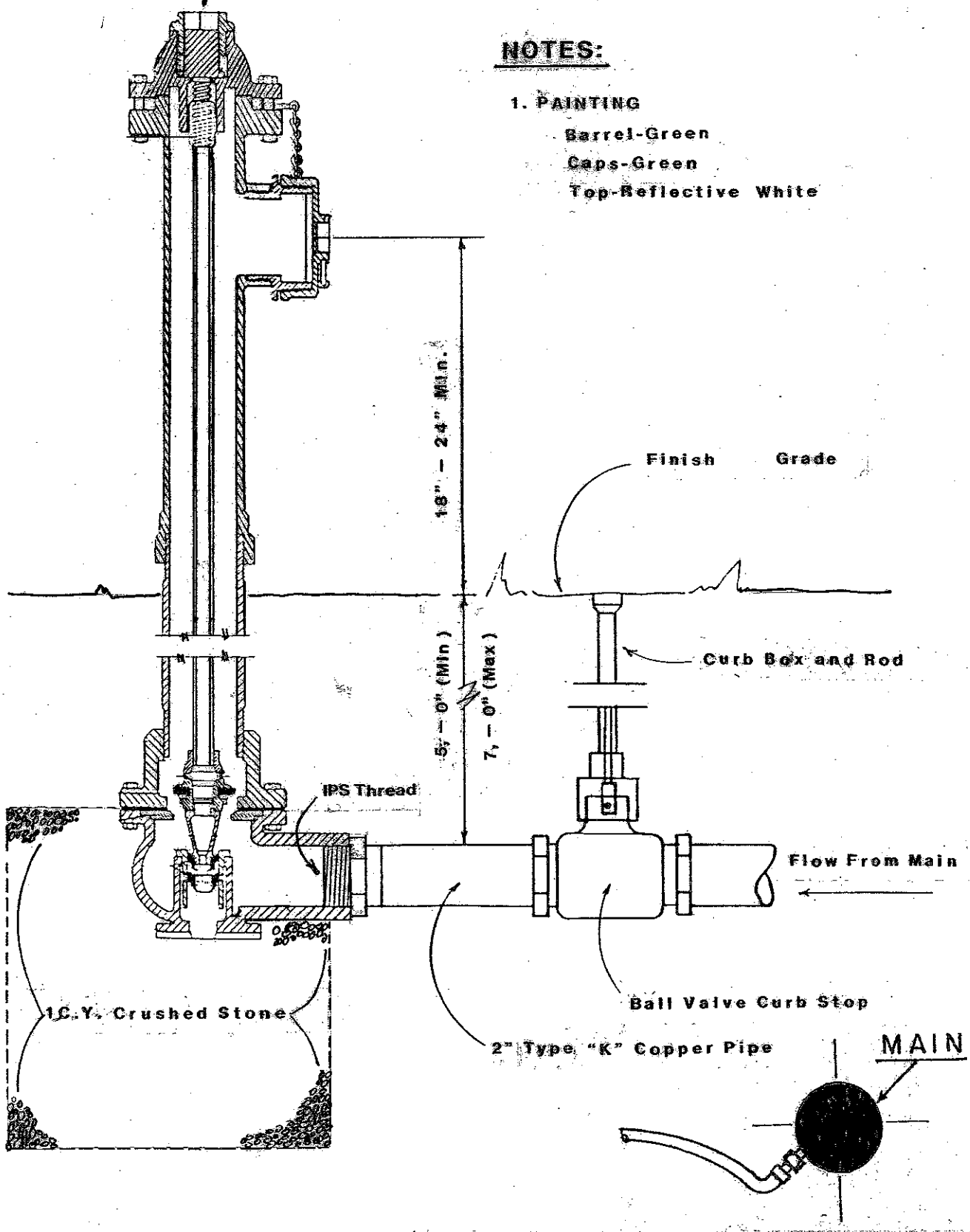
1. PAINT ABOVE GROUND PORTION GREEN.
2. INSTALL 2 INDICATOR POSTS MADE OF 2" ID GALV PIPE, 7'-0" LONG. BETWEEN HYDRANT AND STREET ON BOTH SIDES. OF HYDRANT.
3. INDICATOR POSTS SHALL BE PAINTED GREEN WITH REFECTIVE TOPS AT LEAST 6" FROM TOP
4. AN OPERATING HANDLE IS TO BE SUPPLED WITH EACH HYDRANT.
5. MURDOCK
   2488 RIVER ROAD
   CINCINNATI, OHIO 45204
   (513) 471-7700



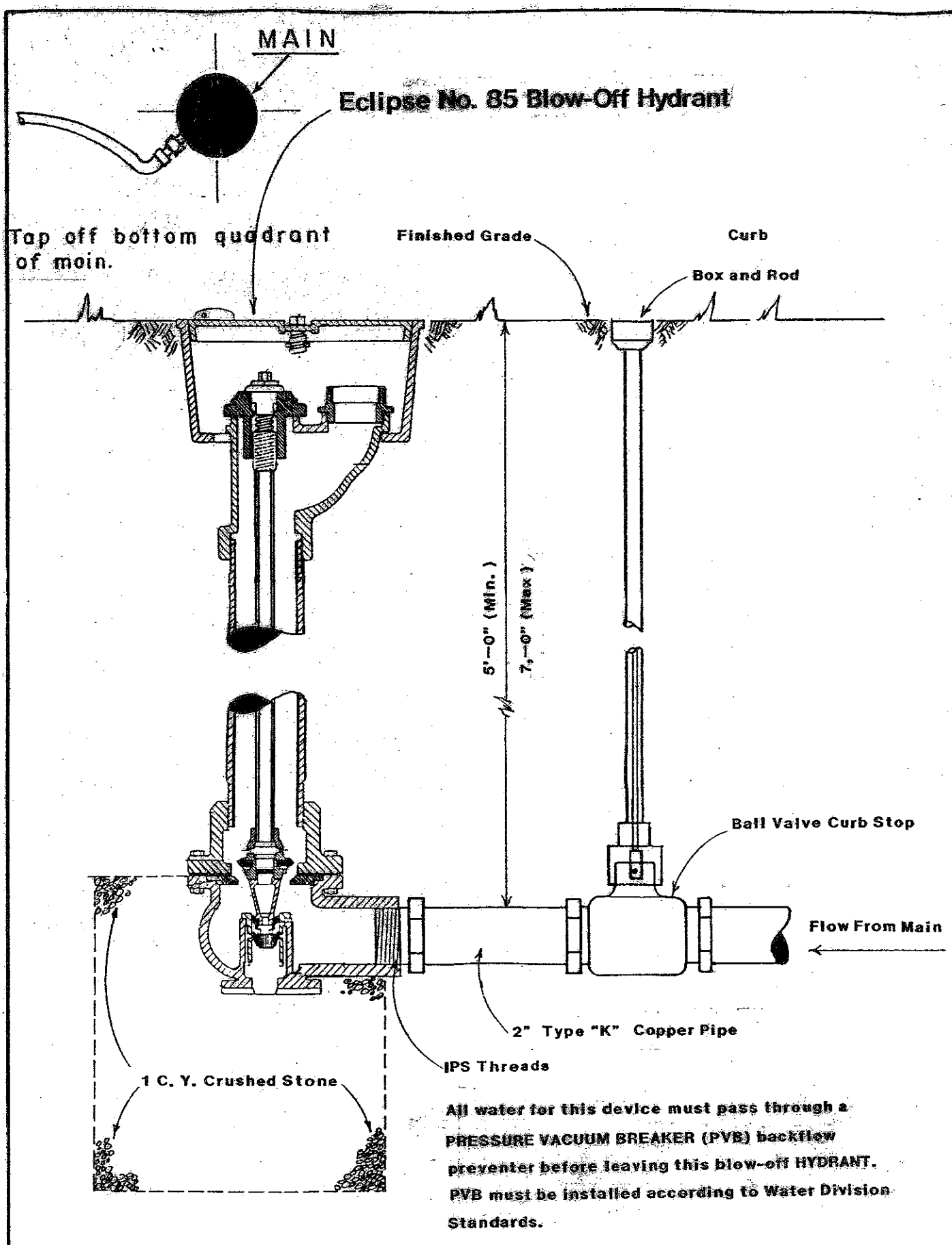
Tap off bottom quadrant of main.

APPROVED: ENGINEERING	PORTSMOUTH WATER DIVISION FLUSHING HYDRANT STANDARD TYPE I	REV. 0 DATE	STD. NO. 780314-0

Eclipse No. 2 Hydrant With Tamper Proof Option



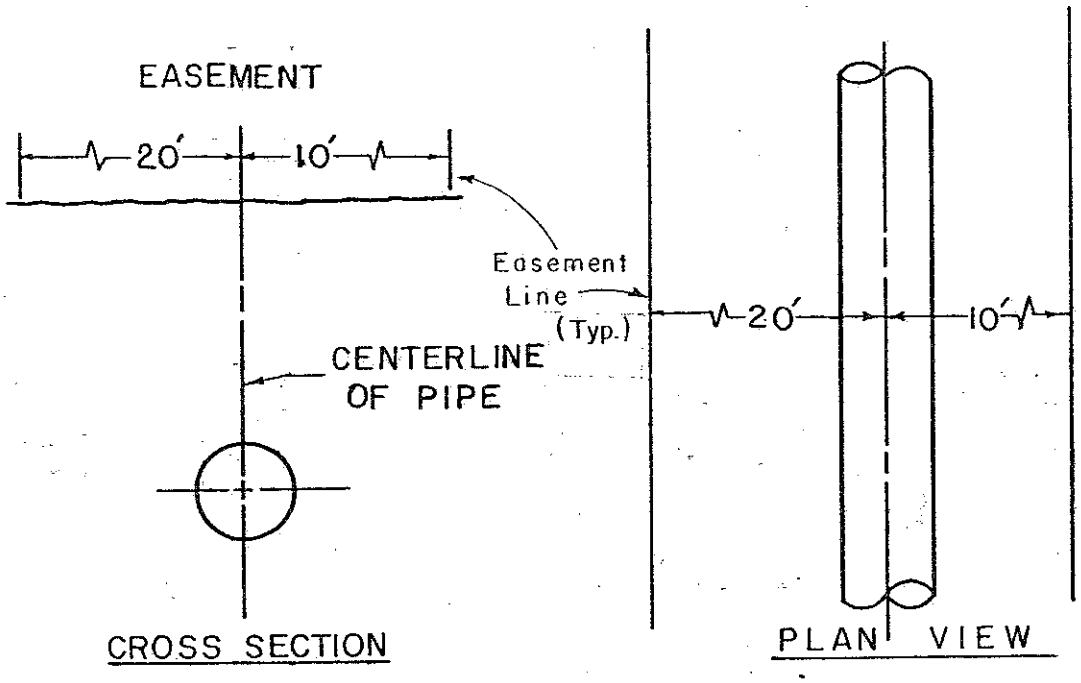
APPROVED:	PORTSMOUTH WATER DIVISION	REV. 0 DATE 3/89	STD. NO.
ENGINEERING	FLUSHING HYRANT, TYPE II		



All water for this device must pass through a PRESSURE VACUUM BREAKER (PVB) backflow preventer before leaving this blow-off HYDRANT. PVB must be installed according to Water Division Standards.

APPROVED:	PORTSMOUTH WATER DIVISION	REV. 0 DATE 3/89	STD. NO.
ENGINEERING	FLUSHING HYDRANT TYPE III		

WATER MAIN EASEMENT



1. NO BUILDINGS, STRUCTURES, OR SEPTIC SYSTEMS SHALL BE LOCATED WITHIN THE EASEMENT AREA.
2. TREES SHALL NOT BE PLANTED WITHIN TEN (10) FEET OF THE MAIN.
3. UTILITY/LIGHT POLES SHALL BE LOCATED NO CLOSER THAN TEN (10) FEET FROM THE PIPE.
4. FINAL FINISHED GRADE CAN NOT BE CHANGED MORE THAN 6".
5. ANY CONSTRUCTION ACTIVITIES WITHIN THE EASEMENT AREA MUST FIRST BE REVIEWED BY THE WATER WORKS AT LEAST THIRTY (30) DAYS PRIOR TO START OF WORK.
6. WATER WORKS SHALL HAVE THE RIGHT TO REPAIR, RELAY, AND PERFORM ANY NECESSARY MAINTENANCE WORK INCLUDED BUT NOT LIMITED TO MAIN EXTENSIONS AND SERVICEINSTALLATIONS IN ACCORDANCE WITH THEIR WATER TARIFF.

APPROVED: Thomas Mann ENGINEERING	PORTSMOUTH WATER DIVISION STANDARD WATER MAIN EASEMENT	REV.0 DATE 5/21/86	STD. NO. 780310-0

Portsmouth Water Division

Hydrostatic Testing Water Mains

Prepared by:
Water Division, Department of Public Works
City of Portsmouth
680 Peverly Hill Road
Portsmouth, NH 03801-5356

Original Issue: June, 1980
Revision #1: February, 1989
Revision #2: January 2002
Revision #3: March, 2011

PURPOSE

The purpose of this booklet is to inform the contractor exactly what is expected for testing water mains.

JURISDICTION

All water mains within the Portsmouth Water System, whether new or old, must be inspected and tested prior to acceptance and/or activation by the Portsmouth Water Division.

Fire services shall also be inspected and tested prior to being activated or re-activated.

TEST EQUIPMENT STANDARDS

GAUGES

1. All gauges shall have a minimum of 3" diameter face.
2. Gauges shall have black painted numerals and lines on a white background.
3. Gauges shall read 0450 PSI Max. graduated in 2 lb. increments (Max.).

PUMPS

Pumps shall be of an approved type and size specifically made for main testing. Pressure range compatible to test pressures required. They shall not have been used for testing with any other fluid.

MAKE-UP TANKS

1. Make-up tanks shall be a smooth, clean, cylindrical rigid plastic or steel tank.
2. Conical tanks, garbage cans, used oil containers, and the like are not acceptable.
3. The tanks shall have either a full length sight tube on the side, or the top be completely open for measuring the draw down on the water.

Hydrostatic testing shall be performed in accordance with A.W.W.A. standard C-600 latest revision.

HYDROSTATIC TESTING

Sec. 1 PRESSURE TEST

After the pipe has been laid, all newly laid pipe or any valved section thereof shall be subjected to a hydrostatic pressure of at least 100 PSI and:

1. Not exceed pipe or thrust restraint design pressures.
2. Be of at least 2-hr duration
3. Not vary by more than ±5 PSI
4. Not exceed twice the rated pressure of the valves or hydrants when the pressure boundary of the test section includes closed valves or hydrants
5. Not exceed the rated pressure of the valves if resilient-seated butterfly valves are used.

1.2 PRESSURIZATION

Each valved section of pipe shall be filed with water slowly and the specified test pressure, based on the elevation of the lowest point of the line or section under test and corrected to the elevation of the test gage, shall be applied by means of a pump connected to the pipe in a manner satisfactory to the Portsmouth Water Division.

1.3 AIR REMOVAL

Before applying the specified test pressure, air shall be expelled completely from the pipe, valves, and hydrants. If permanent air vents are not located at all high points, the contractor shall install corporation cocks at such points so that the air can be expelled as the line is filled with water. After all the air has been expelled, the corporation cocks shall be closed and the test pressure applied. At the conclusion of the pressure test, the corporation cocks shall be removed and plugged or left in place at the discretion of the Portsmouth Water Division.

1.4 EXAMINATION

All exposed pipe, fittings, valves, hydrants, and joints shall be examined carefully during the test. Any damage or defective pipe, fittings, valves, or hydrants that are discovered following the pressure test shall be repaired or replaced with sound material and the test shall be repeated until it is satisfactory to the Portsmouth Water Division.

SECTION 2 - LEAKAGE TEST

A leakage test shall be conducted concurrently with the pressure test.

2.1 LEAKAGE DEFINED

Leakage shall be defined as the quantity of water that must be supplied into the newly laid pipe, or any valved section thereof, to maintain pressure within 5 PSI of the specified test Pressure after the air in the pipeline has been expelled and the pipe has been filled with water.

ALLOWABLE LEAKAGE

No pipe installation will be accepted if the leakage is greater than that determined by the following formula.

$$L = \frac{ND\sqrt{P}}{7400}$$

in which **L** is the allowable leakage, in gallons per hour;

N is the number of joints in the length of pipeline tested;

D is the nominal diameter of the pipe, in inches; and

P is the average test pressure during the leakage test, in pounds per square inch gage.

2.2.1 Allowable leakage at various pressures is shown in table 1

2.2.2 When testing against closed metal-seated valves, an additional leakage per closed valve of 0.0078 gal/hr/in. of nominal valve size shall be allowed.

2.2.3 When hydrants are in the test section, the test shall be made against the closed hydrant. The hydrant lateral gate shall be open.

2.3 Acceptance of Installation

Acceptance shall be determined on the basis of allowable leakage. If any test of pipe laid discloses leakage grater than that specified in Sec 2.2, the contractor sha1"l, at his own expense, locate and repair the defective material until the leakage is within the specified allowance.

2.3.1 All visible leaks are to be repaired regardless of the amount of leakage.

Table 1

Allowable leakage per 1000 feet of pipeline* gph

Average Test Pressure psi	Nominal Pipe Diameter – in											
	2	**3**	**4**	**6**	**8**	**10**	**12**	**14**	**16**	**18**	**20**	**24**
150	0.19	0.28	0.37	0.53	0.74	0.92	1.10	1.29	1.47	1.66	1.84	2.21
125	0.17	0.25	0.34	0.50	0.67	0.84	1.01	1.18	1.34	1.51	1.68	2.01
100	0.15	0.23	0.30	0.45	0.60	0.75	0.90	1.05	1.20	1.35	1.50	1.80

* For pipes with 18 -ft. nominal lengths.

1. A written Certificate of test must be submitted to the Portsmouth Water Division prior to the main being considered for acceptance.

2. The attached list of "approved pipe line testing companies" have been approved to do testing on water mains within the jurisdiction of the Portsmouth Water Division.

3. All companies wishing to do testing must have a Portsmouth Water Division representative present before testing can begin.

4. Consult the back of this booklet for test equipment standards.

BACTERIA TESTING.

1. Mains shall have been thoroughly disinfected with chlorine or powered sodium hypochlorite (no tables allowed) at least24 hours prior to sampling for bacteria.

2. Mains shall be thoroughly flushed prior to sampling.

3. The Portsmouth Water Division laboratory personnel will do the sampling and testing.

4. Samples can only be collected Mondays - Thursdays.

5. Results of samples are usually ready to read 24 hours after it has been collected.

PIPE PRESSURE TESTING COMPANIES

The following companies offer the service of pipe pressure testing on underground piping systems. This list is not to be considered an endorsement by the Water Division for any products or services provided by the listed companies but merely a source of contacts.

John Hoadley & Sons, Inc.
672 Union Street
Rockland, MA 02370
(781) 878-8098

Pipe Line Testing Service Inc.
P.O. Box 122
Winchester, MA 01890
(617) 729-3519

Green Mountain Pipe Line Services
1887 River Street
Bethel, VT 05032
(802) 234-9931

WASTE Inc.
58 Chenell Drive
Concord, NH 03301
(603) 225-92765

Water Service Consultants, Inc.
8 Industrial Park Drive, Unit 18
Hooksett, NH 03106
(603) 668-0088

Water & Waste Pipe Testing, Inc.
P.O. Box 2145
Wakefield, MA 01880
(781) 245-6705

LEAKAGE SURVEY COMPANIES

The following companies offer the service of leak location on underground piping systems. The Portsmouth Water Division is not available for leak detection on private water lines or water lines under construction by those other than the Portsmouth Water Division. This list is not to be considered an endorsement by the Water Division for any products or services provided by the listed companies but merely a source of contacts.

Heath Consultants Inc.
306 East Main St.
P.O. Box 511
Norton, MA 02766-0511
(508) 285-9891

John Hoadley & Sons, Inc.
672 Union Street
Rockland, MA 02370
(781) 878-8098

Pipe Line Testing Service Inc.
P.O. Box 122
Winchester, MA 01890
(617) 729-3519

Green Mountain Pipe Line Services
1887 River Street
Bethel, VT 05032
(802) 234-9931

WASTE Inc.
58 Chenell Drive
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(603) 668-0088

Water & Waste Pipe Testing, Inc.
P.O. Box 2145
Wakefield, MA 01880
(781) 245-6705

PORTSMOUTH WATER DIVISION
PRESSURE/LEAKAGE

TEST REPORT & CERTIFICATION

Passed Failed

Project Name:

Location: Date of Test:

❑ Domestic Water Main ❑Fire Service

Size and length of pipe tested:

Size and number of valves:

Size and number of services: Number of hydrants:

TEST

PRESSURE START: TIME START:

PRESSURE FINISH: TIME FINISH:

PRESSURE CHANGE: ELAPSED TIME:

GALLONS USED TO KEEP TEST PRESSURE GALLONS.

MAXIMUM ALLOWABLE LEAKAGE (BY WATER DIVISION) G.P.H.

TEST PASSED TEST FAILED BY (Portsmouth Water Division official)

I hereby certify this report is a true and accurate record of the actual test performed.

Tester signature: Date:

Tester Typed Name:

Company Name:
Address:
City: State: Zip:
Phone Number: ( )
Distribution:
Portsmouth Water Division; Testing Co.; Contractor; Developer

BACTERIA TEST PASSED

SAMPLE LETTER

Date

Name
Title
Company Name
Address
City, State, Zip

Re: (Project in question)

Dear

This is to notify you that the bacteria test for the above noted project meets our requirements.

Should you need anything further please let me know.

Sincerely,

Chemist

LOCAL MUNICIPALITY STREET ACCEPTANCE
SAMPLE LETTER
(ON LOCAL MUNICIPALITY LETTERHEAD)

Water Divison, Public Works Department
City of Portsmouth
680 Peverly Hill Road
Portsmouth, NH 03801-5356

Re: Acceptance of (street name)_Street

Dear Sirs:

Please be advised that the town of (town name) has accepted (street name) as a municipal street open to the public.

Sincerely,

(MUNICIPAL SEAL)

Town Manager or Selectmen
(With typed names below each signature)

RECORD DRAWING CERTIFICATION

Date: _____

We hereby certify that the drawings submitted herewith are accurate and complete to the best of our knowledge and all location dimensions and discrepancies are noted on the drawings.

PROTECT NAME:

Contractor	Developer
Company Name	Company name
Address	Address
City	City
State Zip	State Zip
( ) Phone	( ) Phone
Signature	Signature
Typed Name	Typed Name
Title	Title

PROJECT FINANCIAL INFORMATION

WATER/SEWER DIVISION

This information is required prior to turning water lines over to the City of Portsmouth for acceptance.

Project Name:

Location:

Owner's Name:

Address:

City: State: Zip:

Phone No.: ( )

Contractor's Name:

Address:

City: State: Zip:

Phone No.: ( )

INSTRUCTIONS:

1. Fill in the data requested above and on the attached page(s).

2. Submit these completed forms to:

Engineering Technician
Portsmouth Water Division
680 Peverly Hill Road
Portsmouth, NH 03801-5356

3. If there are any questions please feel free to contact the Water/Sewer Accountant.

PORTSMOUTH WATER DIVISION

WATER MAIN FINANCIAL DATA

1. Value of mains installed by size:

Size			
Length			
Total Value			

3. Value of services installed by size:

Size			
Number			
Total Value			

3. Value of hydrants:

Valve Opening Size			
Number			
Total Value			

This must be signed prior to submission to the Portsmouth Water Division.

Signed: _____

Typed Name: _____

Company: _____

Date: _____

PORTSMOUTH SEWER DIVISION

SEWER MAIN FINANCIAL DATA

1. Value of gravity mains (and manholes) installed by size:

Size			
Length			
Total Value			

2. Value of forced sewer main by size:

Size			
Length			
Total Value			

3. Value of sewage lift stations:

Location			
Designation Name or Number			
Total Value			

This must be signed prior to submission to the Sewer Division.

Signed: _____

Typed Name: _____

Company: _____

Date: _____

ACCEPTANCE OF WATER LINES AND APPURTENANCES
SAMPLE LETTER

(On Portsmouth Water Division Stationary)

Date

Name
Company Name
Address
City, State Zip

Re: Acceptance of water lines and appurtenances on (street name) in (project name) .

Dear Name:

This letter is to inform you that the Portsmouth Water Division is in receipt of all required data on the (street name) in (project name) and does hereby accept ownership of the water lines and appurtenances in accordance with the rules, regulations and water tariff of the Portsmouth Water Division as of the date of this letter.

Sincerely,

Public Works Department

MISCELLANEOUS

HYDRANT METER RENTALS

Fees for use of water from a hydrant for construction, filling skating rinks, etc. are as follows:

Connect and turn on	$25.00
Disconnect and turn off	$25.00
Meter Deposit 5/8"	$1,000.00
3"	$1,000.00
Meter & Valve	$5.00 / Day
Water used	Standard rate
Hose	When available
Labor	Standard Rate
Backflow Preventer	$15.00 / Day

1. The customers are responsible for the meters and all accessories and fittings. if meter is damaged, or parts are missing the customer will be billed.

2. If the meter is stopped when returned, a flat rate of $10.00/day will be charged for the water used.

3. All equipment (meters, connections, valves etc.) must be returned to the Water Maintenance Shop at Portsmouth Public Works Department. Hours of operation are 7:30 a.m. to 3:30 p.m.

4. The hydrant to be used shall be with the prior approval of the foreman. This includes use of private hydrants.

WATER AVAILABILITY
SAMPLE LETTER

Date

Name
Title
Company Name
Address
City, State, Zip

Re: (Location of property. Town, Tax Map No., Lot No., House Number, Subdivision Name, etc.)

Dear Mr.

Water can be made available to the above mentioned development from (Street) in accordance with the rules, regulations, and the Water Tariff of the Portsmouth Water Division, which is on file here and with the Public Utilities Commission.

Should you have any questions please let me know.

Sincerely,

Engineering Technician

APPENDIX G

NHDES WETLAND PERMIT

&

SHORELAND PERMIT

The State of New Hampshire
Department of Environmental Services

Robert R. Scott, Commissioner

WETLANDS AND NON-SITE SPECIFIC PERMIT 2021-01572

NOTE CONDITIONS

PERMITTEE:	**CITY OF PORTSMOUTH** **TERRY DESMARAIS PE - CITY ENGINEER** **680 PEVERLY HILL RD** **PORTSMOUTH NH 03801**
PROJECT LOCATION	**200 PEIRCE ISLAND RD, PORTSMOUTH** **TAX MAP #208, LOT #1**
WATERBODY:	**PISCATAQUA RIVER**
APPROVAL DATE:	**SEPTEMBER 02, 2021** **EXPIRATION DATE: SEPTEMBER 02, 2026**

Based upon review of permit application 2021-01572 in accordance with RSA 482-A and RSA 485-A:17, the New Hampshire Department of Environmental Services (NHDES) hereby issues this Wetlands and Non-Site Specific Permit. To validate this Permit, signatures of the Permittee and the Principal Contractor are required.

PERMIT DESCRIPTION:
Impact 12,951 square feet of previously developed upland tidal buffer zone and 890 square feet of undeveloped upland tidal buffer zone in order to improve resiliency of the access road to the Peirce Island Wastewater Treatment Facility (WWTF), upgrade an existing parking area, extend a public walking trail, and to replace and rehabilitate existing sewer and drinking water force mains. In addition, the project will temporarily impact 56,794 square feet of previously developed upland tidal buffer zone and 1,803 square feet of undeveloped upland tidal buffer zone for construction access and installation. Compensatory mitigation is provided for permanent impacts within the undeveloped upland tidal buffer zone as a 9,731 square foot buffer enhancement area to be planted.

THIS PERMIT IS SUBJECT TO THE FOLLOWING PROJECT-SPECIFIC CONDITIONS:

1. All work shall be done in accordance with the plans by AECOM and Altus Engineering, Inc., titled Force Main and Water Main Replacement (dated April 2021), Overview Plan (G-001) and Parking Improvements (C-001), Erosion Control Notes and Parking Improvement Details (C-003, C-004; dated April 13, 2021) and Proposed Walking Trail (C-002; dated April 2020), as received by the NH Department of Environmental Services (NHDES) on May 20, 2021; Overall Site Plan (00 G-003-P OSP) dated April 13, 2021 and revised through July 23, 2021, last received by NHDES on July 30, 2021; Compensatory Mitigation and Post-Construction Monitoring Plan (received by NHDES September 1, 2021); and, Parking Improvements (L-001) dated August 31, 2021 and received by NHDES on September 01, 2021, per Rule Env-Wt 307.16.
2. Prior to the start of construction, the contractor shall install fencing around protected plant species to prevent unintentional encroachment, in accordance with Env-Wt 311.06(g).
3. All work shall comply with all applicable conditions specified in Env-Wt 307.
4. All development activities associated with any project shall be conducted in compliance with applicable requirements of RSA 483-B and Env-Wq 1400 during and after construction, per Rule Env-Wt 307.07.
5. All work, including management of soil stockpiles, shall be conducted so as to minimize erosion, minimize sediment transfer to surface waters or wetlands, and minimize turbidity in surface waters and wetlands using the techniques described in Env-Wq 1505.02, Env-Wq 1505.04, Env-Wq 1506, and Env-Wq 1508; the applicable BMP manual; or a

combination thereof, if the BMP manual provides less protection to jurisdictional areas than the provisions of Env-Wq 1500, per Rule Env-Wt 307.03(b).
6. Water quality control measures shall be selected and implemented based on the size and nature of the project and the physical characteristics of the site, including slope, soil type, vegetative cover, and proximity to jurisdictional areas, per Rule Env-Wt 307.03(c)(1).
7. The person in charge of construction equipment shall inspect such equipment for leaking fuel, oil, and hydraulic fluid each day prior to entering surface waters or wetlands or operating in an area where such fluids could reach groundwater, surface waters, or wetlands, per Rule Env-Wt 307.03(g)(1).
8. Equipment shall be staged and refueled outside of jurisdictional areas (unless allowed) per Rule Env-Wt 307.15 and Env-Wt 307.03(h).

MONITORING:
9. Within 60 days of completing a mitigation project that included enhancement, the applicant shall submit a signed letter specifying the date of completion and the anticipated dates of submittal of the annual monitoring reports plus a post - construction monitoring report documenting the conditions of the enhanced area in accordance with Env-Wt 807.03.
10. Compensatory mitigation project monitoring reports shall be submitted to the department annually, by December 1 of each monitoring year in accordance with the approved compensatory mitigation plan, Env- Wt 307.18(a) and Env-Wt 803.04.
11. Mitigation project monitoring shall span no fewer than 5 growing seasons for any mitigation project that includes plantings, in accordance with Env-Wt 803.04(b)(1).

THIS PERMIT IS SUBJECT TO THE FOLLOWING GENERAL CONDITIONS:
1. Pursuant to RSA 482-A:12, a copy of this permit shall be posted in a secure manner in a prominent place at the site of the approved project.
2. In accordance with Env-Wt 313.01(a)(5), and as required by RSA 482-A:11, II, work shall not infringe on the property rights or unreasonably affect the value or enjoyment of property of abutting owners.
3. In accordance with Env-Wt 314.01, a standard permit shall be signed by the permittee, and the principal contractor who will build or install the project prior to start of construction, and will not be valid until signed.
4. In accordance with Env-Wt 314.03(a), the permittee shall notify the department in writing at least one week prior to commencing any work under this permit.
5. In accordance with Env-Wt 314.08(a), the permittee shall file a completed notice of completion of work and certificate of compliance with the department within 10 working days of completing the work authorized by this permit.
6. In accordance with Env-Wt 314.06, transfer of this permit to a new owner shall require notification to, and approval of, the NHDES.
7. The permit holder shall ensure that work is done in a way that protects water quality per Env-Wt 307.03; protects fisheries and breeding areas per Env-Wt 307.04; protects against invasive species per Env-Wt 307.05; meets dredging activity conditions in Env-Wt 307.10; and meets filling activity conditions in Env-Wt 307.11.
8. This project has been screened for potential impact to known occurrences of protected species and exemplary natural communities in the immediate area. Since many areas have never been surveyed, or only cursory surveys have been performed, unidentified sensitive species or communities may be present. This permit does not absolve the permittee from due diligence in regard to state, local or federal laws regarding such communities or species. This permit does not authorize in any way the take of threatened or endangered species, as defined by RSA 212-A:2, or of any protected species or exemplary natural communities, as defined in RSA 217-A:3.
9. In accordance with Env-Wt 307.06(a) through (c), no activity shall jeopardize the continued existence of a threatened or endangered species, a species proposed for listing as threatened or endangered, or a designated or proposed critical habitat under the Federal Endangered Species Act, 16 U.S.C. §1531 et seq.; State Endangered Species Conservation Act, RSA 212-A; or New Hampshire Native Plant Protection Act, RSA 217-A.

10. In accordance with Env-Wt 307.02, and in accordance with federal requirements, all work in areas under the jurisdiction of the U.S. Army Corps of Engineers (USACE) shall comply with all conditions of the applicable state general permit.

APPROVED:

Stefanie M. Giallongo
Inland Wetland Supervisor, Wetlands Bureau
Land Resources Management, Water Division

THE SIGNATURES BELOW ARE REQUIRED TO VALIDATE THIS PERMIT (Env-Wt 314.01).

_____ _____

PERMITTEE SIGNATURE (required) PRINCIPAL CONTRACTOR SIGNATURE (required)

The State of New Hampshire
Department of Environmental Services

Robert R. Scott, Commissioner

September 02, 2021

CITY OF PORTSMOUTH
TERRY DESMARAIS PE - CITY ENGINEER
680 PEVERLY HILL RD
PORTSMOUTH NH 03801

Re: Approved Standard Dredge and Fill Wetlands Permit Application with Mitigation (RSA 482-A)
NHDES File Number: 2021-01572
Subject Property: 200 Peirce Island Rd, Portsmouth, Tax Map #208, Lot #1

Dear Applicant:

On September 02, 2021, the New Hampshire Department of Environmental Services (NHDES) Wetlands Bureau approved the above-referenced Standard Dredge and Fill Wetlands Permit Application. Enclosed please find Wetlands Permit # 2021-01572 to impact 12,951 square feet of previously developed upland tidal buffer zone and 890 square feet of undeveloped upland tidal buffer zone in order to improve resiliency of the access road to the Peirce Island Wastewater Treatment Facility (WWTF), upgrade an existing parking area, extend a public walking trail, and to replace and rehabilitate existing sewer and drinking water force mains. In addition, the project will temporarily impact 56,794 square feet of previously developed upland tidal buffer zone and 1,803 square feet of undeveloped upland tidal buffer zone for construction access and installation. Compensatory mitigation is provided for permanent impacts within the undeveloped upland tidal buffer zone as a 9,731 square foot buffer enhancement area to be planted.

This approval is based on the following findings:

1. This is classified as a Major impact project per Rule Env-Wt 610.17 for construction activity that involves greater than 10,000 square feet of impact in the previously developed upland tidal buffer zone and alteration of undeveloped upland tidal buffer zone (a priority resource area).
2. The applicant has addressed all of the required planning items that are used to determine the appropriate impact classification of a project and the type of approval required, per Rule Env-Wt 306.05.
3. The applicant has demonstrated that the avoidance and minimization requirements in Env-Wt 307, Env-Wt 311.07, Env-Wt 313, and Env-Wt 603.04 have been met, and has demonstrated that all of the requirements listed in Env-Wt 605.01(a) through (c) have been met, for projects in coastal areas, per Rule Env-Wt 605.01.
4. The project meets the approval criteria established in Rule Env-Wt 313.01.
5. The applicant for a permit for work in or adjacent to tidal waters/wetlands or the tidal buffer zone has demonstrated that adverse impacts listed in (a) through (d) have been avoided or minimized as required by Env-Wt 313.04, per Rule Env-Wt 605.02.
6. The project in or on a tidal buffer zone preserves the self-sustaining ability of the buffer area to provide habitat values, protect tidal environments from potential sources of pollution, provide stability of the coastal shoreline, and maintain existing buffers intact where the lot has disturbed area defined under RSA 483- B:4, VI, per Rule Env-Wt 604.02(c).
7. All resource-specific criteria established in Env-Wt 600 have been met, per Rule Env-Wt 313.01(a)(3).
8. All project-specific criteria established in Env-Wt 600 have been met, per Rule Env-Wt 313.01(a)(4).
9. Per Rule Env-Wt311.03(b)(7), the applicant has provided an explanation as to methods, timing, and manner as to how the project will meet standard permit conditions specified in Env-Wt 307.

10. All applicable conditions specified in Env-Wt 307 have been met, per Rule Env-Wt 313.01(a)(2).
11. Related NHDES Wetlands / Shoreland permit files include: 2015-01866, 2015-01878, 2020-02873, 2021-01561.
12. Per Rule Env-Wt 313.04(a)(1) compensatory mitigation is required for permanent impacts to priority resource areas (including the undeveloped upland tidal buffer zone). The applicant is offering permittee responsible mitigation in the form of a 9,731 square foot upland buffer planting area.
13. Per Rule Env-Wt 803.04(a), the applicant has prepared a monitoring plan that is commensurate with the complexity of the permittee-responsible mitigation project.
14. Per Rule Env-Wt 803.08(a), for permittee-responsible mitigation, other than for stream impacts, the applicant has demonstrated that the compensatory mitigation plan meets or exceeds the ratios listed in Table 800-1, relative to the amount of impacted jurisdictional areas.

Mitigation is required as part of this approval. The required mitigation must be completed as approved in the permit, in accordance with the conditions in the permit, and in conjunction with the project. Failure to comply with the mitigation requirements will be considered a violation of RSA 482-A.

In accordance with RSA 482-A:10, RSA 21-O:14, and Rules Env-Wtc 100-200, **any person aggrieved by this decision may file a Notice of Appeal directly with the NH Wetlands Council (Council) within 30 days of the decision date, September 02, 2021**. Every ground claiming the decision is unlawful or unreasonable must be fully set forth in the Notice of Appeal. Only the grounds set forth in the Notice of Appeal are considered by the Council. Information about the Council, including Council Rules, is available at https://nhec.nh.gov/wetlands/index.htm. For appeal related issues, contact the Council Appeals Clerk at (603) 271-6072.

If you have any questions, please contact me at Stefanie.Giallongo@des.nh.gov or (603) 559-1516.

Sincerely,

Stefanie M. Giallongo

Stefanie M. Giallongo
Inland Wetland Supervisor, Wetlands Bureau
Land Resources Management, Water Division

cc: Agent
Municipal Clerk/Conservation Commission
ec: Assistant Wetlands Bureau Administrator
Wetland Mitigation Coordinator

Wetland Permit Application for:
Peirce Island Road, Parking Area, Recreational Trail, Pipeline Replacement, and Sliplining

City of Portsmouth, NH

Prepared For:
City of Portsmouth
Department of Public Works
680 Peverly Hill Road
Portsmouth, NH 03801

and **AECOM**
250 Apollo Drive
Chelmsford, MA 01824

Date:
April 15, 2021

Prepared By:
Normandeau Associates, Inc. 25 Nashua Road
Bedford, NH 03110

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EXHIBIT 25 – COASTAL RESOURCE WORKSHEET

EXHIBIT 26 – PRIME WETLANDS

EXHIBIT 27 - ATTACHMENT A - MINOR AND MAJOR PROJECTS EXHIBIT 28 - FUNCTIONAL ASSESSMENT WORKSHEET

*Exhibit 3 and 6 - Planning actions and materials required by Env-Wt 311.01(a)-(c), Env-Wt 311.03(b)(3), and 311.06 are provided in various other portions of this application.

+Exhibit 24 - After-the-fact application is not applicable

EXHIBIT 1

STANDARD DREDGE AND FILL WETLAND PERMIT APPLICATION FORM

STANDARD DREDGE AND FILL WETLANDS PERMIT APPLICATION

Water Division/Land Resources Management
Wetlands Bureau

Check the Status of your Application

RSA/Rule: RSA 482-A/Env-Wt 100-900

APPLICANT'S NAME: **Terry Desmarais, PE, City Engineer** **TOWN NAME:** Portsmouth

Administrative Use Only	Administrative Use Only	Administrative Use Only	File No.:
			Check No.:
			Amount:
			Initials:

A person may request a waiver of the requirements in Rules Env-Wt 100-900 to accommodate situations where strict adherence to the requirements would not be in the best interest of the public or the environment but is still in compliance with RSA 482-A. A person may also request a waiver of the standards for existing dwellings over water pursuant to RSA 482-A:26, III(b). For more information, please consult the Waiver Request Form.

SECTION 1 - REQUIRED PLANNING FOR ALL PROJECTS (Env-Wt 306.05; RSA 482-A:3, I(d)(2))

Please use the Wetland Permit Planning Tool (WPPT), the Natural Heritage Bureau (NHB) DataCheck Tool, the Aquatic Restoration Mapper, or other sources to assist in identifying key features such as: priority resource areas (PRAs), protected species or habitats, coastal areas, designated rivers, or designated prime wetlands.

Has the required planning been completed?	☒ Yes ☐ No
Does the property contain a PRA? If yes, provide the following information:	☒ Yes ☐ No
• Does the project qualify for an Impact Classification Adjustment (e.g. NH Fish and Game Department (NHF&G) and NHB agreement for a classification downgrade) or a Project-Type Exception (e.g. Maintenance or Statutory Permit-by-Notification (SPN) project)? See Env-Wt 407.02 and Env-Wt 407.04.	☐ Yes ☒ No
• Protected species or habitat? o If yes, species or habitat name(s): *Iva frutescens* o NHB Project ID #: NHB21-1136	☒ Yes ☐ No
• Bog?	☐ Yes ☒ No
• Floodplain wetland contiguous to a tier 3 or higher watercourse?	☐ Yes ☒ No
• Designated prime wetland or duly-established 100-foot buffer?	☐ Yes ☒ No
• Sand dune, tidal wetland, tidal water, or undeveloped tidal buffer zone?	☒ Yes ☐ No
Is the property within a Designated River corridor? If yes, provide the following information: • Name of Local River Management Advisory Committee (LAC): • A copy of the application was sent to the LAC on Month: Day: Year:	☐ Yes ☒ No

For dredging projects, is the subject property contaminated? • If yes, list contaminant:	☐ Yes ☒ No
Is there potential to impact impaired waters, class A waters, or outstanding resource waters?	☐ Yes ☒ No
For stream crossing projects, provide watershed size (see WPPT or Stream Stats): N/A	

SECTION 2 - PROJECT DESCRIPTION (Env-Wt 311.04(i))

Provide a **brief** description of the project and the purpose of the project, outlining the scope of work to be performed and whether impacts are temporary or permanent. DO NOT reply "See attached"; please use the space provided below.

The City of Portsmouth is nearing completion of a major upgrade to the Peirce Island Wastewater Treatement Facility (WWTF; DES Wetland Permits 2015-1866 and 2015-1878). Several additional improvements are proposed to enhance access reliability to the WWTF, and the public's access to the island. These improvements include raising the access road approximately 3 feet at its lowest point to elevate it above the 100-year flood line and to address sea level rise; converting a former informal public parking area and natural lands; and extending a public walking trail around the northeastern perimeter of the island. At the same time, the City is planning to permanently replace the two sewer force mains on Peirce Island between the Peirce Island Road Bridge and the Peirce Island WWTF, the water main on Peirce Island between the Peirce Island Road Bridge and the Peirce Island Pool, and slip line one of the force mains under the Peirce Island Road. The majority of the work lies within the Tidal Buffer Zone (TBZ).

SECTION 3 - PROJECT LOCATION

Separate wetland permit applications must be submitted for each municipality within which wetland impacts occur.

ADDRESS: 200 Peirce Island Road

TOWN/CITY: Portsmouth

TAX MAP/BLOCK/LOT/UNIT: 208/1

US GEOLOGICAL SURVEY (USGS) TOPO MAP WATERBODY NAME: Piscataqua River
☐ N/A

(Optional) LATITUDE/LONGITUDE in decimal degrees (to five decimal places): 43.07509° North
-70.74582° West

SECTION 4 - APPLICANT (DESIRED PERMIT HOLDER) INFORMATION (Env-Wt 311.04(a))

If the applicant is a trust or a company, then complete with the trust or company information.

NAME: Terry Desmarais, P.E., City Engineer

MAILING ADDRESS: 680 Peverly Hill Road

TOWN/CITY: Portsmouth | STATE: NH | ZIP CODE: 03801

EMAIL ADDRESS: tldesmarais@cityofportsmouth.com

FAX: N/A | PHONE: (603) 766-1421

ELECTRONIC COMMUNICATION: By initialing here: _____, I hereby authorize NHDES to communicate all matters relative to this application electronically.

SECTION 5 - AUTHORIZED AGENT INFORMATION (Env-Wt 311.04(c))

☐ N/A

LAST NAME, FIRST NAME, M.I.: Meserve, Erik

COMPANY NAME: AECOM

MAILING ADDRESS: 250 Apollo Drive

TOWN/CITY: Chelmsford | STATE: MA | ZIP CODE: 01824

EMAIL ADDRESS: erik.meserve@aecom.com

FAX: N/A | PHONE: (978) 905-3145

ELECTRONIC COMMUNICATION: By initialing here _____, I hereby authorize NHDES to communicate all matters relative to this application electronically.

SECTION 6 - PROPERTY OWNER INFORMATION (IF DIFFERENT THAN APPLICANT) (Env-Wt 311.04(b))

If the owner is a trust or a company, then complete with the trust or company information.

☐ Same as applicant

NAME: City of Portsmouth

MAILING ADDRESS: 97 Junkins Avenue

TOWN/CITY: Portsmouth | STATE: NH | ZIP CODE: 03801

EMAIL ADDRESS: N/A

FAX: M/A | PHONE: N/A

ELECTRONIC COMMUNICATION: By initialing here _____, I hereby authorize NHDES to communicate all matters relative to this application electronically.

SECTION 7 - RESOURCE-SPECIFIC CRITERIA ESTABLISHED IN Env-Wt 400, Env-Wt 500, Env-Wt 600, Env-Wt 700, OR Env-Wt 900 HAVE BEEN MET (Env-Wt 313.01(a)(3))

Describe how the resource-specific criteria have been met for each chapter listed above (please attach information about stream crossings, coastal resources, prime wetlands, or non-tidal wetlands and surface waters):
Peirce Island is located in the City of Portsmouth on the Piscataqua River. It is owned by the City and the State of NH, and provides multiple public services, including the WWTF, the State Fish Pier, and a public outdoor pool, boat ramp, park, and numerous walking trails. The Project Area occupies the Peirce Island Road Bridge, the eastern end of the island, and the road between Peirce Island Road Bridge and the WWTF. The Project Area is bordered by estuarine habitats, including rocky shore (E2RS1/2) and salt marsh (E2EM1). Most of the work lies within the 100-foot TBZ, although a small portion of the parking area lies within protected shoreline. No freshwater resources are within or adjacent to the impact area. A protected plant, *Iva frutescens*, occurs in the project vicinity. Please see Exhibit 25 - Coastal Resource Worksheet attached to this application for further discussion of the areas coastal resources and the proposed mitigation for the planned temporary and permanent impacts to the undistrubed TBZ. Please see Exhibit 8 - Permittee Responsible Mitigation Project Worksheet attached to this application for further discussion of the proposed mitigation for impacts to the protected plant, *Iva frutescens*.

SECTION 8 - AVOIDANCE AND MINIMIZATION

Impacts within wetland jurisdiction must be avoided to the maximum extent practicable (Env-Wt 313.03(a)).* Any project with unavoidable jurisdictional impacts must then be minimized as described in the Wetlands Best Management Practice Techniques For Avoidance and Minimization and the Wetlands Permitting: Avoidance, Minimization and Mitigation Fact Sheet. For minor or major projects, a functional assessment of all wetlands on the project site is required (Env-Wt 311.03(b)(10)).*

Please refer to the application checklist to ensure you have attached all documents related to avoidance and minimization, as well as functional assessment (where applicable). Use the Avoidance and Minimization Checklist, the Avoidance and Minimization Narrative, or your own avoidance and minimization narrative.

**See Env-Wt 311.03(b)(6) and Env-Wt 311.03(b)(10) for shoreline structure exemptions.*

SECTION 9 - MITIGATION REQUIREMENT (Env-Wt 311.02)

If unavoidable jurisdictional impacts require mitigation, a mitigation pre-application meeting must occur at least 30 days but not more than 90 days prior to submitting this Standard Dredge and Fill Permit Application.

Mitigation Pre-Application Meeting Date: Month: 8 Day: 19 Year: 2020

(☐ N/A - Mitigation is not required)

SECTION 10 - THE PROJECT MEETS COMPENSATORY MITIGATION REQUIREMENTS (Env-Wt 313.01(a)(1)c)

Confirm that you have submitted a compensatory mitigation proposal that meets the requirements of Env-Wt 800 for all permanent unavoidable impacts that will remain after avoidance and minimization techniques have been exercised to the maximum extent practicable: ☒ I confirm submittal.

(☐ N/A – Compensatory mitigation is not required)

SECTION 11 - IMPACT AREA (Env-Wt 311.04(g))

For each jurisdictional area that will be/has been impacted, provide square feet (SF) and, if applicable, linear feet (LF) of impact, and note whether the impact is after-the-fact (ATF; i.e., work was started or completed without a permit).

For intermittent and ephemeral streams, the linear footage of impact is measured along the thread of the channel. *Please note, installation of a stream crossing in an ephemeral stream may be undertaken without a permit per Rule Env-Wt 309.02(d), however other dredge or fill impacts should be included below.*

For perennial streams/rivers, the linear footage of impact is calculated by summing the lengths of disturbances to the channel and banks.

Permanent impacts are impacts that will remain after the project is complete (e.g., changes in grade or surface materials).

Temporary impacts are impacts not intended to remain (and will be restored to pre-construction conditions) after the project is completed.

JURISDICTIONAL AREA		PERMANENT			TEMPORARY		
		SF	LF	ATF	SF	LF	ATF
Wetlands	Forested Wetland			☐			☐
	Scrub-shrub Wetland			☐			☐
	Emergent Wetland			☐			☐
	Wet Meadow			☐			☐
	Vernal Pool			☐			☐
	Designated Prime Wetland			☐			☐
	Duly-established 100-foot Prime Wetland Buffer			☐			☐
Surface Water	Intermittent / Ephemeral Stream			☐			☐
	Perennial Stream or River			☐			☐
	Lake / Pond			☐			☐
	Docking - Lake / Pond			☐			☐
	Docking - River			☐			☐
Banks	Bank - Intermittent Stream			☐			☐
	Bank - Perennial Stream / River			☐			☐
	Bank / Shoreline - Lake / Pond			☐			☐
Tidal	Tidal Waters			☐			☐
	Tidal Marsh			☐			☐
	Sand Dune			☐			☐
	Undeveloped Tidal Buffer Zone (TBZ)	890		☐	1803		☐
	Previously-developed TBZ	12951		☐	55624		☐
	Docking - Tidal Water			☐			☐
TOTAL		13841			**57427**		

SECTION 12 - APPLICATION FEE (RSA 482-A:3, I)

☐ **MINIMUM IMPACT FEE**: Flat fee of $400.

☐ **NON-ENFORCEMENT RELATED, PUBLICLY-FUNDED AND SUPERVISED RESTORATION PROJECTS, REGARDLESS OF IMPACT CLASSIFICATION:** Flat fee of $400 (refer to RSA 482-A:3, 1(c) for restrictions).

☐ **MINOR OR MAJOR IMPACT FEE:** Calculate using the table below:

Permanent and temporary (non-docking):	71268 SF	× $0.40 =	$	28507.20
Seasonal docking structure:	SF	× $2.00 =	$	
Permanent docking structure:	SF	× $4.00 =	$	
Projects proposing shoreline structures (including docks) add $400 =			$	

Total =	$ 28507.20
The application fee for minor or major impact is the above calculated total or $400, whichever is greater =	$ 28507.20

SECTION 13 - PROJECT CLASSIFICATION (Env-Wt 306.05)

Indicate the project classification.

☐ Minimum Impact Project	☐ Minor Project	☒ Major Project

SECTION 14 - REQUIRED CERTIFICATIONS (Env-Wt 311.11)

Initial each box below to certify:

Initials:	
TD	To the best of the signer's knowledge and belief, all required notifications have been provided.
TD	The information submitted on or with the application is true, complete, and not misleading to the best of the signer's knowledge and belief.
TD	The signer understands that: • The submission of false, incomplete, or misleading information constitutes grounds for NHDES to: 1. Deny the application. 2. Revoke any approval that is granted based on the information. 3. If the signer is a certified wetland scientist, licensed surveyor, or professional engineer licensed to practice in New Hampshire, refer the matter to the joint board of licensure and certification established by RSA 310-A:1. • The signer is subject to the penalties specified in New Hampshire law for falsification in official matters, currently RSA 641. • The signature shall constitute authorization for the municipal conservation commission and the Department to inspect the site of the proposed project, except for minimum impact forestry SPN projects and minimum impact trail projects, where the signature shall authorize only the Department to inspect the site pursuant to RSA 482-A:6, II.
TD	If the applicant is not the owner of the property, each property owner signature shall constitute certification by the signer that he or she is aware of the application being filed and does not object to the filing.

SECTION 15 - REQUIRED SIGNATURES (Env-Wt 311.04(d); Env-Wt 311.11)

SIGNATURE (OWNER):	PRINT NAME LEGIBLY:	DATE:
	Terry Desmarais, P.E., City Engineer	5/13/21
SIGNATURE (APPLICANT, IF DIFFERENT FROM OWNER):	PRINT NAME LEGIBLY:	DATE:
SIGNATURE (AGENT, IF APPLICABLE):	PRINT NAME LEGIBLY:	DATE:

SECTION 16 - TOWN / CITY CLERK SIGNATURE (Env-Wt 311.04(f))

As required by RSA 482-A:3, I(a)(1), I hereby certify that the applicant has filed four application forms, four detailed plans, and four USGS location maps with the town/city indicated below.	
TOWN/CITY CLERK SIGNATURE: _____	PRINT NAME LEGIBLY:
TOWN/CITY:	DATE:

DIRECTIONS FOR TOWN/CITY CLERK:
Per RSA 482-A:3, I(a)(1)

1. IMMEDIATELY sign the original application form and four copies in the signature space provided above.
2. Return the signed original application form and attachments to the applicant so that the applicant may submit the application form and attachments to NHDES by mail or hand delivery.
3. IMMEDIATELY distribute a copy of the application with one complete set of attachments to each of the following bodies: the municipal Conservation Commission, the local governing body (Board of Selectmen or Town/City Council), and the Planning Board.
4. Retain one copy of the application form and one complete set of attachments and make them reasonably accessible for public review.

DIRECTIONS FOR APPLICANT:
Submit the original permit application form bearing the signature of the Town/City Clerk, additional materials, and the application fee to NHDES by mail or hand delivery at the address at the bottom of this page. Make check or money order payable to “Treasurer – State of NH”.

Keep this checklist for your reference; do not submit with your application.

APPLICATION CHECKLIST

Unless specified, all items below are required. Failure to provide the required items will delay a decision on your project and may result in denial of your application. Please reference statute RSA 482-A, Fill and Dredge in Wetlands, and the Wetland Rules Env-Wt 100-900.

- ☒ The completed, dated, signed, and certified application (Env-Wt 311.03(b)(1)).
- ☒ Correct fee as determined in RSA 482-A:3, I(b) or (c), subject to any cap established by RSA 482-A:3, X (Env-Wt 311.03(b)(2)). Make check or money order payable to "Treasurer – State of NH".
- ☒ The Required Planning actions required by Env-Wt 311.01(a)-(c) and Env-Wt 311.03(b)(3).
- ☒ US Army Corps of Engineers (ACE) "Appendix B, New Hampshire General Permits (GPs), Required Information and Corps Secondary Impacts Checklist" and its required attachments (Env-Wt 307.02). This includes the US Fish and Wildlife Service IPAC review and Section 106 Historic/Archaeological Resource review.
- ☒ Project plans described in Env-Wt 311.05 (Env-Wt 311.03(b)(4)).
- ☒ Maps, or electronic shape files and meta data, and other attachments specified in Env-Wt 311.06 (Env-Wt 311.03(b)(5)).
- ☒ Explanation of the methods, timing, and manner as to how the project will meet standard permit conditions required in Env-Wt 307 (Env-Wt 311.03(b)(7)).
- ☒ If applicable, the information regarding proposed compensatory mitigation specified in Env-Wt 311.08 and Chapter Env-Wt 800 - Permittee Responsible Mitigation Project Worksheet, unless not required under Env-Wt 313.04 (Env-Wt 311.03(b)(8); Env-Wt 311.08; Env-Wt 313.04).
- ☒ Any additional information specific to the **type of resource** as specified in Env-Wt 311.09 (Env-Wt 311.03(b)(9); Env-Wt 311.04(j)).
- ☒ Project specific information required by Env-Wt 500, Env-Wt 600, and Env-Wt 900 (Env-Wt 311.03(b)(11)).
- ☒ A list containing the name, mailing address and tax map/lot number of each abutter to the subject property (Env-Wt 311.03(b)(12)).
- ☒ Copies of certified postal receipts or other proof of receipt of the notices that are required by RSA 482-A:3, I(d) (Env-Wt 311.03(b)(13)).
- ☒ Project design considerations required by Env-Wt 313 (Env-Wt 311.04(j)).
- ☒ Town tax map showing the subject property, the location of the project on the property, and the location of properties of abutters with each lot labeled with the name and mailing address of the abutter (Env-Wt 311.06(a)).
- ☒ Dated and labeled color photographs that:
  - (1) Clearly depict:
    - a. All jurisdictional areas, including but not limited to portions of wetland, shoreline, or surface water where impacts have or are proposed to occur.
    - b. All existing shoreline structures.
  - (2) Are mounted or printed no more than 2 per sheet on 8.5 x 11 inch sheets (Env-Wt 311.06(b)).
- ☒ A copy of the appropriate US Geological Survey map or updated data based on LiDAR at a scale of one inch equals 2,000 feet showing the location of the subject property and proposed project (Env-Wt 311.06(c)).
- ☒ A narrative that describes the work sequence, including pre-construction through post-construction, and the relative timing and progression of all work (Env-Wt 311.06(d)).

☒ For all projects in the protected tidal zone, a copy of the recorded deed with book and page numbers for the property (Env-Wt 311.06(e)).

☒ If the applicant is not the owner in fee of the subject property, documentation of the applicant's legal interest in the subject property, provided that for utility projects in a utility corridor, such documentation may comprise a list that:

(1) Identifies the county registry of deeds and book and page numbers of all of the easements or other recorded instruments that provide the necessary legal interest; and

(2) Has been certified as complete and accurate by a knowledgeable representative of the applicant (Env-Wt 311.06(f)).

☒ The NHB memo containing the NHB identification number and results as well as any written follow-up communications such as additional memos or email communications with either NHB or NHF&G (Env-Wt 311.06(g)). See Wetlands Permitting: Protected Species and Habitat Fact Sheet.

☒ A statement of whether the applicant has received comments from the local conservation commission and, if so, how the applicant has addressed the comments (Env-Wt 311.06(h)).

☒ For projects in LAC jurisdiction, a statement of whether the applicant has received comments from the LAC and, if so, how the applicant has addressed the comments (Env-Wt 311.06(i)).

☒ If the applicant is also seeking to be covered by the state general permits, a statement of whether comments have been received from any federal agency and, if so, how the applicant has addressed the comments (Env-Wt 311.06(j)).

☒ Avoidance and Minimization Written Narrative or the Avoidance and Minimization Checklist, or your own avoidance and minimization narrative (Env-Wt 311.07).

☐ For after-the-fact applications: information required by Env-Wt 311.12.

☒ Coastal Resource Worksheet for coastal projects as required under Env-Wt 600.

☒ Prime Wetlands information required under Env-Wt 700. See WPPT for prime wetland mapping.

Required Attachments for Minor and Major Projects

☒ Attachment A: Minor and Major Projects (Env-Wt 313.03).

☒ Functional Assessment Worksheet or others means of documenting the results of actions required by Env-Wt 311.10 as part of an application preparation for a standard permit (Env-Wt 311.03(b)(3); Env-Wt 311.03(b)(10)). See Functional Assessments for Wetlands and Other Aquatic Resources Fact Sheet. For shoreline structures, see shoreline structures exemption in Env-Wt 311.03(b)(10)).

Optional Materials

☐ Stream Crossing Worksheet which summarizes the requirements for stream crossings under Env-Wt 900.

☐ Request for concurrent processing of related shoreland / wetlands permit applications (Env-Wt 313.05).

EXHIBIT 2

FEES/CHECK

EXHIBIT 3

Required Planning Actions
required by Env-Wt 311.01(a)-(c) and Env-Wt 311.03(b)(3)

Required Planning Actions

All Required Planning actions required by Env-Wt 311.01(a)-(c) and Env-Wt 311.03(b)(3) have been done. See results in Exhibits 4 and 19.

EXHIBIT 4

USACE APPENDIX B – NH GENERAL PERMITS REQUIRED INFORMATION AND CORPS SECONDARY IMPACTS CHECKLIST

US Army Corps of Engineers ®
New England District

Appendix B

New Hampshire General Permits (GPs)
Required Information and Corps Secondary Impacts Checklist

In order for the Corps of Engineers to properly evaluate your application, applicants must submit the following information along with the New Hampshire DES Wetlands Bureau application or permit notification forms. Some projects may require more information. For a more comprehensive checklist, go to https://www.nae.usace.army.mil/Missions/Regulatory/ "Useful Documents, Forms and Publications" and then "Corps Application Form and Guidance." Check with the Corps at (978) 318-8832 for project-specific requirements. For your convenience, this Appendix B is also attached to the State of New Hampshire DES Wetlands Bureau application and Permit by Notification forms.

All Projects:

- New Hampshire Department of Environmental Services (DES) Wetlands Permit Application.
- Request for Project Review Form by the New Hampshire Division of Historical Resources (DHR) https://www.nh.gov/nhdhr/review/rpr.htm.
- Photographs of wetland/waterway to be impacted.
- Purpose of the project.
- Legible, reproducible plans no larger than 11"x17" with bar scale. Provide locus map and plan views of the entire property.
- Typical cross-section views of all wetland and waterway fill areas and wetland replication areas.
- In navigable waters, show mean low water (MLW) and mean high water (MHW) elevations. Show the high tide line (HTL) elevations when fill is involved. In other waters, show ordinary high water (OHW) elevation.
- On each plan, show the following for the project:
    - Vertical datum and the NAVD 1988 equivalent with the vertical units as U.S. feet. In coastal waters this may be mean higher high water (MHHW), mean high water (MHW), mean low water (MLW), mean lower low water (MLLW) or other tidal datum with the vertical units as U.S. feet. MLLW and MHHW are preferred. Provide the correction factor detailing how the vertical datum (e.g., MLLW) was derived using the latest National Tidal Datum Epoch for that area, typically 1983-2001.
    - Horizontal state plane coordinates in U.S. survey feet based on the Traverse Mercator Grid system for the State of New Hampshire (Zone 2800) NAD 83.
    - Project limits with existing and proposed conditions.
    - Limits of any Federal Navigation Project in the vicinity of the project area and horizontal State Plane Coordinates in U.S. survey feet for the limits of the proposed work closest to the Federal Navigation Project;
    - Volume, type, and source of fill material to be discharged into waters and wetlands, including the area(s) (in square feet or acres) of fill in wetlands, below the OHW in inland waters and below the HTL in coastal waters.
    - Delineation of all waterways and wetlands on the project site,:
- Use Federal delineation methods and include Corps wetland delineation data sheets (GC 2).
- For activities involving discharges of dredged or fill material into waters of the U.S., include a statement describing how impacts to waters of the U.S. are to be avoided and minimized, and either a statement describing how impacts to waters of the U.S. are to be compensated for (or a conceptual or detailed mitigation plan) or a statement explaining why compensatory mitigation should not be required for the proposed impacts. Please contact the Corps for guidance.

US Army Corps of Engineers ®
New England District

New Hampshire General Permits (GPs)
Appendix B - Corps Secondary Impacts Checklist
(for inland wetland/waterway fill projects in New Hampshire)

1. Attach any explanations to this checklist. Lack of information could delay a Corps permit determination.
2. All references to "work" include all work associated with the project construction and operation. Work includes filling, clearing, flooding, draining, excavation, dozing, stumping, etc.
3. See GC 5, regarding single and complete projects.
4. Contact the Corps at (978) 318-8832 with any questions.

1. Impaired Waters	Yes	No
1.1 Will any work occur within 1 mile upstream in the watershed of an impaired water? See http://des.nh.gov/organization/divisions/water/wmb/section401/impaired_waters.htm to determine if there is an impaired water in the vicinity of your work area.*	X	
2. Wetlands	Yes	No
2.1 Are there are streams, brooks, rivers, ponds, or lakes within 200 feet of any proposed work?	X	
2.2 Are there proposed impacts to SAS, special wetlands. Applicants may obtain information from the NH Department of Resources and Economic Development Natural Heritage Bureau (NHB) DataCheck Tool for information about resources located on the property at https://www2.des.state.nh.us/nhb_datacheck/. The book Natural Community Systems of New Hampshire also contains specific information about the natural communities found in NH.		X
2.3 If wetland crossings are proposed, are they adequately designed to maintain hydrology, sediment transport & wildlife passage?		N/A
2.4 Would the project remove part or all of a riparian buffer? (Riparian buffers are lands adjacent to streams where vegetation is strongly influenced by the presence of water. They are often thin lines of vegetation containing native grasses, flowers, shrubs and/or trees that line the stream banks. They are also called vegetated buffer zones.)		X
2.5 The overall project site is more than 40 acres?		X
2.6 What is the area of the previously filled wetlands?	0	
2.7 What is the area of the proposed fill in wetlands?	0	
2.8 What is the % of previously and proposed fill in wetlands to the overall project site?	0	
3. Wildlife	Yes	No
3.1 Has the NHB & USFWS determined that there are known occurrences of rare species, exemplary natural communities, Federal and State threatened and endangered species and habitat, in the vicinity of the proposed project? (All projects require an NHB ID number & a USFWS IPAC determination.) NHB DataCheck Tool: https://www2.des.state.nh.us/nhb_datacheck/ USFWS IPAC website: https://ecos.fws.gov/ipac/location/index	X	

3.2 Would work occur in any area identified as either "Highest Ranked Habitat in N.H." or "Highest Ranked Habitat in Ecological Region"? (These areas are colored magenta and green, respectively, on NH Fish and Game's map, "2010 Highest Ranked Wildlife Habitat by Ecological Condition.") Map information can be found at: • PDF: https://wildlife.state.nh.us/wildlife/wap-high-rank.html. • Data Mapper: www.granit.unh.edu. • GIS: www.granit.unh.edu/data/downloadfreedata/category/databycategory.html.		X
3.3 Would the project impact more than 20 acres of an undeveloped land block (upland, wetland/waterway) on the entire project site and/or on an adjoining property(s)?		X
3.4 Does the project propose more than a 10-lot residential subdivision, or a commercial or industrial development?		X
3.5 Are stream crossings designed in accordance with the GC 21?		N/A
4. Flooding/Floodplain Values	Yes	No
4.1 Is the proposed project within the 100-year floodplain of an adjacent river or stream?	X	
4.2 If 4.1 is yes, will compensatory flood storage be provided if the project results in a loss of flood storage?		X
5. Historic/Archaeological Resources		
For a minimum, minor or major impact project - a copy of the Request for Project Review (RPR) Form (www.nh.gov/nhdhr/review) with your DES file number shall be sent to the NH Division of Historical Resources as required on Page 11 GC 8(d) of the GP document**	X	

*Although this checklist utilizes state information, its submittal to the Corps is a Federal requirement.
** If your project is not within Federal jurisdiction, coordination with NH DHR is not required under Federal law.

Section 1.1

Peirce Island lies in the Lower Piscataqua River –South water quality assessment unit (AUID: NHEST600031001-02-02). It is listed as Severe for Aquatic Life and Swimming, and Poor for Boating and Fish Consumption. The constituents of concern are mercury, fecal coliform, enterococcus, dioxins and PCBs. The project will result in a net benefit to water quality by stabilizing the parking area (reduce sedimentation) and adding grass and native vegetation to treat runoff before it reaches the river (further reduce sedimentation and nutrient/pollutant abatement).

Section 2.1

This project is located within 200 feet of the tidal Piscataqua River. Much of the area to be impacted has been previously disturbed by the on-site essential infrastructure (WWTF) and an existing informal walking trail. Minor clearing of vegetation will occur during trail construction, but there will be a net benefit to the river in the parking area as a result of conversion from compacted gravel to a mix of grass, native shrubs, and pervious grass pavers.

Section 3.1

The NH State threatened intertidal shrub, marsh elder (*Iva frutescens),* is present on site. A survey was conducted identifying the current locations of marsh elder within the project area. During installation of the temporary sewer force mains in October, 2020 under Emergency Authorization 2020-02873, two areas of the adjacent marsh elder stands were inadvertently impacted, with some of the plants crushed and minor soil disturbance. After consultation with NHDES and NH Natural Bureau (NHNHB), several steps were prescribed by NHDES to mitigate the impacts. These included hand-raking and mulching the impact areas, erecting construction fencing between the marsh elder stands and the work area as future protection, monitoring the areas for one growing season to determine restoration success, and provide NHDES and NHNHB with documentation of the restoration work and the results of the monitoring effect.

Section 3.2

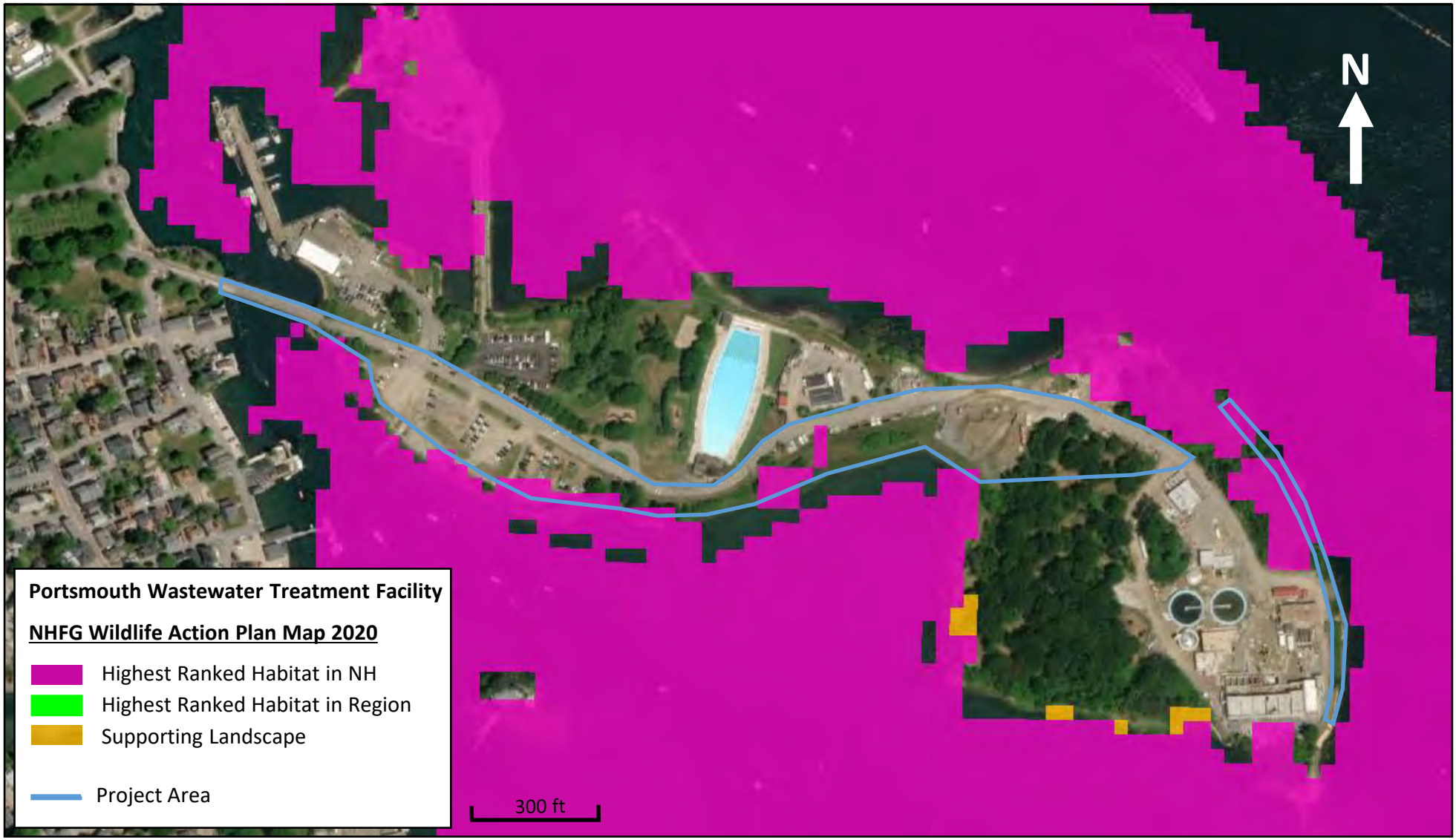
The 2020 Wildlife Action Plan map designates portions of the proposed work areas as Highest Ranked Habitat in N.H. (See attached map). We believe the designation of these areas as Highest Ranked Habitat in N.H. is a map scale issue, in which the extent of the adjacent estuarine area was over-estimated. These areas are more likely a mixture of Unranked and Supporting Landscape.

Section 4.1

Portions of the proposed parking area are within the mapped 100-year FEMA floodplain. There will be a net loss of 80 cubic yards of flood storage due to elevating the road. The Piscataqua River is tidal in this location, therefore this minor loss of flood storage is highly unlikely to affect adjacent properties or impact water levels, and the increased elevations are necessary to ensure access to critical infrastructure during high water.

Section 5

The NH Division of Historical Resources (NHDHR) review determined no historical properties will be affected by the proposed project. Please see responses from NHDHR attached to the end of this Exhibit.


N
Portsmouth Wastewater Treatment Facility
NHFG Wildlife Action Plan Map 2020
Highest Ranked Habitat in NH
Highest Ranked Habitat in Region
Supporting Landscape
Project Area
300 ft

NH DIVISION OF HISTORICAL RESOURCES

Date: 3/1/21 **Site No.** **DHR Review No.** 12424

Project: Peirce Island Force Main Replacement Project

Report: Phase IB Archaeological Investigation, Piece Island Force Main Project, Portsmouth, NH

Other Parties IAC, NHDES

NEPA and Sec. 106 of the NHPA require consultation with the SHPO to ensure the review of all actions covered by these acts relative to historical and cultural properties. The review should focus on the project's impacts pertinent to this act.

FOR MORE INFORMATION CONTACT: David Trubey, Review & Compliance Coordinator, (603-271-2813)

COMMENTS: Please check one. Additional comments should be included below or on a separate sheet.

✓ **CONCUR** WITH RESULTS OF SURVEY & RECOMMENDATION OF NO FURTHER STUDY.

____ **CONCUR WITH CONDITION** (Indicate major reservations about the project and the specific substantive changes or modifications desired.)

____ **TECHNICAL COMMENTS** (No formal position, technical comments may be attached.)

____ **NO COMMENTS**

Date: 3-4-2021

Reviewer's signature: David Trubey **Title:** R+C Coordinator

Amended RPR

After consultation with DHR, an amended RPR was prepared to address the excavation in the road on the west side of Peirce Island Road Bridge for sliplining the pipe under the bridge. This location is within the Nationally Registered Historic District and in close proximity to registered archaeological sites. The RPR amendment was submitted on April 15, 2021. DHR has indicated they will require a monitor be present during the excavation.

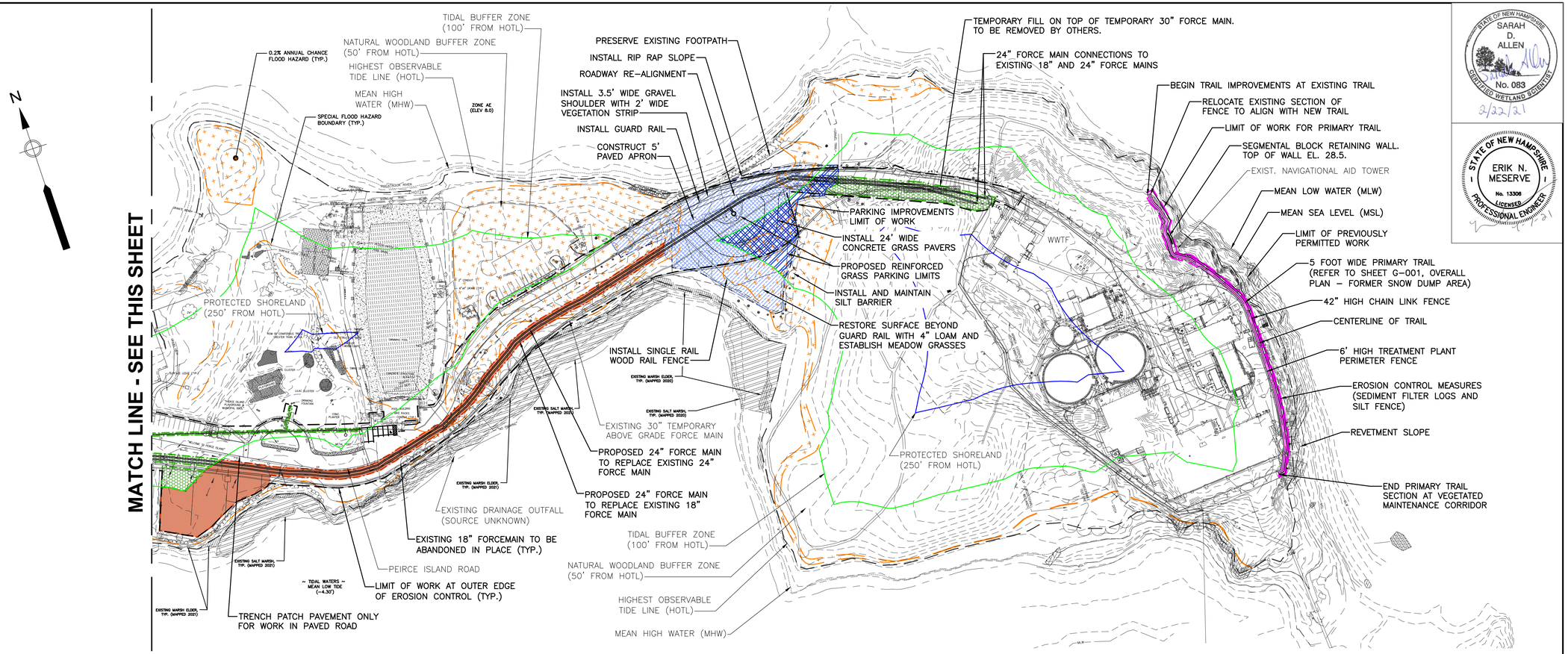
EXHIBIT 5

PROJECT PLANS

Project Plans

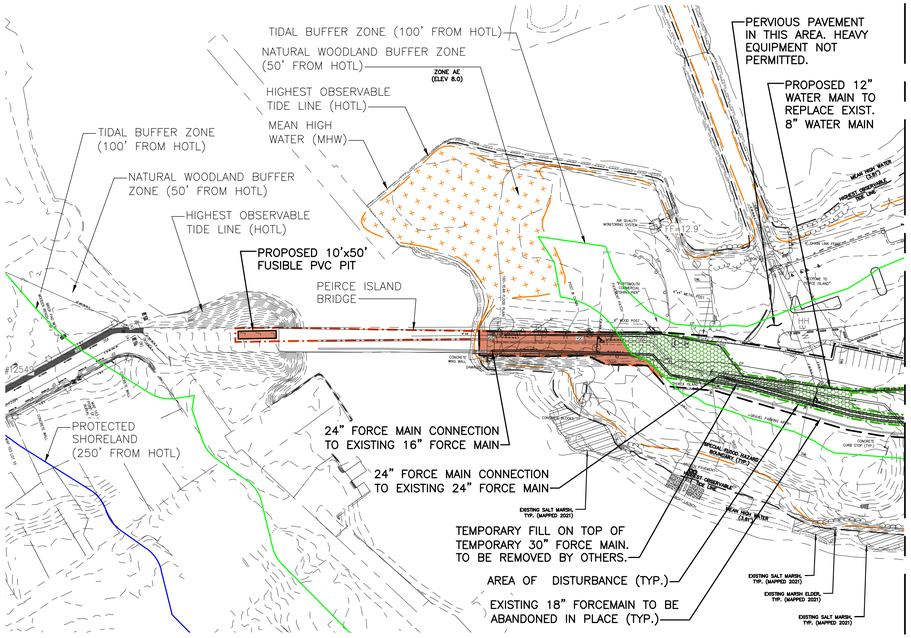
The following submittal is for multiple projects, including the Peirce Island Force Main and Water Main Replacement Project, Peirce Island Roadway and Snow Dump Improvements, and the Peirce Island Trail Extension. The following drawings are included to illustrate these projects:

- Overall Site Plan (All Projects) Sheet 00 G-003-P OSP
- Peirce Island Force Main and Water Main Replacement Project Plans (12 sheets)
- Peirce Island Roadway and Snow Dump Improvements and Peirce Island Trail Extension Plans (7 sheets)



PLAN

SCALE: 1"=100'



PLAN

SCALE: 1"=100'

LEGEND

- MEAN HIGH WATER (MHW)
- HIGHEST OBSERVABLE TIDE LINE (HOTL)
- SPECIAL FLOOD HAZARD BOUNDARY
- NATURAL WOODLAND BUFFER ZONE – 50' FROM HOTL
- TIDAL BUFFER ZONE – 100' FROM HOTL
- PROTECTED SHORELAND – 250' FROM HOTL
- LIMIT OF WORK (L.O.W.)
- AREA OF DISTURBANCE BOUNDARY
- SALT MARSH AREA
- MARSH ELDER
- .2% ANNUAL CHANCE OF FLOOD HAZARD AREA
- PIPELINE AREA OF DISTURBANCE 0–100 FEET FROM HOTL
- PIPELINE AREA OF DISTURBANCE 100–250 FEET FROM HOTL
- PARKING AREA OF DISTURBANCE 0–100 FEET FROM HOTL
- PARKING AREA OF DISTURBANCE 100–250 FEET FROM HOTL
- DUPLICATE AREA OF DISTURBANCE 0–100 FEET FROM HOTL
- DUPLICATE AREA OF DISTURBANCE 100–250 FEET FROM HOTL
- TRAIL IMPROVEMENTS AREA OF DISTURBANCE 0–100 FEET FROM HOTL

Peirce Island WWTF Wetlands Impact

	Temp (s.f.)	Perm (s.f.)	Total (s.f.)
Pipeline			
PDTBZ	52,500	0	52,500
Road & Grass Parking ^			
Previously Disturbed Tidal Buffer Zone	26,346	11,438	37,784
Duplicate Area between Pipeline& Parking	-16,928	0	-16,928
Restoration Area in Parking +	-7,464	0	-7,464
Fee Subtotal	1,954	11,438	13,392
Recreational Trail ^			
Undisturbed Tidal Buffer Zone	1,803	890	2,693
Previously Disturbed Tidal Buffer Zone	1,170	1,513	2,683
Previously Disturbed Tidal Buffer Zone *	(512)	(553)	(1,065)
Fee Subtotal	2,973	2,403	5,376
Fee Total	57,427	13,841	71,268

^ See Sheet G-001 for total impact area
+ To be restored to native habitat & excluded from fee (See Sheet G-001)
* Previously permitted & excluded from fee

Peirce Island WWTF Shoreland Impact

	Temp (s.f.)	Perm (s.f.)	Total (s.f.)
Pipeline Temporary Impacts 100-250'			
Previously Disturbed Tidal Buffer Zone	35,900	0	35,900
Duplicate Area between Pipeline& Parking	-8,415	0	-8,415
Subtotal	27,485	0	27,485
Recreational Trail			
Impervious Area within 100' Tidal Buffer Zone			
Previously Disturbed Tidal Buffer Zone	0	2,956	2,956
Total	27,485	2,956	30,441

1" = 100' SCALE: 0 100 200 300 FEET

STATE OF NEW HAMPSHIRE — SARAH D. ALLEN — No. 083 — CERTIFIED WETLAND SCIENTIST — 2/22/21

STATE OF NEW HAMPSHIRE — ERIK N. MESERVE — No. 13306 — LICENSED PROFESSIONAL ENGINEER — 2/22/21

AECOM

PROJECT

PEIRCE ISLAND FORCE MAIN AND WATER MAIN REPLACEMENT

Peirce Island, Portsmouth NH

OWNER

CITY OF PORTSMOUTH NEW HAMPSHIRE

680 Peverly Hill Road
Portsmouth, NH 03801

ENGINEER

AECOM TECHNICAL SERVICES, INC.
250 APOLLO DRIVE
CHELMSFORD, MA 01824
PHONE: (978) 905-2100
www.aecom.com

ALTUS ENGINEERING, INC.

STATE OF NEW HAMPSHIRE — ERIC D. WEINRIEB — No. 7634 — LICENSED PROFESSIONAL ENGINEER — 4/9/21

REGISTRATION

PERMIT SUBMITTAL

PERMIT APPLICATION DRAWING NOT FOR CONSTRUCTION

ISSUE/REVISION

I/R	DATE	DESCRIPTION

PROJECT NUMBER

60649477

Designed By:	S. HE
Drawn By:	M. THIBODEAU
Dept Check:	C. BENZIGER
Proj Check:	E. MESERVE
Date:	APRIL 13, 2021
Scale:	AS NOTED

DISCIPLINE

CIVIL

SHEET TITLE

OVERALL SITE PLAN (ALL PROJECTS)

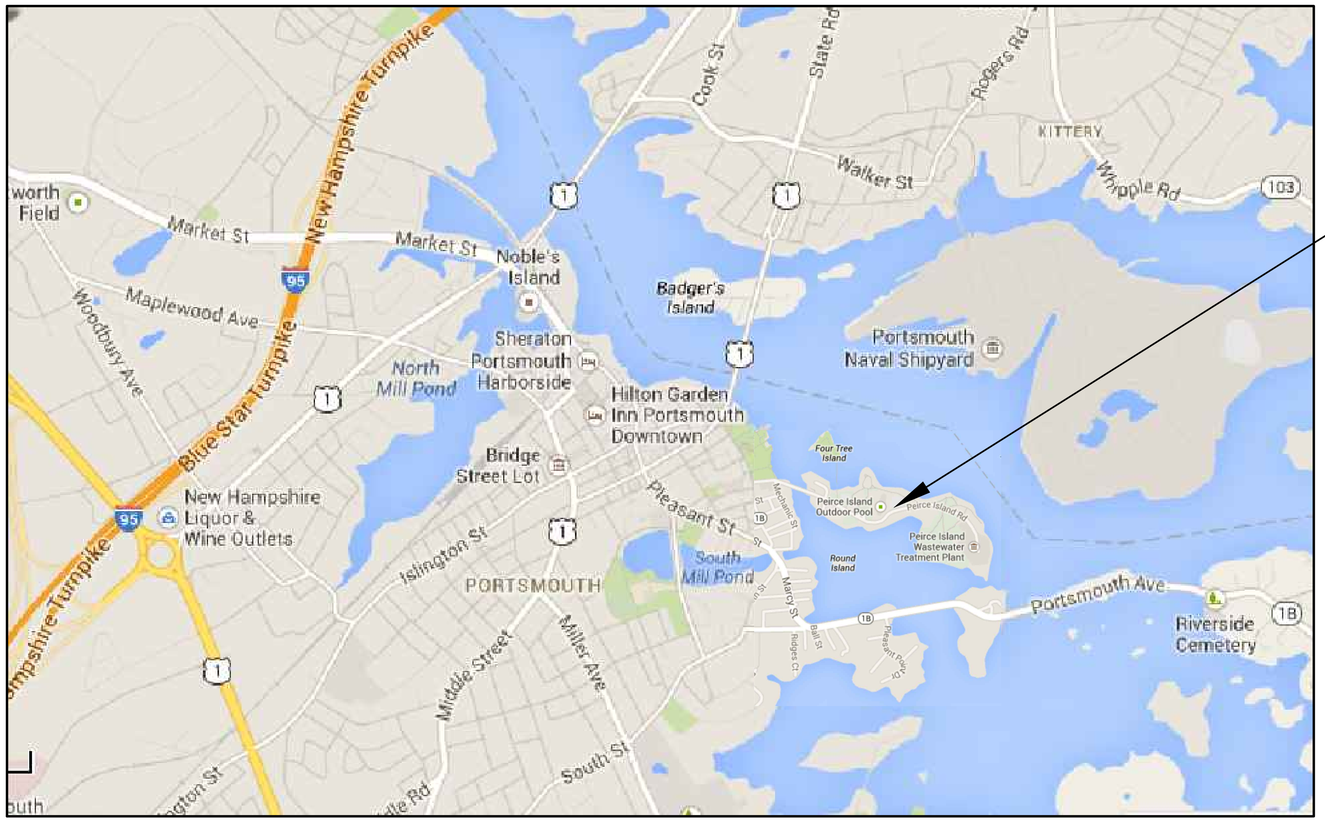
SHEET NUMBER

00 G-003-P OSP

PATH/FILENAME: C:\JOBS\DRAWINGS\4507 PWFP\4507.07 WATERLINE REPLACEMENT\INCOMING\210406 COMPLETE UPDATE\00 G-003-P OSP.DWG
LAST UPDATE: Tuesday, April 13, 2021 12:58:24 PM
PLOT DATE: Monday, April 19, 2021 9:04:45 AM

CITY OF PORTSMOUTH, NEW HAMPSHIRE

PEIRCE ISLAND
FORCE MAIN AND WATER MAIN REPLACEMENT
APRIL 2021



LOCATION PLAN

APPROXIMATE SCALE: 1" = 1000'

0 1000 2000 3000

SCALE: 1"=1000'

INDEX OF DRAWINGS

AECOM

PROJECT

PEIRCE ISLAND
FORCE MAIN AND
WATER MAIN
REPLACEMENT

Peirce Island, Portsmouth NH

OWNER

CITY OF PORTSMOUTH
NEW HAMPSHIRE

680 Peverly Hill Road
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Scale:	AS NOTED

DISCIPLINE

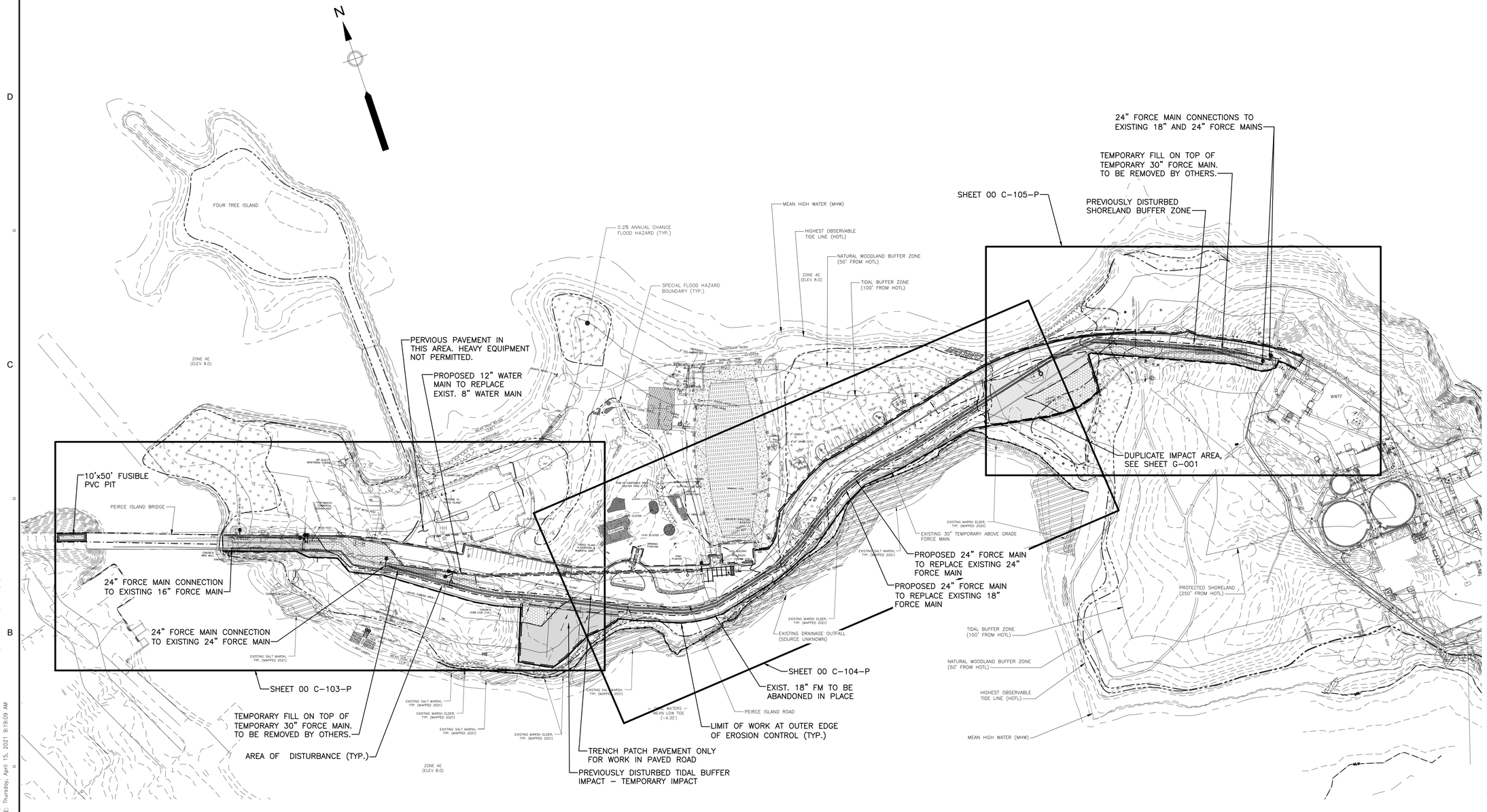
CIVIL

SHEET TITLE

COVER SHEET, LOCATION PLAN AND INDEX OF DRAWINGS

SHEET NUMBER

00 G-001-P



PLAN

SCALE: 1"=100'

LIMIT OF TEMPORARY DISTURBANCE AREAS:

52,500 S.F.	0–100 FOOT PREVIOUSLY DISTURBED TIDAL BUFFER ZONE
35,900 S.F.	100–250 FOOT PREVIOUSLY DISTURBED SHORELAND BUFFER ZONE

NOTES:

1. FOR LEGEND, ABBREVIATIONS AND GENERAL NOTES, SEE SHEET 00 C–001–P.

1" = 100' SCALE 0 100 200 300 FEET

PATH/FILENAME: L:\LEGACY\USCHL1FP001\DATA\PROJECTS\WAKEFIELD\DATA_2\EVERYONE\PORTSMOUTH PEIRCE ISLAND FM REPLACEMENT\900 CAD-GIS\SHEETS\G\00 G-002-P.DWG
LAST UPDATE: Wednesday, April 14, 2021 8:48:30 AM
PLOT DATE: Thursday, April 15, 2021 9:19:09 AM

AECOM

PROJECT

PEIRCE ISLAND FORCE MAIN AND WATER MAIN REPLACEMENT

Peirce Island, Portsmouth NH

OWNER

CITY OF PORTSMOUTH NEW HAMPSHIRE

680 Peverly Hill Road
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REGISTRATION

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PERMIT APPLICATION DRAWING
NOT FOR CONSTRUCTION

ISSUE/REVISION

I/R	DATE	DESCRIPTION

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Drawn By:	M. THIBODEAU
Dept Check:	C. BENZIGER
Proj Check:	E. MESERVE
Date:	APRIL 2021
Scale:	AS NOTED

DISCIPLINE

CIVIL

SHEET TITLE

OVERALL SITE AND KEY PLAN

SHEET NUMBER

00 G-002-P

GENERAL NOTES

1. IT IS THE INTENT OF THE CONTRACT DOCUMENTS TO PRESCRIBE A COMPLETE WORK OR IMPROVEMENT. THE CONTRACT DOCUMENTS ARE COMPLEMENTARY, AND ANY REQUIREMENTS INDICATED IN ONE OF THE DOCUMENTS IS AS BINDING AS HAVING BEEN INDICATED IN ALL.
2. HORIZONTAL LOCATIONS SHOWN ARE REFERENCED TO THE NH STATE PLANE COORDINATE SYSTEM, NAD83.
3. VERTICAL DATUM IS NAVD 88 AND IS BASED ON NATIONAL GEODETIC SURVEY FIRST ORDER CLASS I BENCHMARKS "V31 USGS" (PID:OC0289) HAVING A PUBLISHED ELEVATION OF 29.19' AND "W31" (PID:OC0413) HAVING A PUBLISHED ELEVATION OF 20.54'. REFER ALSO TO VERTICAL DATUM CONVERSION NOTE BELOW.
4. TOPOGRAPHIC INFORMATION SHOWN IS THE RESULT OF A SURVEY MADE IN JULY 2013, AUGUST 2020 AND JANUARY 2021 BY DOUCET SURVEY, INC., 102 KENT PLACE, NEWMARKET, NH 03857. WETLAND BOUNDARIES, HIGHEST OBSERVABLE TIDE LINE (HOTL) AND EXISTING TREE SURVEY WERE DELINEATED BY NORMANDEAU ASSOCIATES, INC. ON JANUARY 14, 2021.
5. THE LOCATION OF ANY UNDERGROUND UTILITY INFORMATION SHOWN ON THIS PLAN IS BASED ON RECORD DRAWINGS AND IS APPROXIMATE. THE OWNER DOES NOT GUARANTEE THE ACCURACY OR COMPLETENESS OF UNDERGROUND UTILITIES SHOWN. PRIOR TO ANY EXCAVATION ON SITE THE CONTRACTOR SHALL CONTACT DIG SAFE AT 1-888-344-7233.
6. IT IS THE CONTRACTOR'S RESPONSIBILITY TO VERIFY ALL EXISTING CONDITIONS AT THE SITE.
7. THE CONTRACTOR SHALL ERECT EROSION CONTROL MEASURES PRIOR TO COMMENCING ANY CLEARING, EXCAVATION OR STORAGE OF BACKFILL MATERIAL ON-SITE. REFER TO SPECIFICATION SECTION 01568 AND DETAILS.
8. THE ENGINEER MAY DIRECT THE CONTRACTOR TO VARY THE PROPOSED WORK DURING CONSTRUCTION TO MEET EXISTING CONDITIONS.
9. THE CONTRACTOR SHALL TAKE ALL NECESSARY MEASURES AND SHALL PROVIDE ALL NECESSARY CONTINUOUS BARRIERS OF SUFFICIENT TYPE, SIZE AND STRENGTH TO PREVENT ACCESS TO ALL OPEN EXCAVATIONS AT THE COMPLETION OF EACH DAYS WORK. REFER TO SPECIFICATION SECTION 01046 FOR ADDITIONAL REQUIREMENTS
10. INTERRUPTION TO WATER AND OTHER EXISTING UTILITIES SHALL BE REQUESTED IN WRITING BY THE CONTRACTOR 3 DAYS IN ADVANCE OF THE WORK AND REVIEWED BY THE ENGINEER.
11. CONTRACTOR SHALL MAINTAIN FLOW OF SEWAGE IN ACCORDANCE WITH SECTION 01063.
12. EXISTING UTILITIES INTERFERING WITH THE WORK SHALL BE RELOCATED AS DIRECTED BY THE ENGINEER AT NO ADDITIONAL COST TO THE OWNER.
13. PIPE SHALL BE AS INDICATED IN THE PIPING SCHEDULE AND SPECIFICATIONS. PROVIDE RESTRAINED MECHANICAL JOINT FITTINGS FOR CONNECTIONS TO EXISTING PIPING AS SPECIFIED .
14. PIPING WHICH IS EXPOSED DURING EXCAVATION, INCLUDING TEE'S, VALVES, AND FITTINGS, AND IS NOT TO BE DEMOLISHED, SHALL BE SUPPORTED, BRACED OR OTHERWISE PROTECTED DURING CONSTRUCTION ACTIVITIES.
15. ALL PIPING SHALL BE CONSTRUCTED WITH A MINIMUM OF 5 FEET OF COVER.
16. ALL PIPES SHALL SLOPE UNIFORMLY BETWEEN ELEVATIONS SHOWN UNLESS OTHERWISE INDICATED ON THE DRAWINGS OR DIRECTED BY THE ENGINEER. NO SAGS OR CRESTS IN PIPING WILL BE PERMITTED.
17. WHERE NEW PIPING IS TO BE CONNECTED TO EXISTING PIPING, THE CONTRACTOR SHALL FURNISH AND INSTALL ALL ADAPTERS, FITTINGS, AND ADDITIONAL PIPE WHICH MAY NOT BE SHOWN IN DETAILS (REQUIRED AS A RESULT OF CUTTING THE EXISTING PIPE BACK) IN ORDER TO COMPLETE THE CONNECTION AS REQUIRED.
18. ALL SIGNAGE, HEADWALLS, GUARD RAILS, GUARD POSTS, FENCES, CURBS, ROADWAYS, SIDEWALKS AND ANY OTHER OBJECTS DISTURBED BY CONTRACTOR ACTIVITIES SHALL BE RETURNED TO PRE-CONSTRUCTION CONDITION OR BETTER AS DIRECTED BY THE ENGINEER AT NO ADDITIONAL COST TO THE OWNER.
19. ALL AREAS OF EXCAVATION, BACKFILL, FILL AND GRADING SHALL BE RETURNED TO THE ORIGINAL GRADE UNLESS SHOWN ON THE DRAWINGS.
20. ALL UTILITY BOXES, FRAMES, GRATES, ETC. DISTURBED BY CONTRACTOR AND NOT TO BE ABANDONED SHALL BE RESET TO THE PROPER GRADE AT NO ADDITIONAL COST TO THE OWNER.
21. UNPAVED AREAS DISTURBED BY THE CONTRACTOR SHALL BE CLEARED AND GRUBBED IF REQUIRED, AND RESTORED WITH LOAM AND SEED.
22. ALL EXISTING PIPES TO BE ABANDONED SHALL BE PLUGGED AT OPEN ENDS. SEE PIPE PLUGGING DETAIL ON SHEET 99 C-502-P.
23. RECORD DRAWINGS FOR EXISTING FACILITIES CAN BE FOUND IN THE SPECIFICATIONS.

VERTICAL DATUM CONVERSION NOTE:

SURVEY BY DOUCET ASSOCIATES IS BASED ON NAVD 88 DATUM. EXISTING PLANT AND FORCE MAIN RECORD DRAWINGS ARE BASED ON NGVD 29 DATUM. TO CONVERT NAVD 88 ELEVATIONS TO NGVD 29, ADD 0.77 FEET. TO CONVERT NGVD ELEVATIONS TO NAVD 88 SUBTRACT 0.77 FEET.

GEOTECHNICAL NOTES

1. FOR EARTH EXCAVATION, BACKFILL, FILL AND GRADING SEE SPECIFICATION 02210.
2. FOR DEWATERING SEE SPECIFICATION 02140.
3. FOR EXCAVATION SUPPORT SYSTEM SEE SPECIFICATION 02160.
4. BORING LOCATIONS ARE SHOWN ON THE PLANS AND BORING LOGS ARE BOUND IN THE SPECIFICATIONS.
5. BORINGS WERE TAKEN FOR PURPOSES OF DESIGN AND INDICATE SUBSURFACE CONDITIONS AT BORING LOCATION ONLY. SUBSURFACE CONDITIONS MAY VARY FROM THOSE SHOWN IN THE LOG.
6. IN ALL AREAS WHERE DEWATERING IS NECESSARY, MEASURES SHALL BE TAKEN TO ENSURE THE PRESERVATION OF WATERCOURSES AND COMPLIANCE WITH ALL REGULATIONS AND LAWS. ALL DEWATERING MUST BE DISCHARGED INTO SEDIMENT TRAPS AS INDICATED IN THE DETAILS AND AS SPECIFIED IN SPECIFICATION SECTION 01568.
7. FOR ROCK EXCAVATION AND DISPOSAL, SEE SPECIFICATION SECTION 02211.

ABBREVIATIONS

APPROX.	APPROXIMATE	TS&V	TAPPING SLEEVE AND VALVE
B&B	BALL AND BURLAP	TYP.	TYPICAL
BLDG.	BUILDING	UE	UNDERGROUND ELECTRIC
CB	CATCH BASIN	V	VENT
CONC.	CONCRETE	VERT.	VERTICAL
C.I.	CAST IRON	VGC	VERTICAL GRANITE CURB
CLF	CHAIN LINK FENCE	W	WIDTH
C.O. OR CO	CLEANOUT	WSO	WATER SHUT OFF
CW	CITY WATER OR CROSS WALK	WV	WATER VALVE
D	DRAIN		
DI	DUCTILE IRON		
DIA.	DIAMETER		
DIM.	DIMENSION		
DMH	DRAIN MANHOLE		
DWGS	DRAWINGS		
DYL OR DYCL	DOUBLE YELLOW CENTER LINE		
E	ELECTRICAL		
ECC.	ECCENTRIC		
EL. OR ELEV.	ELEVATION		
EMERG.	EMERGENCY		
EOP	EDGE OF PAVEMENT		
EXIST.	EXISTING		
FES	FLARED END SECTION		
FF OR F.F.E.	FINISHED FLOOR ELEVATION		
FM	FORCE MAIN		
GAL.	GALLON		
GP	GUARD POST		
GRAN.	GRANITE		
GV	GATE VALVE		
HOTL	HIGHEST OBSERVABLE TIDE LINE		
INV.	INVERT		
L	LENGTH		
LF	LINEAR FOOT		
L.O.W.	LIMIT OF WORK		
MECH.	MECHANICAL		
MH	MANHOLE		
MHW	MEAN HIGH WATER		
MLW	MEAN LOW WATER		
MJ	MECHANICAL JOINT		
MSL	MEAN SEA LEVEL		
N.C.	NORMALLY CLOSED		
PBS	PRINTED BOTH SIDES		
PSNH	PUBLIC SERVICE OF NEW HAMPSHIRE		
PVC	POLYVINYL CHLORIDE		
RCP	REINFORCED CONCRETE PIPE		
RED.	REDUCER		
RET.	RETAIN OR RETAINING		
SAN	SANITARY DRAIN		
SD	STORM DRAIN		
SL	SLUDGE OR STOP LINE		
SMH	SEWER MANHOLE		
SWL	SINGLE WHITE LINE		
SYL	SINGLE YELLOW LINE		
TBM	TEMPORARY BENCHMARK		
TP	TEST PIT		

LEGEND

EXISTING

- UTILITY POLE & GUY WIRE
- UTILITY POLE W/ LIGHT
- SIGN
- YARD HYDRANT
- UNIDENTIFIED PIPE
- WOODEN POST
- FIRE HYDRANT
- WATER METER
- WATER GATE VALVE
- VENT PIPE
- WATER SHUTOFF VALVE
- CLEANOUT
- TRAFFIC DIRECTION ARROW
- ELECTRIC BOX
- CATCH BASIN (ROUND)
- CATCH BASIN
- DRAIN MANHOLE
- ELECTRIC MANHOLE
- CHEMICAL MANHOLE
- WATER MANHOLE
- SEWER MANHOLE
- UNIDENTIFIED MANHOLE
- JURISDICTIONAL WETLAND SYMBOL
- FLAG POLE
- CONIFEROUS TREE
- DECIDUOUS TREE
- SHRUB
- CONCRETE
- BOULDER
- ROW OF BOULDERS
- LANDSCAPED AREA
- GRAVEL
- LEDGE OUTCROP
- BOLLARD
- DRAINAGE FLOW DIRECTION ARROW
- CHAINLINK FENCE
- OVERHEAD WIRES
- DRAIN LINE
- TREE LINE
- SHRUB LINE
- GUARDRAIL
- CONTOUR LINE
- EDGE OF JURISDICTIONAL WETLAND
- AREA OF STONE RIPRAP
- BORING
- MONITORING WELL
- TEST PIT
- MEAN HIGH WATER
- HIGHEST OBSERVABLE TIDE LINE
- SPECIAL FLOOD HAZARD BOUNDARY
- SALT MARSH AREA
- MARSH ELDER
- .2% ANNUAL CHANCE OF FLOOD HAZARD AREA
- AREA OF DISTURBANCE BOUNDARY
- AREA OF DISTURBANCE 0-100 FEET FROM HOTL
- AREA OF DISTURBANCE 100-250 FEET FROM HOTL
- DUPLICATE IMPACT AREA

PROPOSED

- LIMIT OF WORK
- AREA OF DISTURBANCE
- STRUCTURE
- PIPE PLUG OR CAP
- DEMOLITION
- ABANDON IN PLACE
- TREE REMOVAL
- TEE
- REDUCER
- BEND
- GATE VALVE
- PIPE - ≤ 6" DIAM.
- PIPE - > 6" DIAM.
- DIRECTION OF FLOW
- MANHOLE
- CLEANOUT
- GUARD POST OR BOLLARD
- CHAIN LINK FENCE
- TEMPORARY FENCE
- SEDIMENT FILTER LOG EROSION CONTROL
- CONTOUR
- SPOT ELEVATION
- TOP OF SLOPE
- CRUSHED STONE MOWING STRIP
- CONCRETE
- CURB
- POINT OF CONNECTION, NEW WORK TO EXIST.
- LIMIT OF DISTURBANCE

AECOM

PROJECT

PEIRCE ISLAND FORCE MAIN AND WATER MAIN REPLACEMENT

Peirce Island, Portsmouth NH

OWNER

CITY OF PORTSMOUTH NEW HAMPSHIRE

680 Peverly Hill Road
Portsmouth, NH 03801

ENGINEER

AECOM TECHNICAL SERVICES, INC.
250 APOLLO DRIVE
CHELMSFORD, MA 01824
PHONE: (978) 905-2100
www.aecom.com

REGISTRATION

PERMIT SUBMITTAL

PERMIT APPLICATION DRAWING
NOT FOR CONSTRUCTION

ISSUE/REVISION

I/R	DATE	DESCRIPTION

PROJECT NUMBER

60649477

Designed By:	S. HE
Drawn By:	M. THIBODEAU
Dept Check:	C. BENZIGER
Proj Check:	E. MESERVE
Date:	MARCH 2021
Scale:	AS NOTED

DISCIPLINE

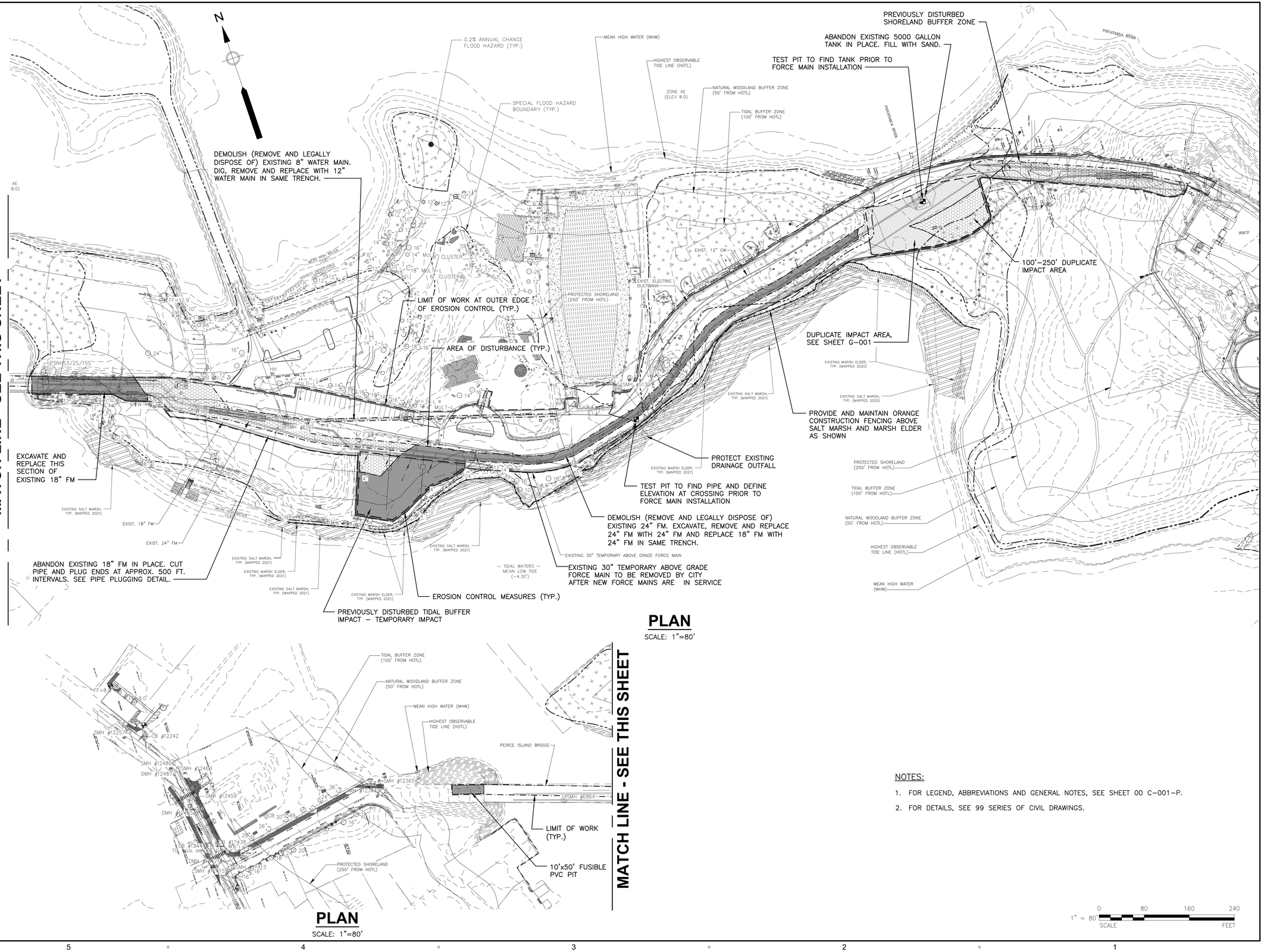
CIVIL

SHEET TITLE

LEGEND, ABBREVIATIONS AND GENERAL NOTES

SHEET NUMBER

00 C-001-P



PLAN
SCALE: 1"=80'

PLAN
SCALE: 1"=80'

NOTES:

1. FOR LEGEND, ABBREVIATIONS AND GENERAL NOTES, SEE SHEET 00 C-001-P.
2. FOR DETAILS, SEE 99 SERIES OF CIVIL DRAWINGS.

1" = 80' SCALE: 0 80 160 240 FEET

PATH/FILENAME: L:\LEGACY\USCHL1FP001\DATA\PROJECTS\WAKEFIELD\DATA_2\EVERTONE\PORTSMOUTH PEIRCE ISLAND FM REPLACEMENT\900 CAD-GIS\SHEETS\C\00 C-101-P.DWG
LAST UPDATE: Tuesday, April 13, 2021 2:01:14 PM
PLOT DATE: Tuesday, April 13, 2021 4:46:43 PM

AECOM

PROJECT

PEIRCE ISLAND FORCE MAIN AND WATER MAIN REPLACEMENT

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Drawn By:	M. THIBODEAU
Dept Check:	C. BENZIGER
Proj Check:	E. MESERVE
Date:	APRIL 2021
Scale:	AS NOTED

DISCIPLINE

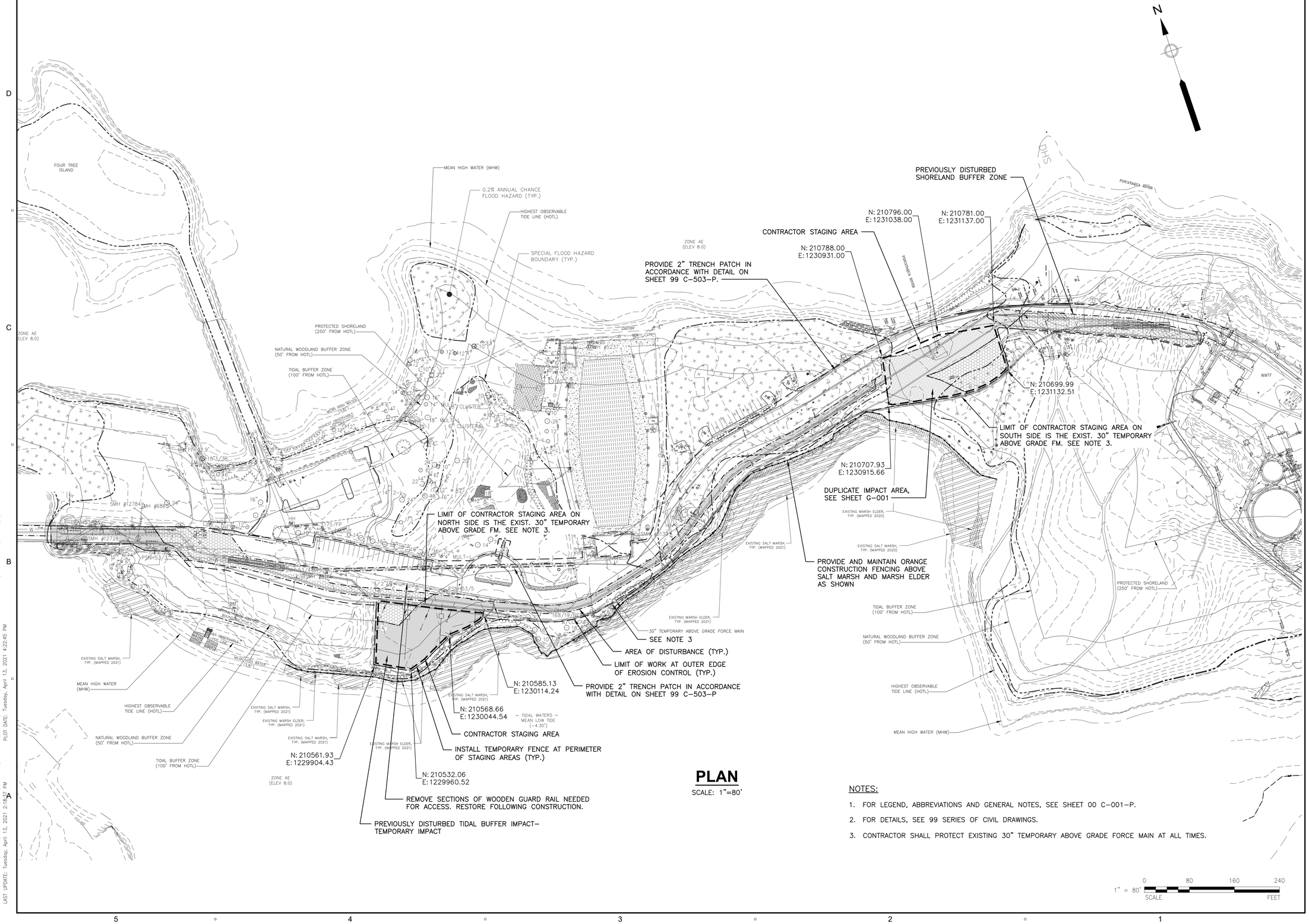
CIVIL

SHEET TITLE

EXISTING CONDITIONS, EROSION CONTROL AND DEMOLITION PLAN

SHEET NUMBER

00 C-101-P


FOUR TREE ISLAND
MEAN HIGH WATER (MHW)
0.2% ANNUAL CHANCE FLOOD HAZARD (TYP.)
HIGHEST OBSERVABLE TIDE LINE (HOTL)
SPECIAL FLOOD HAZARD BOUNDARY (TYP.)
ZONE AE (ELEV 8.0)
PROTECTED SHORELAND (250' FROM HOTL)
NATURAL WOODLAND BUFFER ZONE (50' FROM HOTL)
TIDAL BUFFER ZONE (100' FROM HOTL)
PROVIDE 2" TRENCH PATCH IN ACCORDANCE WITH DETAIL ON SHEET 99 C-503-P.
CONTRACTOR STAGING AREA
N: 210788.00
E: 1230931.00
N: 210796.00
E: 1231038.00
N: 210781.00
E: 1231137.00
PREVIOUSLY DISTURBED SHORELAND BUFFER ZONE
PISCATAQUA RIVER
N: 210699.99
E: 1231132.51
LIMIT OF CONTRACTOR STAGING AREA ON SOUTH SIDE IS THE EXIST. 30" TEMPORARY ABOVE GRADE FM. SEE NOTE 3.
N: 210707.93
E: 1230915.66
DUPLICATE IMPACT AREA, SEE SHEET G-001
EXISTING MARSH ELDER, TYP. (MAPPED 2020)
EXISTING SALT MARSH, TYP. (MAPPED 2020)
EXISTING SALT MARSH, TYP. (MAPPED 2021)
PROVIDE AND MAINTAIN ORANGE CONSTRUCTION FENCING ABOVE SALT MARSH AND MARSH ELDER AS SHOWN
LIMIT OF CONTRACTOR STAGING AREA ON NORTH SIDE IS THE EXIST. 30" TEMPORARY ABOVE GRADE FM. SEE NOTE 3.
SMH #12784
SMH #6864
SMH #12728
SMH #12729
PSNH53/5
PSNH53/4
PSNH53/3
PSNH53/2
PSNH53/1
PSNH53/38
PSNH53/39
PSNH53/40
PSNH53/41
PSNH53/42
PSNH53/43
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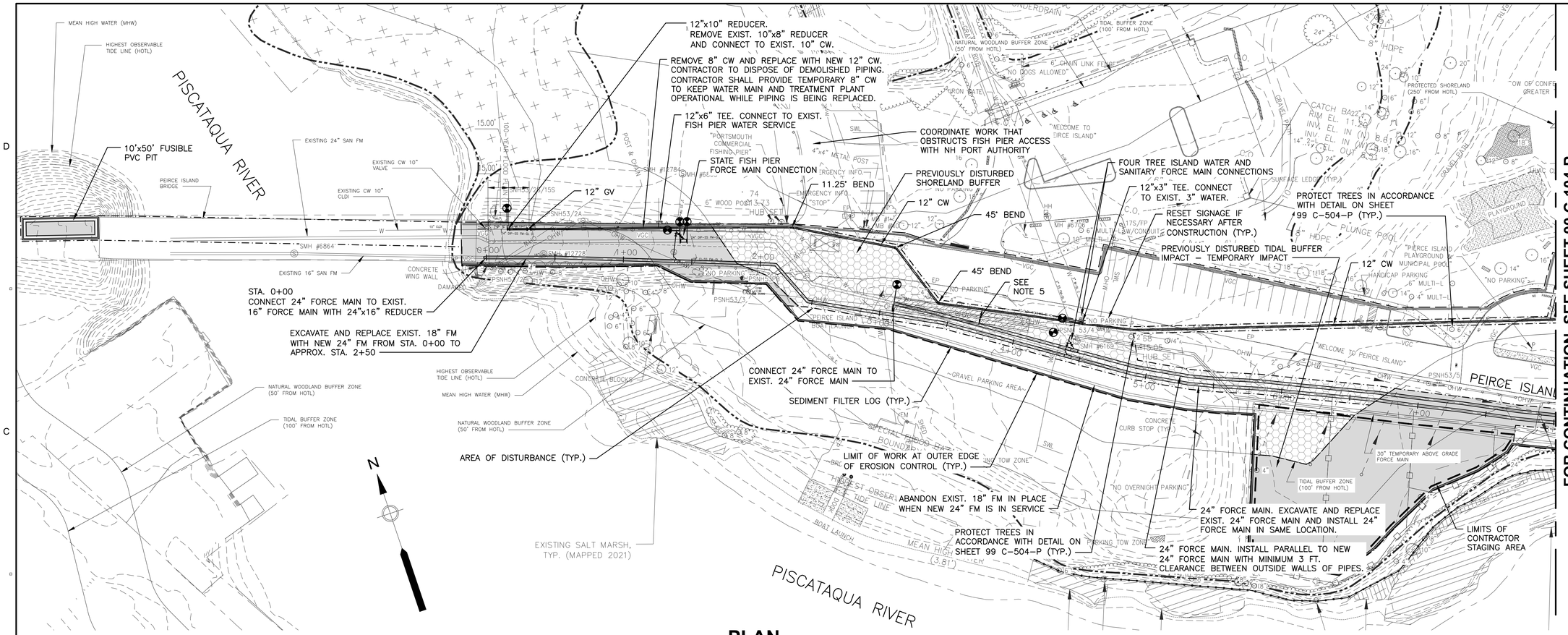
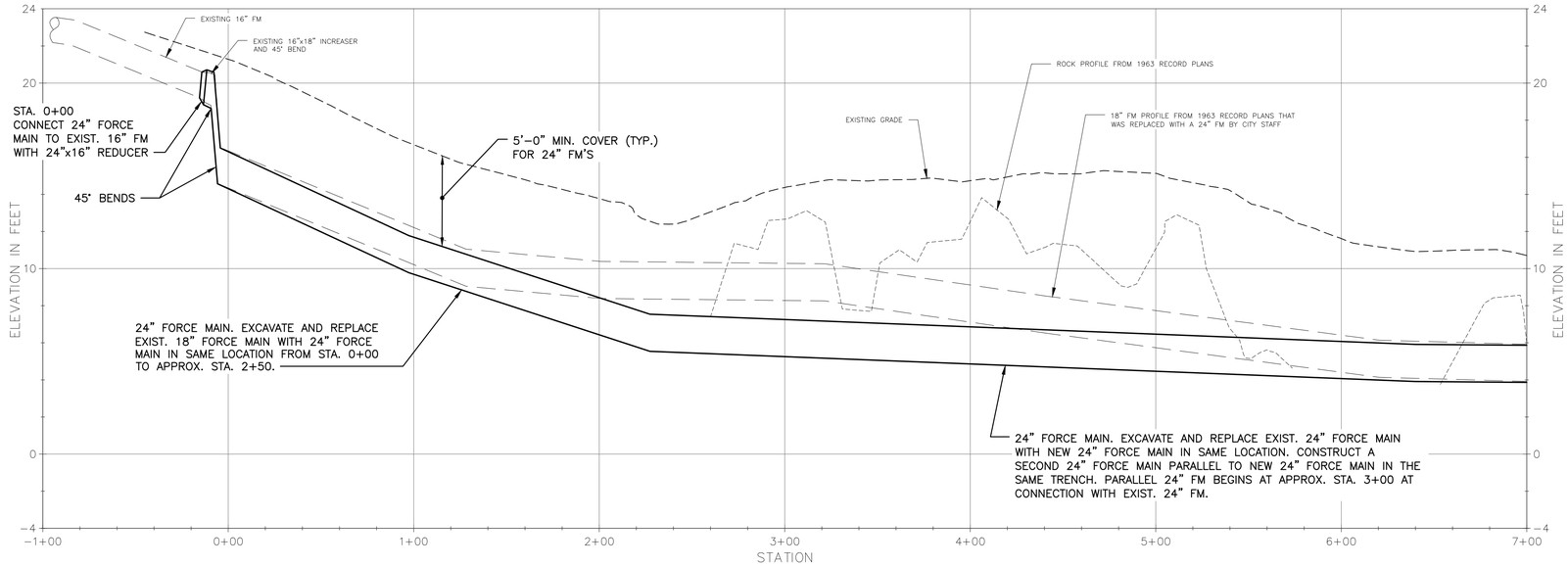
PSNH53/77



PLAN

SCALE: 1"=40'



PROFILE

SCALE: 1"=40' (HORIZ.)
1"=4' (VERT.)

1" = 40' HORIZONTAL SCALE 0 40 80 120 FEET

1" = 4' VERTICAL SCALE 0 4 8 12 FEET

NOTES:

1. FOR LEGEND, ABBREVIATIONS AND GENERAL NOTES, SEE SHEET 00 C-001-P.
2. FOR DETAILS, SEE 99 SERIES OF CIVIL SHEETS.
3. MOVE SEDIMENT FILTER LOGS ON AND OFF ROAD DAILY AS NEEDED TO ALLOW TRAFFIC TO FLOW. ONE LANE OF ROAD TO REMAIN OPEN FOR TRAFFIC AT ALL TIMES.
4. CONTRACTOR TO PERFORM VACUUM TEST EXCAVATIONS TO DETERMINE THE LOCATION OF THE EXISTING SANITARY FORCE MAINS PRIOR TO CONSTRUCTION OF REPLACEMENT WATER MAIN.
5. CONTRACTOR SHALL MAINTAIN A MINIMUM OF 10 FEET OF SEPARATION BETWEEN NEW SANITARY FORCE MAIN AND NEW WATER MAIN WHERE POSSIBLE.

FOR CONTINUATION, SEE SHEET 00 C-104-P

AECOM

PROJECT

PEIRCE ISLAND FORCE MAIN AND WATER MAIN REPLACEMENT

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60649477

Designed By:	S. HE
Drawn By:	M. THIBODEAU
Dept Check:	C. BENZIGER
Proj Check:	E. MESERVE
Date:	APRIL 2021
Scale:	AS NOTED

DISCIPLINE

CIVIL

SHEET TITLE

PIPING PLAN AND PROFILE I

SHEET NUMBER

00 C-103-P

PATH/FILENAME: L:\LEGACY\USCHL1FP001\DATA\PROJECTS\WAKEFIELD\DATA_2\OVERTONE\PORTSMOUTH PEIRCE ISLAND FM REPLACEMENT\900 CAD-GIS\SHEETS\C\00 C-103-P.DWG
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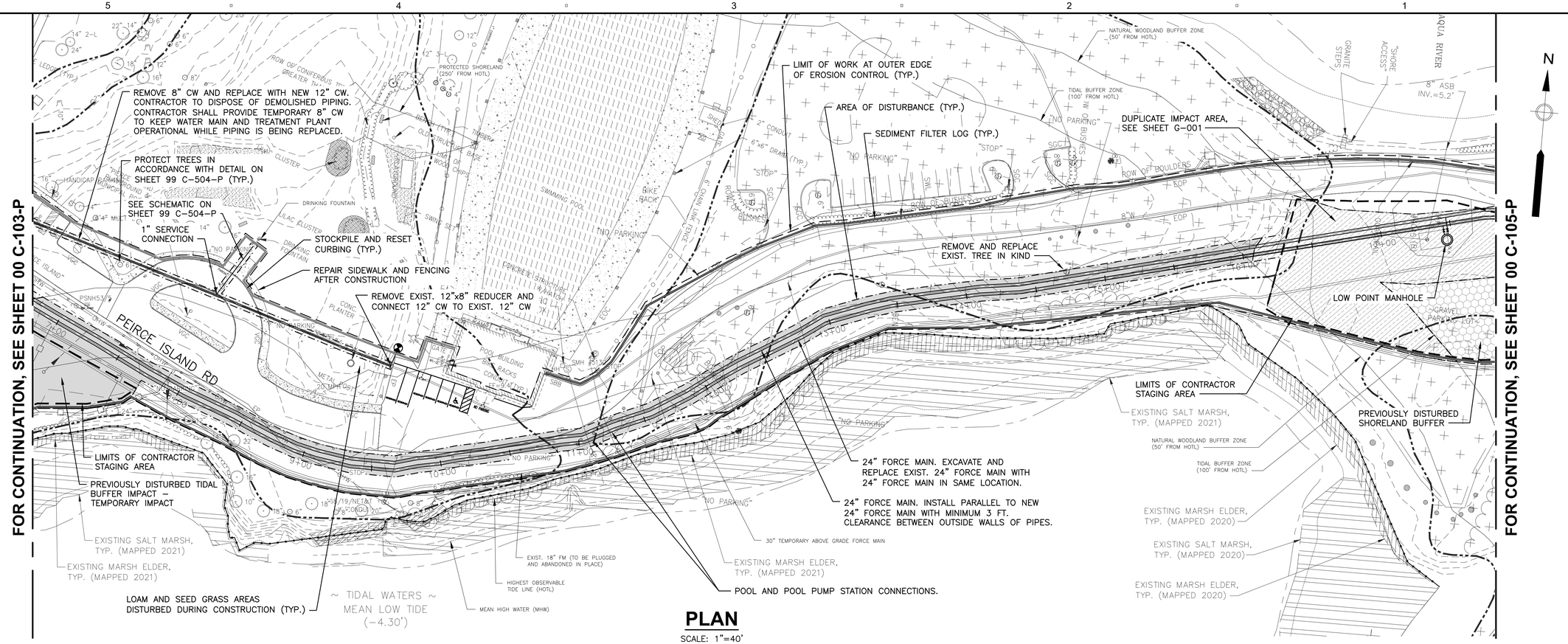
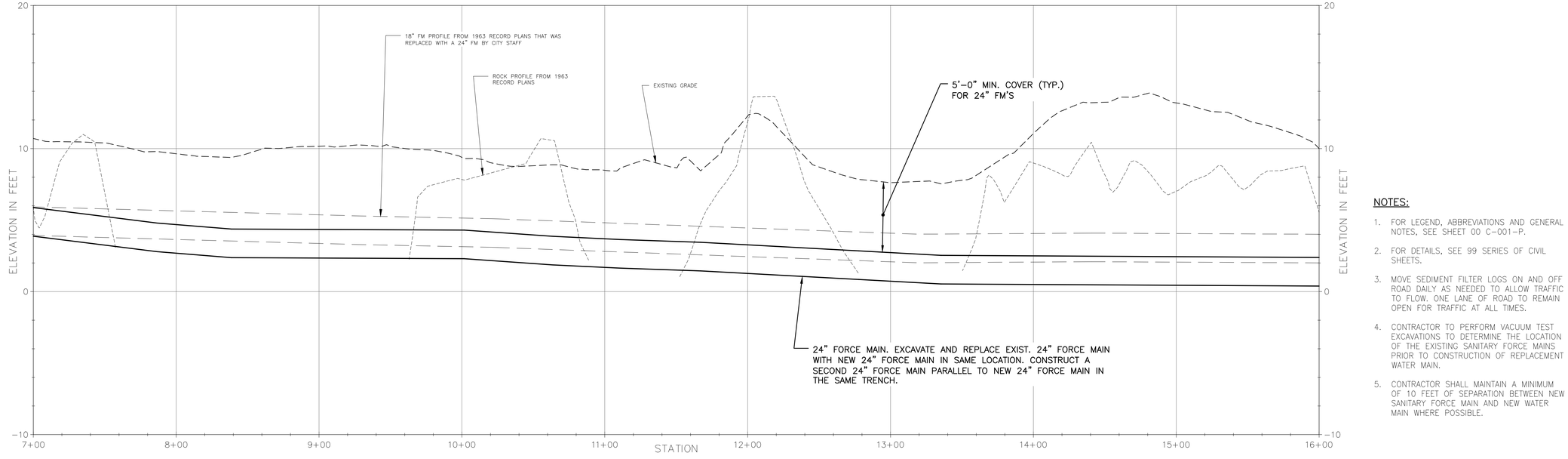
PLOT DATE: Tuesday, April 13, 2021 4:25:58 PM





PROFILE

SCALE: 1"=40' (HORIZ.)
1"=4' (VERT.)

NOTES:

1. FOR LEGEND, ABBREVIATIONS AND GENERAL NOTES, SEE SHEET 00 C-001-P.
2. FOR DETAILS, SEE 99 SERIES OF CIVIL SHEETS.
3. MOVE SEDIMENT FILTER LOGS ON AND OFF ROAD DAILY AS NEEDED TO ALLOW TRAFFIC TO FLOW. ONE LANE OF ROAD TO REMAIN OPEN FOR TRAFFIC AT ALL TIMES.
4. CONTRACTOR TO PERFORM VACUUM TEST EXCAVATIONS TO DETERMINE THE LOCATION OF THE EXISTING SANITARY FORCE MAINS PRIOR TO CONSTRUCTION OF REPLACEMENT WATER MAIN.
5. CONTRACTOR SHALL MAINTAIN A MINIMUM OF 10 FEET OF SEPARATION BETWEEN NEW SANITARY FORCE MAIN AND NEW WATER MAIN WHERE POSSIBLE.

1" = 40' HORIZONTAL SCALE: 0, 40, 80, 120 FEET

1" = 4' VERTICAL SCALE: 0, 4, 8, 12 FEET

AECOM

PROJECT

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Proj Check:	E. MESERVE
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Scale:	AS NOTED

DISCIPLINE

CIVIL

SHEET TITLE

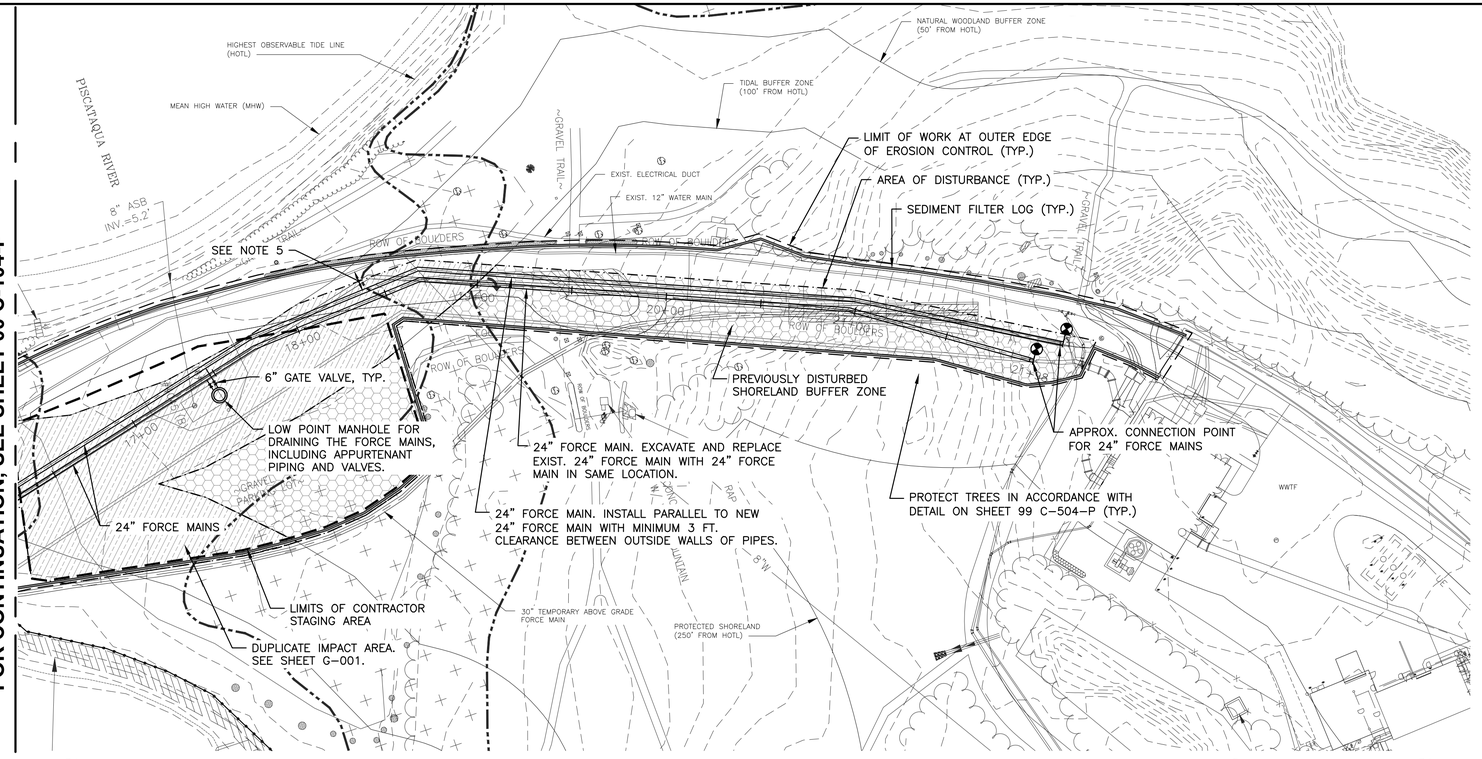
PIPING PLAN AND PROFILE II

SHEET NUMBER

00 C-104-P

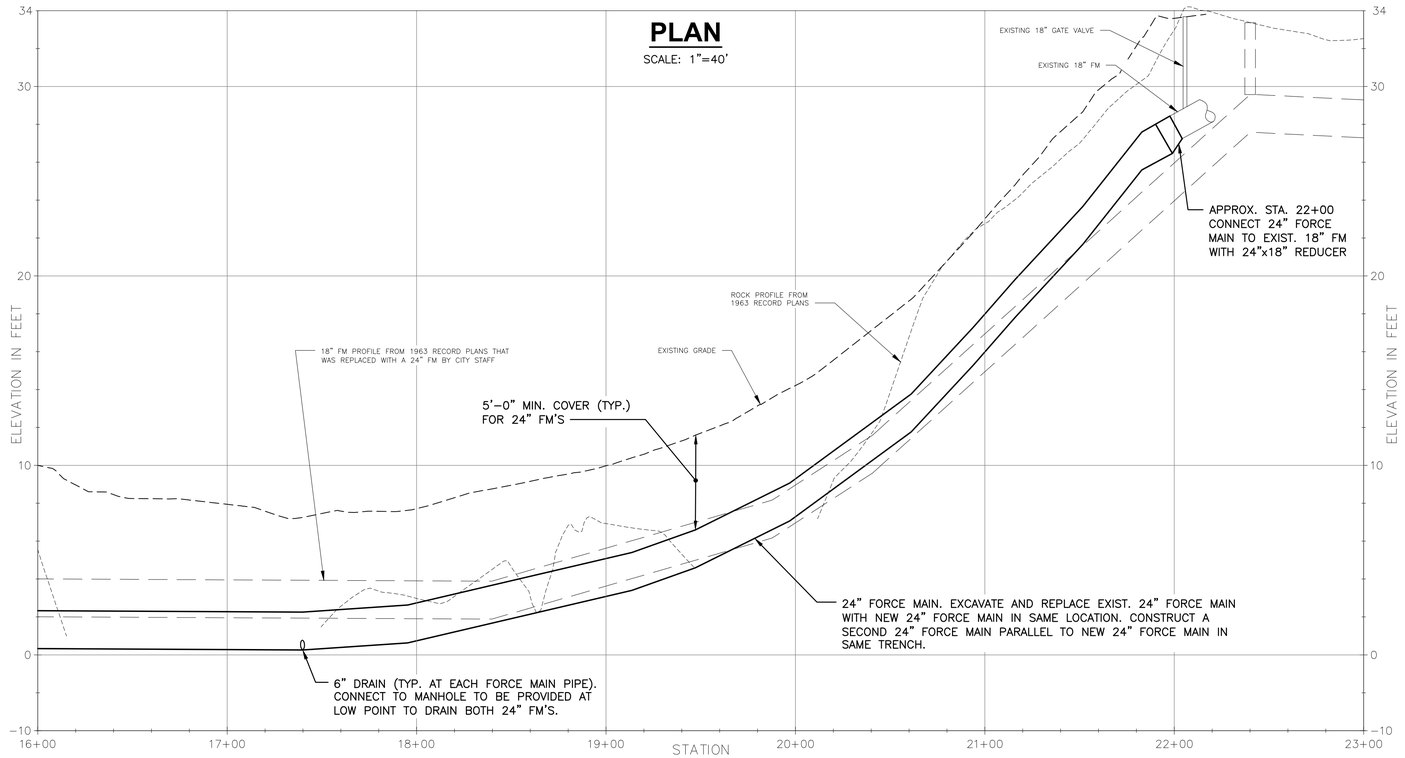
PATH/FILENAME: I:\LEGACY\USCHLTP0001\DATA\PROJECTS\WAKEFIELD\DATA_2\EVERYONE\PORTSMOUTH PEIRCE ISLAND FM REPLACEMENT\900 CAD-GIS\SHEETS\C\00 C-104-P.DWG
LAST UPDATE: Tuesday, April 13, 2021 3:34:14 PM
PLOT DATE: Tuesday, April 13, 2021 4:27:19 PM

FOR CONTINUATION, SEE SHEET 00 C-104-P



PLAN

SCALE: 1"=40'



PROFILE

SCALE: 1"=40' (HORIZ.)
1"=4' (VERT.)

1" = 40' HORIZONTAL SCALE 0 40 80 120 FEET

1" = 4' VERTICAL SCALE 0 4 8 12 FEET

NOTES:

1. FOR LEGEND, ABBREVIATIONS AND GENERAL NOTES, SEE SHEET 00 C-001-P.
2. FOR DETAILS, SEE 99 SERIES OF CIVIL SHEETS.
3. MOVE SEDIMENT FILTER LOGS ON AND OFF ROAD DAILY AS NEEDED TO ALLOW TRAFFIC TO FLOW. ONE LANE OF ROAD TO REMAIN OPEN FOR TRAFFIC AT ALL TIMES.
4. CONTRACTOR TO PERFORM VACUUM TEST EXCAVATIONS TO DETERMINE THE LOCATION OF THE EXISTING SANITARY FORCE MAINS PRIOR TO CONSTRUCTION OF REPLACEMENT WATER MAIN.
5. CONTRACTOR SHALL MAINTAIN A MINIMUM OF 10 FEET OF SEPARATION BETWEEN EXISTING WATER MAIN AND NEW SEWER FORCE MAINS WHERE POSSIBLE.

AECOM

PROJECT

PEIRCE ISLAND FORCE MAIN AND WATER MAIN REPLACEMENT
Peirce Island, Portsmouth NH

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Proj Check:	E. MESERVE
Date:	APRIL 2021
Scale:	AS NOTED

DISCIPLINE

CIVIL

SHEET TITLE

PIPING PLAN AND PROFILE III

SHEET NUMBER

00 C-105-P

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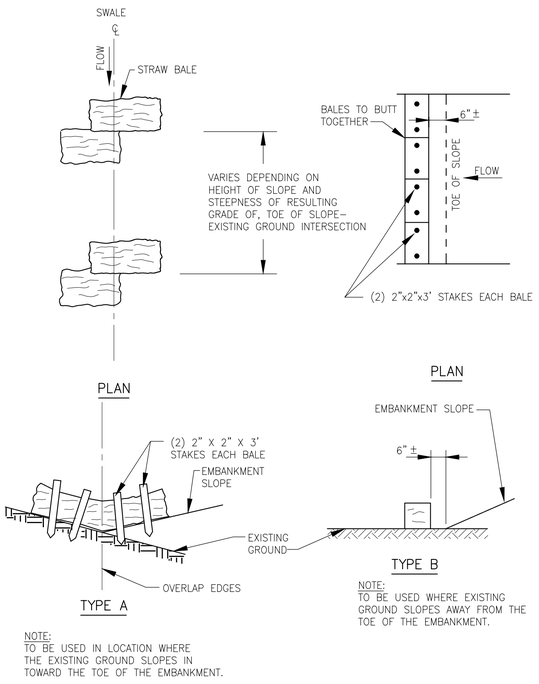
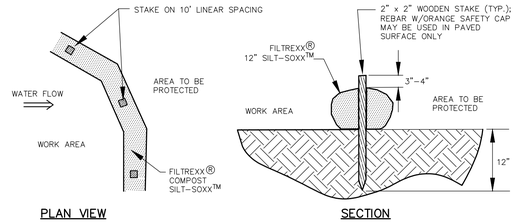
LAST UPDATE: Tuesday, April 13, 2021 3:42:15 PM
PLOT DATE: Tuesday, April 13, 2021 4:28:12 PM



STRAW BALE EROSION CONTROL

NTS
2-1.60.4 (REV. 09-29-95)

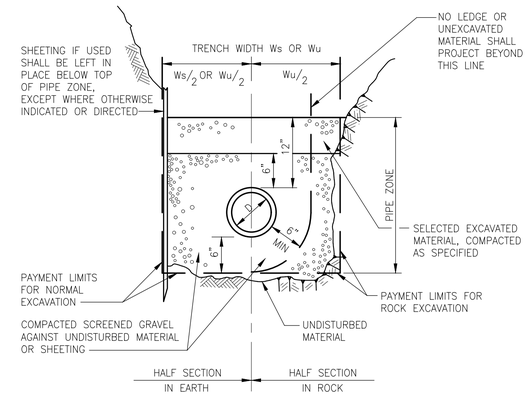


NOTES:

1. SILTSOXX MAY BY USED IN PLACE OF SILT FENCE OR OTHER SEDIMENT BARRIERS FOR AREAS OF REVETMENT CONSTRUCTION.
2. ALL MATERIAL TO MEET FILTREXX SPECIFICATIONS.
3. SILTSOXX COMPOST/SOIL/ROCK/SEED FILL MATERIAL SHALL BE ADJUSTED AS NECESSARY TO MEET THE REQUIREMENTS OF THE SPECIFIC APPLICATION.
4. ALL SEDIMENT TRAPPED BY SILTSOXX SHALL BE DISPOSED OF PROPERLY.

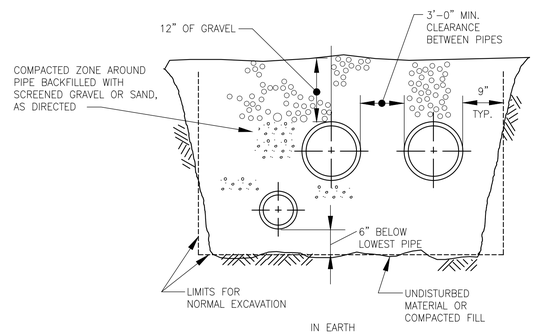
SEDIMENT FILTER LOG STAKING DETAIL

NOT TO SCALE



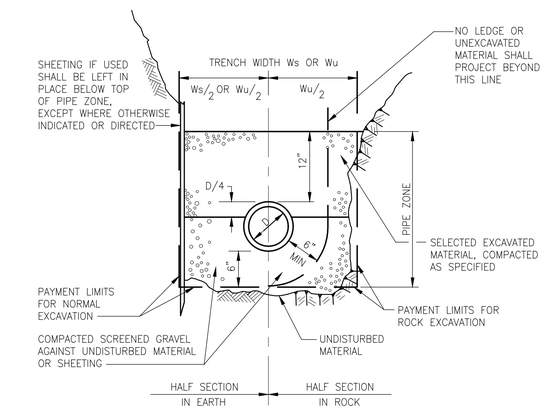
TRENCH SECTION FOR PIPE 18 INCH DIAMETER AND SMALLER

NOT TO SCALE



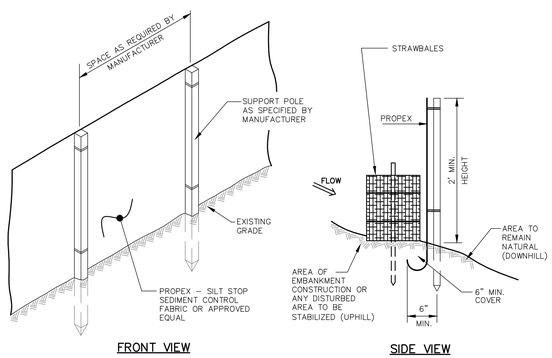
MULTIPLE PIPE TRENCH SECTION

NOT TO SCALE



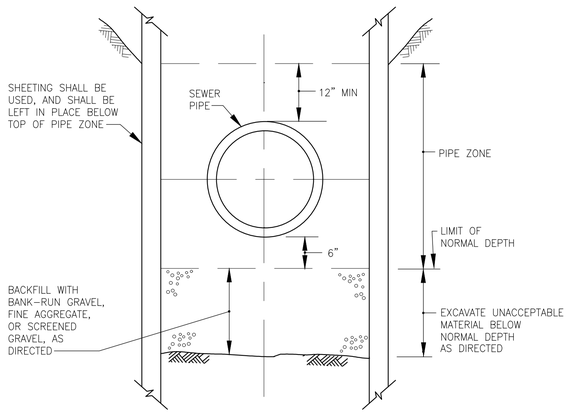
TRENCH SECTION FOR DI OR PVC PIPE 20 INCH DIAMETER AND LARGER

NOT TO SCALE
2-1.1.2 (REV. 03-15-95)



SILT FENCE/STRAWBALE DETAIL

NOT TO SCALE



DETAILS NOT SHOWN ARE SAME AS TRENCH SECTIONS SHOWN ELSEWHERE

TRENCH SECTION IN UNACCEPTABLE MATERIAL

NOT TO SCALE
2-1.1.21 (REV. 03-15-95)

TRENCH WIDTH Ws OR Wu

NOMINAL PIPE DIAMETER D	DEPTH OF PIPE INVERT BELOW GROUND SURFACE		
	0 TO 12'	12' TO 20'	>20'
24" AND SMALLER	5'-0"	7'-0"	9'-0"
OVER 24"	D + 3'-0"	D + 5'-0"	D + 7-0"

1. PIPE TRENCHES MAY BE EXCAVATED WIDER THAN TRENCH WIDTH Ws (SHEETED) OR Wu (UNSHEETED) ABOVE THE TOP OF PIPE ZONE.
2. TRENCHES SHALL NOT BE EXCAVATED BEYOND THE TRENCH WIDTH Wu BELOW THE TOP OF PIPE ZONE.
3. SHEETING MUST BE USED IF EXCAVATION AND BACKFILL, BELOW NORMAL DEPTH, IS REQUIRED. SHEETING SHALL BE LEFT IN PLACE BELOW A LINE 1'-0" ABOVE THE TOP OF PIPE.

GENERAL NOTES FOR PIPE TRENCHES

NOT TO SCALE
2-1.1.11 (REV. 10-23-95)

AECOM

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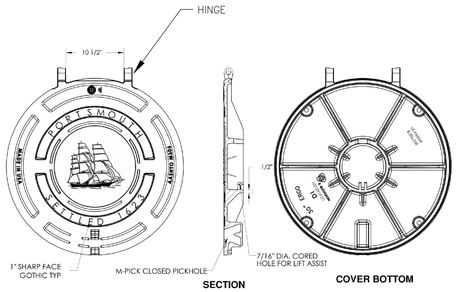
CIVIL

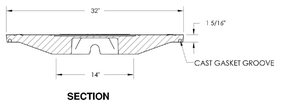
SHEET TITLE

DETAILS I

SHEET NUMBER

99 C-501-P





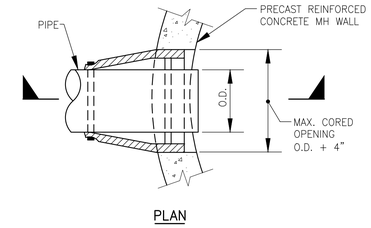
SECTION

NOTES:

1. CITY TO PROVIDE MANHOLE COVERS. CONTRACTOR TO INSTALL COVERS.

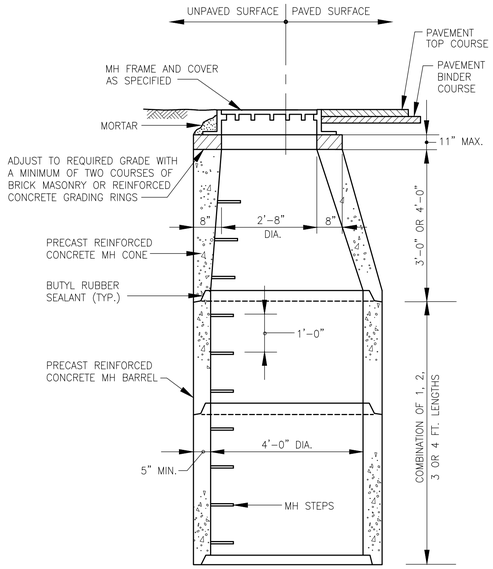
MANHOLE COVER

NOT TO SCALE



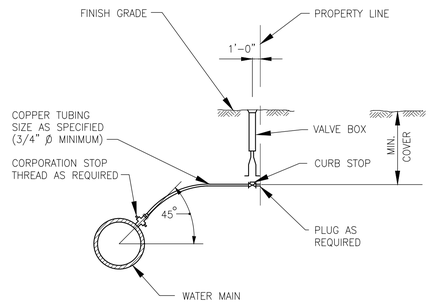
WATERTIGHT RESILIENT CONNECTOR FOR CONNECTING PIPES TO PRECAST CONCRETE MANHOLES

NOT TO SCALE
2-1.5.62.1 (REV. 4-5-96)



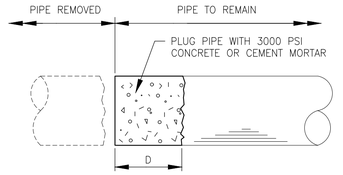
4'-0" SEWER/DRAIN MANHOLE RISER WITH ECCENTRIC CONE TOP

NOT TO SCALE



SERVICE CONNECTION

NTS
2-1.20 (REV. 12-15-94)

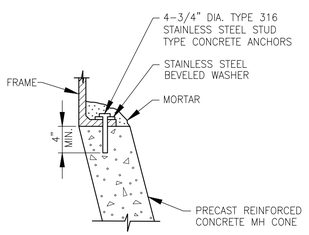


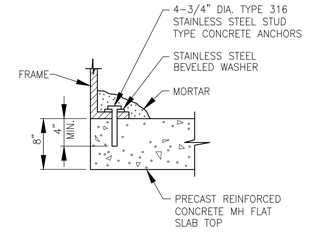
NOTES:

1. PLUG ALL ABANDONED PIPES AT THEIR TERMINATIONS.
2. DEPTH OF PLUG (D) SHALL BE EQUAL TO DIAMETER OF PIPE (12" MIN.).

TYPICAL PIPE PLUGGING DETAIL

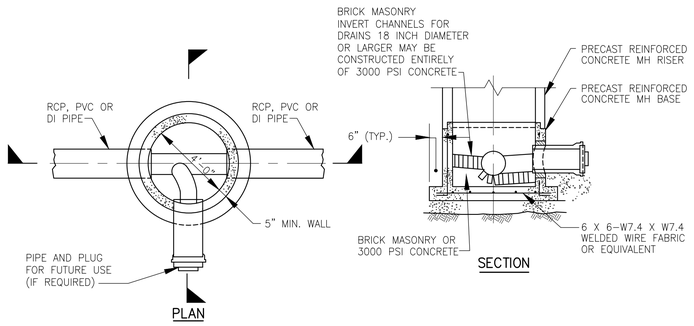
NTS

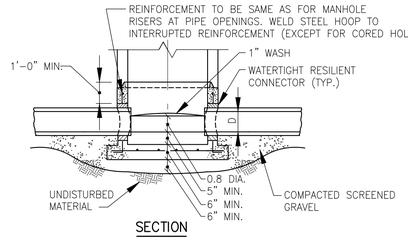




ANCHOR BOLT DETAILS FOR FRAMES FOR MANHOLE TOPS

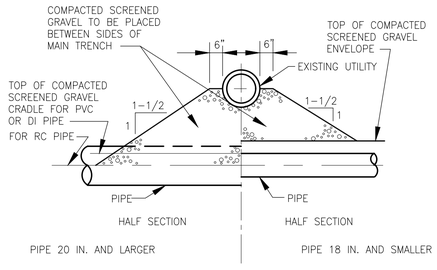
NOT TO SCALE



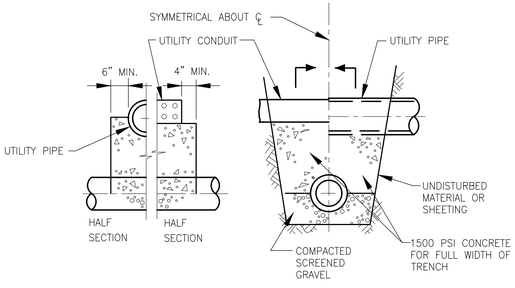


4'-0" PRECAST REINFORCED CONCRETE MANHOLE BASE FOR SEWER/DRAIN MANHOLES

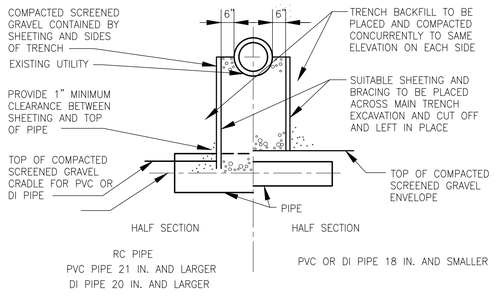
NOT TO SCALE



TYPE A



TYPE C



TYPE B

TYPICAL SUPPORTS FOR UTILITIES

NOT TO SCALE
2-1.8 (REV. 03-15-95)

AECOM

PROJECT

PEIRCE ISLAND FORCE MAIN AND WATER MAIN REPLACEMENT

Peirce Island, Portsmouth NH

OWNER

CITY OF PORTSMOUTH NEW HAMPSHIRE

680 Peverly Hill Road
Portsmouth, NH 03801

ENGINEER

AECOM TECHNICAL SERVICES, INC.
250 APOLLO DRIVE
CHELMSFORD, MA 01824
PHONE: (978) 905-2100
www.aecom.com

REGISTRATION

PERMIT SUBMITTAL
PERMIT APPLICATION DRAWING
NOT FOR CONSTRUCTION

ISSUE/REVISION

I/R	DATE	DESCRIPTION

PROJECT NUMBER

60649477

Designed By:	S. HE
Drawn By:	M. THIBODEAU
Dept Check:	C. BENZIGER
Proj Check:	E. MESERVE
Date:	APRIL 2021
Scale:	AS NOTED

DISCIPLINE

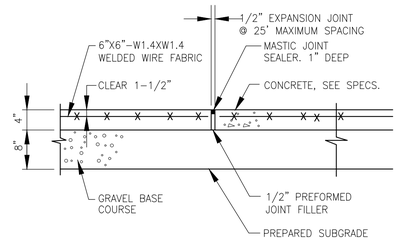
CIVIL

SHEET TITLE

DETAILS Ii

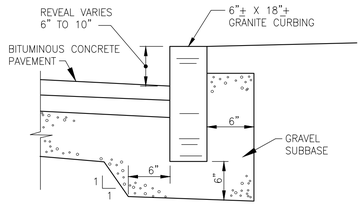
SHEET NUMBER

99 C-502-P



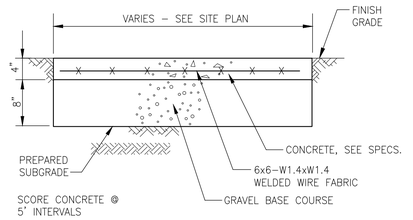
EXPANSION JOINT FOR CONCRETE WALKWAYS

NOT TO SCALE
2-1.41.1.1 (REV. 12-15-94)



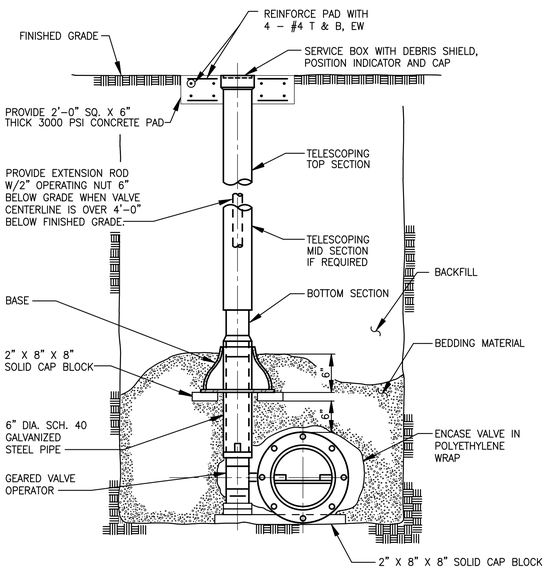
GRANITE CURB

NOT TO SCALE
2-1.42.1 (REV. 12-15-94)



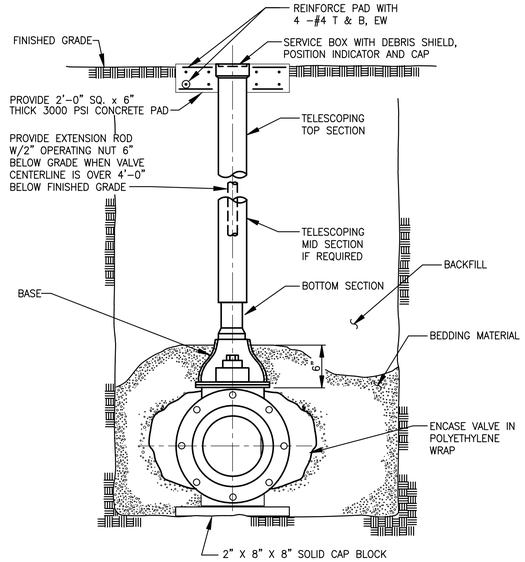
CONCRETE WALKWAY SECTION

NOT TO SCALE
2-1.41.1 (REV. 12-15-94)



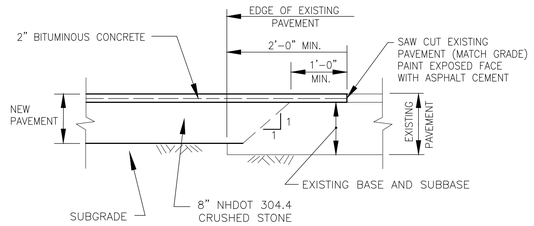
BURIED BUTTERFLY OR PLUG VALVE

NTS



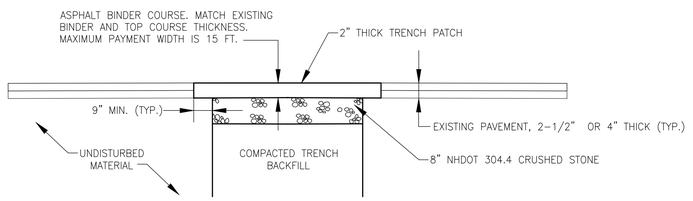
BURIED GATE VALVE

NTS



TYPICAL FORMAT OF PAVEMENT MATCHING DETAIL

N.T.S.



NOTE:

1. REMOVE AND DISPOSE OF EXCESS MATERIAL TO LOCATION AS DIRECTED BY THE ENGINEER.

PAVEMENT TRENCH REPAIR

NOT TO SCALE

AECOM

PROJECT

PEIRCE ISLAND
FORCE MAIN AND
WATER MAIN
REPLACEMENT

Peirce Island, Portsmouth NH

OWNER

CITY OF PORTSMOUTH
NEW HAMPSHIRE

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Portsmouth, NH 03801

ENGINEER

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Drawn By:	M. THIBODEAU
Dept Check:	C. BENZIGER
Proj Check:	E. MESERVE
Date:	APRIL 2021
Scale:	AS NOTED

DISCIPLINE

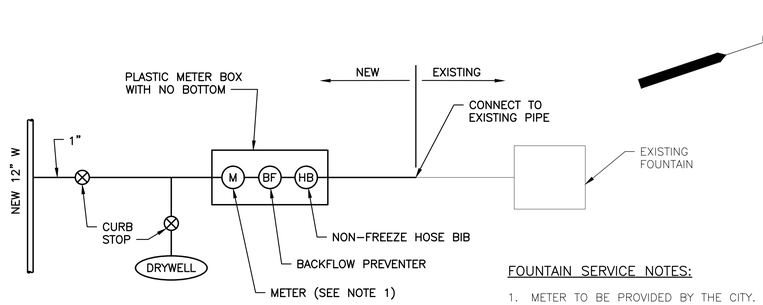
CIVIL

SHEET TITLE

DETAILS III

SHEET NUMBER

99 C-503-P

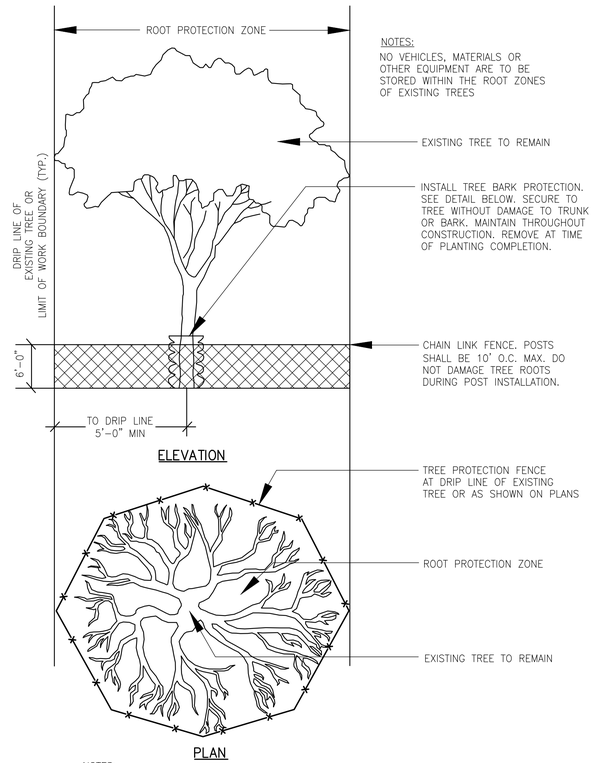


FOUNTAIN SERVICE NOTES:

1. METER TO BE PROVIDED BY THE CITY.

FOUNTAIN SERVICE CONNECTION SCHEMATIC

SCALE: NONE



NOTES:

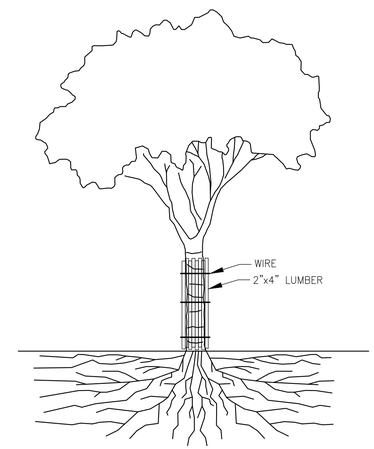
1. THIS DETAIL APPLIES FOR THE PROTECTION OF ALL TREES ON THE WWTF SITE, CONTRACTOR STAGING AREAS AND RESTRICTED USE CONSTRUCTION STAGING AREAS.
2. NO VEHICLES, MATERIALS OR OTHER EQUIPMENT ARE TO BE STORED WITHIN THE ROOT ZONES OF EXISTING TREES.

TREE PROTECTION

NTS

LANDSCAPING NOTES:

1. THE CONTRACTOR SHALL LOCATE AND VERIFY ALL UTILITIES PRIOR TO STARTING WORK. CONTRACTOR TO VERIFY THAT ADEQUATE DRAINAGE EXISTS PRIOR TO PLANTING.
2. THE CONTRACTOR SHALL SUPPLY ALL PLANT MATERIALS IN QUANTITIES SUFFICIENT TO COMPLETE THE PLANTING SHOWN ON ALL DRAWINGS. PLANT COUNTS ARE FOR CONVENIENCE ONLY. CONTRACTOR SHALL USE SUFFICIENT PLANT MATERIALS TO FULFILL DESIGN INTENT, BUT IN NO CASE SHALL CONTRACTOR USE FEWER PLANTS THAN LISTED.
3. ALL MATERIAL SHALL CONFORM TO THE GUIDELINES ESTABLISHED BY THE "AMERICAN STANDARD FOR NURSERY STOCK", PUBLISHED BY THE AMERICAN ASSOCIATION OF NURSERYMEN.
4. ALL PLANT MATERIALS ARE SUBJECT TO THE APPROVAL OF THE ENGINEER AT THE NURSERY AND AT THE SITE. ALL TREES SHALL HAVE A SINGLE LEADER UNLESS SPECIFIED OTHERWISE. NO UN-APPROVED SUBSTITUTIONS WILL BE ACCEPTED. PLANT SPECIES AND CULTIVAR, SIZE AND QUANTITY SHALL NOT CHANGE WITHOUT APPROVAL OF LANDSCAPE ARCHITECT.
5. LOCATION OF ALL TREES AND SHRUBS SHALL BE MARKED FOR THE APPROVAL OF THE PROJECT ENGINEER. MARKING SHALL BE COMPLETED THE DAY PRIOR TO COMMENCEMENT OF PLANTING.
6. ALL PLANTS SHALL BEAR THE SAME RELATIONSHIP TO FINISHED GRADE AS ORIGINAL GRADE BEFORE DIGGING. PLANT TO BE TRANSPLANTED SHALL BE DUG CAREFULLY, WITH ADEQUATE ROOT-BALLS AND PRUNED ACCORDING TO ANA STANDARD PRACTICE. TREES WITH ROOT FLARE COVERED BY MORE THAN 1.5" OF SOIL WILL BE REJECTED PRIOR TO INSTALLATION. SET PLANTS PLUMB.
7. ALL TREES AND SHRUBS SHALL BE BALLED IN BURLAP OR CONTAINERIZED, UNLESS SPECIFIED OTHERWISE. NO ROOT-BOUND CONTAINER GROWN STOCK WILL BE ACCEPTED. ALL PLASTIC ROOT WRAPPING AND METAL WIRE BASKETS SHALL BE CAREFULLY REMOVED AT THE TIME OF PLANTINGS, EXCEPT WIRE THAT IS DIRECTLY UNDER THE ROOT-BALLS.
8. AFTER CONDUCTING SOIL TESTS WITHIN PLANTING AREAS, THE CONTRACTOR IS RESPONSIBLE FOR PROVIDING PLANTING TOPSOIL AND/OR AMENDMENTS FOR BACKFILLING AT ALL PLANTS, AS NECESSARY. SUBMIT WRITTEN CONTENT ANALYSIS TO OWNER/REP. FOR APPROVAL. ADD 'PHC HEALTHY START 3-4-3' AND 'MYCOR TREE OR PLANT SAVER 4-7-4', OR EQUAL. FOLLOW MANUFACTURER'S GUIDELINES. THE PLANTING TOPSOIL IS TO BE SANDY LOAM MODIFIED WITH ORGANIC COMPONENT TO HAVE AT LEAST 4% ORGANIC MATTER BUT NOT MORE THAN 8% ORGANIC MATTER, DRY WEIGHT BASIS, A COMPACTED MINIMUM INFILTRATION RATE OF 2.5 CM/HR, PH RANGE OF 5.5 TO 6.5, AND NO COARSE FRAGMENTS OVER 2.5 CM IN SIZE.
9. CONTRACTOR SHALL PLACE 2" TO 3" OF FINE SHREDDED, AGED 2 YEARS, DARK BROWN PINE BARK MULCH THROUGHOUT THE BED AREAS. DO NOT PLACE MULCH IN CONTACT WITH TREE TRUNK. SUBMIT SAMPLE OF MULCH FOR APPROVAL.
10. ALL EVERGREEN PLANTS SHALL BE SPRAYED WITH AN ANTI-DESICCANT THE FIRST WEEK OF NOVEMBER, THE FIRST WINTER FOLLOWING PLANTING.
11. FLOOD PLANTS THOROUGHLY ONCE IMMEDIATELY AFTER PLANTING AND TWICE DURING THE FIRST TWENTY-FOUR HOUR PERIOD AFTER PLANTING.
12. EXTREME CARE SHALL BE TAKEN NOT TO DISTURB EXISTING PLANT MATERIALS, EXCEPT THOSE SPECIFICALLY NOTED "TO BE TRANSPLANTED OR REMOVED". ANY PLANT INJURED OR DESTROYED SHALL BE REPLACED WITH A PLANT OF EQUAL OR GREATER SIZE AND SPECIES AT THE CONTRACTORS EXPENSE.
13. IF NECESSARY, NEW PLANTING SHOULD BE PLACED OUTSIDE OF THE CRITICAL ROOT ZONE (CRZ) OF EXISTING TREES. CRZ RADIUS EQUALS ONE-FOOT TIMES THE DBH (DIAMETER-AT-BREAST-HEIGHT) OF THE TREES, MEASURED FROM THE TREE TRUNK. TREE FENCING IS NECESSARY TO PROTECT EXISTING VEGETATION TO BE PRESERVED FROM BOTH FOOT AND VEHICULAR TRAFFIC. TREE FENCING TO BE LOCATED AT THE EDGE OF THE CRZ.
14. DO NOT WRAP TRUNK OF TREE.
15. THE CONTRACTOR SHALL MAINTAIN THE PLANTS FOR A MINIMUM OF 90 DAYS FOLLOWING INSTALLATION, OR LONGER IF CONTRACTED BY THE OWNER. BEFORE THE END OF THE 90-DAY PERIOD, THE CONTRACTOR SHALL PROVIDE A WRITTEN MAINTENANCE OUTLINES TO THE OWNERS AND THE CONTRACTOR SHALL BE AVAILABLE TO ANSWER QUESTIONS OR CONCERNS AT THAT TIME.
16. THE CONTRACTOR SHALL GUARANTEE ALL PLANTS FOR A MINIMUM OF ONE YEAR FROM FINAL ACCEPTANCE BY OWNER/REP. THE CONTRACTOR SHALL REPLACE ANY DEAD MATERIALS AT HIS/HER OWN EXPENSE.



NOTES:

1. THIS DETAIL APPLIES FOR THE PROTECTION OF ALL TREES ON THE WWTF SITE, CONTRACTOR STAGING AREAS AND RESTRICTED USE CONSTRUCTION STAGING AREAS.
2. IN SITUATIONS WHERE A PROTECTED TREE REMAINS IN THE IMMEDIATE AREA OF INTENDED CONSTRUCTION AND THE TREE MAY BE IN DANGER OF BEING DAMAGED BY CONSTRUCTION EQUIPMENT OR OTHER ACTIVITY, THE CONTRACTOR OR SUBCONTRACTOR SHALL PROTECT THE TREE WITH 2"x4" LUMBER ENCIRCLED WITH WIRE OR OTHER MEANS THAT DO NOT DAMAGE THE TREE. THE INTENT IS TO PROTECT THE TRUNK OF THE TREE AGAINST INCIDENTAL CONTACT BY LARGE CONSTRUCTION EQUIPMENT.

TREE BARK PROTECTION

NTS

AECOM

PROJECT

PEIRCE ISLAND FORCE MAIN AND WATER MAIN REPLACEMENT

Peirce Island, Portsmouth NH

OWNER

CITY OF PORTSMOUTH NEW HAMPSHIRE

680 Peverly Hill Road
Portsmouth, NH 03801

ENGINEER

AECOM TECHNICAL SERVICES, INC.
250 APOLLO DRIVE
CHELMSFORD, MA 01824
PHONE: (978) 905-2100
www.aecom.com

REGISTRATION

PERMIT SUBMITTAL
PERMIT APPLICATION DRAWING
NOT FOR CONSTRUCTION

ISSUE/REVISION

I/R	DATE	DESCRIPTION

PROJECT NUMBER

60649477

Designed By:	S. HE
Drawn By:	M. THIBODEAU
Dept Check:	C. BENZIGER
Proj Check:	E. MESERVE
Date:	APRIL 2021
Scale:	AS NOTED

DISCIPLINE

CIVIL

SHEET TITLE

DETAILS IV

SHEET NUMBER

99 C-504-P

PROPOSED RAISED SECTION OF ROADWAY

INITIAL LIMIT OF CONSTRUCTION

PISCATAQUA RIVER
MEAN LOW TIDE (−4.30')

0.2% ANNUAL CHANCE FLOOD HAZARD (TYP.)

EXISTING TRAIL, TYP.

100' TIDAL BUFFER

HOTL

SALT MARSH

INITIAL LIMIT OF CONSTRUCTION

PROPOSED GRASSED PARKING AREA

~ TIDAL WATERS ~
MEAN LOW TIDE (−4.30')

PROPOSED CONCRETE GRASS PAVERS

LIMIT OF PROPOSED IMPROVEMENTS

PROPOSED TRAIL IMPROVEMENTS UDTBZ IMPACT AREA

PROPOSED TRAIL IMPROVEMENTS PDTBZ IMPACT AREA

INITIAL LIMIT OF CONSTRUCTION

PROPOSED TRAIL IMPROVEMENTS PDTBZ* IMPACT AREA PREVIOUSLY PERMITTED

SPECIAL FLOOD HAZARD BOUNDARY (TYP.)

NOTES:

1. REFER TO "CITY OF PORTSMOUTH, NH, PEIRCE ISLAND WASTEWATER TREATMENT FACILITY UPGRADE, FEBRUARY 2016, CWSRF CS−330106−16" SHEET 00 C−001 FOR LEGEND, ABBREVIATIONS AND GENERAL NOTES; SHEET 00 C−101 AND 00 C−102 FOR EXISTING SURVEY PLANS.
2. 100−YEAR FLOODPLAIN PER FEMA FLOOD MAP, EFFECTIVE JANUARY 29, 2021.
3. WETLANDS WERE DELINEATED BY NORMANDEAU ASSOCIATES, INC. BETWEEN MAY 2014 AND SEPTEMBER 2016; AND VERIFIED APRIL 2020. THE WETLANDS DELINEATION WERE COMPLETED IN ACCORDANCE WITH THE CRITERIA DESCRIBED IN THE U.S. ARMY CORPS OF ENGINEERS WETLAND DELINEATION MANUAL TECHNICAL REPORT Y−87−1 (JANUARY 1987) AND THE REGIONAL SUPPLEMENT FOR THE NORTH CENTRAL AND NORTHEAST REGION (JANUARY 2012) AND MEET THE CRITERIA FOR WETLAND DELINEATION IN ACCORDANCE WITH THE NHDES ADMINISTRATIVE RULES ENV−WT 301.01 AND ENV−WT 101.49.

TIDAL DATUM

Based on Seavey Island, ME - Datum, NAVD88

HOTL	FIELD ESTIMATED
MHHW	4.22
MHW	3.81
MTL	-0.24
MLW	-4.30
MLLW	-4.62

LEGEND:

- EXISTING GRAVEL SURFACE TO BE REMOVED
- ROAD IMPROVEMENTS − EXIST. IMPERVIOUS AREA WITH 100' TIDAL BUFFER
- ROAD IMPROVEMENTS − PROP. IMPERVIOUS AREA WITH 100' TIDAL BUFFER
- PDTBZ − ROAD TEMPORARY IMPACT
- PDTBZ − ROAD PERMANENT IMPACT
- AREA TO BE RESTORED TO OLD FIELD HABITAT
- TRAIL IMPROVEMENTS − PROP. IMPERVIOUS AREA WITH 100' TIDAL BUFFER
- UDTBZ − TRAIL TEMPORARY IMPACT
- PDTBZ − TRAIL TEMPORARY IMPACT
- PDTBZ − TRAIL TEMPORARY IMPACT (PREVIOUSLY PERMITTED)

PEIRCE ISLAND WWTF WETLANDS IMPACT − TRAIL			
TEMP.	PERM.	TOTAL	
UDTBZ	1,803 S.F.	890 S.F.	2,693 S.F.
PDTBZ	1,169 S.F	1,514 S.F.	2,683 S.F.
PDTBZ*	512 S.F.	553 S.F.	1,065 S.F.

* PREVIOUSLY PERMITTED

PEIRCE ISLAND WWTF WETLANDS IMPACT − ROAD AND GRASS PARKING			
TEMP.	PERM.	TOTAL	
PDTBZ	26,346 S.F.	11,438 S.F.	37,784 S.F.

PEIRCE ISLAND WWTF SHORELAND IMPACT − IMPERVIOUS AREA WITHIN 100' TIDAL BUFFER		
	EXISTING	PROPOSED
ROAD	28,702 S.F.	11,438 S.F.
TRAIL	11,493 S.F.	2,956 S.F

TOTAL AREA OF DISTURBANCE	
SNOW DUMP AREA	49,996 S.F.
TRAIL IMPROVEMENTS	6,441 S.F.

PEIRCE ISLAND NATIVE HABITAT RESTORATION	
	AREA
0−100' (PDTBZ)	7,464 S.F.
100−250'	2,267 S.F.
TOTAL	9,731 S.F.

GRAPHIC SCALE
50 0 25 50 100 200
(IN FEET)

PERMIT APPLICATION DRAWING
NOT FOR CONSTRUCTION

MARK	DATE	MADE BY	CHECKED	DESCRIPTION
1	10/14/20	RMB	JKC	PORTSMOUTH CON. COMM. COMMENTS

REVISIONS

AECOM TECHNICAL SERVICES, INC.
1 TECHNOLOGY PARK DRIVE
WESTFIELD, MA 01085
PHONE (781) 246−3200

AECOM

SURVEY DATUM: NAD83 (2011)

SARAH D. ALLEN
No. 083
CERTIFIED WETLAND SCIENTIST
STATE OF NEW HAMPSHIRE

JEFFREY K. CLIFFORD
No. 6524
LICENSED PROFESSIONAL ENGINEER
STATE OF NEW HAMPSHIRE

CITY OF PORTSMOUTH, NH - DEPARTMENT OF PUBLIC WORKS
PEIRCE ISLAND WWTF UPGRADE

OVERVIEW PLAN

(FORMER SNOW DUMP AREA & TRAIL IMPROVEMENTS)

ALTUS ENGINEERING, INC.
133 COURT STREET PORTSMOUTH, NH 03801
VOICE: (603) 433−2335
FAX: (603) 433−4194

PROJECT NO:	4507.04
CAD DWG FILE:	4507.04.SITE
DESIGNED BY:	RMB
DRAWN BY:	RMB
DEPT CHECK:	JKC
PROJ CHECK:	JKC
DATE:	APRIL 13, 2021
SCALE:	1" = 50'

G - 001

PISCATAQUA RIVER
MEAN LOW TIDE (−4.30')

MEAN HIGH WATER (3.81')

HIGHEST OBSERVABLE TIDE LINE

LIMIT OF WORK PER NHDES WETLANDS PERMIT 2015-01866

EXISTING EDGE OF PAVEMENT (TRAVEL WAY)

LIMIT OF ROADWAY RE-ALIGNMENT

PARKING IMPROVEMENTS – LIMIT OF WORK

REMOVE EXIST. GUARDRAIL

ADJUST RIM TO FINISH GRADE (TYP.)

INSTALL 3.5' WIDE GRAVEL SHOULDER WITH 2' WIDE VEGETATION STRIP (SEE ROAD CROSS SECTION DETAIL)

INSTALL GUARDRAIL

CONSTRUCT 5' PAVED APRON

ROADWAY RE-ALIGNMENT

INSTALL RIP RAP SLOPE

PRESERVE EXISTING FOOTPATH

INSTALL AND MAINTAIN SILT BARRIER (TYP)

CONSTRUCT 5' PAVED APRON

EXISTING GRAVEL LOT

RIPRAP SLOPE

"SHORE ACCESS"

GRANITE STEPS

HOTL

~GRAVEL TRAIL~

100 YEAR FEMA FLOODPLAIN (2005)

50' NATURAL WOODLAND BUFFER

100' TIDAL BUFFER

150' NATURAL WOODLAND BUFFER

R=850' (C.L.)

R=475' (C.L.)

CROSS SECTION

SALT MARSH

MEAN HIGH WATER (3.81')

EXISTING MARSH ELDER, TYP. (MAPPED 2021)

~ TIDAL WATERS ~
MEAN LOW TIDE (−4.30')

EXISTING LIMITS OF GRAVEL LOT

INSTALL 24'-WIDE CONCRETE GRASS PAVERS (TYP)

INSTALL SINGLE RAIL WOOD RAIL FENCE (TYP)

INSTALL AND MAINTAIN DOUBLE ROW SILT BARRIER (TYP)

PROVIDE 5'-WIDE FENCE OPENING

RESTORE SURFACE BEYOND GUARDRAIL WITH 6" LOAM AND ESTABLISH MEADOW GRASSES (TYP)

SALT MARSH

EXISTING MARSH ELDER, TYP (MAPPED 2021)

EXISTING GRAVEL LOT

SALT MARSH BOUNDARY

ESTUARINE, INTERTIDAL, PERSISTENT EMERGENT VEGETATION (E2EM1)

50' NATURAL WOODLAND BUFFER

100' TIDAL BUFFER

150' NATURAL WOODLAND BUFFER

50.00' WATERFRONT BUFFER

PALUSTRINE, SCRUB-SCRUB, BROAD-LEAFED DECIDUOUS (PSS1)

PROP. BOULDER (TYP)

PARKING IMPROVEMENTS – LIMIT OF WORK

INSTALL WHEEL STOP (TYP)

EXISTING GRAVEL LOT LIMITS

LIMIT OF WORK PER NHDES WETLANDS PERMIT 2015-01866

PROPOSED REINFORCED GRASS PARKING LIMITS (TYP)

INSTALL AND MAINTAIN SINGLE ROW SILT BARRIER (TYP)

LIMIT OF ROADWAY RE-ALIGNMENT

SUMMARY:

FILL TO RAISE ROADWAY AND PARKING	2,000 C.Y.
FILL BELOW ELEV. 8 (100 YR FEMA ZONE AE – NAVD 1988)	80 C.Y.

GRAPHIC SCALE
20 0 10 20 40 80
(IN FEET)

ALTUS ENGINEERING, INC.
133 COURT STREET PORTSMOUTH, NH 03801
VOICE: (603) 433-2335
FAX: (603) 433-4194

PERMIT APPLICATION DRAWING
NOT FOR CONSTRUCTION

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REVISIONS

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1 TECHNOLOGY PARK DRIVE
WESTFIELD, MA 01085
PHONE (781) 246-3200

AECOM

JEFFREY K. CLIFFORD No. 6524 LICENSED PROFESSIONAL ENGINEER - STATE OF NEW HAMPSHIRE

CITY OF PORTSMOUTH, NH - DEPARTMENT OF PUBLIC WORKS
PEIRCE ISLAND WWTF UPGRADE
PARKING IMPROVEMENTS
(FORMER SNOW DUMP AREA)

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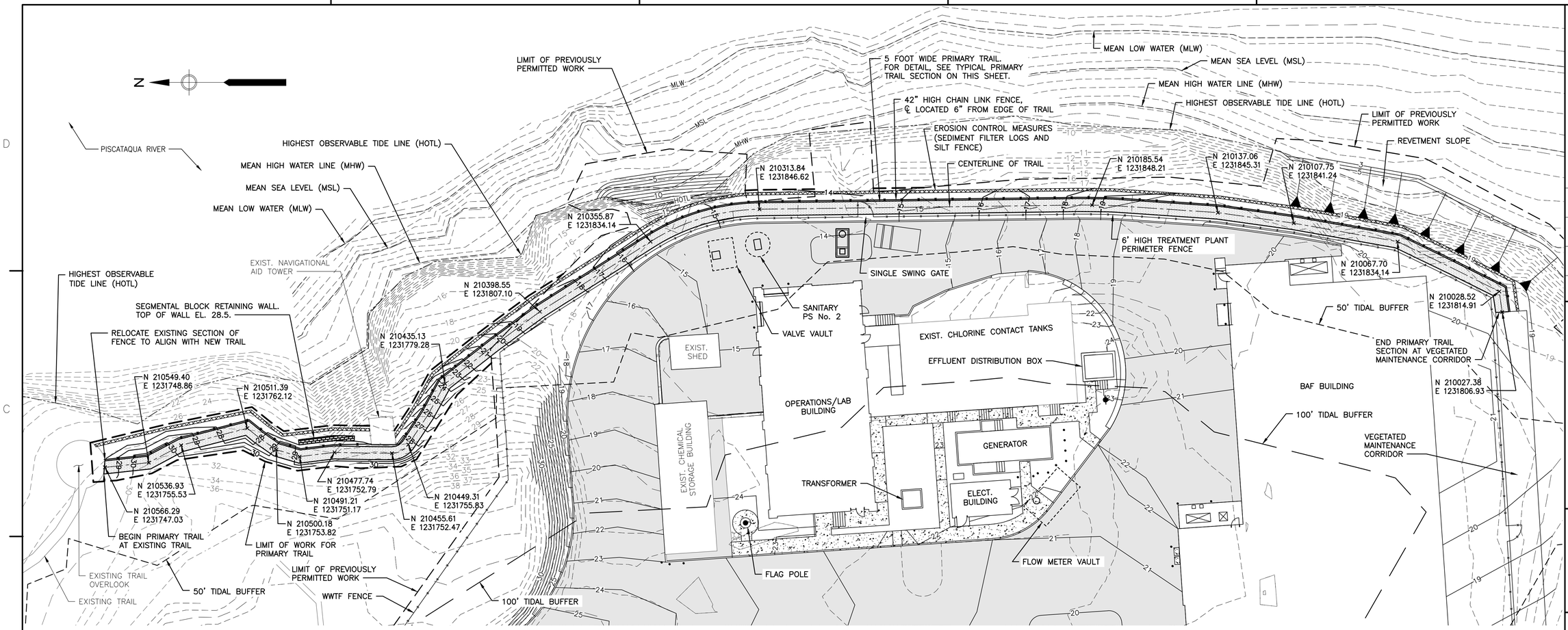
DESIGNED BY:	RMB
DRAWN BY:	RMB
DEPT CHECK:	JKC
PROJ CHECK:	JKC
DATE:	APRIL 13, 2021
SCALE:	1" = 20'

C - 001

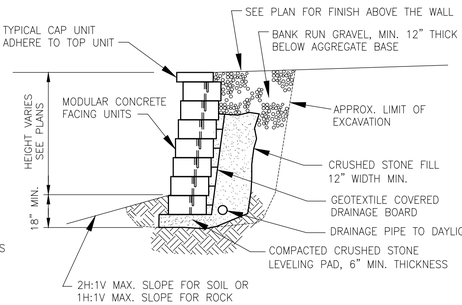


PLAN

SCALE: 1"=20'

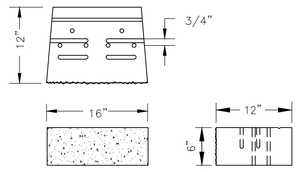
RETAINING WALL NOTES:

1. STRIP ALL VEGETATION AND ORGANIC SOIL FROM THE WALL ALIGNMENT.
2. FINAL WALL ALIGNMENT SHALL BE LOCATED IN THE FIELD.
3. DO NOT OVER EXCAVATE UNLESS DIRECTED BY THE ENGINEER TO REMOVE UNACCEPTABLE SOIL.
4. THE RETAINING WALL DESIGN ENGINEER SHALL VERIFY FOUNDATION SOILS AS BEING COMPETENT.
5. BASE SHALL CONSIST OF 95% COMPACTED CRUSHED STONE, MINIMUM 6" THICK.
6. FOLLOW APPLICABLE PROVISIONS OF THE MANUFACTURER'S INSTALLATION INSTRUCTIONS AND SPECIFICATIONS.
7. BACKFILL AND COMPACT BEHIND THE WALL AS WALL IS INSTALLED UNDER PAVEMENT.
8. COMPACTION TESTS SHALL BE TAKEN AS THE WALL IS INSTALLED.
9. BACKFILL COMPACTION SHALL BE TO 95% OF MAXIMUM PROCTOR DENSITY.
10. PROVIDE A DRAINAGE SWALE TO DIRECT FLOWS AROUND THE ENDS OF THE WALL.
11. ESTABLISH TURF AS SOON AS THE WALL IS COMPLETED.
12. CAPS SHALL BE PLACED AS REQUIRED BY CONTRACT.
13. CAPS SHALL BE ADHERED TO WALL USING CONCRETE ADHESIVE.
14. WHEN CUTTING CAP UNIT FOR WALL END DO NOT USE A CAP SECTION LESS THAN 6" WIDE.
15. CAPS MAY BE PLACED FLUSH OR WITH A 1/2" TO 3/4" OVERHANG ON TOP OF WALL.



PRECAST CONC. BLOCK RETAINING WALL SECTION

SCALE: NONE

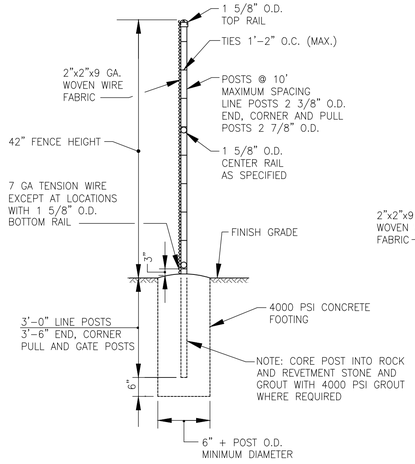


TYPICAL UNIT

UNIT DIMENSIONS

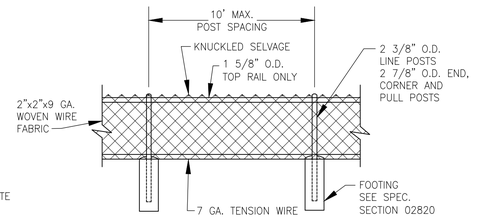
RETAINING WALL DETAIL

SCALE: NONE



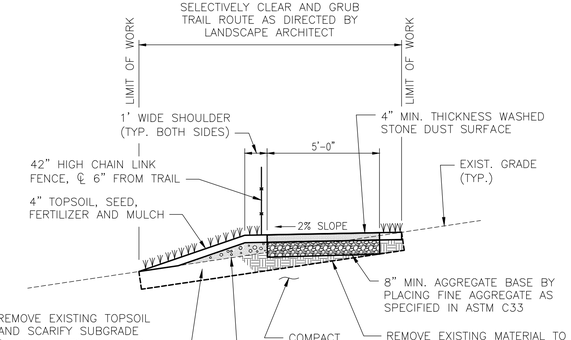
CHAIN LINK FENCE SECTION

NOT TO SCALE



3'-6" HEIGHT CHAIN LINK FENCE ELEVATION

NOT TO SCALE



TYPICAL PRIMARY TRAIL SECTION

NOT TO SCALE

NOTES:

1. FOR LEGEND, ABBREVIATIONS AND GENERAL NOTES, SEE SHEET 00 C-001.

1" = 20'

0 20 40 60

SCALE FEET

MARK	DATE	MADE BY	CHECKED	DESCRIPTION
				REVISIONS

PERMIT APPLICATION DRAWING
NOT FOR CONSTRUCTION

AECOM TECHNICAL SERVICES, INC.
257 SIMARANO DRIVE, SUITE 102
CHELMSFORD, MA 01824
PHONE: (978) 905-2100
www.aecom.com

AECOM

STATE OF NEW HAMPSHIRE – ERIK N. MESERVE – No. 13306 LICENSED PROFESSIONAL ENGINEER

CITY OF PORTSMOUTH, NH - DEPARTMENT OF PUBLIC WORKS
PEIRCE ISLAND WWTF UPGRADE

PROPOSED WALKING TRAIL

WALKING PATH

PROJECT NO:	60301525
CAD DWG FILE:	~~00 C-701 AS~~ C-002 8-31-20
DESIGNED BY:	E. MESERVE
DRAWN BY:	C. BENZIGER
DEPT CHECK:	C. BENZIGER
PROJ CHECK:	E. MESERVE
DATE:	APRIL 2020
SCALE:	AS NOTED

C-002

PATH/FILENAME: P:\PRO\60301525 - PORTSMOUTH WWTF UPGRADE\SHEETS\BP-2\C\00 C-701 AS C-002 8-31-20.DWG
LAST UPDATE: Tuesday, September 01, 2020 12:44:09 PM
PLOT DATE: Tuesday, September 01, 2020 12:56:48 PM
ANSI D – 1-Sep-20

MEAN HIGH WATER (3.81')

HIGHEST OBSERVABLE TIDE LINE

HOTL

~GRAVEL TRAIL~

ROW OF BOULDERS

ROW OF BUSHES

EOP

EOP

"NO PARKING"

WATER-SURVEY LINE

MHSTCK(NAD83/2011)

8" ASB INV=5.42

18" SAN F/M

24" SAN F/M

EDGE OF RIPRAP

BENCH

3" JAPANESE TREE LILAC

LEDGE

WOOD POST

8" OAK

8" OAK

150' NATURAL WOODLAND BUFFER

16" ELM

14" OAK

8" ELM

18" ELM

2L 6" OAK

20" OAK

10" BIRCH

8" BIRCH

12" BIRCH

2L 8" BIRCH

7" BIRCH

6" BIRCH

12" POPLAR

12" POPLAR

2 5" BIRCH

6" POPLAR

3" MAPLE

14" ELM

26" OAK

6" CHERRY

15" OAK

12" CHERRY

5" SUMAC

12" CHERRY

4" ASH

SUMAC

MAPLE

6" 10" 12" OAK

4 4" BIRCH

3" MAPLE

10" 12" OAK

3 6" BIRCH

9" 5" B

HIGHEST OBSERVABLE TIDE LINE

MEAN HIGH WATER (3.81')

RESTORE SURFACE WITH 6" LOAM & ESTABLISH MEADOW GRASS, TYP; SEE SPECIFICATIONS

SHRUB PLANTING, TYP; SEE DETAIL SHEET L-002

150' NATURAL WOODLAND BUFFER

24.0'

GRAPHIC SCALE

20 0 10 20 40 80

(IN FEET)

PLANT SCHEDULE

SYM	QTY	BOTANICAL NAME	COMMON NAME	SIZE
Shrubs and Groundcovers				
⊕	23	*Myrica pensylvanica*	Bayberry	hvy/3' B&B
⊕	27	*Myrica pensylvanica*	Bayberry	#5 pot
⊛	81	*Aronia melanocarpa*	Black Chokeberry	#5 pot
⊙	74	*Prunus maritima*	Beach Plum	#5 pot
	17600 ft²	Meadow Restoration Seed Mix		See specs

MARK	DATE	MADE BY	CHECKED	DESCRIPTION
REVISIONS				

AECOM TECHNICAL SERVICES, INC.
1 TECHNOLOGY DRIVE
WAKEFIELD, MA 01880
PHONE (781) 246-3200

CITY OF PORTSMOUTH, NH - DEPARTMENT OF PUBLIC WORKS
PEIRCE ISLAND WWTF UPGRADE

PARKING IMPROVEMENTS

(FORMER SNOW DUMP AREA)

PROJECT NO:	4507.04
CAD DWG FILE:	4507.04.SITE
DESIGNED BY:	SS
DRAWN BY:	SS
DEPT CHECK:	XX
PROJ CHECK:	XX
DATE:	AUGUST 6, 2020
SCALE:	1" = 20'

L - 001

SECTION

SHRUB PLANTING

NOT TO SCALE

NOTES:

1. SCARIFY SOILS CONTINUOUSLY TO A DEPTH OF 6" AT INTERFACE BETWEEN SOIL TYPES AND LIFTS TO PROMOTE BLENDING OF SOILS.
2. ALL PLANTING TO BE DONE AS PER ANSI A300 (PART 6) 2012.

PRELIMINARY COPY

NOTE: This document is preliminary only and is not intended for any purpose except review and comment by the owner and its agents.

MARK	DATE	MADE BY	CHECKED	DESCRIPTION

REVISIONS

AECOM TECHNICAL SERVICES, INC.
1 TECHNOLOGY PARK
WAKEFIELD, MA 01880
PHONE (781) 246-3200

CITY OF PORTSMOUTH, NH - DEPARTMENT OF PUBLIC WORKS
PEIRCE ISLAND WWTF UPGRADE

PARKING IMPROVEMENT DETAILS

(FORMER SNOW DUMP AREA)

PROJECT NO:	4507.04
CAD DWG FILE:	4507.04.SITE
DESIGNED BY:	SS
DRAWN BY:	SS
DEPT CHECK:	XX
PROJ CHECK:	XX
DATE:	AUGUST 6, 2020
SCALE:	AS SHOWN

L - 002

SEDIMENT AND EROSION CONTROL NOTES

PROJECT NAME AND LOCATION

ROAD, PARKING AREA AND RECREATION TRAIL IMPROVEMENTS
TAX MAP 208 LOT 1
PORTSMOUTH, NEW HAMPSHIRE

LATITUDE: 043° 04' 29" N
LONGITUDE: 070° 44' 35" W

APPLICANT:
CITY OF PORTSMOUTH
DEPARTMENT OF PUBLIC WORKS
680 PEVERLY HILL ROAD
PORTSMOUTH, NEW HAMPSHIRE

DESCRIPTION

The project consists of improvements to raise the access road above anticipated 2100 100-year flood elevation; to convert an informal parking area the former snow dump, currently used as laydown area, to a formal grassed public parking area; and to extend the public walking trail 600 feet around the northeastern perimeter of the island.

DISTURBED AREA

The total area to be disturbed for the development improvements is approximately 55,738 SF (1.3 acres).

PROJECT PHASING

The proposed project will be completed in two phase. Phase I is the trail extension; Phase II is the road and grass parking improvements.

NAME OF RECEIVING WATER

The site drains directly to the Piscataqua River (tidal).

NPDES CONSTRUCTION GENERAL PERMIT

Contractor shall prepare a Stormwater Pollution Prevention Plan (SWPPP) is accordance with federal storm water permit requirements. The SWPPP must be prepared in a format acceptable to the Owner and three (3) copies provided to the City at least fourteen (14) days prior to initiating construction. Contractor is responsible for all cost associated with preparation and implementation of SWPPP including any temporary erosion control measures (whether indicated or not on these drawings) as required for the contractor's sequence of activities.

The Contractor and Owner shall each file a Notice of Intent (NOI) with the U.S.E.P.A. under the NPDES Construction General Permit. (U.S.E.P.A., 1200 Pennsylvania Avenue NW, Washington, DC 20460) All work shall be in accordance with NPDES General Permit: NHR120000, including NOI requirements, effluent limitations, standards and management for construction. The Contractor shall be responsible for obtaining a USEPA Construction Dewatering Permit, if required.

SEQUENCE OF MAJOR ACTIVITIES

1. Prepare SWPPP and file NPDES Notice of Intent, prior to any construction activities. The Contractor and Owner shall each file a Notice of Intent (N.O.I.) to U.S.E.P.A.
2. Install temporary erosion control measures including silt fences, stabilized construction entrance and inlet sediment filters as noted on the plan. All temporary erosion control measures shall be maintained in good working condition for the duration of the project.
3. Upon completion of Items 1 through 2, clear and grub wooded areas (some stumps may require grinding). Dispose of stumps in an approved offsite location.
4. Strip and stockpile loam. Stockpiles shall be temporarily stabilized with hay bales, mulch and surrounded by a hay bale or silt fence barrier until material is removed and final grading is complete.
5. Reclaim/remove existing paved surfaces.
6. Perform all required demolition activities.
7. Initiate facility construction.
8. Construct ditches and swales early in construction sequence; stabilize them prior to directing flow to them.
9. Ditches and swales shall have sides and bottom reinforced with excelsior matting, Permanent turf reinforcement shall be installed at swale sloped greater than 5%.
10. Rough grade site including placement of borrow materials.
21. Construct drainage structures, parking area & road base materials. All roadways and parking lots shall be stabilized within 72 hours of achieving finished grade
19. Install base course paving, pavers & curbing.
20. Install top course paving.
21. Loam (6" min) and seed all disturbed areas not paved or otherwise stabilized within 72 hours of achieving finished grade.
22. When all construction activity is complete and site is stabilized, remove all hay bales, storm check dams, silt fences and sediment that has been trapped by these devices.
23. File a Notice of Termination (N.O.T.) with U.S.E.P.A.

TEMPORARY EROSION & SEDIMENT CONTROL AND STABILIZATION PRACTICES

All work shall be in accordance with state and local permits. Work shall conform to the practices described in the "New Hampshire Stormwater Manual, Volumes 1 – 3", issued December 2008, as amended. As indicated in the sequence of Major Activities, the silt fences shall be installed prior to commencing any clearing or grading of the site. Structural controls shall be installed concurrently with the applicable activity. Once construction activity ceases permanently in an area, silt fences and any earth/dikes will be removed once permanent measures are established.

During construction, runoff will be diverted around the site with stabilized channels where possible. Sheet runoff from the site shall be filtered through hay bale barriers, stone check dams, and silt fences. All storm drain inlets shall be provided with hay bale filters or stone check dams. Stone rip rap shall be provided at the outlets of drain pipes and culverts where shown on the drawings.

Stabilize all ditches, swales and their contributing areas prior to directing flow to them.

Temporary and permanent vegetation and mulching is an integral component of the erosion and sedimentation control plan. All areas shall be inspected and maintained until vegetative cover is established. These control measures are essential to erosion prevention and also reduce costly rework of graded and shaped areas.

Temporary vegetation shall be maintained in these areas until permanent seeding is applied. Additionally, erosion and sediment control measures shall be maintained until permanent vegetation is established.

INSTALLATION, MAINTENANCE AND INSPECTION PROCEDURES FOR TEMPORARY EROSION AND SEDIMENT CONTROL MEASURES

A. GENERAL
These are general inspection and maintenance practices that shall be used to implement the plan:

1. The smallest practical portion of the site shall be denuded at one time, but in no case shall it exceed 5 acres at one time.
2. All control measures shall be inspected at least once each week and following any storm event of 0.5 inches or greater.
3. All measures shall be maintained in good working order; if a repair is necessary, it will be initiated within 24 hours.
4. Built-up sediment shall be removed from silt fence or other barriers when it has reached one-third the height of the fence or bale, or when "bulges" occur.
5. All diversion dikes shall be inspected and any breaches promptly repaired.
6. Temporary seeding and planting shall be inspected for bare spots, washouts, and unhealthy growth.
7. The owner's authorized engineer shall inspect the site on a periodic basis to review compliance with the Plans'
8. All roadways and parking lots shall be stabilized within 72 hours of achieving finished grade.
9. All cut and fill slopes shall be seeded/loamed within 72 hours of achieving finished grade.
10. An area shall be considered stable if one of the following has occurred:
    a. Base coarse gravels have been installed in areas to be paved;
    b. A minimum of 85% vegetated growth as been established;
    c. A minimum of 3 inches of non-erosive material such as stone of riprap has been installed; – or –
    d. Erosion control blankets have been properly installed.
11. The length of time of exposure of area disturbed during construction shall not exceed 45 days.

B. MULCHING
Mulch shall be used on highly erodible soils, on critically eroding areas, on areas where conservation of moisture will facilitate plant establishment, and where shown on the plans.

1. Timing – In order for mulch to be effective, it must be in place prior to major storm events. There are two (2) types of standards which shall be used to assure this:
    a. Apply mulch prior to any storm event. This is applicable when working within 100 feet of wetlands. It will be necessary to closely monitor weather predictions, usually by contacting the National Weather Service in Concord, to have adequate warning of significant storms.
    b. Required Mulching within a specified time period. The time period can range from 21 to 28 days of inactivity on a area, the length of time varying with site conditions. Professional judgment shall be used to evaluate the interaction of site conditions (soil erodibility, season of year, extent of disturbance, proximity to sensitive resources, etc.) and the potential impact of erosion on adjacent areas to choose an appropriate time restriction.
2. Guidelines for Winter Mulch Application –

Type	Rate per 1,000 s.f.	Use and Comments
Hay or Straw	70 to 90 lbs.	Must be dry and free from mold. May be used with plantings.
Wood Chips or Bark Mulch	460 to 920 lbs.	Used mostly with trees and shrub plantings.
Jute and Fibrous Matting (Erosion Blanket	As per manufacturer Specifications	Used in slope areas, water courses and other Control areas.
Crushed Stone 1/4" to 1-1/2" dia.	Spread more than 1/2" thick	Effective in controlling wind and water erosion.
Erosion Control Mix	2" thick (min)	* The organic matter content is between 80 and 100%, dry weight basis. * Particle size by weight is 100% passing a 6" screen and a minimum of 70 %, maximum of 85% passing a 0.75" screen. * The organic portion needs to be fibrous and elongated. * Large portions of silts, clays or fine sands are not acceptable in the mix. * Soluble salts content is less than 4.0 mmhos/cm. * The pH should fall between 5.0 and 8.0.

3. Maintenance – All mulches must be inspected periodically, in particular after rainstorms, to check for rill erosion. If less than 90% of the soil surface is covered by mulch, additional mulch shall be immediately applied.

C. TEMPORARY GRASS COVER
1. Seedbed Preparation –
Apply fertilizer at the rate of 600 pounds per acre of 10-10-10. Apply limestone (equivalent to 50 percent calcium plus magnesium oxide) at a rate of three (3) tons per acre.

2. Seeding –
    a. Utilize annual rye grass at a rate of 40 lbs/acre.
    b. Where the soil has been compacted by construction operations, loosen soil to a depth of two (2) inches before applying fertilizer, lime and seed.
    c. Apply seed uniformly by hand, cyclone seeder, or hydroseeder (slurry including seed and fertilizer). Hydroseedings, which include mulch, may be left on soil surface. Seeding rates must be increased 10% when hydroseeding.
3. Maintenance –
Temporary seedings shall be periodically inspected. At a minimum, 95% of the soil surface should be covered by vegetation. If any evidence of erosion or sedimentation is apparent, repairs shall be made and other temporary measures used in the interim (mulch, filter barriers, check dams, etc.).

D. FILTERS
1. Silt Fence
    a. Synthetic filter fabric shall be a pervious sheet of propylene, nylon, polyester or ethylene yarn and shall be certified by the manufacturer or supplier as conforming to the following requirements:

Physical Property	Test	Requirements
Filtering Efficiency	VTM-51	75% minimum
Tensile Strength at 20% Maximum Elongation*	VTM-52	Extra Strength 50 lb/lin in (min) Standard Strength 30 lb/lin in (min)
Flow Rate	VTM-51	0.3 gal/sf/min (min)

* Requirements reduced by 50 percent after six (6) months of installation.

Synthetic filter fabric shall contain ultraviolet ray inhibitors and stabilizer to provide a minimum of six (6) months of expected usable construction life at a temperature range of 0 degrees F to 120° F.

    b. Posts shall be spaced a maximum of ten (10) feet apart at the barrier location or as recommended by the manufacturer and driven securely into the ground (minimum of 16 inches).
    c. A trench shall be excavated approximately six (6) inches wide and eight (8) inches deep along the line of posts and upslope from the barrier.
    d. When standard strength filter fabric is used, a wire mesh support fence shall be fastened securely to the upslope side of the posts using heavy duty wire staples at least one (1) inch long, tie wires or hog rings. The wire shall extend no more than 36 inches above the original ground surfaces.
    e. The "standard strength" filter fabric shall be stapled or wired to the fence, and eight (8) inches of the fabric shall be extended into the trench. The fabric shall not extend more than 36 inches above the original ground surface. Filter fabric shall not be stapled to existing trees.
    f. When extra strength filter fabric and closer post spacing are used, the wire mesh support fence may be eliminated. In such a case, the filter fabric is stapled or wired directly to the posts with all other provisions of item (g) applying.
    g. The trench shall be backfilled and the soil compacted over the filter fabric.
    h. Silt fences shall be removed when they have served their useful purpose but not before the upslope areas has been permanently stabilized.

2. Sequence of Installation –
Sediment barriers shall be installed prior to any soil disturbance of the contributing upslope drainage area.

3. Maintenance –
    a. Silt fence barriers shall be inspected immediately after each rainfall and at least daily during prolonged rainfall. They shall be repaired if there are any signs of erosion or sedimentation below them. Any required repairs shall be made immediately. If there are signs of undercutting at the center or the edges, or impounding of large volumes of water, the sediment barriers shall be replaced with a temporary stone check dam.
    b. Should the fabric on a silt fence or filter barrier decompose or become ineffective prior to the end of the expected usable life and the barrier still is necessary, the fabric shall be replaced promptly.
    c. Sediment deposits must be removed when deposits reach approximately one-third (1/3) the height of the barrier.
    d. Any sediment deposits remaining in place after the silt fence or other barrier is no longer required shall be removed. The area shall be prepared and seeded.
    e. Additional stone may have to be added to the construction entrance, rock barrier and riprap lined swales, etc., periodically to maintain proper function of the erosion control structure.

4. Alternative Method
Filtrexx Siltsoxx or approved equal – install per manufacturer specifications.

E. PERMANENT SEEDING –
1. Bedding – stones larger than 1½", trash, roots, and other debris that will interfere with seeding and future maintenance of the area should be removed. Where feasible, the soil should be tilled to a depth of 5" to prepare a seedbed and mix fertilizer into the soil.

2. Fertilizer – lime and fertilizer should be applied evenly over the area prior to or at the time of seeding and incorporated into the soil. Kinds and amounts of lime and fertilizer should be based on an evaluation of soil tests. When a soil test is not available, the following minimum amounts should be applied:
Agricultural Limestone @ 100 lbs. per 1,000 s.f.
10-20-20 fertilizer @ 12 lbs. per 1,000 s.f.

3. Seed Mixture (recommended):
SEE LANDSCAPE PLANS

4. Sodding – sodding is done where it is desirable to rapidly establish cover on a disturbed area. Sodding an area may be substituted for permanent seeding procedures anywhere on site. Bed preparation, fertilizing, and placement of sod shall be performed according to the S.C.S. Handbook. Sodding is recommended for steep sloped areas, areas immediately adjacent to sensitive water courses, easily erodible soils (fine sand/silt), etc.

WINTER CONSTRUCTION NOTES

1. All proposed vegetated areas which do not exhibit a minimum of 85% vegetative growth by October 15th, or which are disturbed after October 15th, shall be stabilized by seeding and installing erosion control blankets on slopes greater than 3:1, and elsewhere seeding and placing 3 to 4 tons of mulch per acre, secured with anchored netting. The installation of erosion control blankets or mulch and netting shall not occur over accumulated snow or on frozen ground and shall be completed in advance of thaw or spring melt events;

2. All ditches or swales which do not exhibit a minimum of 85% vegetative growth by October 15th, or which are disturbed after October 15th, shall be stabilized temporarily with stone or erosion control blankets appropriate for the design flow conditions; and

3. After November 15th, incomplete road or parking surfaces where work has stopped for the winter season shall be protected with a minimum of 3 inches of crushed gravel per NHDOT Item 304.3.

SPILL PREVENTION MEASURED AND SPILL MITIGATION

Spill prevention and spill mitigation measures shall be implemented to prevent the release of fuel and other related substances to the environment. The measures shall be included at a minimum:

a) The storage requirements shall include:
    i. Storage of regulated substances on an impervious surface.
    ii. Secure storage areas against unauthorized entry.
    iii. Label regulated containers clearly and visibly.
    iv. Inspect stage areas weekly.
    v. Cover regulated containers in outside storage areas.
    vi. Whenever possible, keep regulated containers that are stored outside more than 50 feet from surface water and storm drains, 75 feet from private wells, and 400 feet from public well.
    vii. Secondary containment is required for containers containing regulated substances stored outside, except for on premise use fuel tanks or aboveground or underground storage tanks otherwise regulated.

b) The fuel handling requirements shall include:
    i. Except when in use, keep containers containing regulated substances closed and sealed.
    ii. Place drip pans under spigots, valves, and pumps.
    iii. Have spill control and containment equipment readily available in all work areas.
    iv. Use funnel and drip pans when transferring regulated substances.
    v. Perform transfers of regulated substances over an impervious surface.

c) The training of on-site employees and on-site posting of release response information describing what to do in the event of regulated substances.

d) Fueling and maintenance of excavation, earthmoving and other construction related equipment will comply with regulation of New Hampshire Department of Environmental Services (see WD-DWGB-22-6 Best management Practices for Fueling and Maintenance of Excavation and Earthmoving Equipment.
http://des.nh.gov/organization/ommissioner/pip/factsheets/dwgb/documents/dwgb-22-6.pdf

NOTE:
ALL FACILITIES SHOULD BE INSPECTED ON AN ANNUAL BASIS AT A MINIMUM. IN ADDITION, ALL FACILITIES SHOULD BE INSPECTED AFTER A SIGNIFICANT PRECIPITATION EVENT TO ENSURE THE FACILITY IS DRAINING APPROPRIATELY AND TO IDENTIFY ANY DAMAGE THAT OCCURRED AS A RESULT OF THE INCREASED RUNOFF. FOR THE PURPOSE OF THIS STORMWATER MANAGEMENT PROGRAM, A SIGNIFICANT RAINFALL EVENT IS CONSIDERED AN EVENT OF THREE (3) INCHES IN A 24-HOUR PERIOD OR 0.5 INCHES IN A ONE-HOUR PERIOD. IT IS ANTICIPATED THAT A SHORT, INTENSE EVENT IS LIKELY TO HAVE A HIGHER POTENTIAL OF EROSION FOR THIS SITE THAN A LONGER, HIGH VOLUME EVENT.

ALTUS ENGINEERING, INC.
133 COURT STREET PORTSMOUTH, NH 03801
VOICE: (603) 433-2335
FAX: (603) 433-4194

PERMIT APPLICATION DRAWING
NOT FOR CONSTRUCTION

MARK	DATE	MADE BY	CHECKED	DESCRIPTION

REVISIONS

AECOM TECHNICAL SERVICES, INC.
101 LIBERTY HILL ROAD
WAKEFIELD, MA 01880
PHONE (781) 246-3200

AECOM

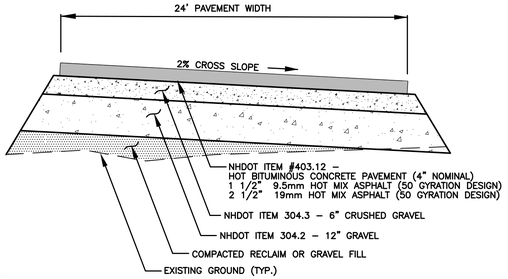
JEFFREY K. CLIFFORD No. 6524 LICENSED PROFESSIONAL ENGINEER – STATE OF NEW HAMPSHIRE

CITY OF PORTSMOUTH, NH - DEPARTMENT OF PUBLIC WORKS
PEIRCE ISLAND WWTF UPGRADE

EROSION CONTROL NOTES
(FORMER SNOW DUMP AREA)

PROJECT NO:	4507.04
CAD DWG FILE:	4507.04.SITE
DESIGNED BY:	RMB
DRAWN BY:	RMB
DEPT CHECK:	JKC
PROJ CHECK:	JKC
DATE:	APRIL 13, 2021
SCALE:	AS SHOWN

C - 003

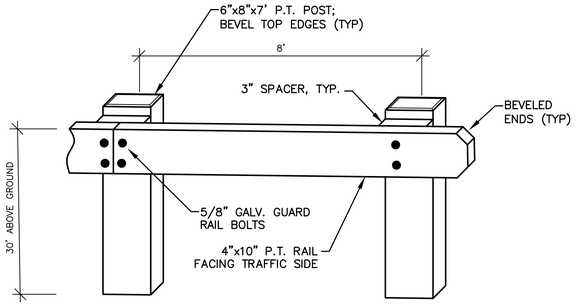


NOTES

1. ALL PAVEMENT, LOAM, CLAY, MUCK, ORGANIC AND/OR YIELDING MATERIAL SHALL BE REMOVED TO A DEPTH OF NO LESS THAN 22" BELOW FINISH GRADE. INSTALL COMPACTED SAND OR GRAVEL BORROW TO SUBGRADE, AS NECESSARY.
2. THOROUGHLY COMPACT THE SUBGRADE WITH A VIBRATORY ROLLER. PROOF ROLL THE SUBGRADE WITH A FULLY LOADED 10-WHEEL DUMP TRUCK AND REMOVE ANY UNSTABLE SUBGRADE SOILS.
3. SUBGRADE SHALL BE FREE OF VOIDS THAT ALLOW MOVEMENT/SETTLEMENT OF MATERIALS. REMOVE ANY VISIBLE ORGANICS AT SUBGRADE, REPLACE WITH COMPACTED COMMON OR STRUCTURAL FILL.
4. EACH GRAVEL BASE COURSE TO BE CONSTRUCTED AT THE PAVEMENT CROSS SLOPE.
5. COMPACT ALL MATERIALS TO 95% MAXIMUM PROCTOR DENSITY.

PAVEMENT SECTION

NOT TO SCALE

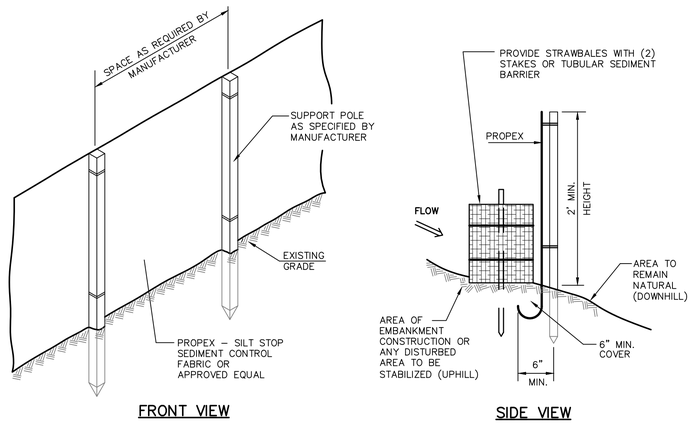


NOTE:

FENCE BY GC/AAA FENCE COMPANY, DOVER, NH, TEL. (800) 660-0833 OR APPROVED EQUAL

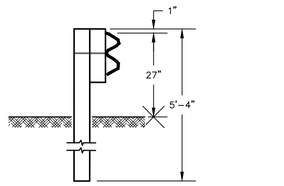
SINGLE RAIL WOOD BARRIER

NOT TO SCALE



DOUBLE SILT BARRIER DETAIL

NOT TO SCALE

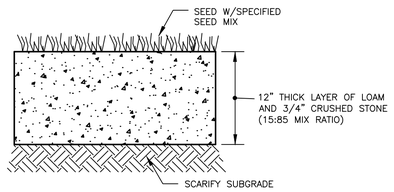


AASHTO DESIGNATION	G4(2W)
NH STANDARD BEAM GUARD RAIL DETAIL, SECTION 606	
POST SPACING	6'-3"
DEFLECTION DISTANCE *	3'
POST TYPE	6" x 8" TREATED WOOD POST
BEAM TYPE	"W" SECTION, 12 GA., "CORTEN" STEEL, NHDOT 606.2
OFFSET BRACKETS	6" x 8" x 14" TREATED BLOCK

PROVIDE TERMINAL SECTION AT EACH END

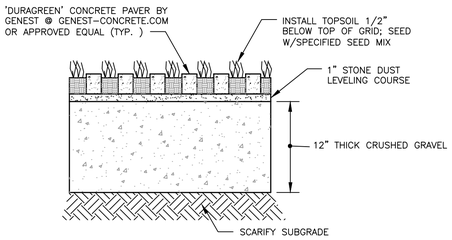
"W" BEAM GUARDRAIL DETAIL (WOOD POSTS)

NOT TO SCALE



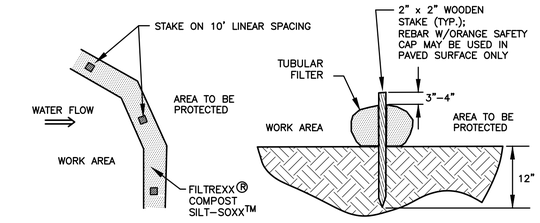
REINFORCED GRASSED PARKING DETAIL

NOT TO SCALE



CONCRETE GRASS PAVER DETAIL

NOT TO SCALE



NOTES:

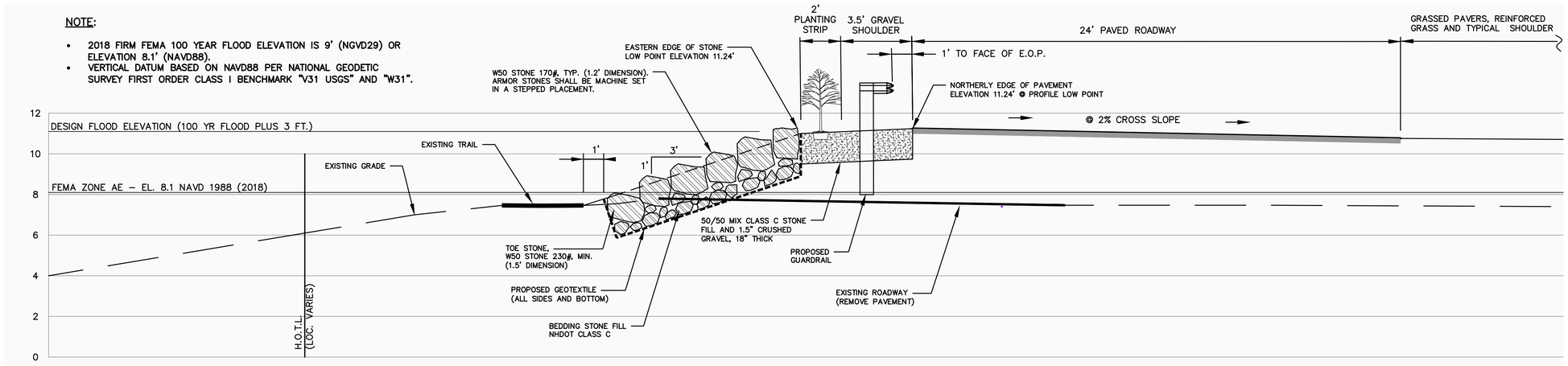
1. SILTSOXX OR APPROVED EQUAL SHALL BE USED FOR TUBULAR SEDIMENT BARRIERS.
2. ALL MATERIAL TO MEET MANUFACTURER'S SPECIFICATIONS.
3. COMPOST/SOIL/ROCK/SEED FILL MATERIAL SHALL BE ADJUSTED AS NECESSARY TO MEET THE REQUIREMENTS OF THE SPECIFIC APPLICATION.
4. ALL SEDIMENT TRAPPED BY BARRIER SHALL BE DISPOSED OF PROPERLY.

TUBULAR SEDIMENT BARRIER DETAIL

NOT TO SCALE

NOTE:

- 2018 FIRM FEMA 100 YEAR FLOOD ELEVATION IS 9' (NGVD29) OR ELEVATION 8.1' (NAVD88).
- VERTICAL DATUM BASED ON NAVD88 PER NATIONAL GEODETIC SURVEY FIRST ORDER CLASS I BENCHMARK "V31 USGS" AND "W31".



ROADWAY CROSS SECTION DETAIL

SCALE: 1" = 3'

PERMIT APPLICATION DRAWING
NOT FOR CONSTRUCTION

MARK	DATE	MADE BY	CHECKED	DESCRIPTION

REVISIONS

AECOM TECHNICAL SERVICES, INC.
1 TECHNOLOGY DRIVE
WAKEFIELD, MA 01880
PHONE (781) 246-3200

AECOM

STATE OF NEW HAMPSHIRE – JEFFREY K. CLIFFORD No. 6524 LICENSED PROFESSIONAL ENGINEER

CITY OF PORTSMOUTH, NH - DEPARTMENT OF PUBLIC WORKS
PEIRCE ISLAND WWTF UPGRADE

PARKING IMPROVEMENT DETAILS

(FORMER SNOW DUMP AREA)

ALTUS ENGINEERING, INC.
133 COURT STREET PORTSMOUTH, NH 03801
VOICE: (603) 433-2335
FAX: (603) 433-4194

PROJECT NO:	4507.04
CAD DWG FILE:	4507.04.SITE
DESIGNED BY:	RMB
DRAWN BY:	RMB
DEPT CHECK:	JKC
PROJ CHECK:	JKC
DATE:	APRIL 13, 2021
SCALE:	AS SHOWN

C - 004

EXHIBIT 7

PROJECT NARRATIVE

(EXPLANATION OF METHODS, TIMING, AND MANNER OF HOW THE PROJECT WILL MEET STANDARD PERMIT CONDITIONS (ENV-WT 307))

Peirce Island Wastewater Treatment Facility

Project Narrative

Section 1. Required Information

a. Project Purpose and Description (Env-Wt 603.02)

The City of Portsmouth is nearing completion of a major upgrade to the Peirce Island Wastewater Treatment Facility (WWTF; DES Wetland Permits 2015-1866 and 2015-1878). Several additional improvements are proposed to enhance access reliability to the WWTF, and the public's access to the island. These improvements include raising the access road approximately 3 feet at its lowest point to elevate it above the 100-year flood line; converting a former informal public parking area and permitted snow dump, currently used as the Project's construction laydown area, to a formal grassed public parking area and natural lands; and extending a public walking trail around the northeastern perimeter of the island. At the same time, the City is planning to permanently replace the two sewer force mains on Peirce Island between Peirce Island Road Bridge and the Peirce Island WWTF, replace the water main on Peirce Island between Peirce Island Road Bridge and the Peirce Island Pool, and slipline one of the force mains under the Peirce Island Road Bridge. The majority of the impacts will be temporary, associated with burial of the new water and sewer lines and the recreational path. Portions of the access road and the parking area will require permanent fill as described below.

Most of the work will occur in the tidal buffer zone, most of which is previously developed. Smaller portions associated with the parking area and the pipeline replacement work lie in the protected shoreland zone.

The specifics of the project are as follows:

Raising the Access Road

The access road currently floods during spring high tides and storm events. Since this is the only access and egress point for the WWTF, the road is considered critical infrastructure. Raising the road approximately 3 feet above its lowest point will elevate it out of the current 100-year flood line, and protect it against a sea level rise predicted to be 1.6 ft (See Coastal Vulnerability Assessment, Exhibit 25). The road will be shifted slightly to the south to accommodate the additional fill required.

No impacts to the rocky shore, salt marsh, or marsh elder (*Iva frutescens*; a NH Threatened species) are anticipated. Runoff from the road will be directed into the grassed parking area (described below) for treatment before before infiltrating and potentially draining as sheetflow to the south into Portsmouth Harbor. The existing walking trail and vegetation north of the road will be maintained, and a narrow buffer of stone and upland plantings is proposed between the trail and the road to protect the road from high water and wave action during storms.

Improving the Public Parking Area

Prior to the WWTF improvements, the current construction laydown area was an informal grassed parking area during the warmer months, and used as a permitted snow dump during the winter by the City. The City is proposing to restore a portion of the laydown area back to grassed parking to

accommodate up to 55 cars (Sheet C-001, Parking Improvements). A 24-foot wide travel lane of concrete grass pavers will provide a more stable corridor for vehicle travel. Both the grass parking area (approximately 14,148 sf) and the concrete grass pavers (approximately 5,478 sf) will be permeable to minimize runoff to the harbor. A low wooden fence will border the grass parking area to contain vehicles. The remainder of the gravel lot, approximately 8,120 sf, will be restored to an old field habitat using native species as shown on Sheet C-001.

The project will not adversely impact the adjacent tidal flats, salt marsh, or marsh elder. Because of the low volume of traffic, the permeable nature of the surfaces proposed in the parking area, and the restored herbaceous vegetation, the project will benefit adjacent resources by reducing the volume and improving the quality of runoff.

Recreational Trail

The proposed recreational trail follows an informal path currently used by pedestrians to circumnavigate the island (Exhibit 5, Sheet G-001). The trail extends a section of established walking trails and runs approximately 590 feet from the west end, starting at an existing overlook/"look out", to the east end of the WWTF where it joins a vegetated maintenance corridor leading back to the parking area. The trail will be 5 feet wide with a packed stone dust surface, and a 42-inch chain link fence downslope of the trail to protect walkers and vegetation. Any disturbed sideslope grades will be loamed and seeded.

All of this trail lies within the 50-foot waterfront buffer. Adverse impacts from the construction or use of the trail are expected to be minimal, due to the minor amount of tree clearing needed in the undisturbed tidal buffer and the existing cleared surfaces available for the path for the portion of the route to the east of the WWTF.

Sewer Force Main Replacement

The 24" sewer force main failed in September 2020. An Emergency Authorization (NHDES 2020-2873) was obtained to implement a temporary above-grade repair. The permanent solution is to replace both the existing 18" and 24" sewer force mains between the Peirce Island Road Bridge and the WWTF. The existing 18" sewer force main is closer to the adjacent tidal flats, salt marsh and marsh elder and will be drained and abandoned in place. The existing 24" sewer force main will be dug up, the trench widened, and the two new 24" sewer force mains will be placed in this trench. The areas that are disturbed as part of this work will be restored to pre-construction conditions.

Water Main Replacement

The existing 8" water main will be replaced with a 12" water main between the Peirce Island Road Bridge and the Peirce Island Pool, much of it within the Peirce Island roadway. The existing water main will be dug up and the new water main installed in its place. The areas that are disturbed as part of this work will be restored to pre-construction conditions. Upon completion of the pipe replacements, the road between Peirce Island Road Bridge and the WWTF will be regraded and receive a full width, 1-1/2" top course of pavement.

Sewer Force Main Sliplining

The 24" sewer force main under Peirce Island Road Bridge is showing signs of corrosion. To avoid unexpected failure of this pipeline, it will be sliplined with a 20" fusible PVC pipeline. Access pits will be excavated at either end of the bridge, and the 20" fusible PVC slipliner will be pulled through the

existing pipeline. The areas that are disturbed as part of this work will be in the roadway and will be restored to pre-construction conditions.

Description of Natural Resources

Peirce Island is located in the City of Portsmouth on the Piscataqua River. It is owned by the City and the State of NH, and provides multiple public services, including the WWTF, the State Fish Pier, a public outdoor pool, boat ramp, park and numerous walking trails. The slipline portion of the Project Area is contained to the Peirce Island Road Bridge. The pipeline replacement portion of the Project Area is linear on the west end of the island, widens out near the parking area, and narrows again for the recreational area at the east end near the wastewater treatment facility. The shoreline of the Piscataqua River adjacent the west end of Peirce Island Road Bridge and Peirce Island is bordered by estuarine habitats, including rocky shore (E2RS1/2) and salt marsh (E2EM1). No impacts to these wetland resources are proposed. Most of the work area lies within the 100-foot tidal buffer zone, with a smaller section of the pipeline corridor and of the parking area lying within protected shoreland. Based on consultation with DES Shoreland, a Permit-By-Notification application was submitted concurrently with the Wetlands application for temporary pipeline impacts in the protected shoreland outside of the tidal buffer zone. No freshwater resources are within or adjacent to the impact areas. Marsh elder, a State Threatened plant species, forms a narrow band along the southern shore of much of the island.

Tidal Buffer Zone

Most of the proposed work occurs within the jurisdictional tidal buffer zone (TBZ), the majority of which is previously developed (PDTBZ). The PDTBZ includes the paved road for the pipelines and slipline work on the bridge, grassed lawns and unpaved parking area in the vicinity of the pipeline work, paved areas and structures within the wastewater treatment facility, the access road, and the gravel lot used as a construction laydown area and snow dump. A smaller section of the TBZ in the proposed project area is undisturbed TBZ, primarily in the vicinity of the recreational trail. This section is dominated by small trees and vines: staghorn sumac (*Rhus typhina*), oriental bittersweet (*Celastrus orbiculatus*), black cherry (*Prunus serotina*) and gray birch *(Betula populifolia*). The ground cover is a mix of perennial grasses and some forbs.

Salt marsh

Several sections of salt marsh occur on the southern, more protected side of the island. The marshes are a mix of high marsh and low marsh with typical *Spartina* species (*S. alterniflora* in the low marsh and *S. patens* dominating the high marsh). Typical salt marsh forbs dominate in the upper marsh and marsh elder, *Iva frutescens*, (NH state-Threatened; see NHB21-1136) occurs in multiple stands along the upland border. This shrub is common in southern New England, and is reaching the northern edge of its geographic range in NH. No salt marsh will be impacted by the project. As partial mitigation for accidental impacts to marsh elder, a construction fence has been erected between the work area and the marsh elder to protect against encroachment.

Rocky shore

The western shoreline of the Piscataqua River adjacent Peirce Island Road Bridge and the eastern portion of Peirce Island below the Highest Observable Tide Line is predominantly bedrock outcrop and cobble gravel/shore. Rockweeds (*Ascophyllum* and *Fucus* spp) are prevalent in the lower intertidal zone on boulders and ledge. Much of the remaining rocky shore is unvegetated. The sections on which the bridge and WWTF are located is steep-sided exposed ledge and riprap. By the gravel lot and access road, the rocky shore is more gradual in slope and of finer gravel and cobble. Off the northwestern corner of the Peirce Island Rd. bridge, a shelf of cobble gravel occurs between the grassed upland bank and steep-sloped riprap. Much of the cobble gravel areas are unvegetated with minor occurrences of salt tolerant species such as *Spartina patens*, *Limonium carolinianum*, and *Solidago sempervirens*. No rocky shore will be impacted by the project.

Protected Shoreland

Approximately a third of the pipeline replacement work will occur in the protected shoreland zone above the PDTBZ at the west end of the island, and two small pieces lie outside of the previously permitted area near the WWTF. These areas of the island are developed and maintained, and includes Peirce Island Road, the boat ramp parking area, and mowed parkland.

State-Listed Species

The NHB data review (NHB21-1136; Exhibit 19) indicates eelgrass (*Zostera maritima*) and Atlantic and Shortnose Sturgeon (*Acipenser oxyrinchus* and *A. brevirostrum*) occur in the subtidal waters off Peirce Island. The proposed work will have no adverse impacts to those marine species. The project does not impact any estuarine or marine wetland resources, nor does it include in-water work that would adversely effect marine biota or their habitats.

b. Proposed Mitigation

Mitigation for impacts in the Undisturbed Tidal Buffer Zone

Mitigation for 890 sf of permanent impact to Undisturbed TBZ is provided by re-establishing approximately 9,730 sf of native grass and shrub habitat (Exhibit 5, Sheet C-001 and details) in the restored snow dump area. All other permanent impacts are associated with modifying the road and improving the parking area within Previously Developed TBZ. Additional water quality benefits will be gained by converting approximately 20,020 sf of impervious surface in the laydown/ parking area to grassed permeable substrates that will both infiltrate runoff, and remove nutrients and sediment from sheetflow prior to entering the Piscataqua River. On the north side of the road, the existing path and vegetation will remain intact, and additional stone and vegetation will be added to buffer scour and wave action to the road.

The re-establishment of native species around the perimeter of the parking area will enhance water quality treatment of any sheetflow that does not infiltrate from the parking area, thereby buffering the salt marsh and Piscataqua River from any surplus nutrients and sediments. Once final grading is completed, the enhancement area will receive a minimum of 4 inches of loam, and planted with a mix of the following shrubs: bayberry (*Myrica pensylvanica*), beach plum (*Prunus maritimus*), and black chokeberry (*Aronia melanocarpa*) (See landscaping details in Exhibit 5, Sheets L-001 and L-002). All of these species are native to the area and tolerant of periodic inundation by salt water, therefore should

be appropriate for this site. Once planted, the area will be seeded using a native upland conservation mix. The City agrees to monitor the site for 3 years to evaluate the stability of the area and to ensure at least 80% of the plantings or their ecological equivilents have successfully established.

Mitigation for Impacts to Marsh Elder

During installation of the temporary sewer force mains in October, 2020 under Emergency Authorization 2020-02873, two areas of the adjacent marsh elder stands (*Iva frutescens;* NH State Threatened) were inadvertently impacted, with some of the plants crushed and minor soil disturbance. After consultation with NHDES and NH Natural Heritage Bureau (NHNHB), several steps were prescribed by NHDES to mitigate the impacts. These included hand-raking and mulching the impact areas, erecting construction fencing between the marsh elder stands and the work area as future protection, monitoring the areas for one growing season to determine restoration success, and providing NHDES and NHNHB with documentation of the restoration work and the results of the monitoring effort. The City of Portsmouth completed the restoration work on November 14, 2020 and a letter documenting the work was sent to David Price, NHDES, on December 11, 2020. The City will be monitoring the recovery of the marsh elder during the 2021 growing season and will provide documentation of the monitoring results by October 1, 2021. The letter and accompanying photographs are attached.

Section 8. How Project meets Relevant Standard Conditions and Approval Criteria

Env-WT 307.03 Protection of Water Quality

a) Water quality will be protected during construction using Best Management Practices (BMP) for controlling runoff and stabilizing sediments.
b) Soil stockpiles will be managed to minimize risk of erosion and sedimentation to tidal waters or wetlands. See Exhibit 5, Sheet 99 C-501-P for erosion and sediment controls.
c) All water quality measures are designed to provide maximum protection during storm events during construction, and will be removed from the site when construction is complete, and vegetated areas are stable.
d) During construction, erosion and sedimentation control structures will be inspected daily, and any sediments accumulated behind erosion control structures will be removed and disposed at a stable and suitable site.
e) Substrates exposed during construction will be permanently stabilized within 3 days of completion of final grades.
f) No work requiring a coffer dam or turbidity barrier is proposed in or near open water.
g) The contractor will be required to inspect equipment daily for leaking fuel, oil and hydraulic fluid prior to initiating work. All leaks shall be contained and repaired to prevent fluids from reaching groundwater, surface water or wetlands. Kits for oil and diesel spills will be readily accessible at each work site, and equipment operators will be trained in their use.
h) Equipment shall be staged and refueled in accordance to Env-Wt 307.15.

Env-Wt 307.05 Protection Against Invasive Species

a) through d) do not apply.
e) To prevent the use of soil or seed stock containing nuisance or invasive species, the contractor shall follow the Invasive Plant BMPs.

Env-Wt 307.06 Protection of Rare, Threatened or Endangered Species or Critical Habitat

a) through c) No direct impacts to the marsh elder bordering the southern edge of the island shall occur. All work activities will be directed to avoid and minimize adverse impacts to soils upgradient of the plants. The construction fencing erected in 2020 shall be maintained for the duration of the project to protect the marsh elder and saltmarsh.

Env-Wt 307.07 Consistency with Shoreland Water Quality Protection Act

All project activities shall be conducted in compliance with the applicable requirements of RSA 483-B and Env-Wq 1400 during and after construction.

Env-Wt 307.11 Filling Activities

a) Fill shall be clean sand, gravel, rock, or other material that:
   (1) Meets the project's specifications for its use; and
   (2) Does not contain any material that could contaminate surface or groundwater or otherwise adversely affect the ecosystem in which it is used;.
b) Limits of fill shall be clearly identified prior to commencement of work and controlled in accordance with Env-Wt 307.03 to ensure that fill does not spill over or erode into any area where filling is not authorized
c) Slopes shall be immediately stabilized by a method specified in Env-Wq 1506 or Env-Wq 1508, as applicable, to prevent erosion into adjacent wetlands or surface waters
d) through k) do not apply
l) This permit is requesting approximately 80 cy of fill to be placed in the TBZ, a PRA, to raise the access road to the WWTF as a critical infrastructure project.

Env-Wt 307.12 Restoring Temporary Impacts; Site Stabilization. In addition to all other applicable conditions in this part, the following conditions shall apply to restoring all temporary impacts:

a) Within 3 days of final grading or temporary suspension of work in an area that is in or adjacent to surface waters, all exposed soil areas shall be stabilized by:
   (1) Seeding and mulching, if during the growing season; or
   (2) mulching with tackifiers on slopes less than 3:1 or netting and pinning on slopes steeper than 3:1 if not within the growing season
b) Any seed mix used shall not contain plant species that are exotic aquatic weeds;
c) Mulch used within an area being restored shall be natural straw or equivalent non-toxic, non-seedbearing organic material;
d) If any temporary impact area that is stabilized with seeding or plantings does not have at least 75% successful establishment of wetlands vegetation after 2 growing seasons, the area shall be replanted or reseeded, as applicable;
e) Does not apply.
f) If a temporary impact area is restored by seeding or plantings, then:

(1) The work shall not be deemed successful if the area is invaded by nuisance species such as common reed or purple loosestrife during the first full growing season following the completion of construction; and
(2) The person responsible for the work shall submit a remediation plan to the department that proposes measures to be taken to eradicate nuisance species during this same period;

g) Unless otherwise authorized, any trees cut in an area of authorized temporary impacts shall be cut at ground level with the shrub and tree roots left intact, to prevent disruption to the Tidal Buffer Zone soil structure and to allow stump sprouts to revegetate the work area.

Env-Wt 313.01 Criteria for Approving Standard Permit Applications

a) The department shall not approve an application for a standard permit and issue a permit unless:
(1a) The project has provided a functional assessment and demonstrated there will be no adverse impacts to surrounding wetlands and waters, and the Tidal Buffer Zone.
(1b) Avoidance and minimization criteria have been met to the degree feasible;
(1c) A proposal for appropriate mitigation for impacts in the Tidal Buffer Zone demonstrates that there will be a net benefit for water quality and natural habitats.
(2) Recommended applicable conditions are provided above.
(3) All resource-specific criteria in Env-Wt 600 have been met.
(4) All project-specific criteria in Env-Wt 600 have been met.
(5) The work does not infringe on abutting properties, and provides public parking and recreational trail access.

b) Does not apply.

c) The requirements to avoid and minimize have been met:
(1) There are no practicable alternative that would have a less adverse impact on the area or the environment, and still meet the critical infrastructure needs and public benefits proposed.
(2) The project does not impact State wetlands or waters
(3) The project will enhance water quality and result in a net gain in permeable surfaces and stormwater treatment within the Tidal Buffer Zone.

EXHIBIT 8

PERMITTEE RESPONSIBLE MITIGATION PROJECT WORKSHEET

PERMITTEE RESPONSIBLE MITIGATION PROJECT WORKSHEET

Water Division/Land Resources Management

Wetlands Bureau

Check the Status of your Application

RSA/Rule: 482-A: / Env-Wt 800

SECTION 1. PROPOSED PERMITTEE RESPONSIBLE MITIGATION PROJECT TYPE		
UPLAND BUFFER PRESERVATION: ☒ AQUATIC RESOURCE RESTORATION: ☒ MITIGATION PAYMENT: ☐		
SECTION 2. PROPOSED MITIGATION PROJECT LOCATION INFORMATION (if applicable)		
STREET/ROAD: Peirce Island Road	TOWN/CITY: Portsmouth	TAX MAP/LOT #: 208/1
SECTION 3. APPLICANT INFORMATION		
APPLICANT NAME: City of Portsmouth		
APPLICANT MAILING ADDRESS: 680 Peverly Hill Road		
CONTACT INDIVIDUAL: Terry Desmarais, PE		
DAYTIME TELEPHONE: (603) 766-1421	EMAIL (IF ANY): tldesmarais@cityofportsmouth.com	
SECTION 4. RESOURCE WORKSHEET SUMMARY		
AQUATIC RESOURCES INVOLVED IN PROJECT: See Table Below. **N/A. See Text Below**.		
TOTAL PRESERVATION PROPOSED: Upland: Acres Wetland: Acres		
TOTAL LENGTH OF STREAM ON PROPERTY: Linear Feet % having 100-ft wooded zone: in direction % upland: in direction		
# CONFIRMED VERNAL POOLS:	# POTENTIAL VERNAL POOLS:	
AREA OF WETLAND RESTORATION PROPOSED: acres	AREA OF WETLAND CREATION PROPOSED: acres	
AREA OF WETLAND ENHANCEMENT PROPOSED: acres	AREA OF UPLAND ENHANCEMENT PROPOSED: 0.20 acres	
SECTION 5. BRIEF NARRATIVE DESCRIBING PROPOSED PERMITTEE RESPONSIBLE MITIGATION		
See Text Below, and Exhibit 7 - Project Narrative		
SECTION 6. SIGNATURE AND CERTIFICATION		
- I hereby certify that: ▪ The information contained in or otherwise submitted with this application is true, complete, and not misleading to the best of my knowledge and belief; ▪ **I understand that:** - Submitting false, incomplete, or misleading information is grounds for denying the application or revoking any award of ARM Funds that is made based on such information; and - I am subject to the penalties for making unsworn false statements specified RSA 641:3 or any successor New Hampshire statute.		
SIGNATURE: _____	**DATE:** _____ / _____/ _____	

Lori.Sommer@des.nh.gov or (603) 271-4059
NHDES Wetlands Bureau, Concord, NH 03303-0095
www.des.nh.gov

Summary of Aquatic Resource(s) Involved in Project

The following information is required to be provided about the aquatic resources found on the proposed impact site and the mitigation site. New Hampshire RSA 482-A:3 requires a wetland permit for any proposed project that involves dredging and filling wetlands or impacts to the bed or bank surface waters such as rivers and streams. Before NHDES will issue a permit, applicants must demonstrate that their project proposal will avoid adverse impacts to aquatic resources and will minimize and mitigate those impacts that are unavoidable. When impacts to aquatic resources are unavoidable, applicants must identify the wetland and stream(s) resource types that will be lost during the development of the project. Identifying the functions and values of the aquatic resource that will be lost at the project site better ensures that they can be recreated and transferred to the proposed mitigation site. Please use the table formats provided below to document all aquatic resources types on the impact site and the mitigation site. A separate table should be prepared for each site. *Additional rows may be required for projects proposing impacts to multiple resource types.*

Wetland Resources: Wetlands shall be classified by US Fish and Wildlife Service Manual WS/OBS-79/31 Classification of Wetlands and Deepwater Habitats of the United States, Cowardin et al, 1979, reprinted 1992.

Stream Resources: For permittee responsible mitigation projects to restore or improve stream systems, the streams on the project site shall be reviewed and the following information collected to the best extent possible:

Stream order according to New Hampshire Hydrography Dataset (NHHD)	Geomorphology including degradation
Rosgen stream type	Position within the surrounding landscape
Impacts to upstream and downstream flooding	Connectivity improvement for aquatic organism passage
Stream bed materials	Fisheries presence
Sediment Transport capacity	Characterization of the adjacent buffers in terms of vegetative coverage
Channel form	Floodplain connectivity

These general principals are described within the New Hampshire Stream Crossing Guidelines, University of New Hampshire, May 2009.

Wetland Functions & Values: A wetland evaluation is the process of determining the values of a wetland based on an assessment of the functions it performs. The evaluation of wetland functions and values should be determined through use of the *Method for Inventorying and Evaluating Freshwater Wetlands in New Hampshire*, 2015 edition (2015 NH Method) –*OR*– U.S. Army Corps of Engineers (USACE) New England District *Highway Methodology Workbook Supplement*, 1999 edition (1999 US ACE Highway Workbook Supplement). The evaluation should focus on the following:

Ecological Integrity (EI), Wetland-Dependent Wildlife Habitat (WH), Fish and Aquatic Habitat (FH), Scenic Quality (SQ), Educational Potential (EP), Wetland-based Recreation (WR), Flood Storage (FS), Groundwater (GW), Sediment Trapping (ST), Nutrient Trapping/Retention/Transformation (NT), Shoreline Anchoring (SA), Noteworthiness (NW).

Secondary Impacts: The USACE federal mitigation guidance should be consulted if the project involves conversion of forested wetlands to scrub-shrub or emergent wetlands, cutting of riparian buffer and impacts within the buffer to vernal pools.

WETLAND/STREAM RESOURCE SUMMARY

Wetland ID or Stream Number	**Cowardin Wetland Class** (list all that apply) **or Stream Type**	**Principal Functions & Values**	**Project Impacts**						**Vernal Pool Present? ID or Number**	**Other Comments**
			Permanent Wetland (sq.ft.)	**Permanent Stream Bank** (lin.ft.)			**Temporary** (sq.ft.)	**Secondary** (sq.ft.)		
				Bank Left	Bank Right	Channel				

MITIGATION RESOURCE SUMMARY

Wetland ID or Stream Number	**Cowardin Wetland Class** (list all that apply) **or Stream Type**	**Principal Functions & Values**	**Wetland/Stream Resources**			**Vernal Pool Present? ID or Number**	**Other Comments**
			Area of Wetland (sq.ft. or acres)	**Streams** (lin.ft.)			
				Length on Property	% having 100 foot wooded zone		

Peirce Island Wastewater Treatment Facility

Mitigation for impacts in the Undisturbed Tidal Buffer Zone

Mitigation for 890 sf of permanent impact to Undisturbed TBZ is provided by re-establishing 9,730 sf of native grass and shrub habitat (Exhibit 5, Sheet C-001 and details). All other permanent impacts are associated with modifying the road and improving the parking area within Previously Developed TBZ. Additional water quality benefits will be gained by converting approximately 20,020 sf of impervious surface in the laydown/ parking area to grassed permeable substrates that will both infiltrate runoff, and remove nutrients and sediment from sheetflow prior to entering the Piscataqua River. On the north side of the road, the existing path and vegetation will remain intact, and additional stone and vegetation will be added to buffer the road from scour and wave action.

The re-establishment of native species around the perimeter of the parking area will enhance water quality treatment of sheetflow from the parking area, thereby buffering the salt marsh and Piscataqua River from any surplus nutrients and sediments. Once final grading is completed, the enhancement area will receive a minimum of 6 inches of loam, and planted with a mix of the following shrubs: bayberry (*Myrica pennsylvanica*), beach plum (*Prunus maritimus*), and black chokeberry (*Aronia melanocarpa*) (See landscaping details in Exhibit 5, Sheets L-001 and L-002). All of these species are native to the area and tolerant of periodic inundation by salt water, therefore should be appropriate for this site. Once planted, the area will be seeded using a native upland conservation mix. The City agrees to monitor the site for 3 years to evaluate the stability of the area and to ensure at least 80% of the plantings or their ecological equivilents have successfully established.

Mitigation for Impacts to Marsh Elder

During installation of the temporary sewer force mains in October, 2020 under Emergency Authorization 2020-02873, two areas of the adjacent marsh elder stands (*Iva frutescens;* NH State Threatened) were inadvertently impacted, with some of the plants crushed and minor soil disturbance. After consultation with NHDES and NH Natural Heritage Bureau (NHNHB), several steps were prescribed by NHDES to mitigate the impacts. These included hand-raking and mulching the impact areas, erecting construction fencing between the marsh elder stands and the work area as future protection, monitoring the areas for one growing season to determine restoration success, and providing NHDES and NHNHB with documentation of the restoration work and the results of the monitoring effort. The City of Portsmouth completed the restoration work on November 14, 2020 and a letter documenting the work was sent to David Price, NHDES, on December 11, 2020. The City will be monitoring the recovery of the marsh elder during the 2021 growing season and will provide documentation of the monitoring results by October 1, 2021. The letter and accompanying photographs are attached.

PUBLIC WORKS DEPARTMENT

CITY OF PORTSMOUTH
680 Peverly Hill Road
Portsmouth N.H. 03801
(603) 427-1530 FAX (603) 427-1539

December 11, 2020

Via Email
David Price
Wetlands Bureau, Land Resources Manager
Water Division, NH Department of Environmental Services
222 International Drive – Suite 175
Portsmouth, NH 03801

Re: Marsh Elder Restoration
Peirce Island, Portsmouth, New Hampshire

Dear Mr. Price:

On October 23, 2020 there was damage to some Marsh Elder plants on Peirce Island during installation of a temporary sewer force main. The temporary force main was installed on the ground as an emergency replacement to a leaking 24-inch sewer force main between the Mechanic Street Wastewater Pump Station and the Peirce Island Wastewater Treatment Facility. On November 2, 2020 the NH Wetlands Bureau outlined steps the City of Portsmouth needed to take to restore the Marsh Elder population on Peirce Island. The steps are outlines below:

1. Hand rake the existing ruts and place either weed-free straw or saltmarsh hay over exposed soil areas.
2. Appropriately fence (construction fence) off the existing populations to minimize any further impacts during construction.
3. Monitor the area to determine restoration success for a minimum of one (1) growing season.
4. Please provide DES and NHB with photographic documentation within 30 days of completion of Items 1 and 2 above.
5. By October 1, 2021, please provide DES and NHB with photographic documentation of the area to determine restoration success and the possible need for additional monitoring.

This letter is a formal notification of the completion of Items 1 and 2, as well as providing the photographic documentation stated in Item 4. The ruts were raked out and weed-free straw was installed over the exposed soil on November 13, 2020. The installation of construction fence to protect the Marsh Elder was completed on December 7, 2020. Please see Attachment A: Locations of Damaged Marsh Elder Plants, Attachment B: Weed-Free Straw Installation and Attachment C: Construction Fencing for photographic documentation.

If you need any more information or have any questions please contact me by phone at 603-766-1421 or by email at tldesmarais@cityofportsmouth.com.

Sincerely,

Terry Desmarais
City Engineer
Enclosures

ec: Amy Lamb, Natural Heritage Bureau
Peter Britz, Environmental Planner
Zachary Cronin, Assistant City Engineer
James Tow, General Foreman Utilities

Attachment A: Locations of Damaged Marsh Elder Plants

Attachment B: Weed-Free Straw Installation

Photo 1: Straw Restoration at Area A

Photo 2: Straw Restoration at Area A

Photo 3: Staw Restoration in Area B

Photo 4: Straw Restoration in Area B

Attachment C: Construction Fencing

Photo 1: Construction Fencing Area A

Photo 2: Construction Fencing Area B

Photo 3: Construction Fencing Along the Length of Temporary Sewer Force Main

EXHIBIT 9

ADDITIONAL RESOURCE INFORMATION

(TREE INVENTORY REPORT)

Shoreland Tree Inventory Report
Peirce Island Wastewater Treatment Facility
City of Portsmouth, NH

Prepared For:
Altus Engineering
133 Court Street
Portsmouth, NH 03801

Prepared On:
April 12, 2021

Prepared By:
Normandeau Associates, Inc.
25 Nashua Road
Bedford, NH 03110

www.normandeau.com

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List of Tables

Introduction

Normandeau Associates, Inc. (Normandeau), completed two tree inventories in the vicinity of the Pierce Island Wastewater Treatment Facility (WWTF) on Peirce Island in Portsmouth, New Hampshire. The first was performed to document existing vegetative conditions within the protected shoreland area by the proposed recreational trail along the eastern edge of the island, following a currently existing unofficial path. A second tree inventory assessment was performed in support of the replacement of the sewer force mains and water line on the southwestern edge of Peirce Island. The reference line for each inventory, in both cases the HOTL, was established on July 3, 2013 and surveyed by Doucet Survey, Inc. This line was verified during both the April 23, 2020 and January 14, 2021 field visits. This report outlines the results of these tree inventories, methods used, and the basic regulatory requirements associated with the removal of vegetation from the site.

Vegetation is an important component in preserving and protecting water quality. Well vegetated shorelands that are comprised of native trees, shrubs, and ground cover provide significant benefits in terms of stormwater runoff. The Shoreland Water Quality Protection Act (SWQPA), RSA 483-B, serves to protect the water quality of New Hampshire's surface waters by managing the disturbance of shoreland areas. The protected shoreland area includes lands located within 250 feet from the reference line of public waters. The reference line for coastal waters is the highest observable tide line (HOTL), which means a line defining the furthest landward limit of tidal flow. The HOTL was previously delineated by Normandeau.

The SWQPA attempts to maintain a shoreland buffer of natural vegetation to reduce the transportation of excess nutrients, sediments, and other pollutants into waterbodies. The SWQPA protects a 150-foot wide vegetated buffer adjacent to public waters such as lakes, ponds, rivers, and tidal waters. The vegetated buffer area is divided into two zones: the waterfront buffer and the natural woodland buffer. The waterfront buffer encompasses the first 50 feet beginning at the reference line, and the natural woodland buffer includes the area between 50 feet and 150 feet from the reference line.

Trees and saplings can be removed from the protected shoreland area, though different vegetation removal limitations apply within the two zones described above. Removal of trees and saplings within the waterfront buffer must be performed in accordance with a grid and point system. Removal of trees and saplings within the natural woodland buffer must comply with the unaltered state requirement. There are no limitations on tree removal in areas extending beyond 150 feet from the reference line.

Most of the work associated with the recreational trail and pipeline projects will occur in the 100-foot tidal buffer zone (TBZ), most of which was previously developed. However, approximately one-third of the pipeline replacement work falls outside of the TBZ but lies within the natural woodland buffer portion of the protected shoreland zone.

Methods

Normandeau wetland scientists performed the tree inventories on April 23, 2020 and January 14, 2021. All trees and saplings were included in the inventories, as well as large shrub species as measured at a height of 4.5 feet above the ground (on the uphill side). Vegetation was located using

a differential GPS unit capable of sub-meter accuracy. Each specimen was identified to the species level, if possible, and a diameter at breast height (DBH) measurement recorded. When a cluster of trees or saplings were growing from one individual plant, a diameter was recorded for each stem within the grouping. In addition to performing the inventory of individual trees and saplings, a general description of understory vegetation within the survey areas was also documented.
After conducting the field inventories, trees and saplings within the waterfront buffer (first 50 feet beginning at the reference line) were assigned a score based on DBH. Tree and sapling scores were calculated using the following guidelines:

- Diameter of one to three inches = 1 point
- Diameter greater than 3 inches and including 6 inches = 5 points
- Diameter greater than 6 inches and including 12 inches = 10 points
- Diameter greater than 12 inches = 15 points

For specimens with multiple stems greater than 1 inch, a diameter was recorded for each individual stem as described above. To calculate the score for plants with multiple stems, the score for each stem was determined, and then a sum of all scores for the plant resulted in a total score for that specimen. For example, a plant with three stems measuring diameters of 3 inches (1 point), 5 inches (5 points), and 6 inches (5 points) was assigned a total score of 11 points.

To complete each tree inventory assessment, the waterfront buffer in each surveyed area was divided into 25-foot by 50-foot grid segments. The purpose of the grid segments was to determine the tree and sapling score within each grid. Under the SWQPA, a minimum tree and sapling score of 25 points must be maintained within each grid segment. A general characterization of the percent shrub cover within the waterfront buffer was also recorded during each survey. This included an account of dominant species as well as the presence of any invasive species that were not recorded during the tree inventories.

Results

The results of the tree inventories are reported separately as the Trail inventory conducted on April 23, 2020 and the Pipeline tree inventory conducted on January 14, 2021. A total of 25 and 81 grid segments were located in the Trail and Pipeline Survey areas, respectively.

Trail Survey

The overall vegetative site conditions in the Trail Survey area at the eastern end of Peirce Island consisted of a relatively densely spaced canopy of predominantly deciduous trees with significant occurrence of Asian bittersweet (*Celastrus orbiculatus*) in various portions of the site. The tree species observed within the 50-foot waterfront buffer are displayed in Table 1 below. The most dominant species within the waterfront buffer were staghorn sumac (*Rhus hirta*) and black cherry (*Prunus serotina*). A total of 60 stems of staghorn sumac were measured within the waterfront buffer with an average

diameter of 2.5 inches. A total of 54 stems of black cherry were documented within the waterfront buffer with an average diameter of 3.8 inches.

Table 1. Trees and sapling inventoried within the Trail Survey waterfront buffer.

Scientific Name	Common Name
Amelanchier sp.	Serviceberry
Betula papyrifera	Paper birch
Betula populifolia	Gray birch
Juniperus virginiana	Eastern red cedar
Malus sp.	Apple
Pinus strobus	Eastern white pine
Populus sp.	Aspen
Prunus serotina	Black cherry
Quercus rubra	Northern red oak
Rhus hirta	Staghorn sumac
Sorbus americana	American mountain ash

As detailed in the methods section of this report, the waterfront buffer was divided into 25-foot by 50-foot grid segments, with a total of 25 grids located in the Trail Survey area. The scores within these grid segments ranged from a low of 0 points in eight grids to a high of 81 points in grids 8 and 9 (Table 2). All grid segments and the location of each tree and shrub inventoried are depicted in the Trail Survey Tree Inventory Map provided in Appendix A. A complete table of the identified trees and shrubs for the Trail Survey is provided in Appendix B, Table 6.

Table 2. Protected Waterfront Buffer Grid Segment scores in the Trail Survey area. Bolded values do not meet the minimum 25 point score specified in RSA 483. Shaded segments are those whose score will be lowered below the minimum 25 point score due to tree removal necessary for the work.

Segment	Score	Shrub Cover	Score Post-Construction
1	52	90	52
2	62	90	56
3	47	90	35
4	32	90	29
5	29	90	**2**
6	35	90	35
7	33	90	32
8	81	90	70
9	81	50	79
10	**6**	40	**6**
11	**1**	10	**1**
12	**0**	0	**0**
13	**0**	10	**0**
14	**11**	20	**11**
15	**8**	20	**8**
16	**3**	15	**3**
17	**12**	15	**12**
18	**0**	15	**0**
19	**0**	10	**0**
20	**6**	10	**6**
21	**10**	5	**10**
22	**0**	0	**0**
23	**0**	0	**0**
24	**0**	0	**0**
25	**0**	0	**0**

Understory woody vegetation was estimated through the Trail Survey area. The northern end of survey area exhibits an understory consisting of sprouting deciduous tree saplings (many small staghorn sumac and black cherry), dense patches of the invasive Asian bittersweet. The understory

in this portion of the project area is approximately 90% cover. Vegetative cover within the eastern project area decreases southward and is 0% in certain sections (Table 2).

Although it was too early in the season to fully characterize the herbaceous vegetation, outside of the WWTF, it was generally undisturbed and unmaintained, and inside the WWTF footprint it was generally absent, replaced by constructed materials and fencing.

Pipeline Survey

The overall vegetative site conditions in the Pipeline Survey area consisted of small stands with relatively densely spaced canopy of predominately deciduous trees interrupted by stretches of open grassy areaThe tree species observed within the 50-foot waterfront buffer are displayed in Table 3 below. The most dominant species within the waterfront buffer were staghorn sumac (*Rhus hirta*) and crabapple (*Malus* sp.). A total of 105 stems of staghorn sumac were measured within the waterfront buffer with an average diameter of 1.3 inches. A total of 66 stems of crabapple were documented within the waterfront buffer with an average diameter of 2.6 inches.

Table 3. Trees and sapling inventoried within the Pipeline Survey waterfront buffer.

Scientific Name	Common Name
Abies balsamea	Balsam fir
Acer platanoides	Norway maple
Acer rubrum	Red maple
Amelanchier sp.	Serviceberry
Cornus florida	Dogwood
Juniperus virginiana	Eastern red cedar
Malus sp.	Apple
Myrica pensylvanica	Bayberry
Populus tremoloides	Quaking aspen
Prunus serotina	Black cherry
Quercus palustris	Pin oak
Quercus rubra	Northern red oak
Rhus hirta	Staghorn sumac
Sorbus americana	American mountain ash
N/A	Unknown

The scores within the 81 grid segments in the Pipeline Survey area ranged from a low of 0 points in 36 grids to a high of 98 points in grid 67 (Table 4). All grid segments and the location of each tree and shrub inventoried are depicted in the Pipeline Survey Tree Inventory Map provided in Appendix A. A complete table of the identified trees and shrubs for the Pipeline Survey is provided in Appendix B, Table 6.

Understory vegetation was estimated through the Pipeline Survey area. The western end exhibits an understory consisting of open grass and sparsely populated deciduous tree saplings (primarily small staghorn sumac). From Grids 15 to 23 there is little to no vegetative cover due to the boat ramp, parking area and paved road. In the central and eastern portions of the Pipeline Survey area (Grids 24 to 81) vegetative cover returns, with stretches of shrub cover ranging from 5 to 90%, again primarily small staghorn sumac, interspersed with stretches of open grassy area (Table 4).

Table 4. Protected Waterfront Buffer Grid Segment scores in the Pipeline Survey area. Bolded values do not meet the minimum 25 point score specified in RSA 483. Shaded segments are those whose score will be lowered below the minimum 25 point score due to tree removal necessary for the work.

Segment	Score	Shrub Cover	Score Post-Construction
1	**6**	0	**6**
2	59	0	59
3	30	0	30
4	**0**	5	**0**
5	28	5	28
6	**13**	5	**13**
7	**11**	5	**11**
8	75	5	75
9	48	5	48
10	**21**	5	**21**
11	50	5	50
12	**0**	0	**0**
13	**0**	0	**0**
14	30	0	30
15	**0**	0	**0**
16	**0**	0	**0**
17	**0**	0	**0**
18	**0**	0	**0**
19	**0**	0	**0**
20	**0**	0	**0**
21	**0**	0	**0**
22	**0**	0	**0**
23	**0**	0	**0**
24	35	0	35
25	**0**	5	**0**
26	**1**	5	**1**
27	31	5	31
28	**0**	0	**0**
29	32	25	32
30	51	25	51
31	27	25	27
32	**16**	25	**16**
33	36	25	36
34	36	25	36
35	**19**	25	**19**
36	**1**	25	**1**
37	**8**	75	**8**
38	**16**	75	**16**
39	**0**	75	**0**
40	**21**	75	**21**
41	35	75	35
42	25	75	25
43	**15**	75	**15**
44	25	75	25
45	**10**	75	**10**
46	**16**	75	**16**
47	**17**	75	**17**
48	**22**	50	**22**
49	**21**	50	**21**
50	**0**	0	**0**
51	**0**	0	**0**
52	**0**	0	**0**
53	**0**	0	**0**
54	33	25	33
55	**0**	0	**0**
56	**0**	0	**0**
57	**23**	30	**23**
58	56	30	56
59	25	30	25
60	**0**	0	**0**
61	**0**	0	**0**
62	**10**	0	**0**
63	**0**	0	**0**
64	**0**	0	**0**
65	**0**	0	**0**
66	**8**	35	**8**
67	98	35	98
68	**6**	35	**6**
69	29	35	29
70	**11**	35	**11**
71	**6**	35	**6**
72	**0**	0	**0**
73	**0**	0	**0**
74	**0**	0	**0**
75	**0**	0	**0**
76	**0**	0	**0**
77	**0**	0	**0**
78	**0**	0	**0**
79	**2**	0	**2**
80	**0**	0	**0**
81	27	90	27

The portion of the work area for the pipeline replacement that falls outside of the TBZ but within the natural woodland buffer consists of Peirce Island Road and a dirt and gravel parking area with grass medians associated with a public boat ramp. This area was cleared of trees and developed prior to July 1, 2008 and has been maintained as such since its development.

Discussion

As much of the total project area lies within the 100-ft tidal buffer zone (TBZ) (Figure 1 and 2), wetland regulations take precedence over much of the project area.

For the recreational trail, the majority of the work is proposed adjacent to the current footprint of the WWTF plant (Segments 10-25). No additional clearing will be required in those segments. For Segments 2-9, the trail will follow an existing informal path which will be graded and widened. In those segments, the resulting segment scores mostly do not drop below 25, with the exception of Segment 5. For this segment, impacts are mitigated by restoring pervious conditions and native shrub cover to over 9,000 SF in the parking area.

For the pipeline project, the majority of the work falls within the roadbed of Peirce Island Road, and will not require clearing natural vegetation. Segment 35 contains a tree located within the planned area of disturbance, specifically a laydown/staging area. Care will be taken to not remove or damage this tree. In Segment 62 a tree is located directly adjacent the area of disturbance for the pipeline and likely will need to be removed. This tree will be replaced at the end of the project. A few other individual trees may need to be cut outside of the waterfront buffer, but the City is committed to minimizing the need for impacting trees and replacing those that are unavoidably impacted. See construction plans for tree protection and planting details.

Appendix A – Tree Inventory Map

Project No: 23264.002

Drawn By: eolliver

Date : 4/9/2021

Tree DBH

- 1 to 3 in.
- >3 to 6 in.
- >6 to 12 in.
- >12 in.
- Limit of Disturbance

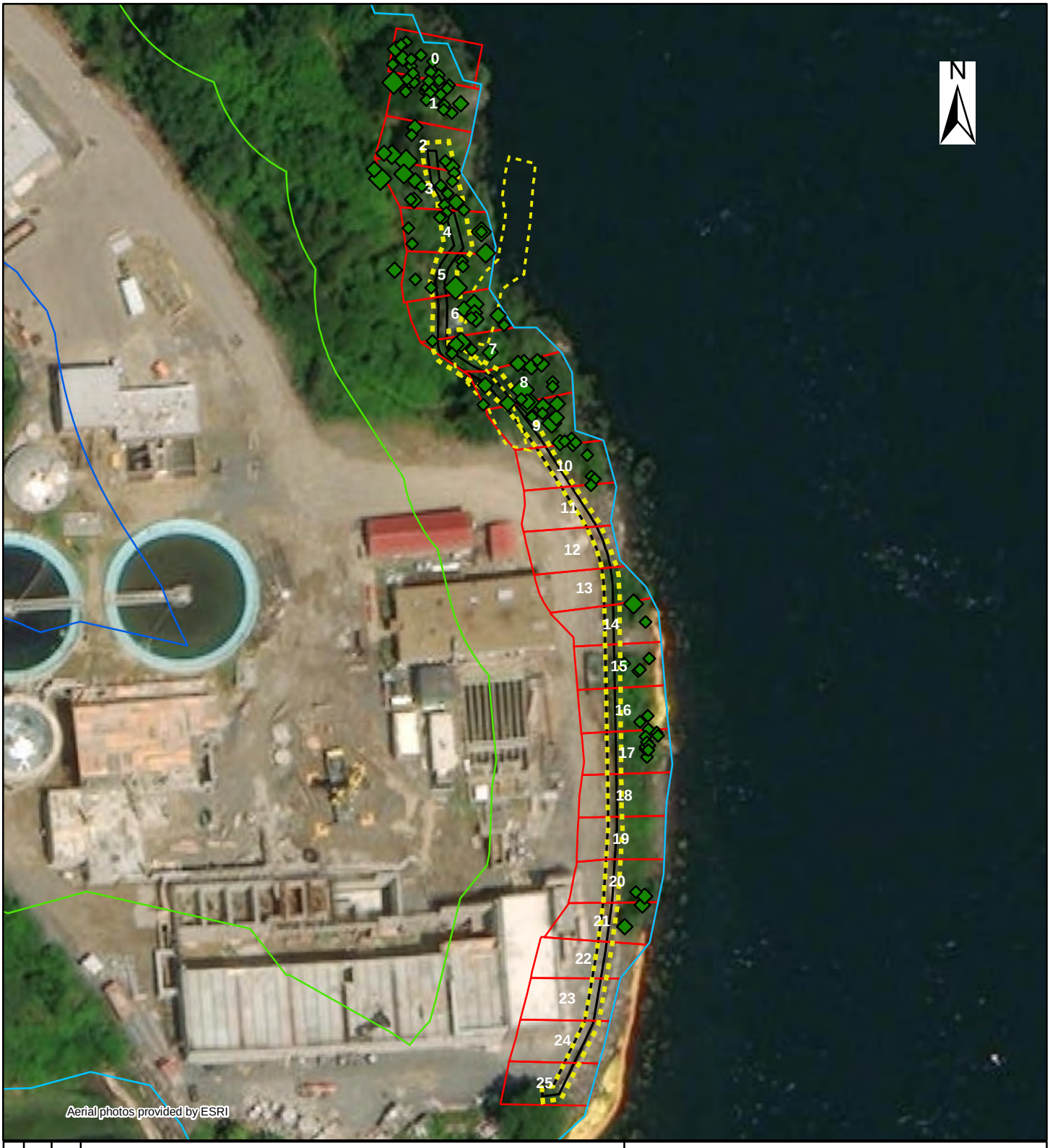
- 100ft Tidal Buffer
- 250ft Shoreland Buffer
- Highest Observable Tide Line
- Shoreland 25'x50' Grid

0 50 100 Feet

Pipeline Tree Inventory
Portsmouth Wastewater Treatment Facility
Peirce Island
Portsmouth, NH

NORMANDEAU ASSOCIATES
Environmental Consultants
25 Nashua Road Bedford, NH 03110
(603) 472-5191 www.normandeau.com

Path: J:\Projects\Portsmouth Wastewater Treatment Facility_Pierce Island\MXD\Pipeline_TreeInventory_040921.mxd



Project No: 23264.002

Drawn By: eoliver

Date : 4/9/2021

Tree DBH

- 1 to 3 in.
- >3 to 6 in.
- >6 to 12 in.
- >12 in.
- Limit of Disturbance
- 100ft Tidal Buffer
- 250ft Shoreland Buffer
- Highest Observable Tide Line
- Proposed Trail
- Shoreland 25'x50' Grid

0 50 100 Feet

Trail Tree Inventory
Portsmouth Wastewater Treatment Facility
Peirce Island
Portsmouth, NH

NORMANDEAU ASSOCIATES
Environmental Consultants
25 Nashua Road Bedford, NH 03110
(603) 472-5191 www.normandeau.com

Path: J:\Projects\Portsmouth Wastewater Treatment Facility_Pierce Island\MXD\Trail_TreeInventory_040921.mxd

Appendix B – Tree Inventory Data

Table 5. Trees and shrubs identified in Trail Survey area. Trees to be cut are shaded.

Tree ID	Grid	Species	Stem Diameter (in.)					Tree and Sapling Score
			1	2	3	4	5	
3	1	*Rhus hirta*	1	-	-	-	-	1
4	1	*Rhus hirta*	1	-	-	-	-	1
5	1	*Rhus hirta*	1	-	-	-	-	1
6	1	*Prunus serotina*	2	-	-	-	-	1
7	1	*Prunus serotina*	3	-	-	-	-	1
8	1	*Prunus serotina*	1	-	-	-	-	1
9	1	*Rhus hirta*	3	-	-	-	-	1
10	1	*Prunus serotina*	1	1	-	-	-	2
11	1	*Prunus serotina*	1	1	1	1	1	5
12	1	*Rhus hirta*	1	-	-	-	-	1
13	1	*Prunus serotina*	1	-	-	-	-	1
16	1	*Prunus serotina*	2	-	-	-	-	1
17	1	*Rhus hirta*	3	-	-	-	-	1
18	1	*Rhus hirta*	1	-	-	-	-	1
19	1	*Rhus hirta*	1	-	-	-	-	1
20	1	*Rhus hirta*	1	1	-	-	-	2
21	1	*Prunus serotina*	3	-	-	-	-	1
22	1	*Prunus serotina*	4	3	2	1	-	8
58	1	*Quercus rubra*	20	-	-	-	-	15
59	1	*Prunus serotina*	2	1	-	-	-	2
72	1	*Rhus hirta*	1	1	-	-	-	2
73	1	*unknown shrub*	1	1	-	-	-	2
1	2	*Prunus serotina*	5	-	-	-	-	5
2	2	*Rhus hirta*	1	-	-	-	-	1
23	2	*Rhus hirta*	2	-	-	-	-	1
24	2	*Prunus serotina*	4	-	-	-	-	5
74	2	*Malus* sp.	4	-	-	-	-	5
77	2	*Betula populifolia*	10	-	-	-	-	10
78	2	*Betula populifolia*	16	12	10	-	-	35
25	3	Unidentified	3	-	-	-	-	1

Tree ID	Grid	Species	Stem Diameter (in.)					Tree and Sapling Score
			1	2	3	4	5	
26	3	*Malus* sp.	1	-	-	-	-	1
27	3	*Rhus hirta*	1	-	-	-	-	1
28	3	*Rhus hirta*	1	1	-	-	-	2
29	3	*Sorbus americana*	4	-	-	-	-	5
79	3	*Betula populifolia*	5	7	3	3	2	18
80	3	*Pinus strobus*	5	-	-	-	-	5
81	3	*Pinus strobus*	2	-	-	-	-	1
82	3	*Amelanchier* sp.	3	4	2	2	-	8
83	3	*Amelanchier* sp.	2	2	-	-	-	2
88	3	*Rhus hirta*	2	-	-	-	-	1
92	3	*Prunus serotina*	2	2	-	-	-	2
84	4	*Rhus hirta*	2	2	-	-	-	2
85	4	*Prunus serotina*	3	-	-	-	-	1
89	4	*Rhus hirta*	2	-	-	-	-	1
90	4	*Rhus hirta*	1	-	-	-	-	1
91	4	*Rhus hirta*	1	-	-	-	-	1
93	4	*Sorbus americana*	3	2	-	-	-	6
94	4	*Juniperus virginiana*	7	-	-	-	-	10
95	4	*Juniperus virginiana*	7	-	-	-	-	10
30	5	*Rhus hirta*	1	-	-	-	-	1
31	5	*Rhus hirta*	1	-	-	-	-	1
32	5	*Rhus hirta*	1	-	-	-	-	1
87	5	*Rhus hirta*	3	-	-	-	-	1
96	5	*Prunus serotina*	14	8	-	-	-	25
98	6	*Prunus serotina*	5	3	-	-	-	6
99	6	*Prunus serotina*	8	-	-	-	-	10
100	6	*Prunus serotina*	4	-	-	-	-	5
101	6	*Prunus serotina*	4	-	-	-	-	5
102	6	*Prunus serotina*	2	-	-	-	-	1
103	6	*Prunus serotina*	4	-	-	-	-	5

Tree ID	Grid	Species	Stem Diameter (in.)					Tree and Sapling Score
			1	2	3	4	5	
104	6	*Sorbus americana*	3	1	1	-	-	3
97	7	*Rhus hirta*	2	-	-	-	-	1
105	7	*Betula populifolia*	2	-	-	-	-	1
106	7	*Betula populifolia*	4	-	-	-	-	5
107	7	*Betula populifolia*	4	7	4	-	-	20
108	7	*Betula popuifolia*	2	-	-	-	-	1
109	7	*Sorbus americana*	4	-	-	-	-	5
33	8	*Betula papyrifera*	5	-	-	-	-	5
35	8	*Populus* sp.	5	-	-	-	-	5
36	8	*Prunus serotina*	3	-	-	-	-	1
37	8	*Prunus serotina*	19	19	-	-	-	30
39	8	*Populus* sp.	5	-	-	-	-	5
110	8	*Rhus hirta*	1	2	3	4	2	9
111	8	*Rhus hirta*	2	4	-	-	-	6
112	8	*Rhus hirta*	5	-	-	-	-	5
113	8	*Rhus hirta*	5	2	-	-	-	6
114	8	*Rhus hirta*	4	-	-	-	-	5
115	8	*Prunus serotina*	2	2	-	-	-	2
116	8	*Prunus serotina*	3	-	-	-	-	1
117	8	*Amelanchier*	2	-	-	-	-	1
38	9	*Prunus serotina*	19	22	-	-	-	30
118	9	*Sorbus americana*	2	4	3	-	-	7
119	9	*Populus* sp.	7	4	-	-	-	15
120	9	*Populus* sp.	5	-	-	-	-	5
121	9	*Amelanchier* sp.	4	-	-	-	-	5
122	9	*Prunus serotina*	1	-	-	-	-	1
123	9	*Populus* sp.	2	-	-	-	-	1
124	9	*Populus* sp.	2	-	-	-	-	1
125	9	*Prunus serotina*	4	1	-	-	-	6

Tree ID	Grid	Species	Stem Diameter (in.)					Tree and Sapling Score
			1	2	3	4	5	
126	9	*Prunus serotina*	1	1	-	-	-	2
128	9	*Prunus serotina*	1	1	-	-	-	2
129	9	*Sorbus americana*	4	2	-	-	-	6
41	10	*Prunus serotina*	3	-	-	-	-	1
42	10	*Rhus hirta*	3	-	-	-	-	1
127	10	*Prunus serotina*	1	2	-	-	-	2
130	10	*Prunus serotina*	2	2	-	-	-	2
40	11	*Prunus serotina*	1	-	-	-	-	1
131	14	*Rhus hirta*	10	-	-	-	-	10
132	14	*Rhus hirta*	2	-	-	-	-	1
43	15	*Rhus hirta*	3	-	-	-	-	5
44	15	*Rhus hirta*	3	-	-	-	-	1
45	15	*Rhus hirta*	1	-	-	-	-	1
46	15	*Rhus hirta*	2	-	-	-	-	1
47	16	*Juniperus virginiana*	2	-	-	-	-	1
48	16	*Rhus hirta*	3	-	-	-	-	1
49	16	*Rhus hirta*	2	-	-	-	-	1
50	17	*Rhus hirta*	3	-	-	-	-	1
51	17	*Rhus hirta*	3	-	-	-	-	1
52	17	*Rhus hirta*	2	-	-	-	-	1
53	17	*Rhus hirta*	1	-	-	-	-	1
54	17	*Rhus hirta*	1	-	-	-	-	1
55	17	*Rhus hirta*	1	-	-	-	-	1
56	17	*Rhus hirta*	1	-	-	-	-	1
57	17	*Rhus hirta*	2	-	-	-	-	1
133	17	*Rhus hirta*	2	1	-	-	-	2
134	17	*Rhus hirta*	2	1	-	-	-	2
135	20	*Juniperus virginiana*	1	-	-	-	-	1
136	20	*Quercus rubra*	4	-	-	-	-	5
137	21	*Quercus rubra*	6	-	-	-	-	5
138	21	*Quercus rubra*	6	-	-	-	-	5

Table 6. Trees and shrubs identified in Pipeline Survey area.

Tree ID	GRID	Species	Stem Diameter (in.)					Tree and Sapling Scores
			1	2	3	4	5	
313	1	*Abies balsamea*	1	-	-	-	-	1
314	1	Unknown shrub	1.5	1.4	1.1	1.1	1	5
309	2	*Malus* sp.	11	2.5	1.5	-	-	12
311	2	*Acer platanoides*	11.1	10.9	10.3	9.5	-	40
312	2	*Betula populifera*	11.9	3.4	-	-	-	15
315	2	Unknown	2.5	-	-	-	-	1
316	2	Unknown	1.6	-	-	-	-	1
310	3	Prunus serotina	8.1	7.8	7.4	-	-	30
298	5	*Malus* sp.	3.2	-	-	-	-	5
301	5	*Malus* sp.	2.6	-	-	-	-	1
302	5	*Juniperus virginiana*	2.1	-	-	-	-	1
297	5	*Acer platanoides*	6	9	-	-	-	15
299	5	*Acer platanoides*	3.6	-	-	-	-	5
300	5	*Acer platanoides*	2.4	-	-	-	-	1
293	6	*Malus* sp.	1.5	-	-	-	-	1
295	6	*Malus* sp.	1.5	1.3	-	-	-	2
294	6	*Acer platanoides*	7.3	-	-	-	-	10
296	7	*Juniperus virginiana*	-	3	-	-	-	1
292	7	*Quercus rubra*	8	-	-	-	-	10
287	8	*Prunus serotina*	5.4	-	-	-	-	5
285	8	*Malus* sp.	3.1	1.3	1.2	3.2	-	12
291	8	*Acer platanoides*	8	-	-	-	-	10
288	8	*Acer platanoides*	5.6	-	-	-	-	5
289	8	*Acer platanoides*	5.6	5.4	10	10	-	30
290	8	*Acer platanoides*	2.1	-	-	-	-	1
281	8	*Populus tremoloides*	3	-	-	-	-	1
282	8	*Populus tremoloides*	5.2	-	-	-	-	5
283	8	*Populus tremoloides*	4.2	-	-	-	-	5

Tree ID	GRID	Species	Stem Diameter (in.)					Tree and Sapling Scores
			1	2	3	4	5	
284	8	*Populus tremoloides*	2	-	-	-	-	1
275	9	*Prunus serotina*	5.1	3.2	3	-	-	11
276	9	*Malus* sp.	2	-	-	-	-	1
279	9	*Juniperus virginiana*	2	-	-	-	-	1
270	9	*Acer platanoides*	4	4.7	3.5	-	-	15
271	9	*Acer platanoides*	3.3	-	-	-	-	5
274	9	*Acer platanoides*	3	-	-	-	-	1
273	9	*Acer platanoides*	2.2	-	-	-	-	1
272	9	*Acer platanoides*	2.2	-	-	-	-	1
277	9	*Acer platanoides*	3.6	-	-	-	-	5
278	9	*Acer platanoides*	2.9	-	-	-	-	1
280	9	*Acer platanoides*	5.2	3	-	-	-	6
267	10	*Acer platanoides*	8	-	-	-	-	10
268	10	*Acer platanoides*	10	-	-	-	-	10
269	10	*Acer platanoides*	2	-	-	-	-	1
266	11	*Prunus serotina*	11	9	7	14	4.5	50
265	14	*Acer platanoides*	8	-	-	-	-	10
263	14	*Amelanchier* sp.	5.4	1.9	2	2.1	2.8	9
264	14	*Amelanchier* sp.	2.7	6.5	-	-	-	11
262	24	*Acer rubrum*	4	8	7	10	-	35
261	26	*Juniperus virginiana*	3	-	-	-	-	1
258	27	*Malus* sp.	3.5	5.5	4	-	-	15
260	27	*Malus* sp.	4	7	-	-	-	15
259	27	*Juniperus virginiana*	2	-	-	-	-	1
256	29	*Malus* sp.	1.5	2.5	3.1	1	-	8
254	29	*Juniperus virginiana*	4.2	10	5.5	2.5	2	22
255	29	*Juniperus virginiana*	1	-	-	-	-	1

Tree ID	GRID	Species	Stem Diameter (in.)					Tree and Sapling Scores
			1	2	3	4	5	
257	29	*Rhus hirta*	1.1	-	-	-	-	1
251	30	*Prunus serotina*	9.6	6.6	6.3	-	-	30
252	30	*Malus* sp.	3	3.7	2.6	3	2	9
253	30	*Malus* sp.	4.5	-	-	-	-	5
248	30	*Rhus hirta*	1.5	1.6	2	-	-	3
249	30	*Rhus hirta*	1.5	-	-	-	-	1
250	30	*Rhus hirta*	1.8	1.6	1.5	-	-	3
242	31	*Cornus florida*	2	2	2	2	2	5
243	31	*Cornus florida*	2	2	2	1	1	5
244	31	*Cornus florida*	1	-	-	-	-	1
245	31	*Rhus hirta*	2.5	-	-	-	-	1
241	31	*Rhus hirta*	1.6	1.3	-	-	-	2
246	31	*Rhus hirta*	2.1	-	-	-	-	1
247	31	*Rhus hirta*	2.3	4	3.3	2.8	-	12
237	32	*Rhus hirta*	2.7	3.1	-	-	-	6
239	32	*Rhus hirta*	2	2.7	-	-	-	2
240	32	*Rhus hirta*	1.5	2.2	1.2	-	-	3
238	32	*Rhus hirta*	3.9	-	-	-	-	5
223	33	*Malus* sp.	2	2	2	2	2	5
224	33	*Malus* sp.	2	2	2	1	1	5
225	33	*Malus* sp.	1	-	-	-	-	1
234	33	*Rhus hirta*	2.7	-	-	-	-	1
232	33	*Rhus hirta*	2.3	-	-	-	-	1
233	33	*Rhus hirta*	1.6	-	-	-	-	1
229	33	*Rhus hirta*	3	-	-	-	-	1
236	33	*Rhus hirta*	3.8	1.2	-	-	-	6
230	33	*Rhus hirta*	2.9	1.1	-	-	-	2
231	33	*Rhus hirta*	2.2	-	-	-	-	1
235	33	*Rhus hirta*	2.2	-	-	-	-	1
228	33	*Rhus hirta*	3.9	-	-	-	-	5
227	33	*Rhus hirta*	2.9	-	-	-	-	1
226	33	*Rhus hirta*	3.1	-	-	-	-	5
222	34	*Prunus serotina*	11.9	-	-	-	-	10

Tree ID	GRID	Species	Stem Diameter (in.)					Tree and Sapling Scores
			1	2	3	4	5	
220	34	*Malus* sp.	6.6	2.3	6.1	3	1.9	23
221	34	*Malus* sp.	1.3	2.2	2	-	-	3
219	35	*Malus* sp.	3.3	1	1.4	1.8	1.6	9
218	35	*Sorbus americana*	6.1	-	-	-	-	10
217	36	*Malus* sp.	2	-	-	-	-	1
215	37	*Quercus rubra*	1.2	1.7	1.8	1.6	1.3	5
216	37	*Quercus rubra*	1.6	1.8	1.3	-	-	3
213	38	*Malus* sp.	2	-	-	-	-	1
214	38	*Quercus rubra*	26.1	-	-	-	-	15
210	40	*Quercus palustris*	15.1	-	-	-	-	15
212	40	*Quercus rubra*	3.2	-	-	-	-	5
211	40	*Amelanchier* sp.	1.2	-	-	-	-	1
307	41	*Prunus serotina*	2	2	1	1	1	5
209	41	*Quercus rubra*	17.9	-	-	-	-	15
208	41	*Quercus rubra*	24.5	-	-	-	-	15
206	42	*Prunus serotina*	12	-	-	-	-	10
207	42	*Quercus rubra*	22	-	-	-	-	15
205	43	*Quercus rubra*	21.5	-	-	-	-	15
204	44	*Quercus rubra*	6.7	-	-	-	-	10
203	44	*Quercus rubra*	21.5	-	-	-	-	15
202	45	*Quercus rubra*	10.8	-	-	-	-	10
201	46	*Quercus rubra*	25	-	-	-	-	15
200	46	Unknown	1.4	-	-	-	-	1
196	47	*Acer platanoides*	2.8	2.3	1.9	-	-	3
197	47	*Quercus palustris*	11.2	-	-	-	-	10
198	47	*Rhus hirta*	2.1	1.4	-	-	-	2
199	47	*Rhus hirta*	2.5	-	-	-	-	1
195	47	*Rhus hirta*	2.9	-	-	-	-	1
194	48	*Rhus hirta*	3.3	-	-	-	-	5
193	48	*Rhus hirta*	3.8	3.2	2.5	3.8	2.8	17
192	49	*Rhus hirta*	4.6	-	-	-	-	5
191	49	*Rhus hirta*	4.2	3.7	4.1	2.7	-	16

Tree ID	GRID	Species	Stem Diameter (in.)					Tree and Sapling Scores
			1	2	3	4	5	
188	54	*Prunus serotina*	5.8	9.3	9.5	1.8	5.5	31
189	54	*Prunus serotina*	1.5	-	-	-	-	1
190	54	*Rhus hirta*	2.4	-	-	-	-	1
184	57	*Myrica pensylvanica*	1.8	3.7	-	-	-	6
187	57	*Malus* sp.	1.5	1.2	-	-	-	2
185	57	*Malus* sp.	3	2.1	3	1	2	5
186	57	*Juniperus virginiana*	4.7	3.5	-	-	-	10
179	58	*Prunus serotina*	3.4	1.9	5.7	2.3	5.2	17
180	58	*Prunus serotina*	8	-	-	-	-	10
183	58	*Malus* sp.	4.3	3.1	4.7	1.7	1	17
178	58	*Juniperus virginiana*	5.4	-	-	-	-	5
182	58	*Amelanchier* sp.	1.5	2.6	-	-	-	2
181	58	*Amelanchier* sp.	3.1	-	-	-	-	5
176	59	*Prunus serotina*	6.2	5.7	-	-	-	15
177	59	*Juniperus virginiana*	8.1	-	-	-	-	10
306	62	*Quercus rubra*	11.2	-	-	-	-	10
175	66	*Rhus hirta*	2.7	-	-	-	-	1
174	66	*Rhus hirta*	1	2	4	-	-	7
168	67	*Amelanchier* sp.	1	2.5	1	1	2.9	5
169	67	*Amelanchier* sp.	3.3	2.9	4.3	-	-	11
165	67	*Rhus hirta*	2.5	-	-	-	-	1
167	67	*Rhus hirta*	1.9	2.1	2.1	-	-	3
164	67	*Rhus hirta*	3.9	-	-	-	-	5
166	67	*Rhus hirta*	3.5	-	-	-	-	5
163	67	*Rhus hirta*	2.7	-	-	-	-	1

Tree ID	GRID	Species	Stem Diameter (in.)					Tree and Sapling Scores
			1	2	3	4	5	
170	67	*Rhus hirta*	4.3	5	-	-	-	10
162	67	*Rhus hirta*	4.2	-	-	-	-	5
171	67	*Rhus hirta*	5.1	-	-	-	-	5
173	67	*Rhus hirta*	3.5	6.4	4	-	-	20
172	67	*Rhus hirta*	4.2	5.5	4.3	4	-	20
161	67	*Rhus hirta*	2.5	-	-	-	-	1
160	67	*Rhus hirta*	4.7	2.9	-	-	-	6
159	68	*Rhus hirta*	3.5	2	-	-	-	6
156	69	*Rhus hirta*	2	-	-	-	-	1
157	69	*Rhus hirta*	6.5	3	-	-	-	11
154	69	*Rhus hirta*	3.5	2	-	-	-	6
155	69	*Rhus hirta*	4	3	-	-	-	6
158	69	*Rhus hirta*	4	-	-	-	-	5
153	70	*Rhus hirta*	2	3.5	5	-	-	11
150	71	*Rhus hirta*	2	-	-	-	-	1
151	71	*Rhus hirta*	3.5	-	-	-	-	5
138	79	*Amelanchier* sp.	1	1	-	-	-	2
141	81	*Malus* sp.	1	1	1	-	-	3
140	81	*Sorbus americana*	2	2	1	1	1	5
142	81	*Rhus hirta*	1	1	3	-	-	3
143	81	*Rhus hirta*	3	2	-	-	-	2
145	81	*Rhus hirta*	3.5	-	-	-	-	5
144	81	*Rhus hirta*	2	-	-	-	-	1
148	81	*Rhus hirta*	1	1	1	-	-	3
146	81	*Rhus hirta*	1	1	-	-	-	2
147	81	*Rhus hirta*	1	1	-	-	-	2
149	81	*Rhus hirta*	1	-	-	-	-	1

EXHIBIT 10

PROJECT SPECIFIC INFORMATION REQUIRED BY ENV-WT 500, 600, AND 900

(SEE EXHIBIT 7 – PROJECT NARRATIVE)

EXHIBIT 11

ABUTTERS LIST

Abutters List

Pease Development Authority
c/o Portsmouth Fish Cooperative
1 Peirce Island Road
Portsmouth, NH 03801

EXHIBIT 12

CERTIFIED MAILING RECEIPTS

ALTUS
ENGINEERING, INC.

Civil
Site Planning
Environmental
Engineering

133 Court Street
Portsmouth, NH
03801-4413

May 14, 2021

Subject: **NHDES Wetlands Permit Application**
Tax Map 208 Lot 1
City of Portsmouth WWTP
200 Peirce Island Road
Portsmouth, NH
P4507

Dear Abutter:

Pursuant to State of New Hampshire RSA Chapter 482-A, this letter is to notify you that the City of Portsmouth (Tax Map 208, Lot 1), owner and applicant, is submitting a Wetland Permit Application to the NHDES Wetlands Bureau.

The application proposes to replace force mains in connection with the improvements previously approved for the Wastewater Treatment Plant. The utility installations and other site improvements will impact areas within the previously disturbed 100' tidal buffer zone. There are additional impacts located between the 100-foot and 250-foot zones of the Shoreland Protection Buffer.

This letter is for the notification of abutting property owners only. The work is greater than 20-feet from abutting your parcel therefore no further action by you is required.

Once filed, the plans that show the proposed project are available for viewing during normal business hours at the City of Portsmouth City Clerk's office (603) 610-7245 or at the office of the DES Wetlands Bureau (603) 271-2147, 6 Hazen Drive, Concord, N.H. (8am to 4pm). It is suggested the appropriate office is contacted to verify availability of the documents prior to visiting them. Please feel free to contact the project Authorized Agent, Erik Meserve (AECOM), at (978) 905-3145, or the City Engineer, Terry Desmarais at (603) 766-1421 if you have any questions.

Sincerely,

Eric D. Weinrieb
President

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☐ Adult Signature Restricted Delivery	$
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05/14/2021

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Street and Apt. No., or PO Box No. 1 PEIRCE ISLAND ROAD

City, State, ZIP+4® PORTSMOUTH, NH 03801

PS Form 3800, April 2015 PSN 7530-02-000-9047 See Reverse for Instructions

EXHIBIT 13

PROJECT DESIGN CONSIDERATION REQUIRED BY ENV-WT 313

(SEE EXHIBIT 7 - PROJECT NARRATIVE)

EXHIBIT 14

TAX MAP

Partial Legend

See the cover sheet for the complete legend.

7-5A	Lot or lot-unit number
2.56 ac	Parcel area in acres (ac) or square feet (sf)
25	Address number
233-137	Parcel number from a neighboring map
68'	Parcel line dimension
SIMS AVE	Street name

Parcel/Parcel boundary

Parcel/ROW boundary

Water boundary

Structure (1994 data)

Parcel covered by this map

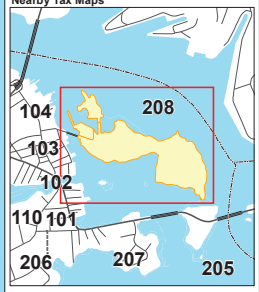
Parcel from a neighboring map (see other map for current status)

0 50 100 200 300 Feet

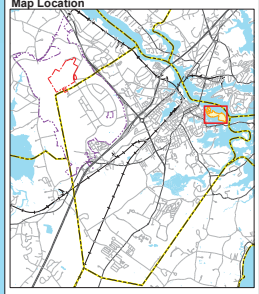
0 20 40 80 Meters

This map is for assessment purposes only. It is not intended for legal description or conveyance. Parcels are mapped as of April 1. Building footprints are 2006 data and may not represent current structures. Streets appearing on this map may be paper (unbuilt) streets. Lot numbers take precedence over address numbers. Address numbers shown on this map may not represent posted or legal addresses.

Nearby Tax Maps



Map Location



Portsmouth, New Hampshire

2019

Tax Map 208

EXHIBIT 15

PHOTOS OF JURISDICTIONAL AREAS AND SHORELINE STRUCTURES

Photo 1. Gravel shoreline on north side of island near the proposed parking area, looking east. (04-23-20)

Photo 2. Construction laydown area in developed Tidal Buffer Zone, looking north from salt marsh. (04-23-20)

Photo 3. Salt marsh with Iva frutescens *at upland edge on southern side of island looking west. (04-23-20)*

Photo 4. Iva frutescens *at upland edge of tidal wetland with narrow saltmarsh band, looking east. (04-23-20)*

Photo 5. Staghorn sumac and Asian bittersweet growing in Protected Waterfront Buffer east of wastewater treatment facility along proposed path, looking north. (04-23-20)

Photo 6. Staghorn sumac dominated shrubland in densely covered portion of proposed path, facing south. (04-23-20)

Photo 7. Dense vegetation surrounding existing staghorn sumac and black cherry dominated portion of the proposed path, looking south. (04-23-20)

Photo 8. Dense bittersweet along the west side of the communications tower on portion of proposed path, looking south. (04-23-20)

Photo 9. Spoil pile in construction laydown area at the proposed parking site, looking south. (04-23-20)

Photo 10. Rip-rap along the edge of the proposed path east of wastewater treatment facility, looking south. (04-23-20)

Photo 11. Southern end of the proposed path that curves around the southeastern corner of the wastewater treatment facility, bordered by rip-rap to the east, looking south. (04-23-20)

Photo 12. From eastern end of the boat ramp parking area, looking east. (01-14-21)

Photo 13. From bridge at western end of the pipeline replacement, looking east. (01-14-21)

Photo 14. From northern embankment off east end of Peirce Island Road Bridge, looking west. (04-06-21)

Photo 15. From the western end of the boat launch parking area along the pipeline replacement, looking east. (01-14-21)

Photo 16. From laydown area at eastern end of the boat launch parking area, looking east. (01-14-21)

Photo 17. Along the pipeline replacement near Grid 42 of the tree inventory for the Pipeline Survey, looking east. (01-14-21)

Photo 18. Along the pipeline replacement near Grid 46 of the tree inventory for the Pipeline Survey, looking east. (01-14-21)

Photo 19. From the vicinity of the USACE Corps in the eastern portion of the pipeline replacement, looking west. (01-14-21)

Photo 20. From the vicinity of the USACE Corps in the eastern portion of the pipeline replacement, looking east. (01-14-21)

Photo 21. From eastern end of the pipeline replacement near the planned parking area, looking west. (01-14-21)

Photo 22. Shoreline off southwestern corner of Peirce Island bridge looking west. (03-23-21)

Photo 23. Shoreline off southwestern corner of Peirce Island bridge looking northeast. (03-23-21)

Photo 24. Shoreline off northwestern corner of Peirce Island Road Bridge looking west. (03-23-21)

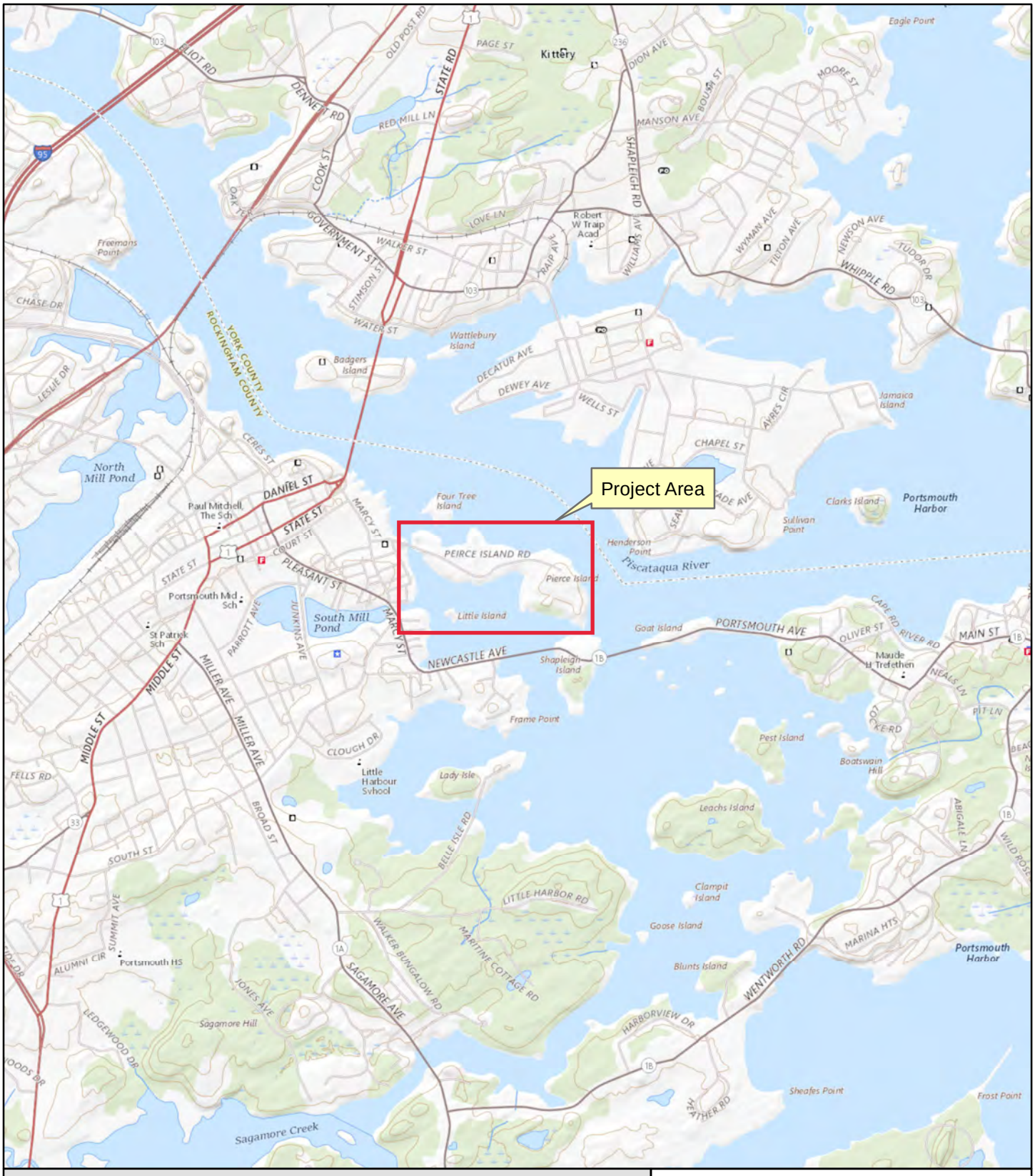
Photo 25. From west end of rocky shore shelf off the northwestern corner of Peirce Island bridge looking northwest. (03-23-21)

Photo 26. From the north side of the Peirce Island Bridge Rd. Bridge facing east. (04-15-21)

Photo 27. From the south side of the Peirce Island Road Bridge facing east. (04-15-21)

EXHIBIT 16

USGS MAP



Service Layer Credits: USGS The National Map: National Boundaries Dataset, 3DEP Elevation Program, Geographic Names Information System, National Hydrography Dataset, National Land Cover Database, National Structures Dataset, and National Transportation Dataset; USGS Global Ecosystems; U.S. Census Bureau TIGER/Line data; USFS Road Data; Natural Earth Data; U.S. Department of State Humanitarian Information Unit; and NOAA National Centers for Environmental Information, U.S. Coastal Relief Model. Data refreshed December, 2019.

Portsmouth WWTF
Peirce Island Improvements
Project Locus

NORMANDEAU ASSOCIATES
ENVIRONMENTAL CONSULTANTS

Path: J:\Projects\Portsmouth Wastewater Treatment Facility_Pierce Island\MXD\Permitting2020Locus.mxd

EXHIBIT 17

CONSTRUCTION NARRATIVE

(NARRATIVE OF WORK SEQUENCE, INCLUDING PRE- AND POST-CONSTRUCTION, AND RELATIVE TIMING AND PROGRESSION OF ALL WORK)

Construction Narrative

The proposed site improvements adjacent to the Peirce Island Wastewater Treatment Facility project will be constructed in three phases over the next 5 years, beginning with installation of the water main and sewer force mains in 2021 as Phase 1. The sewer force mains will improve the reliability of the City's wastewater collection system, maximize flow to the WWTF, and allow removal of the temporary, above ground force main that is currently in use. The water main replacement will take place at the same time. Prior to the start of work construction fencing will be erected between the work area and adjacent marsh elder stands, and erosion and sediment best management practices will be installed (see Erosion BMPs, Exhibit 5, Sheet C-101 P and detail sheets). Trenches will be dug, one of the existing force mains and the existing water main removed, and new pipelines installed. The two force mains will be installed in the same trench, approximately 3' apart. The existing force main that is not removed will be drained, plugged with grout, and abandoned in place. When both of the new force mains are operational, the temporary above-ground force main will be removed. The project will also include sliplining the existing 24" force main under the Peirce Island Rd. Bridge to address corrosion in the existing pipe. Pits will be excavated within the road bed on either end of the bridge, and a smaller diameter pipeline pulled through the existing force main before being connected at either end. The construction period is expected to be 5 months. Erosion and sedimentation controls will remain in place until the vegetation in the grassy areas that are disturbed as part of construction is established (at least 80% cover), after which the areas will be re-opened to the public.

It is expected that the foot trail extension (Phase 2), will also take place in 2021. The trail extension will improve public access and recreation by formalizing a looped trail around the east end of Peirce Island. Upon installation of erosion and sediment best management practices, clearing and grubbing operations will commence. The work will be performed within an approximate 12-ft-wide limit of work, using small tracked construction vehicles. Details for the trail construction are provided in Exhibit 5, Sheet C-002. Construction of the trail and stabilization of the site is expected to take 4 to 6 weeks to complete.

To address logistical and funding considerations, the Phase 3 work, proposed improvements to Peirce Island Road (to address tidal flooding) and the conversion of the former snow dump to a grassed parking area, will be constructed after 2021. The start time will be dependent on funding and completion of the current work at the WWTF, but the work will be complete within the 5-year limit of the permit (2026). Work will begin with the installation of erosion and sediment control best management practices. It is anticipated that much of initial earth moving for the road and parking area will be done simultaneously. Vehicular traffic must be maintained at all times to the Peirce Island Wastewater Treatment Plant, therefore completion of the roadway improvements will be a priority. Once the roadway is functional, the project will proceed with installation of the proposed revetment along the roadway and the establishment of turf at the grassed parking area, and creation of the vegetated buffer around the parking area. Details for the Phase 3 work are provided in Exhibit 5, Sheets C-001.

The Phase 3 construction period is expected to be 6 to 8 weeks. Erosion and sedimentation controls will remain in place until the vegetation in the grassed parking area is established (at least 80% cover), after which the area will be open to the public.

EXHIBIT 18/19

COPY OF DEED

175

Warranty
Pierce et al
to
City of Portsmouth
Del. to
J.D. Sullivan

Know All Men By These Presents, that we, Joseph B. Pierce of Brookline in the County of Norfolk, Elizabeth W. Macmahon, otherwise known as Elizabeth W. Macmahon of Boston in the County of Suffolk and Ann B. Pratt, otherwise known as Annie B. Pratt, of Wenham in the County of Plymouth, all in the Commonwealth of Massachusetts, for and in consideration of the sum of one dollar and other valuable considerations, to us in hand before the delivery hereof, well and truly paid by the City of Portsmouth, a municipal corporation located in the County of Rockingham and State of New Hampshire, the receipt whereof we do hereby acknowledge, have granted, bargained and sold and by these presents do give, grant, bargain, sell, alien, enfeoff, convey and confirm unto the said City of Portsmouth, its successors or assigns forever, the following described tracts of land with the building thereon, and all rights and privileges appurtenant and belonging thereto, situate in the said City of Portsmouth, and bounded and described as follows, to wit:

The Island situated in Piscataqua River, within the limits of the said City of Portsmouth, with the buildings thereon, containing twenty-seven acres, more or less, known as Pierce's Island and formerly known as Partridge's Island and Jaurrin's Island, together with the flats adjoining to the same; being the same premises devised by Joshua W. Peirce to Joseph W. Peirce by will executed July 22, 1859 and allowed by the Court of Probate, May 12, 1876, and devised by the said Joseph W. Peirce by will executed June 4, 1910 and proven and allowed March 7, 1916, to the Grantors herein as residuary legatees; also,

A certain tract or parcel of land with the buildings thereon, situate on Mechanic Street in said Portsmouth, and bounded and described as follows, to wit, — Beginning at the northwesterly corner of land now or formerly of Addie A. Curtis and Mechanic Street, and running in a northerly direction along said Mechanic Street, one hundred forty-six feet, two inches, (146.2) to land now or formerly of John C. Beasley; thence turning and running in an easterly direction along land of said Beasley, thirty (30), feet more or less to the Piscataqua River; thence turning and running in a southerly direction along said River, one hundred forty-five feet six inches (145.6) to land of the said Addie A. Curtis; thence turning and running in a westerly direction, along land of the said Curtis, sixteen (16), feet, to the point begun at. Said tract containing three thousand twelve square feet, more or less, and being the premises described as being Lot #63 on Plan #7 of the "Plan of the City of Portsmouth" on file at the Assessor's Office in said City; also

101

All rights, privileges and grants vested in the grantors or their devisors or grantors by the State of New Hampshire, authorizing and permitting the construction of a bridge from the Southerly part of said City of Portsmouth to Peirce's Island hereinbefore referred to.

To Have And To Hold the said granted premises, with all the privileges and appurtenances to the same belonging, to it the said City of Portsmouth and its successors and assigns forever. And we, the said Joseph B. Pierce, Elizabeth W. Macmahon and Ann B. Pratt and our heirs executors and administrators do hereby

covenant, grant and agree to and with the said City of Portsmouth and its successors and assigns, that until the delivery hereof we were the lawful owners of the said premises and were seized and possessed thereof in our own right in fee simple; and have full power and lawful authority to grant and convey the same in manner aforesaid; and that we will and our heirs, executors and administrators shall and will Warrant And Defend the same to the said City of Portsmouth and its successors and assigns against the lawful claims and demands of any person or persons whomsoever.

And we, Sara L. Peirce, wife of the said Joseph B. Peirce, Charles C., husband of the said Elisabeth W. Macmahon and C. Barton, husband of the said Ann B. Pratt, for the consideration aforesaid, do hereby relinquish our respective rights of dower and curtesy in the before mentioned premises.

In Witness Whereof, we have hereunto set our hands and seals this 9th day of August in the year of our Lord, one thousand nine hundred and twenty-three.

Signed, sealed and delivered in the presence of us

Chas. N. Baxter — Joseph B. Peirce (L S)
witness to all — Sara L. Peirce (L S)
Elisabeth W. Macmahon (L S)
Charles C. Macmahon (L S)
Anne B. Pratt (L S)
C. Barton Pratt (L S)

Commonwealth of Massachusetts,
Norfolk ss. August 9th 1923.

Personally appeared the above named Joseph B. and Sara L. Peirce and acknowledged the foregoing instrument to be their voluntary act and deed,

Before me,

Chas N. Baxter
Notary Public (-)
Justice of the Peace
My Commission expires June 11/1927.

Commonwealth of Massachusetts,
Suffolk ss. August 9th. 1923.

Personally appeared the above named Elisabeth W. Macmahon and Charles C. Macmahon and acknowledged the foregoing instrument to be their voluntary act and deed.

Before me,

Chas N. Baxter
Justice of the Peace

Commonwealth of Massachusetts, Plymouth ss. August 9th. 1923.

Personally appeared the above named Ann B. and C. Barton Pratt and acknowledged the foregoing instrument to be their voluntary act and deed, Before me,

Chas N. Baxter Justice of the Peace and Notary Public (-)

Received and Recorded Sept. 26-9:25 A.M. 1923.
John McGillen Register

EXHIBIT 20

NHB CORRESPONDENCE

CONFIDENTIAL – NH Dept. of Environmental Services review

Memo

NH Natural Heritage Bureau
NHB Datacheck Results Letter

To: Elizabeth Olliver, Normandeau Associates, Inc.
25 Nashua Road
Bedford, NH 03110

From: Amy Lamb, NH Natural Heritage Bureau
Date: 4/6/2021 (valid until 04/06/2022)
Re: Review by NH Natural Heritage Bureau
Permits: NHDES - Wetland Standard Dredge & Fill - Major

NHB ID: NHB21-1136 Town: Portsmouth Location: 200 Peirce Island Road
Description: Replace failed sewer force mains from western bridge abutment to WWTF, and water main to swimming pool. Work will include removal of 1 existing sewer force main, burial of 2 new force mains in its place, and abandoning a second force main in place . The existing lines hung under Peirce Island Road Bridge will be slip lined to ensure integrity. All work will be confined to the existing footprint - a mix of in-road, and off road. Work is an amendment to NHB13-3237 and NHB15-1528, and NHB20-1059.

cc: Kim Tuttle

As requested, I have searched our database for records of rare species and exemplary natural communities, with the following results.

Comments NHB: Please confirm that all shoreline impact areas have been surveyed for marsh elder, and that the conditions on the attached 2016 memo are still valid. Please send the final plan for the proposed plantings discussed in relation to the NHB20-1059 project segment. The eelgrass record, newly added to the NHB database, was included for your information.
F&G: Please contact the NHFG Marine Division to address impacts to Atlantic and Shortnose Sturgeon and anadromous fish species. Please contact Mike Dionne or Cheri Patterson at (603) 868-1095.

Natural Community	**State[1]**	**Federal**	**Notes**
Eelgrass bed	--	--	

Plant species	**State[1]**	**Federal**	**Notes**
marsh elder (*Iva frutescens*)	T	--	Threats are primarily alterations to the hydrology of the wetland, such as ditching or tidal restrictions that might affect the sheet flow of tidal waters across the intertidal flat, activities that eliminate plants, and increased input of nutrients and pollutants in storm runoff.

Department of Natural and Cultural Resources
Division of Forests and Lands
(603) 271-2214 fax: 271-6488

DNCR/NHB
172 Pembroke Rd.
Concord, NH 03301

CONFIDENTIAL – NH Dept. of Environmental Services review

Memo

NH Natural Heritage Bureau
NHB Datacheck Results Letter

Vertebrate species	State[1]	Federal	Notes
Atlantic Sturgeon (*Acipenser oxyrinchus oxyrinchus*)	T	T	Contact the NH Fish & Game Dept and the US Fish & Wildlife Service (see below).
Shortnose Sturgeon (*Acipenser brevirostrum*)	E	E	Contact the NH Fish & Game Dept and the US Fish & Wildlife Service (see below).

[1]Codes: "E" = Endangered, "T" = Threatened, "SC" = Special Concern, "--" = an exemplary natural community, or a rare species tracked by NH Natural Heritage that has not yet been added to the official state list. An asterisk (*) indicates that the most recent report for that occurrence was more than 20 years ago.

Contact for all animal reviews: Kim Tuttle, NH F&G, (603) 271-6544.

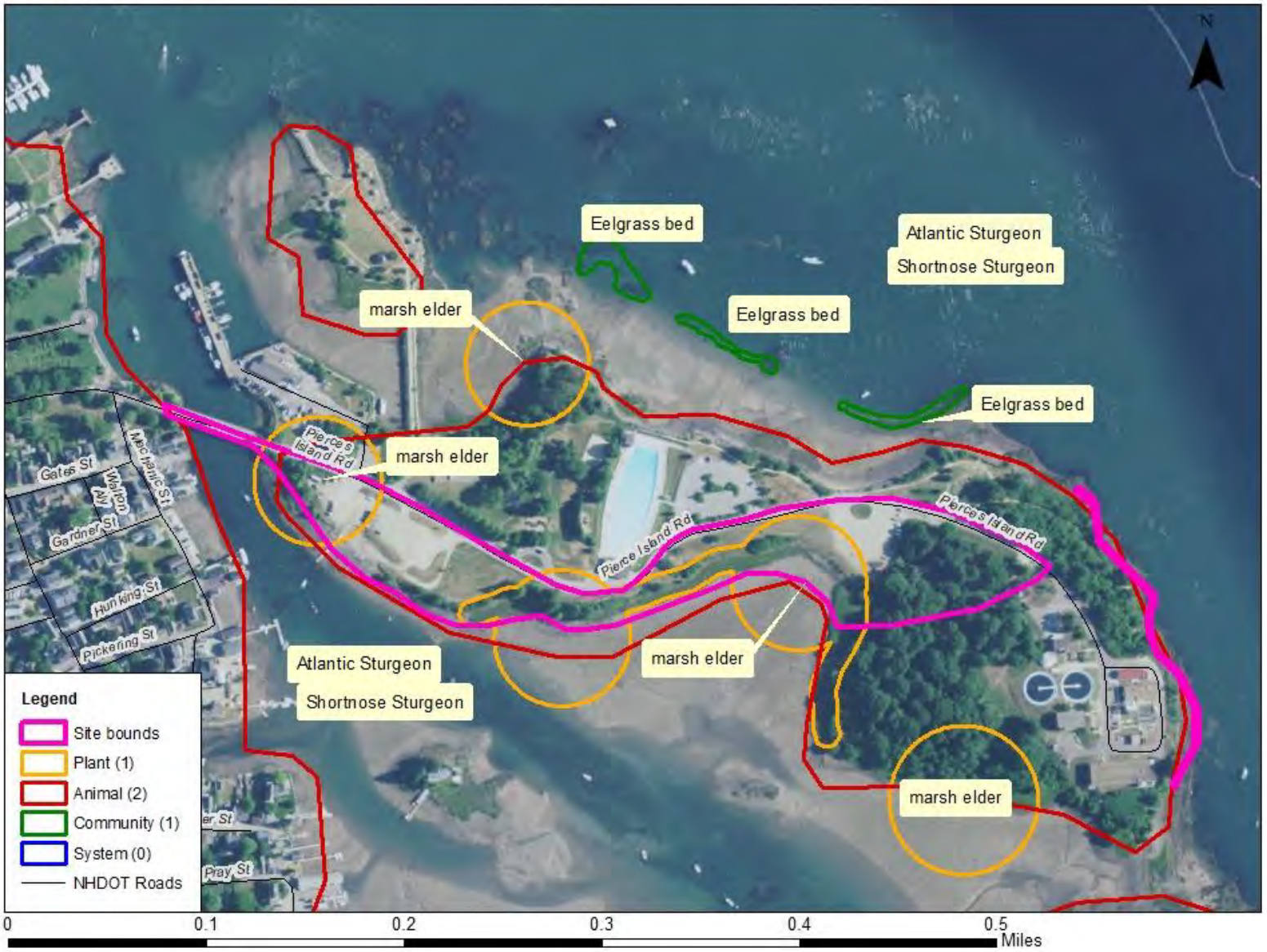
A negative result (no record in our database) does not mean that a sensitive species is not present. Our data can only tell you of known occurrences, based on information gathered by qualified biologists and reported to our office. However, many areas have never been surveyed, or have only been surveyed for certain species. An on-site survey would provide better information on what species and communities are indeed present.

Department of Natural and Cultural Resources
Division of Forests and Lands
(603) 271-2214 fax: 271-6488

DNCR/NHB
172 Pembroke Rd.
Concord, NH 03301

CONFIDENTIAL – NH Dept. of Environmental Services review

NHB21-1136



New Hampshire Natural Heritage Bureau - Community Record

Eelgrass bed

Legal Status

Federal: Not listed
State: Not listed

Conservation Status

Global: Not ranked (need more information)
State: Critically imperiled due to rarity or vulnerability

Description at this Location

Conservation Rank: Not ranked
Comments on Rank: --

Detailed Description: 2017: 174.6 acres of eelgrass bed mapped over 90 individual patches.
General Area: 2017: In permanently inundated tidal waters from Little Bay down to the mouth of Portsmouth Harbor. Often occurred with macroalgae.
General Comments: 2017: Data derived from report on annual mapping of eelgrass extent in the Great Bay estuary.
Management Comments: --

Location

Survey Site Name: Piscataqua River
Managed By:

County:
Town(s): Out-Of-State
Size: 183.6 acres
Elevation:

Precision: Within (but not necessarily restricted to) the area indicated on the map.

Directions: 2017: Eelgrass beds in portions of Portsmouth Harbor, the Piscataqua River, and Little Bay. Includes areas in Maine state waters.

Dates documented

First reported: 2017
Last reported: 2017

New Hampshire Natural Heritage Bureau - Plant Record

marsh elder (*Iva frutescens*)

Legal Status	Conservation Status
Federal: Not listed	Global: Demonstrably widespread, abundant, and secure
State: Listed Threatened	State: Imperiled due to rarity or vulnerability

Description at this Location

Conservation Rank:	Excellent quality, condition and landscape context ('A' on a scale of A-D).
Comments on Rank:	This rank may be for the state rather than relative to others in the region.
Detailed Description:	2020: Tidal Pool: Species observed in flower. 2017: Leachs Island: Several thousand plants spread along 800+ feet of shoreline. 10-20% dieback, 10-15% yellowing, 65-80% normal to vigorous. Aphids observed on 80% of clumps. 2016: Peirce Island: Additional subpopulations located, raising total number of plants to over 600. Plants appear to be in much better health than 2014, with all individuals in fruit and in good vigor. Shaws Hill: Several clumps over an area approximately 30 x 15 feet. Estimated at over 200 individuals. Tidal Pool: Plants in 3 areas along shoreline near tidal pool. 2014 Peirce Island: Over 500 plants were observed, all stunted, with approximately 50-60% dead stems, mostly confined to the upper portions of the plants. 1996: Constant observation since 1953 reported, including all stages of phenology and age structure. 1982: Good clump observed.
General Area:	2017: Leachs Island: Upper edge of brackish marsh/rocky shore. Plants absent from areas with broader expanse of marsh. Rocks present in most areas where the plants are growing. Associated species include black oak (*Quercus velutina*), saltmarsh rush (*Juncus gerardii*), sea-blite (*Suaeda* sp.), hastate-leaved orache (*Atriplex* cf. *prostrata*), smooth cordgrass (*Spartina alterniflora*), Carolina sea-lavender (*Limonium carolinianum*), and seaside plantain (*Plantago maritima* ssp. *juncoides*). 2016: Peirce Island: Population forms a narrow band immediately above the highest observed wrack line along the shore. Associated upland species include staghorn sumac (*Rhus hirta*), autumn-olive (*Elaeagnus umbellata* var. *parvifolia*), Asian bittersweet (*Celastrus orbiculatus*), and speckled alder (*Alnus incana* ssp. *rugosa*). The saline areas downslope of the marsh elder contained over 50% unvegetated substrate, as well as a mixture of cordgrass (*Spartina* sp.) and saltgrass (*Distichlis spicata*). Shaws Hill: Surrounding land use is developed. All plants below highest observable tide line in ***high salt marsh***, located among saltmeadow cordgrass (*Spartina patens*), smooth cordgrass (*Spartina alterniflora*), and seaside goldenrod (*Solidago sempervirens*). Tidal Pool: Sagamore Creek/Great Bay shoreline, with smooth cordgrass (*Spartina alterniflora*), saltmarsh rush (*Juncus gerardii*), saltmeadow cordgrass (*Spartina patens*), seaside goldenrod (*Solidago sempervirens*), and sea-blite (*Suaeda* spp.). 1996: On shores of several islands and peninsulas in the more or less enclosed bay system. Associated plant species: *Solidago sempervirens* (seaside goldenrod), *Juncus gerardii* (salt marsh rush), *Spartina patens* (salt-meadow cord-grass), *Triglochin maritimum* (arrow-grass), *Elymus virginicus* (Virginia wild rye), *Atriplex patula* (narrow-leaved orach), and *Artemisia vulgaris* (common mugwort). Substrate: gravel and marsh peat and muck. 1982: On shore at Pleasant Point.
General Comments:	2016: Peirce Island: "The population currently appears to be in good health, although the results of the June 2014 surveys indicated that there may be some intermittent pressure on this population. The propensity of this species to grow in a very narrow band along the tide line does not allow for rapid adaptation to changing sea levels, storm events, or polluted runoff that a larger, robust population may resist. If sea levels gradually rise as expected, the marsh elder will be unable to move inland due to a small but steep cut bank that forms the upland break adjacent to the marsh elder population. The remaining subpopulations may also be getting shaded by the adjacent upland vegetation, which appears to be encroaching on the shoreline. This vegetation is comprised of large shrub species and the invasive Oriental bittersweet that is capable of overtaking the native plants in the area."
Management Comments:	--

CONFIDENTIAL – NH Dept. of Environmental Services review

Location

Survey Site Name: Little Harbor, back channel
Managed By: Little Harbor Trust

County: Rockingham
Town(s): Portsmouth
Size: 59.9 acres Elevation:

Precision: Within (but not necessarily restricted to) the area indicated on the map.

Directions: 2017: Leachs Island: Island in New Castle only accessible by boat. Plants observed on south shore of island 2016: Peirce Island: Along the southern shore of Peirce Island, along the edge of a small cove west of the wastewater treatment facility. Shaws Hill: Take Laurel Lane off New Castle Avenue, bear left onto driveway right-of-way servicing 51A and 51B Laurel Lane. At end of right-of-way, 51B will be located on the right. Tidal Pool: Along Sagamore Creek shoreline on Creek Farm Reservation property in Portsmouth. In the vicinity of Rte. 1B which encircles the Little Harbor back channel from Portsmouth to New Castle and Rye. Many of the sites are visible only by boat.

Dates documented

First reported: 1953 Last reported: 2020-08-02

New Hampshire Natural Heritage Bureau - Animal Record

Atlantic Sturgeon (*Acipenser oxyrinchus oxyrinchus*)

Legal Status		**Conservation Status**	
Federal:	Listed Threatened	Global:	Rare or uncommon
State:	Listed Threatened	State:	Critically imperiled due to rarity or vulnerability

Description at this Location

Conservation Rank: Not ranked
Comments on Rank: --

Detailed Description: 2016: 1 individual, sex unknown, detected in the lower Piscataqua River. 2015: 1 individual, sex unknown, detected in Portsmouth Harbor. 2012: 1 individual, sex unknown, detected in Little Bay.
General Area: 2016: Tidal waters in Portsmouth Harbor, Little Bay, and the Piscataqua River.
General Comments: --
Management Comments: --

Location

Survey Site Name: Piscataqua River
Managed By:

County:
Town(s): Out-Of-State
Size: 7749.3 acres Elevation:

Precision: Within 1.5 miles of the area indicated on the map (location information is vague or uncertain).

Directions: 2016: Tidal waters of Portsmouth Harbor, Little Bay, and the Piscataqua River.

Dates documented

First reported: 2012-06-02 Last reported: 2016-05-27

The U.S. Fish & Wildlife Service has jurisdiction over Federally listed species. Please contact them at 70 Commercial Street, Suite 300, Concord NH 03301 or at (603) 223-2541.

New Hampshire Natural Heritage Bureau - Animal Record

Shortnose Sturgeon (*Acipenser brevirostrum*)

Legal Status		Conservation Status	
Federal:	Listed Endangered	Global:	Rare or uncommon
State:	Listed Endangered	State:	Critically imperiled due to rarity or vulnerability

Description at this Location

Conservation Rank: Not ranked
Comments on Rank: --

Detailed Description: 2016: 2 individuals, 1 female and 1 sex unknown, detected in Portsmouth Harbor and the lower Piscataqua River. 2015: 3 females and 2 other individuals, sex unknown detected in Portsmouth Harbor. 2014: 1 female detected moving from Portsmouth Harbor up the Piscataqua River to the mouth of the Cocheco River. 2012: 1 female detected in Little Bay. 2011: 1 female detected in Little Bay. 2010: 1 female detected in Little Bay.
General Area: 2016: Tidal waters in Portsmouth Harbor, Little Bay, and the Piscataqua River.
General Comments: --
Management Comments: --

Location

Survey Site Name: Piscataqua River
Managed By:

County:
Town(s): Out-Of-State
Size: 7749.3 acres Elevation:

Precision: Within 1.5 miles of the area indicated on the map (location information is vague or uncertain).

Directions: 2016: Tidal waters of Portsmouth Harbor, Little Bay, and the Piscataqua River.

Dates documented

First reported: 2010-11-03 Last reported: 2016-10-20

The U.S. Fish & Wildlife Service has jurisdiction over Federally listed species. Please contact them at 70 Commercial Street, Suite 300, Concord NH 03301 or at (603) 223-2541.

EXHIBIT 21

CONSERVATION COMISSION CORRESPONDENCE

Conservation Commission Correspondence

The City of Portsmouth Engineer and Environmental Planner conducted a site walk with the Conservation Commission on September 9, 2020. They walked the entire project and introduced the plan to apply for an Emergency Authorization due to a pipeline failure within the project area.

EXHIBIT 22

FEDERAL AGENCY CORRESPONDENCE

Federal Agency Correspondence

No federal natural or cultural resources are directly or indirectly impacted by this project, therefore no federal agency review is anticipated.

EXHIBIT 23

AVOIDANCE AND MINIMIZATION NARRATIVE

AVOIDANCE AND MINIMIZATION WRITTEN NARRATIVE

Water Division/Land Resources Management

Wetlands Bureau

Check the Status of your Application

RSA/ Rule: RSA 482-A/ Env-Wt 311.04(j); Env-Wt 311.07; Env-Wt 313.01(a)(1)b; Env-Wt 313.01(c)

APPLICANT'S NAME: Terry Demarais, PE, City of Portsmouth **TOWN NAME:** Portsmouth

An applicant for a standard permit shall submit with the permit application a written narrative that explains how all impacts to functions and values of all jurisdictional areas have been avoided and minimized to the maximum extent practicable. This attachment can be used to guide the narrative (attach additional pages if needed). Alternatively, the applicant may attach a completed Avoidance and Minimization Checklist (NHDES-W-06-050) to the permit application.

SECTION 1 - WATER ACCESS STRUCTURES (Env-Wt 311.07(b)(1))

Is the primary purpose of the proposed project to construct a water access structure?

The primary purpose of this project does not involve a water access structure.

SECTION 2 - BUILDABLE LOT (Env-Wt 311.07(b)(1))

Does the proposed project require access through wetlands to reach a buildable lot or portion thereof?

The proposed project does not require access through wetlands to reach a buildable lot.

SECTION 3 - AVAILABLE PROPERTY (Env-Wt 311.07(b)(2))*

For any project that proposes permanent impacts of more than one acre, or that proposes permanent impacts to a PRA, or both, are any other properties reasonably available to the applicant, whether already owned or controlled by the applicant or not, that could be used to achieve the project's purpose without altering the functions and values of any jurisdictional area, in particular wetlands, streams, and PRAs?

**Except as provided in any project-specific criteria and except for NH Department of Transportation projects that qualify for a categorical exclusion under the National Environmental Policy Act.*

The proposed project has impacts to the developed and undeveloped tidal buffer zone. The project is intended to provide improvements to the access road to the Wastewater Treatment Facility, public access to the island, extend the existing walking path located within the tidal buffer zone, replace sewer force and water mains, and work to avoid unexpected pipeline failure. No other property can provide access to the island. Improvements to the road necessarily must take place on this property as it is the sole property providing access to the Wastewater Treatment Facility. The parking area is intended for public access to recreational opportunities on this end of Peirce Island, and would be ineffective on adjacent other city-owned properties. Installation of the sewer force and water mains will improve the reliability of the City's wastewater collection system, maximize flow to the WWTF, and allow removal of the temporary, above ground force main currently in use. The sewer force main under Peirce Island Road Bridge is showing signs of corrosion; sliplining it will help avoid unexpected failure of this pipeline.

SECTION 4 - ALTERNATIVES (Env-Wt 311.07(b)(3))

Could alternative designs or techniques, such as different layouts, different construction sequencing, or alternative technologies be used to avoid impacts to jurisdictional areas or their functions and values as described in the Wetlands Best Management Practice Techniques For Avoidance and Minimization?

The proposed project includes a walking trail extending from an existing trail located within the tidal buffer zone. The Wastewater Treatment Facility limits the location of the path within the tidal buffer zone. The path is located at the site of an existing informal path, and it thus requires the least disturbance to the site of any possible alternative path location. This path configuration also requires the least amount of grading of any potential path configuration. Placement of the raised road maximizes use of its present configuration and will also result in lower impacts than any other placement. The parking area will result in a net improvement to existing conditions. The installation of the new sewer force and water mains, as well as the sliplining of the sewer force main under the bridge, are in situ.

SECTION 5 - CONFORMANCE WITH Env-Wt 311.10(c) (Env-Wt 311.07(b)(4))**

How does the project conform to Env-Wt 311.10(c)?

***Except for projects solely limited to construction or modification of non-tidal shoreline structures only need to complete relevant sections of Attachment A.*

The trail portions of the project have been sited at the maximum practicable distance from the tidal wetland (rocky shore). The road will be co-located with the existing road to minimize new impacts, and the parking area is located in a previously degraded tidal buffer and will result in an improvement to current conditions. The sewer force and water main installations and sliplining of the sewer force main under the bridge are sited at pre-existing locations of infrastructure associated with the WWTF.

EXHIBIT 25

COASTAL RESOURCE WORKSHEET AS REQUIRED BY ENV-WT 600

(ALSO SEE EXHIBIT 7 – PROJECT NARRATIVE)

COASTAL RESOURCE WORKSHEET

Water Division/Land Resources Management
Wetlands Bureau

Check the Status of your Application

RSA/Rule: RSA 482-A/ Env-Wt 600

APPLICANT LAST NAME, FIRST NAME, M.I.: Desmarais, Terry, PE, City of Portsmouth

This worksheet may be used to present the information required for projects in coastal areas, in addition to the information required for Lower-Scrutiny Approvals, Expedited Permits, and Standard Permits under Env-Wt 603.01.

Please refer to Env-Wt 605.03 for impacts requiring compensatory mitigation.

SECTION 1 - REQUIRED INFORMATION (Env-Wt 603.02; Env-Wt 603.06; Env-Wt 603.09)

The following information is required for projects in coastal areas.

Describe the purpose of the proposed project, including the overall goal of the project, the core project purpose consisting of a concise description of the facilities and work that could impact jurisdictional areas, and the intended project outcome. Specifically identify all natural resource assets in the area proposed to be impacted and include maps created through a data screening in accordance with Env-Wt 603.03 (refer to Section 2) and Env-Wt 603.04 (refer to Section 3) as attachments.

The City of Portsmouth is nearing completion of a major upgrade to the Peirce Island Wastewater Treatment Facility (WWTF; DES Wetland Permits 2015-1866 and 2015-1878). Several additional improvements are proposed to enhance access reliability to the WWTF, and the public's access to the island. These improvements include raising the access road approximately 3 feet at its lowest point to elevate it above the 100-year flood line and to address sea level rise; converting a former informal public parking area and permitted snow dump, currently used as the Project's construction laydown area, to a formal grassed public parking area and natural lands; and extending a public recreational trail around the northeastern perimeter of the island. At the same time, the City is planning to permanently replace the two sewer force mains on Peirce Island between the Peirce Island Road Bridge and the Peirce Island WWTF, replace the water main on Peirce Island between the Peirce Island Road Bridge and the Peirce Island Pool, and slipline one of the force mains under the Peirce Island Road Bridge. The majority of the work lies within Previously Developed Tidal Buffer Zone (TBZ).

The specifics of the project and a detailed description of the Tidal Buffer Zone and surrounding natural resources are included in Exhibit 7 - Project Narrative.

For standard permit projects, provide:

☒ A Coastal Functional Assessment (CFA) report in accordance with Env-Wt 603.04 (refer to Section 3).

☒ A vulnerability assessment in accordance with Env-Wt 603.05 (refer to Section 4).

Explain all recommended methods and other considerations to protect the natural resource assets during and as a result of project construction in accordance with Env-Wt 311.07, Env-Wt 313, and Env-Wt 603.04.

All impacts are confined to the Tidal Buffer Zone. No impacts to tidal wetlands or waters, including the rocky shore, salt marshes, or *Iva frutescens* (a NH Threatened species) are anticipated. Runoff from the road will be directed into the grassed parking area for sediment, nutrient and contaminant removal before draining as sheetflow to the south into Portsmouth Harbor. The existing walking trail north of the road will be maintained, and a narrow buffer of stone and upland plantings is proposed between the trail and the road to protect the road from high water and wave action during storms.

See additional detail in Exhibit 7 - Project Narrative.

Provide a narrative showing how the project meets the standard conditions in Env-Wt 307 and the approval criteria in Env-Wt 313.01.

The appropriate standard conditions and approval criteria are provided in Exhibit 7 - Project Narrative.

Provide a project design narrative that includes the following:

☒ A discussion of how the proposed project:

- Uses best management practices and standard conditions in Env-Wt 307;
- Meets all avoidance and minimization requirements in Env-Wt 311.07 and Env-Wt 313.03;
- Meets approval criteria in Env-Wt 313.01;
- Meets evaluation criteria in Env-Wt 313.01(c);
- Meets CFA requirements in Env-Wt 603.04; and
- Considers sea-level rise and potential flooding evaluated pursuant to Env-Wt 603.05;

☒ A construction sequence, erosion/siltation control methods to be used, and a dewatering plan; and

☒ A discussion of how the completed project will be maintained and managed.

Upon completion the project will be maintained as part of the City's Department of Public Works management of lands.

☒ Provide design plans that meet the requirements of Env-Wt 603.07 (refer to Section 5);

☒ Provide water depth supporting information required by Env-Wt 603.08 (refer to Section 6); and

☐ For any major project that proposes to construct a structure in tidal waters/wetlands or to extend an existing structure seaward, provide a statement from the Pease Development Authority Division of Ports and Harbors (DP&H) chief harbormaster, or designee, for the subject location relative to the proposed structure's impact on navigation. If the proposed structure might impede existing public passage along the subject shoreline on foot or by non-motorized watercraft, the applicant shall explain how the impediments have been minimized to the greatest extent practicable.

Not applicable.

SECTION 2 - DATA SCREENING (Env-Wt 603.03, in addition to Env-Wt 306.05)

Please use the Wetland Permit Planning Tool, or any other database or source, to indicate the presence of:

☒ Existing salt marsh and salt marsh migration pathways;

☒ Eelgrass beds;

☒ Documented shellfish sites;

☒ Projected sea-level rise; and

☒ 100-year floodplain.

Conduct data screening as described to identify documented essential fish habitat, and tides and currents that may be impacted by the proposed project, by using the following links:

☒ National Oceanic and Atmospheric Administration (NOAA) Tides & Currents; and

☒ NOAA Essential Fish Habitat Mapper.

☒ Verify or correct the information collected from the data screenings by conducting an on-site assessment of the subject property in accordance with Env-Wt 406 and Env-Wt 603.04.

SECTION 3 - COASTAL FUNCTIONAL ASSESSMENT/ AVOIDANCE AND MINIMIZATION (Env-Wt 603.04; Env-Wt 605.01; Env-Wt 605.02; Env-Wt 605.03)

Projects in coastal areas shall:

☒ Not impair the navigation, recreation, or commerce of the general public; and

☒ Minimize alterations in prevailing currents.

An applicant for a permit for work in or adjacent to tidal waters/wetlands or the tidal buffer zone shall demonstrate that the following have been avoided or minimized as required by Env-Wt 313.04:

☒ Adverse impacts to beach or tidal flat sediment replenishment;

☒ Adverse impacts to the movement of sediments along a shore;

☒ Adverse impacts on a tidal wetland's ability to dissipate wave energy and storm surge; and

☒ Adverse impacts of project runoff on salinity levels in tidal environments.

For standard permit applications submitted for minor or major projects:

☒ Attach a CFA based on the data screening information and on-site evaluation required by Env-Wt 603.03. The CFA for tidal wetlands or tidal waters shall be:

- Performed by a qualified coastal professional; and
- Completed using one of the following methods:

  a. The US Army Corps of Engineers (USACE) Highway Methodology Workbook, dated 1993, together with the USACE New England District *Highway Methodology Workbook Supplement*, dated 1999; or

  b. An alternative scientifically-supported method with cited reference and the reasons for the alternative method substantiated.

For any project that would impact tidal wetlands, tidal waters, or associated sand dunes, the applicant shall:

☒ Use the results of the CFA to select the location of the proposed project having the least impact to tidal wetlands, tidal waters, or associated sand dunes;

☒ Design the proposed project to have the least impact to tidal wetlands, tidal waters, or associated sand dunes;

☒ Where impact to wetland and other coastal resource functions is unavoidable, limit the project impacts to the least valuable functions, avoiding and minimizing impact to the highest and most valuable functions; and

☒ Include on-site minimization measures and construction management practices to protect coastal resource areas.

Projects in coastal areas shall use results of this CFA to:

☒ Minimize adverse impacts to finfish, shellfish, crustacean, and wildlife;

☒ Minimize disturbances to groundwater and surface water flow;

☒ Avoid impacts that could adversely affect fish habitat, wildlife habitat, or both; and

☒ Avoid impacts that might cause erosion to shoreline properties.

SECTION 4 - VULNERABILITY ASSESSMENT (Env-Wt 603.05)

Refer to the New Hampshire Coastal Flood Risk Summary Part 1: Science and New Hampshire Coastal Flood Risk Summary Part II: Guidance for Using Scientific Projections or other best available science to:

Determine the time period over which the project is designed to serve.

The useful life of the Peirce Island Wastewater Treatment Facility structures are 50 years, however upgrades to major components of treatment works are typically performed every 20 to 30 years as identified in the 2016 revision of TR-16 Guides for the Design of Wastewater Treatment Works. In consideration of the WWTF's next major upgrade and varying projections for sea level rise, the proposed roadway improvements are based on an "incremental action point" at 2050 (30 year design period).

Identify the project's relative risk tolerance to flooding and potential damage or loss likely to result from flooding to buildings, infrastructure, salt marshes, sand dunes and other valuable coastal resource areas.

The road providing access to the WWTF currently floods several times a year at its low point in the proposed project area and is at risk of wave wash-over from the north side (Piscataqua River), which has the potential to cause erosion and undermine the existing road. Thus, the road is considered to have a low relative flood risk tolerance. The road also provides access to critical infrastructure at the WWTF, allowing operations and maintenance access to continue during storms and high water.

The proposed parking area (current laydown area) has a moderate risk tolerance as no structural damage from flooding is likely.

The proposed sewer force and water main installations have a high risk tolerance as these installations will be buried and will not be located close to high risk areas. The pipe to be sliplined under the Peirce Island Rd. Bridge has a high risk tolerance because its elevation is well above the projected flood zone. The walking path extension also has a high risk tolerance because its elevation is well above the projected flood zone and it is a minor landscape feature.

The salt marshes on the south side of the island in the project vicinity, including the stand of *Iva frutescens*, have a high risk tolerance since they can survive prolonged flooding by seawater and are protected from the higher-impact fetch and wave action generated on the north side.

Reference the projected sea-level rise (SLR) scenario that most closely matches the end of the project design life and the project's tolerance to risk or loss.

TR-16 recommends that wastewater works be designed for flood levels 2-3 feet above the current 100 flood elevation to address "storm surge, wave action and anticipated sea-level rise". The proposed access road improvements have been designed to be at least 3 feet above the current 100 year flood elevation which provides a conservative approach for the 30 year incremental action point.

The proposed roadway elevation also addresses sea-level analysis specific to the New Hampshire seacoast for the 30 year incremental action point. The anticipated 2050 sea-level rise (SLR) at this location is approximately 0.9 feet, based on the RCP4.5 projection (1.15 feet) and the Corps' intermediate sea level rise projection (0.6 feet). The calculations for this work were performed by a coastal engineer, based on the RCP 4.5 projection curve, which anticipates a 3.0' rise at this location by 2100. See attached memorandum re "Coastal Resiliency Basis of Design".

Identify areas of the proposed project site subject to flooding from SLR.

Much of the work area for the road, sewer force and water mains, and parking area currently lies within the predicted 9.0 foot elevation for RSLR at 2050. After construction, all of the road will be elevated above that contour.

Identify areas currently located within the 100-year floodplain and subject to coastal flood risk.

The current FEMA flood map for this site has the 100 year flood elevation at 9 feet NGVD29. The more precise NOAA 100-year flood elevation for 2018 based on tide data is 8.1 feet NAVD88 from the datum for the nearby Seavey Island, Maine (Portsmouth Naval Shipyard). Approximately 12,650 square feet of the road and parking area lie below elevation 8.1 (see Exhibit 5, Sheet C-001).

Describe how the project design will consider and address the selected SLR scenario within the project design life, including in the design plans.

The project proposes to raise the road approximately 3 feet at its lowest elevation, to bring it to Elev. 11.24 NAVD88 (see Exhibit 5, Sheet C-001). This will raise the road approximately 3 feet above the current 100 year floodplain and 2 feet above the projected 100-year floodplain for 2050 (Elev. 8.9). The northern edge of the road will be a 3:1 slope of a mix of stone and vegetation, approximately 2.5 feet high. Seaward of the toe of slope, the existing path and vegetation will remain intact.

The parking area will be sloped down to Elev 8.0 to minimize filling. Permeable grass and concrete-grass pavers will improve water quality of the parking area over its current packed gravel condition. Minimal fill (80 cubic yards) is proposed in the existing floodplain. The pipeline work area, including the bridge crossing, is entirely above the 100-year floodplain for 2100.

The proposed recreational path extension is entirely above the floodplain, at a minimum elevation of 27 feet NAVD88.

Where there are conflicts between the project's purpose and the vulnerability assessment results, schedule a pre-application meeting with the department to evaluate design alternatives, engineering approaches, and use of the best available science.

☐ Pre-application meeting date held: N/A

SECTION 5 - DESIGN PLANS (Env-Wt 603.07, in addition to Env-Wt 311)

Submit design plans for the project in both plan and elevation views that clearly depict and identify all required elements.

The plan view shall depict the following:

☒ The engineering scale used, which shall be no larger than one inch equals 50 feet;

☒ The location of tidal datum lines depicted as lines with the associated elevation noted, based on North American Vertical Datum of 1988 (NAVD 88), derived from https://tidesandcurrents.noaa.gov/datum_options.html, as described in Section 6.

☒ An imaginary extension of property boundary lines into the waterbody and a 20-foot setback from those property line extensions;

☒ The location of all special aquatic sites at or within 100 feet of the subject property;

☒ Existing bank contours;

☒ The name and license number, if applicable, of each individual responsible for the plan, including:

a. The agent for tidal docking structures who determined elevations represented on plans; and

b. The qualified coastal professional who completed the CFA report and located the identified resources on the plan;

☒ The location and dimensions of all existing and proposed structures and landscape features on the property;

☒ Tidal datum(s) with associated elevations noted, based on NAVD 88; and

☒ Location of all special aquatic sites within 100-feet of the property.

The elevation view shall depict the following:

☒ The nature and slope of the shoreline;

☒ The location and dimensions of all proposed structures, including permanent piers, pilings, float stop structures, ramps, floats, and dolphins; and

☒ Water depths depicted as a line with associated elevation at highest observable tide, mean high tide, and mean low tide, and the date and tide height when the depths were measured. Refer to Section 6 for more instructions regarding water depth supporting information.

See specific design and plan requirements for certain types of coastal projects:

- Overwater structures (Env-Wt 606).
- Dredging activities (Env-Wt 607).
- Tidal shoreline stabilization (Env-Wt 609).
- Protected tidal zone (Env-Wt 610).

- Tidal beach maintenance (Env-Wt 608).
- Sand Dunes (Env-Wt 611).

SECTION 6 - WATER DEPTH SUPPORTING INFORMATION REQUIRED (Env-Wt 603.08)

Using current predicted NOAA tidal datum for the location, and tying field measurements to NAVD 88, field observations of at least three tide events, including at least one minus tide event, shall be located to document the range of the tide in the proposed location showing the following levels:

☒ Mean lower low water;
☒ Mean low water;
☒ Mean high water;
☒ Mean tide level;
☒ Mean higher high water;
☒ Highest observable tide line; and
☒ Predicted sea-level rise as identified in the vulnerability assessment in Env-Wt 603.05.

The following data shall be presented in the application project narrative to support how water depths were determined:

☐ The date, time of day, and weather conditions when water depths were recorded; and
☐ The name and license number of the licensed land surveyor who conducted the field measurements.

For tidal stream crossing projects, provide:

☐ Water depth information to show how the tier 4 stream crossing is designed to meet Env-Wt 904.07(c) and (d).

For repair, rehabilitation or replacement of tier 4 stream crossings:

☐ Demonstrate how the requirements of Env-Wt 904.09 are met.

SECTION 7 - GENERAL CRITERIA FOR TIDAL BEACHES, TIDAL SHORELINE, AND SAND DUNES (Env-Wt 604.01)

Any person proposing a project in or on a tidal beach, tidal shoreline, or sand dune, or any combination thereof, shall evaluate the proposed project based on:

☐ The standard conditions in Env-Wt 307;
☐ The avoidance and minimization requirements in Env-Wt 311.07 and Env-Wt 313.03;
☐ The approval criteria in Env-Wt 313.01;
☐ The evaluation criteria in Env-Wt 313.05;
☐ The project specific criteria in Env-Wt 600;
☐ The CFA required by Env-Wt 603.04; and
☐ The vulnerability assessment required by Env-Wt 603.05.

Section 7 does not apply.

New permanent impacts to sand dunes that provide coastal storm surge protection for protected species or habitat shall not be allowed except:

☐ To protect public safety; and
☐ Only if constructed by a state agency, coastal resiliency project, or for a federal homeland security project.

Projects in or on a tidal beach, tidal shoreline, or sand dune shall support integrated shoreline management that:

☐ Optimizes the natural function of the shoreline, including protection or restoration of habitat, water quality, and self-sustaining stability to flooding and storm surge; and

☐ Protects upland infrastructure from coastal hazards with a preference for living shorelines over hardened shoreline practices.

SECTION 8 - GENERAL CRITERIA FOR TIDAL BUFFER ZONES (Env-Wt 604.02)

The 100-foot statutory limit on the extent of the tidal buffer zone shall be measured horizontally. Any person proposing a project in or on an undeveloped tidal buffer zone shall evaluate the proposed project based on:

☒ The standard conditions in Env-Wt 307;

☒ The avoidance and minimization requirements in Env-Wt 311.07 and Env-Wt 313.03;

☒ The approval criteria in Env-Wt 313.01;

☒ The evaluation criteria in Env-Wt 313.05;

☒ The project specific criteria in Env-Wt 600;

☒ The CFA required by Env-Wt 603.04; and

☒ The vulnerability assessment required by Env-Wt 603.05.

Projects in or on a tidal buffer zone shall preserve the self-sustaining ability of the buffer area to:

☒ Provide habitat values;

☒ Protect tidal environments from potential sources of pollution;

☒ Provide stability of the coastal shoreline; and

☒ Maintain existing buffers intact where the lot has disturbed area defined under RSA 483-B:4, IV.

SECTION 9 - GENERAL CRITERIA FOR TIDAL WATERS/WETLANDS (Env-Wt 604.03)

Except as allowed under Env-Wt 606, permanent new impacts to tidal wetlands shall be allowed only to protect public safety or homeland security. Evaluation of impacts to tidal wetlands and tidal waters shall be based on:

☐ The standard conditions in Env-Wt 307;

☐ The avoidance and minimization requirements in Env-Wt 311.07 and Env-Wt 313.03;

☐ The approval criteria in Env-Wt 313.01;

☐ The evaluation criteria in Env-Wt 313.05;

☐ The project specific criteria in Env-Wt 600;

☐ The CFA required by Env-Wt 603.04; and

☐ The vulnerability assessment required by Env-Wt 603.05.

Section 9 does not apply.

Projects in tidal surface waters or tidal wetlands shall:

☐ Optimize the natural function of the tidal wetland, including protection or restoration of habitat, water quality, and self-sustaining stability to storm surge;

☐ Be designed with a preference for living shorelines over hardened stabilization practices; and

☐ Be limited to public infrastructure or restoration projects that are in the interest of the general public, including a road, a bridge, energy infrastructure, or a project that addresses predicted sea-level rise and coastal flood risk.

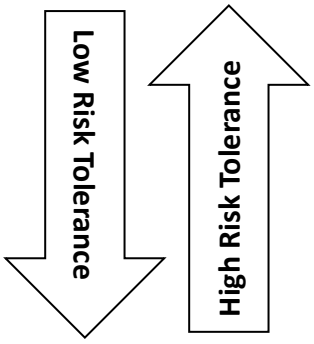
SECTION 10 – GUIDANCE

Your application must follow the New Hampshire Coastal Risk and Hazards Commission's Guiding Principles or other best available science. Below are some of these guidance principles:

- Incorporate science-based coastal flood risk projections into planning;
- Apply risk tolerance* to assessment, planning, design, and construction;
- Protect natural resources and public access;
- Create a bold vision, start immediately, and respond incrementally and opportunistically as projected coastal flood risks increase over time; and
- Consider the full suite of actions including effectiveness and consequences of actions.

*Risk tolerance is a project's willingness to accept a higher or lower probability of flooding impacts. The diagram below gives examples of project with lower and higher risk tolerance:

Critical infrastructures, historic sites, essential ecosystems, and high value assets typically have lower risk tolerance, and thus should be planned, designed, and constructed using higher coastal flood risk projections.



Sheds, pathways, and small docks typically have higher risk tolerance and thus may be planned, designed, and constructed using less protective coastal flood risk projections.

CIVILWORKS NEW ENGLAND

181 WATSON ROAD

P.O. BOX 1166

DOVER, NH 03821-1166

PHONE: 603.749.0443 FAX : 603.749.7348

MEMORANDUM

Date: February 12, 2021

To: Eric Weinrieb, PE

Altus Engineering, Inc.

From: Duncan Mellor, PE
Principal Coastal Engineer

Re: Peirce Island WWTF Access Road Coastal Resiliency Basis of Design

The wastewater treatment facility (WWTF) access road crosses a low area on Peirce Island before rising to the higher elevation of the treatment plant. The access road here is proposed to be raised to maintain facility access during storm surges and in anticipation of sea level rise over time. This low area section of road is adjacent to the main Piscataqua channel with a wind wave fetch of 3,000' from Badgers Island.

WAVE CONDITIONS:

A typical engineering design code for wind criteria is a reference by the American Society of Civil Engineers, ASCE 7-10, which includes maps showing design wind speed (3 second gust, 7% probability of exceedance in 50 years) in the US. This design wind speed when used for wave generation is reduced to remove the added load factor and adjusted down to fit the minimum wind duration to grow these waves to fully developed waves for the wind fetch and water depth. Transforming the wave into shore/shallows gives a 2.6' breaking wave (far in excess of limits for vegetated shoreline). For riprap sizing the W_{50} mean size is 170# (about 1.2' dimension), based on a 2:1 slope. Minimum toe stone size is 230# (about 1.5' size). From a public safety, walking on the rocks standpoint, larger stone is generally more stable when properly set.

Per the NOAA Seavey Island extreme tides data (surge without wave action), the 100-yr flood level is EL 8.1' NAVD88 for 2018 (latest data), which does match the FEMA AE zone elevation of EL 8' NAVD88. With a surge and wave action you may still get some waves washing over the road with wave runup to EL 10.2' with no future sea level rise allowance.

As the wave fetch from Badger's Island would be a northwesterly wind, this design wave condition might not occur during extreme storm surges in a Northeaster or hurricane.

Design guides for alternative road edge wave erosion protection included *Living Shorelines: The Science and Management of Nature-Based Coastal Protection*[1]. Chapter 11 discusses living/planted shoreline design, and multiple cited references indicate a maximum wave height for salt marsh without toe stone berm armoring, is about a 1 foot wave. As the site design wave condition significantly exceed 1 foot, and wave breaking on the shore is expected, some level of stone armoring is needed to ensure that access to the WWTF survives storm conditions.

The State of New Jersey has a well written living shoreline guideline[2] that provides recommended sill stone sizes as a function of wind fetch length (design wind speed and duration not mentioned). For this site with a 0.6 mile fetch, they recommend 300 to 900 pound stones with 1.4' to 2.0' size. This is in good agreement with the site specific wave forecasting and revetment stone sizing performed.

Wave runup, with and without sea level rise projections, will overtop a stone sill/berm if utilized as a toe for a planted slope. There are several well recognized coastal engineering guidelines that indicate bioengineered slopes at this site will fail due to wave action overtopping the seawall.

The Army Corps of Engineers EM-1110-2-1100[3] for grassed sea dikes subject to wave action will have no damage at overtopping of 0.001 cfs/LF (0.6 cups of water per 5 seconds/LF of embankment). Damage will begin at overtopping rates between 0.01 and 0.1 cfs/LF (1 foot of erosion per hour).

Practical case study experience in Europe has been incorporated into EurOtop software[4]. Table 3.1 in the EurOtop manual for calculating wave overtopping volumes provides a discharge limit of 0.001 (cfs/LF) for grass covered slopes. For this site the wave forecasting and runup in storm events and with sea level rise allowance, indicate that stone armoring is needed up to road surface elevation due to wave overtopping.

ROAD ELEVATION & RESILIENCY:

TR-16 Guides for the Design of Wastewater Treatment Works (2016 rev)[5] is a standard for evaluation and design of wastewater treatment facilities with general guidance for coastal resiliency provisions and climate change. The TR-16 coastal resilience allowances follow the former Obama Executive Order that federally funded projects be designed for flood resistance to 2 or 3 feet above the FEMA 100 yr flood (1% annual chance) elevation depending on how critical the structure is to maintaining service. The FEMA flood hazard elevations do not currently include provisions for future sea level rise, so TR-16 added elevation increase allowances for climate change flood protection design extending 2 or 3

feet above the FEMA 100 yr flood elevation, based on how critical the structure is to the facility function. The FEMA flood map for this site has the 100 year flood elevation (AE zone) at 8 feet NAVD88 datum, following FEMA policy to only provide flood elevations to the nearest foot. The more precise NOAA 100-year flood elevation for 2018 based on tide data is 8.1 feet NAVD88 datum for the adjacent Seavey Island, Maine (Portsmouth Naval Shipyard across the channel).

TR-16 recommends that future sea level rise allowances are added to existing flood study elevations. TR-16 provides generalized added freeboard allowances for sea level rise, however these design criteria do not include a timeline for design life and do not consider site-specific considerations[6].

The Portsmouth Harbor NOAA tide station (Seavey Island) has extensive data gaps (years) where no data were collected. The NOAA tide station in Portland, Maine, however does have observed tide levels with over 100 years of data. The Portland tide station has sea level record since 1912 with an average rise of 1.89+/- 0.14 mm/year at 95% confidence. Looking at the Portland tide data over the last 38 years (two tidal epochs) the rate of sea level rise is about 2.6 mm/year (with a larger standard deviation). It is reasonable to use this 2.6 mm/year (10 inches /100 years) rise rate as a lower limit of anticipated sea level rise near term.

There are recent reports presenting projections for accelerating sea level rise caused by global warming. The latest federal government guide is 2017 NOAA Tech Report 083[7,] Sweet et.al. with tabulated values for relative sea level every 10 years starting in the year 2000, with consideration of land/earth crust vertical movement at selected tide gauge cities, and changes in local sea level including by gravitational changes associated with anticipated ice cap melting. This NOAA report does provide eighteen different decadal projections for local sea level rise at Portland, Maine, but did not relate these to the carbon emissions Representative Concentration Pathway (RCP) models developed by the Intergovernmental Panel on Climate Change (IPCC). Interpolation between the NOAA projection values for RCP4.5 sea level rise values, is plotted in green on Figure 1. The RCP4.5 interpolation between NOAA curves for Portland, indicates about 2.5 feet of sea level rise by year 2100. It is apparent that the actual observed rates of sea level rise from tide data in Portland, from a global average to 20 distributed tide stations and from satellite altimetry measurements (global), that the actual rate of sea level rise is significantly less than the NOAA report projected rate of rise. For early 2020, the NOAA projection curve which started in year 2000, is about 2.7 inches higher than observations and the trends are diverging. Thus the RCP4.5 carbon model and associated global warming sea level rise are not supported by observed data for Maine and New Hampshire.

The US Army Corps of Engineers sea level rise projection curves are shown in yellow and red in Figure 1. The “high” red curve has already diverged from observations. The

"intermediate" yellow curve has much better agreement with observations to date, and suggests 1.6 feet of sea level rise by 2100 above 1992 sea level.

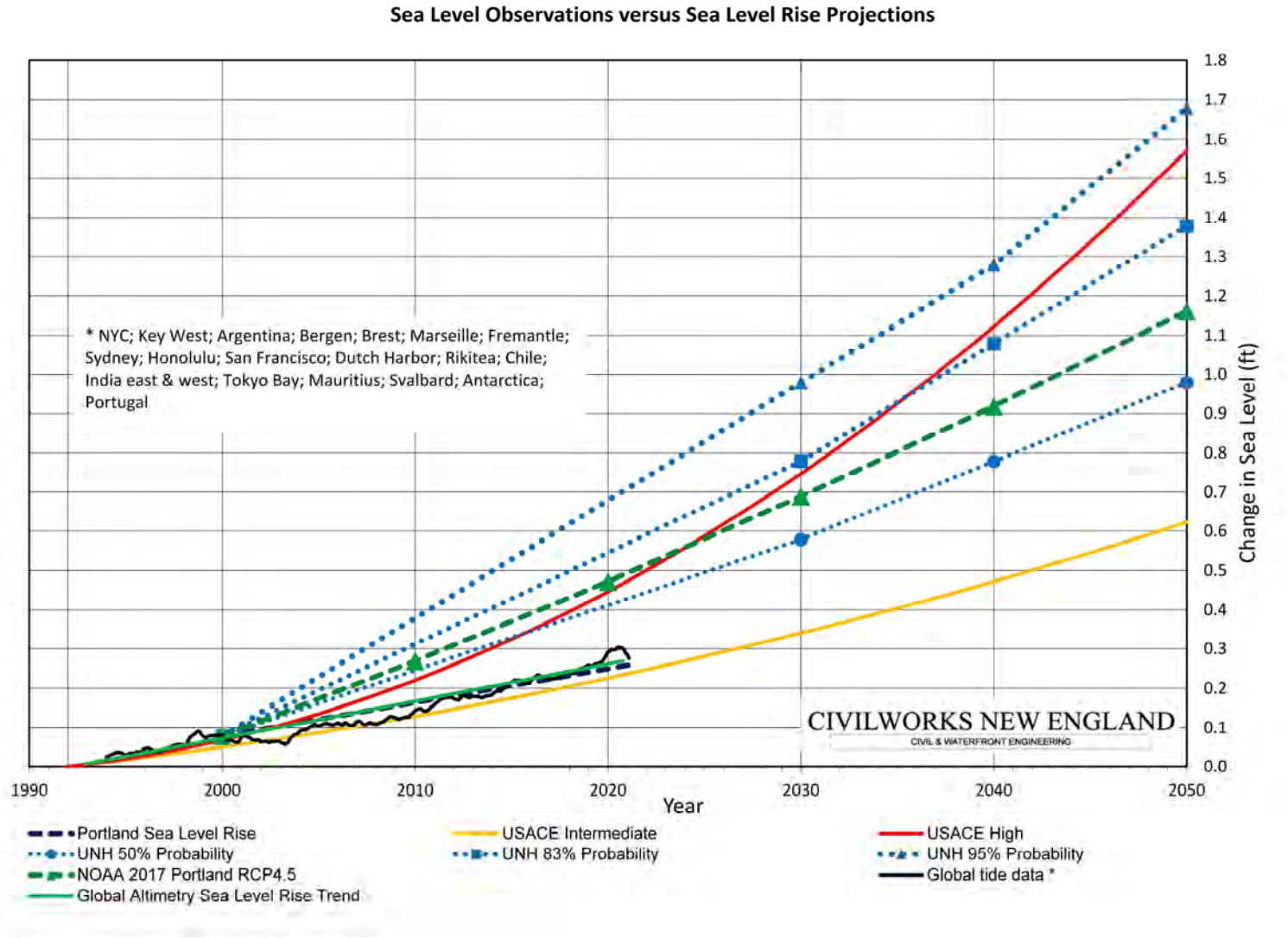


Figure 1 Comparison of Sea Level Rise Projections to Observations

The University of New Hampshire (UNH) issued a two part report *New Hampshire Coastal Flood Risk Summary*[9] in 2019 and 2020, which has been adopted by the state of New Hampshire and is the recommended policy in regulatory permitting by the NH Department of Environmental Services. Both the NOAA projections and the UNH projections use sea level rise projections starting from a sea level in the year 2000, developed by Kopp et. al. (2014)[10]. The UNH report does list probabilities for multiple sea level rise curves, using different probabilities for different projects tolerance for risk. It is important to understand

that these probabilities are Bayesian probabilities, based on future expectations, not traditional probabilities calculated from observational data, such as FEMA flood levels.

The 50% UNH probability sea level rise curve (lower dotted blue line) is plotted from the UNH Part I science report, and it is not used in the Part II guidance report. The Part II guidance report uses the 83% probability curve for the low end of design for projects with a high tolerance for sea level rise. The 95% probability curve is recommended for design of projects with a medium tolerance for sea level rise. UNH does recommend higher 99% and 99.9% probability curves, recommended for design of projects with low and very low tolerance for sea level rise, however these were not plotted given the greater divergence from observed data. For early 2020, the UNH 83% projection curve is about 3.5 inches higher than observations, for UNH 95% projection curve is about 5.2 inches higher than observations and both trends are diverging. The UNH guidance projection curves are based on older rise projections and the UNH model was not calibrated in consideration of actual sea level rise observations and trend over the last 20 years. Since the UNH sea level rise projections are already significantly in higher than observations with a steeper rise trend, they are not recommended for project design.

The design guidance in TR-16 for 100 year flood level plus 3 feet of sea level rise allowance is reasonable and conservative relative to observations, relative to a NOAA RCP4.5 sea level rise projection and relative to the Army Corps of Engineers intermediate sea level rise projection until at least year 2100.

REFERENCES:

1 *Living Shorelines: The Science and Management of Nature-Based Coastal Protection,* CRC Press, 2017, ISBN 9781315151465.

2 *Living Shorelines Engineering Guidelines*, New Jersey Department of Environmental Protection, revised Feb., 2016, SIT-DL-14-9-2942.

3 EM-1110-2-1100, Part 6, Table VI-5-6, Coastal Engineering Manual, US Army Corps of Engineers 2011.

4 *EurOtop*, 2018. Manual on wave overtopping of sea defences and related structures. Van der Meer, J.W., Allsop, N.W.H., Bruce, T., De Rouck, J., Kortenhaus, A., Pullen, T., Schüttrumpf, H., Troch, P. and Zanuttigh, B.

5 *TR-16 Guides For The Design of Wastewater Treatment Works*, NEIWPCC, 2011 Ed., rev 2016.

6 *Coastal Flood Protection: TR-16 Criteria Versus Site Specific Analysis*, D. Mellor, NEWEA Journal, Summer 2020, Vol. 54, No. 2, ISSN 1077-3002.

7 *Global and Regional Sea Level Rise Scenarios for the United States*. NOAA Technical Report NOS CO-OPS 083, Sweet, W.V., R.E. Kopp, C.P. Weaver, J. Obeysekera, R.M. Horton, E.R. Thieler, and C. Zervas, NOAA/NOS Center for Operational Oceanographic Products and Services, 2017.

8 *Procedures to Evaluate Sea Level Change: Impacts, Responses, and Adaptation*, ETL 1100-2-1, June 30, 2014, US Army Corps of Engineers.

9 *New Hampshire Coastal Flood Risk Summary – Part I: Science; Part II: Guidance for Using Scientific Projections*, NH Coastal Flood Risk Science and Technical Advisory Panel (2020), Univ. of New Hampshire, 2019/2020.

10 *Probabilistic 21st and 22nd Century Sea-Level Projections at a Global Network of Tide Gauge Sites.* Earth's Future, Kopp, R.E., Horton, R.M., Little, C.M., Mitrovica, J.X., Oppenheimer, M., Rasmussen, D.J., Strauss, B.H., & Tebaldi, C. (2014).

C:\Users\Dmellor\Documents\Altus\WWTP\Memo Coastal Design Basis 2-16-21.Docx

TIDAL DATUM

Based on Seavey Island, ME - Datum, NAVD88

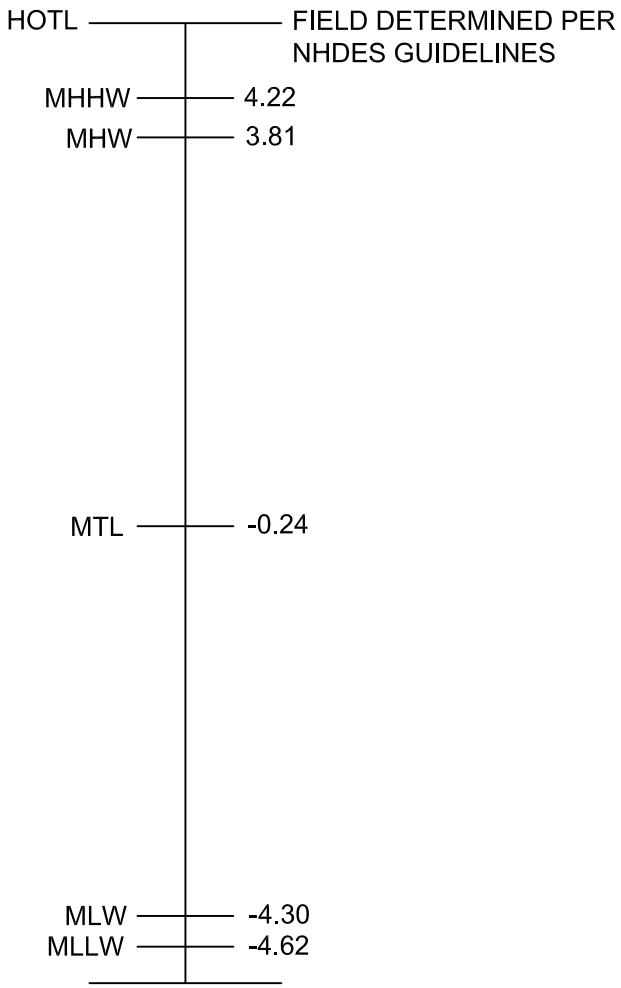
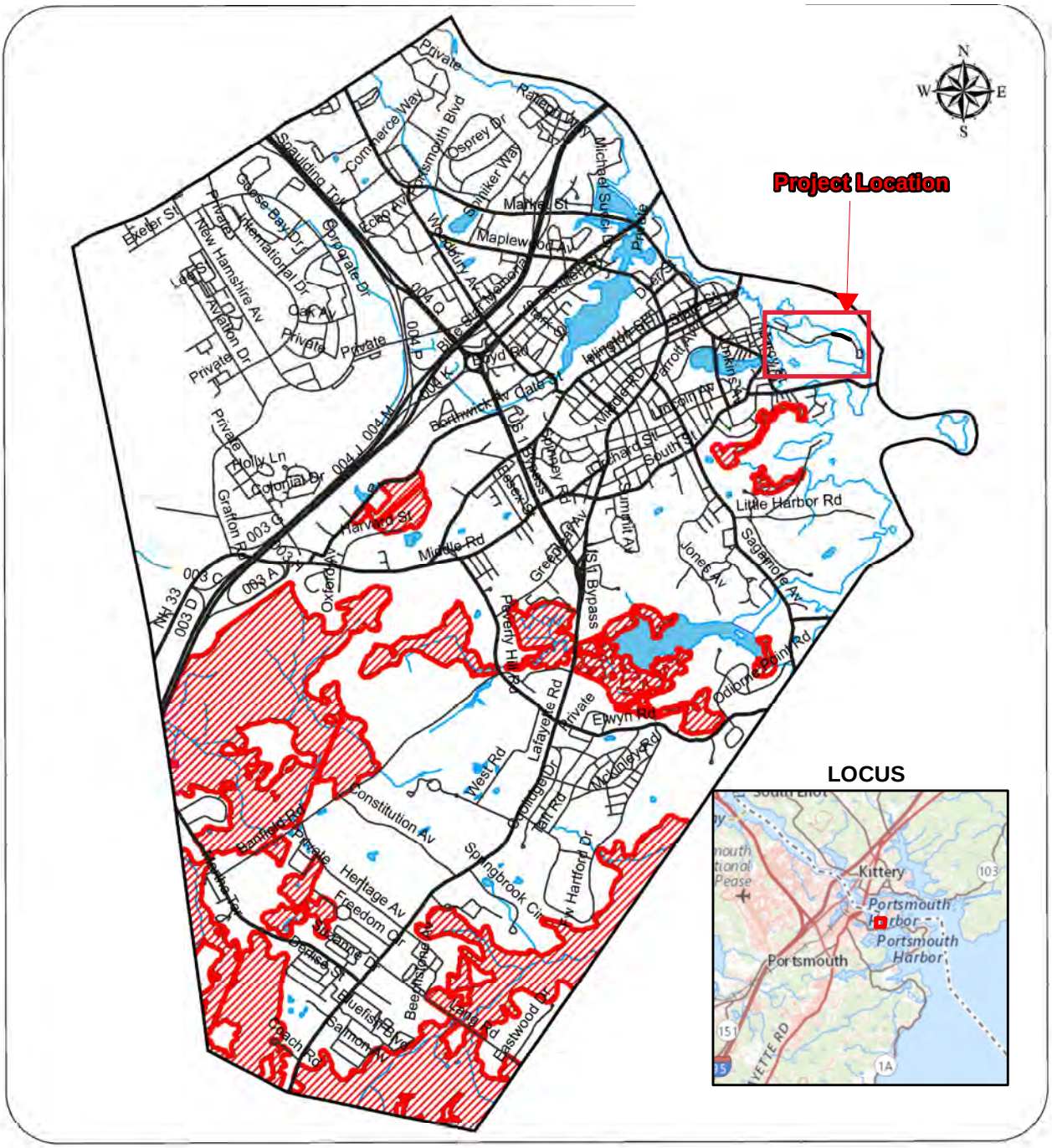


EXHIBIT 26

PRIME WETLANDS



Prime Wetlands in Portsmouth, NH

New Hampshire State Plane Coordinate System
North American Datum 1983 (feet)

The coverages presented are under constant revision as new sites or facilities are added, and may not contain all potential or existing sites or facilities. These maps were prepared using data supplied by the municipality and the information was digitized to the best of our ability. For prime wetland and prime wetland buffer locations for a specific site, please contact the municipal office where the project is proposed. NHDES is not responsible for the use or interpretation of this information by third parties.

New Hampshire Department of Environmental Services
Wetlands Bureau
29 Hazen Drive
P.O. Box 95
Concord, NH 03302-0095

DATE PRODUCED
October, 2012

EXHIBIT 27

ATTACHMENT A – MINOR AND MAJOR PROJECTS

STANDARD DREDGE AND FILL WETLANDS PERMIT APPLICATION ATTACHMENT A: MINOR AND MAJOR PROJECTS

Water Division/Land Resources Management
Wetlands Bureau

Check the Status of your Application

RSA/ Rule: RSA 482-A/ Env-Wt 311.10; Env-Wt 313.01(a)(1); Env-Wt 313.03

APPLICANT'S NAME: **Terry Demarais, PE** **TOWN NAME:** Portsmouth

Attachment A is required for *all minor and major projects*, and must be completed *in addition* to the Avoidance and Minimization Narrative or Checklist that is required by Env-Wt 307.11.

For projects involving construction or modification of non-tidal shoreline structures over areas of surface waters having an absence of wetland vegetation, only Sections I.X through I.XV are required to be completed.

PART I: AVOIDANCE AND MINIMIZATION

In accordance with Env-Wt 313.03(a), the Department shall not approve any alteration of any jurisdictional area unless the applicant demonstrates that the potential impacts to jurisdictional areas have been avoided to the maximum extent practicable and that any unavoidable impacts have been minimized, as described in the Wetlands Best Management Practice Techniques For Avoidance and Minimization.

SECTION I.I - ALTERNATIVES (Env-Wt 313.03(b)(1))

Describe how there is no practicable alternative that would have a less adverse impact on the area and environments under the Department's jurisdiction.

This project necessarily requires disturbance of a portion of Undeveloped Tidal Buffer Zone in which an unofficial trail will be converted to a walking path. The path connects existing trails located within the Undeveloped and Developed Tidal Buffer Zone and no alternative exists while providing shoreline views that are otherwise obstructed by the existing wastewater treatment facility. Additional work within the Developed Tidal Buffer Zone will be improvements to an existing road providing the sole access to the wastewater treatment facility; replacement of a gravel parking area with a pervious grass surface and vegetated buffer, resulting in improvements to existing environmental conditions; installation of new sewer force and water mains which will improve the reliability of the City's wastewater collection system, maximize flow to the WWTF, and allow removal of the temporary, above ground force main currently in use; and sliplining of one of the sewer force mains under the Peirce Island Road Bridge which will help avoid unexpected failure of the pipeline.

SECTION I.II - MARSHES (Env-Wt 313.03(b)(2))

Describe how the project avoids and minimizes impacts to tidal marshes and non-tidal marshes where documented to provide sources of nutrients for finfish, crustacean, shellfish, and wildlife of significant value.

No jurisdictional wetlands providing sources of nutrients for finfish, crustaceans, shellfish, and wildlife of significant value are being impacted as part of this project.

SECTION I.III - HYDROLOGIC CONNECTION (Env-Wt 313.03(b)(3))

Describe how the project maintains hydrologic connections between adjacent wetland or stream systems.

No hydrologic connections exist between adjacent wetland or stream systems within the area for this project.

SECTION I.IV - JURISDICTIONAL IMPACTS (Env-Wt 313.03(b)(4))

Describe how the project avoids and minimizes impacts to wetlands and other areas of jurisdiction under RSA 482-A, especially those in which there are exemplary natural communities, vernal pools, protected species and habitat, documented fisheries, and habitat and reproduction areas for species of concern, or any combination thereof.

There is no proposed impact to jurisdictional wetlands, exemplary natural communities, vernal pools, documented fisheries, and habitat and reproduction areas for species of concern. The environment to be impacted by this project is predominately Previously Disturbed Tidal Buffer Zone and a lesser amount of Undeveloped Tidal Buffer Zone.

There is a protected species, *Iva frutescens*, in the vicinity of the proposed grass parking area and the sewer force and water main replacements. NH Natural Heritage Bureau (NHNHB) has been consulted and has determined the parking area as planned will have no adverse impact on populations of this species. During installation of temporary sewer force mains in October, 2020 under Emergency Authorization 2020-02873, two areas of the adjacent marsh elder stands (*Iva frutescens*; NH State Threatened) were inadvertently impacted. After consultation with NHDES and NHNHB, several steps were prescribed by NHDES to mitigate the impacts. To prevent future impacts, construction fencing will be erected between the marsh elder stands and the work area prior to the start of work.

SECTION I.V - PUBLIC COMMERCE, NAVIGATION, OR RECREATION (Env-Wt 313.03(b)(5))

Describe how the project avoids and minimizes impacts that eliminate, depreciate or obstruct public commerce, navigation, or recreation.

There is no potential for impacts that would eliminate, depreciate, or obstruct public commerce in relation to this project. No businesses will be closed as a result of road construction, and the project will have a long term benefit to accessibility to the Peirce Island area and reliability of the WWTF. The project includes a recreational trail which will provide a public benefit to the community.

SECTION I.VI - FLOODPLAIN WETLANDS (Env-Wt 313.03(b)(6))

Describe how the project avoids and minimizes impacts to floodplain wetlands that provide flood storage.

The road and parking area improvements will result in 80 CY of fill in the coastal 100-year floodplain to raise the elevation of the road providing the only access to the wastewater treatment facility. This impact will have negligible effect on tidal elevations during storms, and will be mitigated by improvements to water quality by replacing the currently unvegetated sand and gravel substrate in the parking area with grassed pavers and a vegetated buffer to treat runoff from the parking area and stabilize the substrates.

SECTION I.VII - RIVERINE FORESTED WETLAND SYSTEMS AND SCRUB-SHRUB – MARSH COMPLEXES (Env-Wt 313.03(b)(7))

Describe how the project avoids and minimizes impacts to natural riverine forested wetland systems and scrub-shrub – marsh complexes of high ecological integrity.

There are no natural riverine forested wetland systems or scrub-shrub marsh complexes affected by the proposed project.

SECTION I.VIII - DRINKING WATER SUPPLY AND GROUNDWATER AQUIFER LEVELS (Env-Wt 313.03(b)(8))

Describe how the project avoids and minimizes impacts to wetlands that would be detrimental to adjacent drinking water supply and groundwater aquifer levels.

This project is located immediately upstream of the tidal system, thus impacts to the site will not affect drinking water supplies or groundwater aquifers.

SECTION I.IX - STREAM CHANNELS (Env-Wt 313.03(b)(9))

Describe how the project avoids and minimizes adverse impacts to stream channels and the ability of such channels to handle runoff of waters.

There are no stream channels in the area to be impacted by the project.

SECTION I.X - SHORELINE STRUCTURES - CONSTRUCTION SURFACE AREA (Env-Wt 313.03(c)(1))

Describe how the project has been designed to use the minimum construction surface area over surface waters necessary to meet the stated purpose of the structures.

There is no planned construction of shoreline structures for this project.

SECTION I.XI - SHORELINE STRUCTURES - LEAST INTRUSIVE UPON PUBLIC TRUST (Env-Wt 313.03(c)(2))

Describe how the type of construction proposed is the least intrusive upon the public trust that will ensure safe docking on the frontage.

There is no planned construction of shoreline structures for this project.

SECTION I.XII - SHORELINE STRUCTURES – ABUTTING PROPERTIES (Env-Wt 313.03(c)(3))

Describe how the structures have been designed to avoid and minimize impacts on ability of abutting owners to use and enjoy their properties.

There is no planned construction of shoreline structures for this project.

SECTION I.XIII - SHORELINE STRUCTURES – COMMERCE AND RECREATION (Env-Wt 313.03(c)(4))

Describe how the structures have been designed to avoid and minimize impacts to the public's right to navigation, passage, and use of the resource for commerce and recreation.

There is no planned construction of shoreline structures for this project.

SECTION I.XIV - SHORELINE STRUCTURES – WATER QUALITY, AQUATIC VEGETATION, WILDLIFE AND FINFISH HABITAT (Env-Wt 313.03(c)(5))

Describe how the structures have been designed, located, and configured to avoid impacts to water quality, aquatic vegetation, and wildlife and finfish habitat.

There is no planned construction of shoreline structures for this project.

SECTION I.XV - SHORELINE STRUCTURES – VEGETATION REMOVAL, ACCESS POINTS, AND SHORELINE STABILITY (Env-Wt 313.03(c)(6))

Describe how the structures have been designed to avoid and minimize the removal of vegetation, the number of access points through wetlands or over the bank, and activities that may have an adverse effect on shoreline stability.

There is no planned construction of shoreline structures for this project.

PART II: FUNCTIONAL ASSESSMENT
REQUIREMENTS Ensure that project meets the requirements of Env-Wt 311.10 regarding functional assessment (Env-Wt 311.04(j); Env-Wt 311.10).
FUNCTIONAL ASSESSMENT METHOD USED: This project does not have any direct impacts to wetlands or waters. The US Army Corps of Engineers highway methodology was used to evaluate the functions of the tidal wetlands adjacent to impacted Tidal Buffer Zone.
NAME OF CERTIFIED WETLAND SCIENTIST (FOR NON-TIDAL PROJECTS) OR QUALIFIED COASTAL PROFESSIONAL (FOR TIDAL PROJECTS) WHO COMPLETED THE ASSESSMENT: Sarah Allen, NH CWS 083
DATE OF ASSESSMENT: 04/07/2021
Check this box to confirm that the application includes a NARRATIVE ON FUNCTIONAL ASSESSMENT: ☒
For minor or major projects requiring a standard permit without mitigation, the applicant shall submit a wetland evaluation report that includes completed checklists and information demonstrating the RELATIVE FUNCTIONS AND VALUES OF EACH WETLAND EVALUATED. Check this box to confirm that the application includes this information, if applicable: ☒ Note: The Wetlands Functional Assessment worksheet can be used to compile the information needed to meet functional assessment requirements.

EXHIBIT 28

FUNCTIONAL ASSESSMENT WORKSHEET

WETLANDS FUNCTIONAL ASSESSMENT WORKSHEET

Water Division/Land Resource Management
Wetlands Bureau

Check the Status of your Application

RSA/Rule: RSA 482-A / Env-Wt 311.03(b)(10); Env-Wt 311.10

APPLICANT LAST NAME, FIRST NAME, M.I.: Terry Demarais, PE, City of Portsmouth

As required by Env-Wt 311.03(b)(10), an application for a standard permit for minor and major projects must include a functional assessment of all wetlands on the project site as specified in Env-Wt 311.10. This worksheet will help you compile data for the functional assessment needed to meet federal (US Army Corps of Engineers (USACE); if applicable) and NHDES requirements. Additional requirements are needed for projects in tidal area; please refer to the Coastal Area Worksheet (NHDES-W-06-079) for more information.

Both a desktop review and a field examination are needed to accurately determine surrounding land use, hydrology, hydroperiod, hydric soils, vegetation, structural complexity of wetland classes, hydrologic connections between wetlands or stream systems or wetland complex, position in the landscape, and physical characteristics of wetlands and associated surface waters. The results of the evaluation are to be used to select the location of the proposed project having the least impact to wetland functions and values (Env-Wt 311.10). This worksheet can be used in conjunction with the Avoidance and Minimization Written Narrative (NHDES-W-06-089) and the Avoidance and Minimization Checklist (NHDES-W-06-050) to address Env-Wt 313.03 (Avoidance and Minimization). If more than one wetland/ stream resource is identified, multiple worksheets can be attached to the application. All wetland, vernal pools, and stream identification (ID) numbers are to be displayed and located on the wetlands delineation of the subject property.

SECTION 1 - LOCATION (USACE HIGHWAY METHODOLOGY)	
ADJACENT LAND USE: Maintained parkland, shrub border, old field, access road, and construction laydown	
CONTIGUOUS UNDEVELOPED BUFFER ZONE PRESENT? ☐ Yes ☒ No	
DISTANCE TO NEAREST ROADWAY OR OTHER DEVELOPMENT (in feet): 30 ft	
SECTION 2 - DELINEATION (USACE HIGHWAY METHODOLOGY; Env-Wt 311.10)	
CERTIFIED WETLAND SCIENTIST (if in a non-tidal area) or QUALIFIED COASTAL PROFESSIONAL (if in a tidal area) who prepared this assessment: Sarah Allen , NHCWS 083	
DATE(S) OF SITE VISIT(S): 04/23/21; 01/14/21	DELINEATION PER ENV-WT 406 COMPLETED? ☒ Yes ☐ No
CONFIRM THAT THE EVALUATION IS BASED ON: ☒ Office and ☒ Field examination.	
METHOD USED FOR FUNCTIONAL ASSESSMENT (check one and fill in blank if “other”): ☒ USACE Highway Methodology. ☐ Other scientifically supported method (enter name/ title):	

SECTION 3 - WETLAND RESOURCE SUMMARY (USACE HIGHWAY METHODOLOGY; Env-Wt 311.10)	
WETLAND ID: Salt marsh south of laydown	LOCATION: (LAT/ LONG) 43.074282/-70.744530
WETLAND AREA: 0.5 ac	DOMINANT WETLAND SYSTEMS PRESENT: Fringe salt marsh
HOW MANY TRIBUTARIES CONTRIBUTE TO THE WETLAND? None	COWARDIN CLASS: E2EM1
IS THE WETLAND A SEPARATE HYDRAULIC SYSTEM? ☐ Yes ☒ No if not, where does the wetland lie in the drainage basin? Lower	IS THE WETLAND PART OF: ☐ A wildlife corridor or ☒ A habitat island?
	IS THE WETLAND HUMAN-MADE? ☐ Yes ☒ No
IS THE WETLAND IN A 100-YEAR FLOODPLAIN? ☒ Yes ☐ No	ARE VERNAL POOLS PRESENT? ☐ Yes ☒ No (If yes, complete the Vernal Pool Table)
ARE ANY WETLANDS PART OF A STREAM OR OPEN-WATER SYSTEM? ☒ Yes ☐ No	ARE ANY PUBLIC OR PRIVATE WELLS DOWNSTREAM/ DOWNGRADIENT? ☐ Yes ☒ No
PROPOSED WETLAND IMPACT TYPE: None	PROPOSED WETLAND IMPACT AREA: None

SECTION 4 - WETLANDS FUNCTIONS AND VALUES (USACE HIGHWAY METHODOLOGY; Env-Wt 311.10)

The following table can be used to compile data on wetlands functions and values. The reference numbers indicated in the "Functions/ Values" column refer to the following functions and values:

1. Ecological Integrity (from RSA 482-A:2, XI)
2. Educational Potential (from USACE Highway Methodology: Educational/Scientific Value)
3. Fish & Aquatic Life Habitat (from USACE Highway Methodology: Fish & Shellfish Habitat)
4. Flood Storage (from USACE Highway Methodology: Floodflow Alteration)
5. Groundwater Recharge (from USACE Highway Methodology: Groundwater Recharge/Discharge)
6. Noteworthiness (from USACE Highway Methodology: Threatened or Endangered Species Habitat)
7. Nutrient Trapping/Retention & Transformation (from USACE Highway Methodology: Nutrient Removal)
8. Production Export (Nutrient) (from USACE Highway Methodology)
9. Scenic Quality (from USACE Highway Methodology: Visual Quality/Aesthetics)
10. Sediment Trapping (from USACE Highway Methodology: Sediment /Toxicant Retention)
11. Shoreline Anchoring (from USACE Highway Methodology: Sediment/Shoreline Stabilization)
12. Uniqueness/Heritage (from USACE Highway Methodology)
13. Wetland-based Recreation (from USACE Highway Methodology: Recreation)
14. Wetland-dependent Wildlife Habitat (from USACE Highway Methodology: Wildlife Habitat)

First, determine if a wetland is suitable for a particular function and value ("Suitability" column) and indicate the rationale behind your determination ("Rationale" column). Please use the rationale reference numbers listed in Appendix A of USACE *The Highway Methodology Workbook Supplement*. Second, indicate which functions and values are principal ("Principal Function/value?" column). As described in *The Highway Methodology Workbook Supplement*, "functions and values can be principal if they are an important physical component of a wetland ecosystem (function only) and/or are considered of special value to society, from a local, regional, and/or national perspective". "Important Notes" are to include characteristics the evaluator used to determine the principal function and value of the wetland.

FUNCTIONS/ VALUES	SUITABILITY (Y/N)	RATIONALE (Reference #)	PRINCIPAL FUNCTION/VALUE? (Y/N)	IMPORTANT NOTES
1	☒ Yes ☐ No	Fringing salt marsh on lee of island provides physical and biological value to area	☐ Yes ☒ No	Patchy, has strip of marsh elder along upland edge, often above HOTL
2	☒ Yes ☐ No	1,2,8,9,14	☐ Yes ☒ No	Marsh is of limited value due to small size and fringe nature.
3	☒ Yes ☐ No	1,2,3,4,5,6	☒ Yes ☐ No	Site is adjacent to Piscataqua River, with anadromous fish migration. Offers nursery and forage to multiple fish species.
4	☒ Yes ☐ No	6,10,11,13,18	☐ Yes ☒ No	Fringe marsh provides minor storage and buffer during storms and flooding
5	☐ Yes ☒ No	4,8,15	☐ Yes ☒ No	Borders tidal waters, minor seepage visible, underlain by gravel and bedrock
6	☒ Yes ☐ No	1	☒ Yes ☐ No	Marsh supports *Iva frutescens*, a State-Threatened species.
7	☒ Yes ☐ No	3,5,7,8,9,11,12,14	☐ Yes ☒ No	Fring marsh vegetation provides limited nutrient removal opportunities of runoff from access road and parking areas.
8	☒ Yes ☐ No	2,5,6,7,9,11,13	☐ Yes ☒ No	Fringe marsh vegetation supports invertebrates and exports detritus for food web support.
9	☒ Yes ☐ No	2,7,12	☐ Yes ☒ No	Fringe marsh adds visual benefit in developed Portsmouth landscape.
10	☒ Yes ☐ No	1,3,4,8,16	☐ Yes ☒ No	Fringe marsh provides modest sediment removal function from runoff from access road and parking area.
11	☒ Yes ☐ No	1,6,7,10,11,12,13,15	☒ Yes ☐ No	Fringe marsh provides important energy absorbing action to protect shoreline from scour.
12	☒ Yes ☐ No	1,10,13,14,22,24,28	☒ Yes ☐ No	Marsh is adjacent to the Peirce Island trail system and supports the rare shrub, *Iva frutescens*.
13	☐ Yes ☒ No	7,9,10,12	☐ Yes ☒ No	Marsh in close proximity to proposed parking area, but access will be discouraged by fencing.

14	☒ Yes ☐ No	3,6,8,13,19	☐ Yes ☒ No	Fringe marsh provides modest wildlife habitat on island in developed Portsmouth harbor.

SECTION 5 - VERNAL POOL SUMMARY (Env-Wt 311.10)

Delineations of vernal pools shall be based on the characteristics listed in the definition of "vernal pool" in Env-Wt 104.44. To assist in the delineation, individuals may use either of the following references:

- *Identifying and Documenting Vernal Pools in New Hampshire 3rd Ed.*, 2016, published by the New Hampshire Fish and Game Department; or
- The USACE *Vernal Pool Assessment* draft guidance dated 9-10-2013 and form dated 9-6-2016, Appendix L of the USACE New England District *Compensatory Mitigation Guidance*.

All vernal pool ID numbers are to be displayed and located on the wetland delineation of the subject property.

"Important Notes" are to include documented reproductive and wildlife values, landscape context, and relationship to other vernal pools/wetlands.

Note: For projects seeking federal approval from the USACE, please attach a completed copy of The USACE "Vernal Pool Assessment" form dated 9-6-2016, Appendix L of the USACE New England District *Compensatory Mitigation Guidance*.

VERNAL POOL ID NUMBER	DATE(S) OBSERVED	PRIMARY INDICATORS PRESENT (LIST)	SECONDARY INDICATORS PRESENT (LIST)	LENGTH OF HYDROPERIOD	IMPORTANT NOTES
1					
2					
3					
4					
5					

SECTION 6 - STREAM RESOURCES SUMMARY

DESCRIPTION OF STREAM:	STREAM TYPE (ROSGEN):
HAVE FISHERIES BEEN DOCUMENTED? ☐ Yes ☐ No	DOES THE STREAM SYSTEM APPEAR STABLE? ☐ Yes ☐ No
OTHER KEY ON-SITE FUNCTIONS OF NOTE:	

The following table can be used to compile data on stream resources. "Important Notes" are to include characteristics the evaluator used to determine principal function and value of each stream. The functions and values reference number are defined in Section 4.

FUNCTIONS/ VALUES	SUITABILITY (Y/N)	RATIONALE	PRINCIPAL FUNCTION/VALUE? (Y/N)	IMPORTANT NOTES
1	☐ Yes ☐ No		☐ Yes ☐ No	
2	☐ Yes ☐ No		☐ Yes ☐ No	
3	☐ Yes ☐ No		☐ Yes ☐ No	
4	☐ Yes ☐ No		☐ Yes ☐ No	
5	☐ Yes ☐ No		☐ Yes ☐ No	
6	☐ Yes ☐ No		☐ Yes ☐ No	
7	☐ Yes ☐ No		☐ Yes ☐ No	
8	☐ Yes ☐ No		☐ Yes ☐ No	
9	☐ Yes ☐ No		☐ Yes ☐ No	
10	☐ Yes ☐ No		☐ Yes ☐ No	
11	☐ Yes ☐ No		☐ Yes ☐ No	
12	☐ Yes ☐ No		☐ Yes ☐ No	
13	☐ Yes ☐ No		☐ Yes ☐ No	
14	☐ Yes ☐ No		☐ Yes ☐ No	

SECTION 7 - ATTACHMENTS (USACE HIGHWAY METHODOLOGY; Env-Wt 311.10)

☒ Wildlife and vegetation diversity/abundance list.

☒ Photograph of wetland.

☒ Wetland delineation plans showing wetlands, vernal pools, and streams in relation to the impact area and surrounding landscape. Wetland IDs, vernal pool IDs, and stream IDs must be indicated on the plans.

☒ For projects in tidal areas only: additional information required by Env-Wt 603.03/603.04. Please refer to the Coastal Area Worksheet (NHDES-W-06-079) for more information.

WETLANDS FUNCTIONAL ASSESSMENT WORKSHEET

Water Division/Land Resource Management
Wetlands Bureau

Check the Status of your Application

RSA/Rule: RSA 482-A / Env-Wt 311.03(b)(10); Env-Wt 311.10

APPLICANT LAST NAME, FIRST NAME, M.I.: Terry Demarais, PE, City of Portsmouth

As required by Env-Wt 311.03(b)(10), an application for a standard permit for minor and major projects must include a functional assessment of all wetlands on the project site as specified in Env-Wt 311.10. This worksheet will help you compile data for the functional assessment needed to meet federal (US Army Corps of Engineers (USACE); if applicable) and NHDES requirements. Additional requirements are needed for projects in tidal area; please refer to the Coastal Area Worksheet (NHDES-W-06-079) for more information.

Both a desktop review and a field examination are needed to accurately determine surrounding land use, hydrology, hydroperiod, hydric soils, vegetation, structural complexity of wetland classes, hydrologic connections between wetlands or stream systems or wetland complex, position in the landscape, and physical characteristics of wetlands and associated surface waters. The results of the evaluation are to be used to select the location of the proposed project having the least impact to wetland functions and values (Env-Wt 311.10). This worksheet can be used in conjunction with the Avoidance and Minimization Written Narrative (NHDES-W-06-089) and the Avoidance and Minimization Checklist (NHDES-W-06-050) to address Env-Wt 313.03 (Avoidance and Minimization). If more than one wetland/ stream resource is identified, multiple worksheets can be attached to the application. All wetland, vernal pools, and stream identification (ID) numbers are to be displayed and located on the wetlands delineation of the subject property.

SECTION 1 - LOCATION (USACE HIGHWAY METHODOLOGY)	
ADJACENT LAND USE: Upland shrub/forest, walking trail, access road and wastewater treatment facility	
CONTIGUOUS UNDEVELOPED BUFFER ZONE PRESENT? ☐ Yes ☒ No	
DISTANCE TO NEAREST ROADWAY OR OTHER DEVELOPMENT (in feet): 10	
SECTION 2 - DELINEATION (USACE HIGHWAY METHODOLOGY; Env-Wt 311.10)	
CERTIFIED WETLAND SCIENTIST (if in a non-tidal area) or QUALIFIED COASTAL PROFESSIONAL (if in a tidal area) who prepared this assessment: Sarah Allen, NHCWS 083	
DATE(S) OF SITE VISIT(S): 04/23/21; 01/14/21	DELINEATION PER ENV-WT 406 COMPLETED? ☒ Yes ☐ No
CONFIRM THAT THE EVALUATION IS BASED ON: ☒ Office and ☒ Field examination.	
METHOD USED FOR FUNCTIONAL ASSESSMENT (check one and fill in blank if "other"): ☒ USACE Highway Methodology. ☐ Other scientifically supported method (enter name/ title):	

SECTION 3 - WETLAND RESOURCE SUMMARY (USACE HIGHWAY METHODOLOGY; Env-Wt 311.10)	
WETLAND ID: Rocky shore on north side of island	LOCATION: (LAT/ LONG) 43o4'23/70o44'23.6
WETLAND AREA: 0.5 ac	DOMINANT WETLAND SYSTEMS PRESENT: Rocky shore
HOW MANY TRIBUTARIES CONTRIBUTE TO THE WETLAND? NA	COWARDIN CLASS: E2RS
IS THE WETLAND A SEPARATE HYDRAULIC SYSTEM? ☐ Yes ☒ No if not, where does the wetland lie in the drainage basin? Lower	IS THE WETLAND PART OF: ☐ A wildlife corridor or ☒ A habitat island? IS THE WETLAND HUMAN-MADE? ☐ Yes ☒ No
IS THE WETLAND IN A 100-YEAR FLOODPLAIN? ☒ Yes ☐ No	ARE VERNAL POOLS PRESENT? ☐ Yes ☒ No (If yes, complete the Vernal Pool Table)
ARE ANY WETLANDS PART OF A STREAM OR OPEN-WATER SYSTEM? ☒ Yes ☐ No	ARE ANY PUBLIC OR PRIVATE WELLS DOWNSTREAM/ DOWNGRADIENT? ☐ Yes ☒ No
PROPOSED WETLAND IMPACT TYPE: None	PROPOSED WETLAND IMPACT AREA: None

SECTION 4 - WETLANDS FUNCTIONS AND VALUES (USACE HIGHWAY METHODOLOGY; Env-Wt 311.10)

The following table can be used to compile data on wetlands functions and values. The reference numbers indicated in the "Functions/ Values" column refer to the following functions and values:

1. Ecological Integrity (from RSA 482-A:2, XI)
2. Educational Potential (from USACE Highway Methodology: Educational/Scientific Value)
3. Fish & Aquatic Life Habitat (from USACE Highway Methodology: Fish & Shellfish Habitat)
4. Flood Storage (from USACE Highway Methodology: Floodflow Alteration)
5. Groundwater Recharge (from USACE Highway Methodology: Groundwater Recharge/Discharge)
6. Noteworthiness (from USACE Highway Methodology: Threatened or Endangered Species Habitat)
7. Nutrient Trapping/Retention & Transformation (from USACE Highway Methodology: Nutrient Removal)
8. Production Export (Nutrient) (from USACE Highway Methodology)
9. Scenic Quality (from USACE Highway Methodology: Visual Quality/Aesthetics)
10. Sediment Trapping (from USACE Highway Methodology: Sediment /Toxicant Retention)
11. Shoreline Anchoring (from USACE Highway Methodology: Sediment/Shoreline Stabilization)
12. Uniqueness/Heritage (from USACE Highway Methodology)
13. Wetland-based Recreation (from USACE Highway Methodology: Recreation)
14. Wetland-dependent Wildlife Habitat (from USACE Highway Methodology: Wildlife Habitat)

First, determine if a wetland is suitable for a particular function and value ("Suitability" column) and indicate the rationale behind your determination ("Rationale" column). Please use the rationale reference numbers listed in Appendix A of USACE *The Highway Methodology Workbook Supplement*. Second, indicate which functions and values are principal ("Principal Function/value?" column). As described in *The Highway Methodology Workbook Supplement*, "functions and values can be principal if they are an important physical component of a wetland ecosystem (function only) and/or are considered of special value to society, from a local, regional, and/or national perspective". "Important Notes" are to include characteristics the evaluator used to determine the principal function and value of the wetland.

FUNCTIONS/ VALUES	SUITABILITY (Y/N)	RATIONALE (Reference #)	PRINCIPAL FUNCTION/VALUE? (Y/N)	IMPORTANT NOTES
1	☒ Yes ☐ No	Porvides buffer from wave action and habitat for marine species	☐ Yes ☒ No	Undisturbed habitat on steep sections, more level sections are used by walkers
2	☐ Yes ☒ No	2	☐ Yes ☒ No	Steep rocky slopes prohibit access.
3	☒ Yes ☐ No	3,4,5,6	☒ Yes ☐ No	Adjacent to Piscataqua River, with anadromous fish migration. Offers nursery and forage to multiple fish species.
4	☐ Yes ☒ No	3,9,13	☐ Yes ☒ No	Steep gradient provides minimal storage during storms and flooding.
5	☐ Yes ☒ No	7	☐ Yes ☒ No	Steep ledge limits discharge potential.
6	☐ Yes ☒ No	None	☐ Yes ☒ No	Mapped as high value on WAP, but appears to be spillover from estuary
7	☐ Yes ☒ No	2,4,5	☐ Yes ☒ No	Rockweed provides minimal nutrient removal opportunities from runoff.
8	☒ Yes ☐ No	2,5,6	☐ Yes ☒ No	Rockweed provides some forage and shelter for higher trophic organisms, occasional detritus.
9	☒ Yes ☐ No	6,7,12	☐ Yes ☒ No	Path will allow public viewing.
10	☐ Yes ☒ No	8	☐ Yes ☒ No	Hard, steep substrate provides minimal sediment removal function.
11	☒ Yes ☐ No	2,8,10,11,16	☒ Yes ☐ No	Ledge protects against erosion, rockweed dissipates wave energy.
12	☒ Yes ☐ No	14,18,22	☐ Yes ☒ No	Typical rocky shore of Piscataqua River, but path will allow public viewing.
13	☐ Yes ☒ No	6,7,9	☐ Yes ☒ No	Steep rocky slopes prohibit access.
14	☒ Yes ☐ No	24	☐ Yes ☒ No	Marine invertebrates and rockweed provide forage for seaducks.

SECTION 5 - VERNAL POOL SUMMARY (Env-Wt 311.10)

Delineations of vernal pools shall be based on the characteristics listed in the definition of "vernal pool" in Env-Wt 104.44. To assist in the delineation, individuals may use either of the following references:

- *Identifying and Documenting Vernal Pools in New Hampshire 3rd Ed.*, 2016, published by the New Hampshire Fish and Game Department; or
- The USACE *Vernal Pool Assessment* draft guidance dated 9-10-2013 and form dated 9-6-2016, Appendix L of the USACE New England District *Compensatory Mitigation Guidance*.

All vernal pool ID numbers are to be displayed and located on the wetland delineation of the subject property.

"Important Notes" are to include documented reproductive and wildlife values, landscape context, and relationship to other vernal pools/wetlands.

Note: For projects seeking federal approval from the USACE, please attach a completed copy of The USACE "Vernal Pool Assessment" form dated 9-6-2016, Appendix L of the USACE New England District *Compensatory Mitigation Guidance*.

VERNAL POOL ID NUMBER	DATE(S) OBSERVED	PRIMARY INDICATORS PRESENT (LIST)	SECONDARY INDICATORS PRESENT (LIST)	LENGTH OF HYDROPERIOD	IMPORTANT NOTES
1					
2					
3					
4					
5					

SECTION 6 - STREAM RESOURCES SUMMARY

DESCRIPTION OF STREAM:	STREAM TYPE (ROSGEN):
HAVE FISHERIES BEEN DOCUMENTED? ☐ Yes ☐ No	DOES THE STREAM SYSTEM APPEAR STABLE? ☐ Yes ☐ No
OTHER KEY ON-SITE FUNCTIONS OF NOTE:	

The following table can be used to compile data on stream resources. "Important Notes" are to include characteristics the evaluator used to determine principal function and value of each stream. The functions and values reference number are defined in Section 4.

FUNCTIONS/ VALUES	SUITABILITY (Y/N)	RATIONALE	PRINCIPAL FUNCTION/VALUE? (Y/N)	IMPORTANT NOTES
1	☐ Yes ☐ No		☐ Yes ☐ No	
2	☐ Yes ☐ No		☐ Yes ☐ No	
3	☐ Yes ☐ No		☐ Yes ☐ No	
4	☐ Yes ☐ No		☐ Yes ☐ No	
5	☐ Yes ☐ No		☐ Yes ☐ No	
6	☐ Yes ☐ No		☐ Yes ☐ No	
7	☐ Yes ☐ No		☐ Yes ☐ No	
8	☐ Yes ☐ No		☐ Yes ☐ No	
9	☐ Yes ☐ No		☐ Yes ☐ No	
10	☐ Yes ☐ No		☐ Yes ☐ No	
11	☐ Yes ☐ No		☐ Yes ☐ No	
12	☐ Yes ☐ No		☐ Yes ☐ No	
13	☐ Yes ☐ No		☐ Yes ☐ No	
14	☐ Yes ☐ No		☐ Yes ☐ No	

SECTION 7 - ATTACHMENTS (USACE HIGHWAY METHODOLOGY; Env-Wt 311.10)

☒ Wildlife and vegetation diversity/abundance list.

☒ Photograph of wetland.

☒ Wetland delineation plans showing wetlands, vernal pools, and streams in relation to the impact area and surrounding landscape. Wetland IDs, vernal pool IDs, and stream IDs must be indicated on the plans.

☒ For projects in tidal areas only: additional information required by Env-Wt 603.03/603.04. Please refer to the Coastal Area Worksheet (NHDES-W-06-079) for more information.

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: Portsmouth Wastewater Treatment Facility City/County: Portsmouth/Rockingham Sampling Date: 1/14/2020

Applicant/Owner: City of Portsmouth State: NH Sampling Point: HOT-UPL

Investigator(s): B. Griffith Section, Township, Range:

Landform (hillside, terrace, etc.): shoreline Local relief (concave, convex, none): Slope %: 3

Subregion (LRR or MLRA): LRR R Lat: 43.074354 Long: -70.744328 Datum: WGS 1984

Soil Map Unit Name: Urban land-Canton complex, 3 to 15 percent slopes NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No (If no, explain in Remarks.)

Are Vegetation , Soil , or Hydrology significantly disturbed? Are "Normal Circumstances" present? Yes X No

Are Vegetation , Soil , or Hydrology naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes	No X	**Is the Sampled Area**
Hydric Soil Present?	Yes	No X	**within a Wetland?** **Yes** **No** X
Wetland Hydrology Present?	Yes	No X	If yes, optional Wetland Site ID:

Remarks: (Explain alternative procedures here or in a separate report.)

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- Surface Water (A1)
- High Water Table (A2)
- Saturation (A3)
- Water Marks (B1)
- Sediment Deposits (B2)
- Drift Deposits (B3)
- Algal Mat or Crust (B4)
- Iron Deposits (B5)
- Inundation Visible on Aerial Imagery (B7)
- Sparsely Vegetated Concave Surface (B8)
- Water-Stained Leaves (B9)
- Aquatic Fauna (B13)
- Marl Deposits (B15)
- Hydrogen Sulfide Odor (C1)
- Oxidized Rhizospheres on Living Roots (C3)
- Presence of Reduced Iron (C4)
- Recent Iron Reduction in Tilled Soils (C6)
- Thin Muck Surface (C7)
- Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- Surface Soil Cracks (B6)
- Drainage Patterns (B10)
- Moss Trim Lines (B16)
- Dry-Season Water Table (C2)
- Crayfish Burrows (C8)
- Saturation Visible on Aerial Imagery (C9)
- Stunted or Stressed Plants (D1)
- Geomorphic Position (D2)
- Shallow Aquitard (D3)
- Microtopographic Relief (D4)
- FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes	No	Depth (inches):
Water Table Present?	Yes	No	Depth (inches):
Saturation Present? (includes capillary fringe)	Yes	No	Depth (inches):

Wetland Hydrology Present? **Yes** **No** X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION – Use scientific names of plants.

Sampling Point: HOT-UPL

Tree Stratum (Plot size: 30' R)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
	=Total Cover		
Sapling/Shrub Stratum (Plot size: 15' R)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
	=Total Cover		
Herb Stratum (Plot size: 5' R)			
1. *Digitaria sanguinalis*	70	Yes	FACU
2. *Festuca rubra*	20	Yes	FACU
3. *Plantago lanceolata*	10	No	FACU
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	100 =Total Cover		
Woody Vine Stratum (Plot size: 30' R)			
1.			
2.			
3.			
4.			
	=Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0.0% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	0	x 3 =	0
FACU species	100	x 4 =	400
UPL species	0	x 5 =	0
Column Totals:	100 (A)		400 (B)

Prevalence Index = B/A = 4.00

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** ___ **No** X

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point HOT-UPL

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-6	10YR 4/4	100					Sandy	
6-10	10YR 4/4	80	10YR 5/6	20	C	M	Sandy	Distinct redox concentrations

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7)
- ___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
- ___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**)
- ___ High Chroma Sands (S11) (**LRR K, L)**
- ___ Loamy Mucky Mineral (F1) (**LRR K, L**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Marl (F10) (**LRR K, L**)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**)
- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
- ___ Polyvalue Below Surface (S8) (**LRR K, L**)
- ___ Thin Dark Surface (S9) (**LRR K, L**)
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
- ___ Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (F22)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** ___ **No** X

Remarks:

This data form is revised from Northcentral and Northeast Regional Supplement Version 2.0 to include the NRCS Field Indicators of Hydric Soils, Version 7.0, 2015 Errata. (http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_051293.docx)

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: Portsmouth Wastewater Treatment Facility City/County: Portsmouth/Rockingham Sampling Date: 1/14/2020

Applicant/Owner: City of Portsmouth State: NH Sampling Point: HOT-Wet

Investigator(s): B. Griffith Section, Township, Range:

Landform (hillside, terrace, etc.): shoreline Local relief (concave, convex, none): Slope %: 3

Subregion (LRR or MLRA): LRR R Lat: 43.074282 Long: -70.744530 Datum: WGS 1984

Soil Map Unit Name: Urban land-Caton complex, 3 to 15 percent slopes NWI classification: E2EM1

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No (If no, explain in Remarks.)

Are Vegetation , Soil , or Hydrology significantly disturbed? Are "Normal Circumstances" present? Yes X No

Are Vegetation , Soil , or Hydrology naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No	**Is the Sampled Area**
Hydric Soil Present?	Yes X	No	**within a Wetland?** **Yes** X **No**
Wetland Hydrology Present?	Yes X	No	If yes, optional Wetland Site ID:

Remarks: (Explain alternative procedures here or in a separate report.)

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- X Surface Water (A1)
- X High Water Table (A2)
- Saturation (A3)
- Water Marks (B1)
- Sediment Deposits (B2)
- Drift Deposits (B3)
- Algal Mat or Crust (B4)
- Iron Deposits (B5)
- Inundation Visible on Aerial Imagery (B7)
- Sparsely Vegetated Concave Surface (B8)
- Water-Stained Leaves (B9)
- Aquatic Fauna (B13)
- Marl Deposits (B15)
- Hydrogen Sulfide Odor (C1)
- Oxidized Rhizospheres on Living Roots (C3)
- Presence of Reduced Iron (C4)
- Recent Iron Reduction in Tilled Soils (C6)
- Thin Muck Surface (C7)
- Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- Surface Soil Cracks (B6)
- Drainage Patterns (B10)
- Moss Trim Lines (B16)
- Dry-Season Water Table (C2)
- Crayfish Burrows (C8)
- Saturation Visible on Aerial Imagery (C9)
- Stunted or Stressed Plants (D1)
- Geomorphic Position (D2)
- Shallow Aquitard (D3)
- Microtopographic Relief (D4)
- X FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes X	No	Depth (inches): 3
Water Table Present?	Yes X	No	Depth (inches): 0
Saturation Present? (includes capillary fringe)	Yes X	No	Depth (inches): 0

Wetland Hydrology Present? **Yes** X **No**

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION – Use scientific names of plants.

Sampling Point: HOT-Wet

Tree Stratum (Plot size: 30' R)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
	=Total Cover		
Sapling/Shrub Stratum (Plot size: 15' R)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
	=Total Cover		
Herb Stratum (Plot size: 5' R)			
1. *Spartina patens*	95	Yes	FACW
2. *Salicornia depressa*	5	No	OBL
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	100 =Total Cover		
Woody Vine Stratum (Plot size: 30' R)			
1.			
2.			
3.			
4.			
	=Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100.0% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	5	x 1 =	5
FACW species	95	x 2 =	190
FAC species	0	x 3 =	0
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	100 (A)		195 (B)

Prevalence Index = B/A = 1.95

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

X 2 - Dominance Test is >50%

X 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** X **No** ___

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point HOT-Wet

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-1	10y 4/1	100					Sandy	
1-3	10YR 3/1	100					Peat	
3-19	10Y 4/1	100					Sandy	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- X Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- X Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7)
- ___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
- ___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**)
- ___ High Chroma Sands (S11) (**LRR K, L)**
- ___ Loamy Mucky Mineral (F1) (**LRR K, L**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Marl (F10) (**LRR K, L**)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**)
- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ? 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
- ___ Polyvalue Below Surface (S8) (**LRR K, L**)
- ___ Thin Dark Surface (S9) (**LRR K, L**)
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
- ___ Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (F22)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** X **No** ___

Remarks:

This data form is revised from Northcentral and Northeast Regional Supplement Version 2.0 to include the NRCS Field Indicators of Hydric Soils, Version 7.0, 2015 Errata. (http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_051293.docx)

Peirce Island Wastewater Treatment Facility

Wetland Narrative

Section 1. Required Information

Peirce Island is located in the City of Portsmouth on the Piscataqua River. It is owned by the City and the State of NH, and provides multiple public services, including the WWTF, the State Fish Pier, a public outdoor pool, boat ramp, park and numerous walking trails. The slip lined portion of the Project Area is contained to the Peirce Island Road Bridge. The pipeline replacement portion of the Project Area is linear on the west end of the island, widens out near the parking area, and narrows again for the recreational area at the east end near the wastewater treatment facility. Peirce Island is bordered by estuarine habitats, including rocky shore (E2RS1/2) and salt marsh (E2EM1). No impacts to these wetland resources are proposed. Most of the work area lies within the 100-foot tidal buffer zone, with a smaller section of the pipeline corridor and of the parking area lying within protected shoreland. Based on consultation with DES Shoreland, a Permit-By-Notification application was submitted concurrently with the Wetlands application for pipeline impacts in the protected shoreland, but outside of the tidal buffer zone. No freshwater resources are within or adjacent to the impact areas. Marsh elder, a State Threatened plant species, forms a narrow band along much of the southern shore of the island.

See representative photographs of resources in Exhibit 15.

Tidal Buffer Zone

Most of the proposed work occurs within the jurisdictional tidal buffer zone (TBZ), the majority of which is previously developed (PDTBZ). The PDTBZ includes the paved road in the vicinity of the pipeline and slipline work, grassed lawns and unpaved parking area in the vicinity of the pipeline work, paved areas and structures within the wastewater treatment facility, and the gravel lot used as a construction laydown area and snow dump. A smaller section of the TBZ in the proposed project area is undisturbed TBZ, primarily in the vicinity of the recreational trail. This section is dominated by small trees and vines: staghorn sumac (*Rhus typhina*), oriental bittersweet (*Celastrus orbiculatus*), black cherry (*Prunus serotina*) and gray birch *(Betula populifolia*). The ground cover is a mix of perennial grasses and some forbs.

Salt Marsh

Several sections of salt marsh occur on the southern, more protected side of the island. The marshes are a mix of high marsh and low marsh with typical *Spartina* species (*S. alterniflora* in the low marsh and *S. patens* dominating the high marsh). Typical salt marsh forbs dominate in the upper marsh and marsh elder, *Iva frutescens*, (NH state-Threatened) occurs along the upland border. This shrub is common in southern New England, and is reaching the northern edge of its geographic range in NH.

Rocky Shore

The eastern portion of Peirce Island and the shoreline of the Piscataqua River adjacent Peirce Island Road Bridge below the Highest Observable Tide Line are predominantly bedrock outcrop and cobble gravel/shore. Rockweeds (*Ascophyllum* and *Fucus* spp) are prevalent in the lower intertidal zone on boulders and ledge. Much of the remaining rocky shore is unvegetated. The sections on which the bridge and the WWTF are located are steep-sided exposed ledge or boulders, with abundant rockweeds. By the gravel lot and access road, the rocky shore is more gradual in slope and of finer gravel and cobble. Off the northwestern corner of the Peirce Island Rd. Bridge, a narrow shelf of cobble and gravel occurs between the grassed upland bank and steep-sloped riprap. The cobble gravel areas are generally unvegetated with minor occurrences of salt tolerant species such as *Spartina patens*, *Limonium carolinianum*, and *Solidago sempervirens*.

Protected Shoreland

Approximately a third of the pipeline replacement work will occur in the protected shoreland zone above the PDTBZ. These areas of the island are developed and maintained, and includes Peirce Island Road, the boat ramp parking area and mowed parkland. A Shoreland PBN for utility maintenance was submitted concurrently with this Wetlands application.

State-Listed Species

The NHB data review (NHB21-1136; Exhibit 19) indicates eelgrass (*Zostera maritima*) and Atlantic and Shortnose Sturgeon (*Acipenser oxyrinchus* and *A. brevirostrum*) occur in the subtidal waters off Peirce Island. The proposed work will have no adverse impacts to those marine species. The project does not impact any estuarine or marine wetland resources, nor does it include in-water work that would adversely affect marine biota or their habitats.

The State of New Hampshire
Department of Environmental Services

Robert R. Scott, Commissioner

May 24, 2021

CITY OF PORTSMOUTH
97 JUNKINS AVE
PORTSMOUTH NH 03801
PORTSMOUTH NH 03801

Re: Accepted Shoreland Permit by Notification (RSA 483-B)
NHDES File Number: 2021-01561
Subject Property: 200 Peirce Island Road, Portsmouth, Tax Map #208, Lot #1

Dear Applicant:

On May 20, 2021, the New Hampshire Department of Environmental Services (NHDES) Shoreland Program received the above-referenced Shoreland Permit by Notification (SPBN). In accordance with RSA 483-B:5-b, I and Env-Wq 1406.19, on May 20, 2021, the NHDES accepted the SPBN. The enclosed SPBN form is your permit. Any individual conducting work under this permit is advised to post a copy of the enclosed SPBN form on site in a prominent location, visible to inspecting personnel, at all times during construction.

Only the impacts shown on the submitted plans and accepted by NHDES as part of the SPBN are authorized under RSA 483-B. Any and all impacts not shown on the accepted plans or permitted through another SPBN or Shoreland Permit Application will render this SPBN invalid and will be in violation of RSA 483-B.

Please note that this SPBN cannot be amended. Prior to any change to the size or location of the proposed impacts, please contact me at Craig.Day@des.nh.gov or (603) 271-0649 to determine the appropriate method to obtain any additional approval under RSA 483-B:5-b as may be required. Please do not hesitate to contact me as noted above if you have additional questions.

Sincerely,

Craig W. Day
Shoreland Specialist, Shoreland Program
Wetlands Bureau, Land Resources Management
Water Division

Enclosure

cc: Erik N. Meserve

NHDES-W-06-039

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

RECEIVED
Administrative
MAY 20 2021
Only
NHDES
LAND RESOURCES MANAGEMENT

Administrative Use Only

☒ PBN Accepted, Expires: 5/24/2026	
☐ PBN Rejected	Reviewer's Initials: CW
File No.: 2021-0156	Admin's Initials: BH
Check No.: 20123	Amount: $400.00

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: 97 Junkins Avenue	TOWN/ CITY: Portsmouth	STATE: NH	ZIP CODE: 03801
PHONE: N/A	EMAIL: N/A		
SECTION 2 - PROJECT LOCATION (RSA 483-B:5-b; Env-Wq 1406.17)			
ADDRESS: 200 Peirce Island Road	TOWN/ CITY: Portsmouth	STATE: NH	ZIP CODE: 03801
WATERBODY NAME: Piscataqua River	TAX MAP/ LOT: 208/1		
SECTION 3 - CONTRACTOR OR AGENT (Env-Wq 1406.17)			
LAST NAME, FIRST NAME, M.I: Meserve, Erik, N.			
MAILING ADDRESS: 250 Apollo Drive	TOWN/ CITY: Chelmsford	STATE: MA	ZIP CODE: 01824
PHONE: (978) 905-3145	EMAIL: erik.meserve@aecom.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 is proposing several improvements to Peirce Island including: a recreational trail; converting a former informal parking area and permitted snow dump to a formal grassed public parking area and natural lands; permanently replacing two sewer force mains and one water main; and slip lining a sewer force main under Peirce Island Road Bridge. This application is submitted concurrently with a Standard Dredge & Fill Wetlands application to address pipeline impacts that will occur in the protected shoreland and outside the tidal buffer zone. Please see Exhibit 3 for an expanded Project Description.

TOTAL SQUARE FEET OF IMPACT: 30,441 TOTAL SQUARE FEET OF NET CHANGE IN IMPERVIOUS AREA: 0 sf

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.

NHDES-W-06-039

SHORELAND PERMIT BY NOTIFICATION (PBN) ELIGIBILITY AND CHECKLIST

Water Division/Land Resources Management

Shoreland Program

Check the Status of your PBN

Keep this page for your reference; do not submit with your application.

Please read this checklist and confirm that your project meets the qualifications for a Shoreland Permit by Notification (PBN). Note that if a PBN is rejected, there is no process for adjustment, and the fee will **not** be returned.

ELIGIBILITY

Your project must meet EACH of the following statements to qualify for the simplified PBN process:

☒ The project **does not** include work in the water or within the bank of a waterbody, such as a dock, boathouse, or retaining wall; the project is not within the 100-foot tidal buffer zone; and the project does not include beach sand replenishment.

☒ The project **does not** impact more than 1,500 square feet or result in a net increase of more than 900 square feet of impervious area. "Project" is defined as the full scope of development activities that are proposed to take place on a parcel of property within 5 years of the application date. These square footage limits do not apply to project types 2, 3, and 4 listed in Section 5.

☒ The project **has not** already begun or been completed. After-the-Fact projects must be reviewed as Shoreland Permit Applications.

☒ The project **does not** include the modification, expansion, or redevelopment of a nonconforming structure. These projects typically require a More Nearly Conforming Request and review as Shoreland Permit Applications. Note that exceptions ***may*** apply to some projects involving decks attached to nonconforming primary structure. Contact the Shoreland Program for more information.

Does your project proposal meet **ALL** of the statements above?

☒ YES. Proceed to completing the Shoreland PBN form below.

☐ NO. You cannot use this form – you must use the standard Shoreland Permit Application Form and/ or a Wetlands Permit Application form.

UNSURE?

- Check the List of Activities That Do Not Require Shoreland Permitting.
- See the Shoreland Program's Vegetation Management Fact Sheet and Frequently Asked Questions.
- Contact the Shoreland Program at shoreland@des.nh.gov or call (603) 271-2147 to speak with a Shoreland Specialist.

INSTRUCTIONS

Mail your complete application form and supporting materials to: NHDES Shoreland Program, 29 Hazen Drive, PO Box 95, Concord, NH 03302-0095.

To increase the chances of your PBN being accepted, ensure that you have completed the following:

☒ The property owner has read and signed the form and initialed the conditions and certifications in Sections 9 and 10.

☒ The notification includes a check with the correct fee, per Section 6.

☒ The notification includes photos of each area that will be impacted, per Section 7.

☒ The notification includes a complete plan of the proposed work in accordance with Section 8 of the PBN Form.

WHAT TO EXPECT

The New Hampshire Department of Environmental Services (NHDES) will review your notification within five business days and email (if provided) or mail you a copy of the accepted notification or a notice of rejection.

☐ YES ☒ NO	This project proposes to install or expand an accessory structure, such as a patio or shed, within 50 feet of the reference line. All plans *must* demonstrate that the height, size, and setback limitations for accessory structures will be met. These limitations are described within the Accessory Structure Fact Sheet. The shoreland frontage on this lot is: 8,284 linear feet. ☐ N/A – There is no direct frontage on this lot.
☐ YES ☒ 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.

T.D. 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.

T.D. 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.

T.D. 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.

T.D. 4. Any fill used shall be clean sand, gravel, rock, or other suitable material.

T.D. 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.

T.D. 1. The property owner shall sign the notification form below.

T.D 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*.

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: City Terry Desmarais, Engineer	DATE: 5/12/21
SIGNATURE (AGENT, IF APPLICABLE):	PRINT NAME LEGIBLY:	DATE:

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: $400

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.

☒ YES		**Required for all projects:** A clear and detailed plan of work depicting, at a minimum, all impact areas, the reference line, and property lines. Plans that are not to scale must show all relevant dimensions and distances from the reference line and dimensions.
☐ YES ☒ NO		This project proposes an increase in impervious (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.
☐ YES ☒ 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%.
☐ YES ☒ 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 stormwater management system that will infiltrate increased stormwater runoff from development per RSA 483-B:9, V(g)(2) and in accordance with Env-Wq 1500.
☐ YES ☒ 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 stormwater management system 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 RSA 483-B:9, V(g)(1,3).
☐ YES ☒ NO		This project proposes impacts within 50 feet of the reference line. Plans and photos must show each area of the waterfront buffer that will be impacted, including groundcover, and calculate the tree and sapling point scores in accordance with the Vegetation Management Fact Sheet.
☒ YES ☐ 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 Vegetation Management Fact Sheet.

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SIGNATURE (OWNER):	PRINT NAME LEGIBLY: City Terry Desmarais, Engineer	DATE: 5/12/21
SIGNATURE (AGENT, IF APPLICABLE):	PRINT NAME LEGIBLY:	DATE:

APPENDIX H

NOT USED

APPENDIX H

SELECT WWTF PROJECT CONTRACT MODICATION REQUESTS

CMR 044A – PEIRCE ISLAND PARKING LOTS

CMR 004b – 12-INCH WATER MAIN

(RECORD PLANS FOR THIS WORK NOT YET AVAILABLE)

AECOM
250 Apollo Drive Chelmford, MA 01824
www.aecom.com

Contract Modification Request: CMR 004B

Project:	Peirce Island WWTF Upgrade
Date:	10/20/16
Description:	12-inch Water Main
To:	Methuen Construction Co., Inc. Attn: Greg Galbraith
CC:	B. Dahlinghaus (AECOM)
From:	AECOM Erik Meserve and Jon Pearson

Comments:

Mr. Galbraith:

The City has recently received a recommendation to increase the size of the water main on Peirce Island Road from 8" to 12" and extend the replacement of the existing 8" water main with a new 12" pipe along the western side of the WWTF. In addition, the City has alerted us to the fact that this water main does not terminate at the WWTF but, in fact, continues along the same general path as the New Castle Force Main to Shapleigh Island and New Castle. We have revised the attached yard piping plans to depict this proposed change.

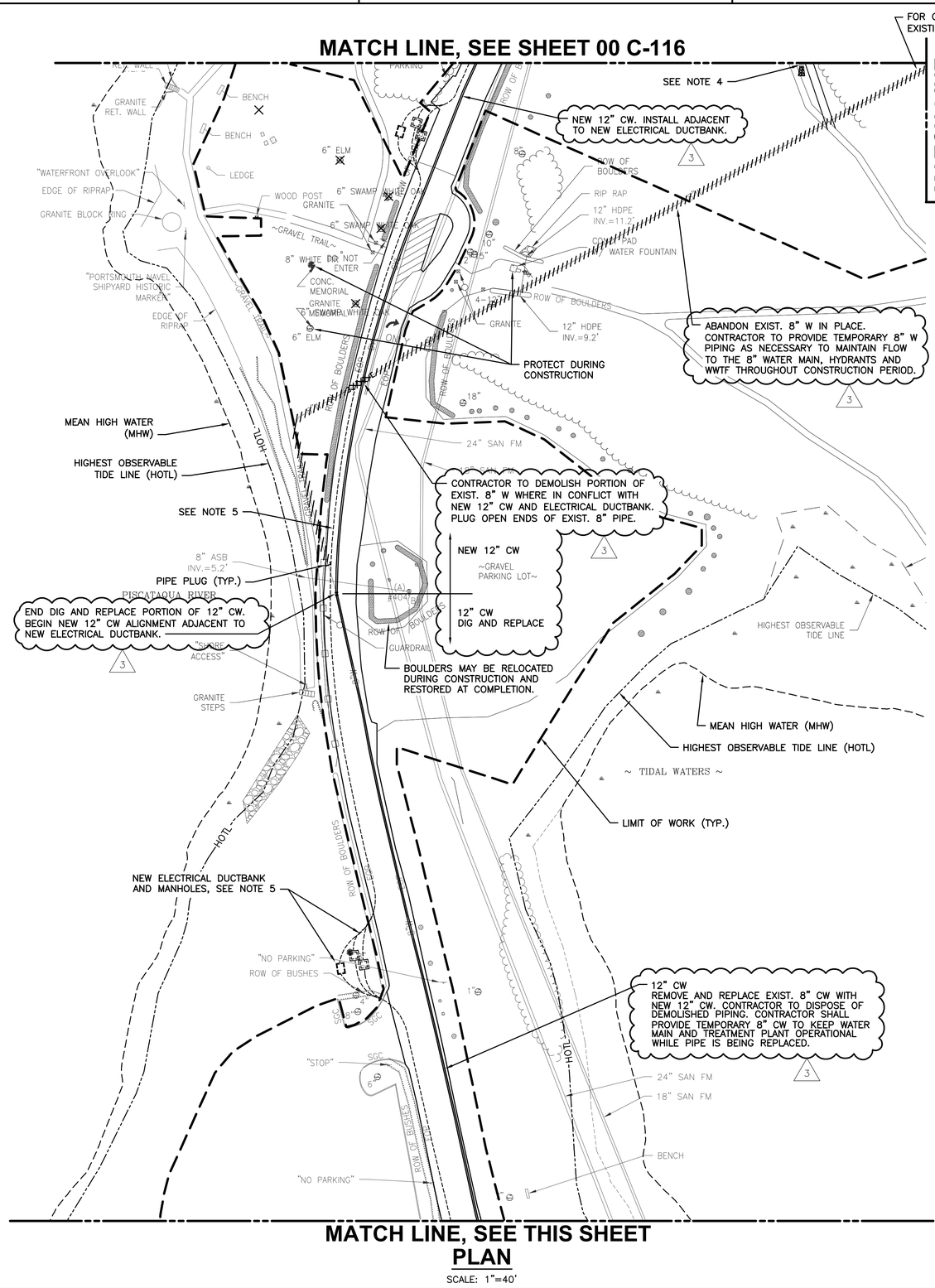
Please provide a cost proposal to execute this work. In your cost proposal, please provide the proposed credit amount for the deletion of the 8" DI water main currently required by the Contract Documents separately from the cost to furnish and install the new 12" DI water main, valves, and fittings. The size of the temporary water main required to maintain the flow of potable water during installation of the new 12" main is not changed and remains at 8". Please note that additional temporary water main will be needed due to the additional length of the existing 8" main being replaced.

In estimating the cost of this work, please note that the "Building" wage decision applies to the water main work from the connection point near the Peirce Island Pool to, and including, the new wye just outside the plant perimeter fence. The "Building" wage decision also applies to the continuation of the 8" main inside the fence to the water meters. The "Heavy" wage decision applies to the water main work from the wye just outside the plant perimeter fence to the connection point behind the new BAF Building.

If you have any questions, please contact me.

Sincerely:

Erik Meserve
Project Engineer
AECOM


MATCH LINE, SEE SHEET 00 C-116
FOR CONTINUATION OF ABANDONMENT OF EXISTING 8" W, SEE SHEET 00 C-108
MATCH LINE, SEE SHEET 00 C-118
SEE NOTE 4
NEW 12" CW. INSTALL ADJACENT TO NEW ELECTRICAL DUCTBANK.
ABANDON EXIST. 8" W IN PLACE. CONTRACTOR TO PROVIDE TEMPORARY 8" W PIPING AS NECESSARY TO MAINTAIN FLOW TO THE 8" WATER MAIN, HYDRANTS AND WWTF THROUGHOUT CONSTRUCTION PERIOD.
PROTECT DURING CONSTRUCTION
CONTRACTOR TO DEMOLISH PORTION OF EXIST. 8" W WHERE IN CONFLICT WITH NEW 12" CW AND ELECTRICAL DUCTBANK. PLUG OPEN ENDS OF EXIST. 8" PIPE.
NEW 12" CW
~GRAVEL PARKING LOT~
12" CW DIG AND REPLACE
MEAN HIGH WATER (MHW)
HIGHEST OBSERVABLE TIDE LINE (HOTL)
SEE NOTE 5
8" ASB INV.=5.2'
PIPE PLUG (TYP.)
PISCATAQUA RIVER
END DIG AND REPLACE PORTION OF 12" CW. BEGIN NEW 12" CW ALIGNMENT ADJACENT TO NEW ELECTRICAL DUCTBANK.
"SCUBA ACCESS"
GRANITE STEPS
BOULDERS MAY BE RELOCATED DURING CONSTRUCTION AND RESTORED AT COMPLETION.
GUARDRAIL
LIMIT OF WORK (TYP.)
~ TIDAL WATERS ~
NEW ELECTRICAL DUCTBANK AND MANHOLES, SEE NOTE 5
12" CW REMOVE AND REPLACE EXIST. 8" CW WITH NEW 12" CW. CONTRACTOR TO DISPOSE OF DEMOLISHED PIPING. CONTRACTOR SHALL PROVIDE TEMPORARY 8" CW TO KEEP WATER MAIN AND TREATMENT PLANT OPERATIONAL WHILE PIPE IS BEING REPLACED.
24" SAN FM
18" SAN FM
BENCH
"NO PARKING"
"STOP"
ROW OF BUSHES
GRANITE RET. WALL
BENCH
LEDGE
"WATERFRONT OVERLOOK"
EDGE OF RIPRAP
GRANITE BLOCK RING
WOOD POST
GRANITE
~GRAVEL TRAIL~
6" SWAMP MAPLE
6" ELM
8" WHITE PINE
"PORTSMOUTH NAVEL SHIPYARD HISTORIC MARKER"
CONC. MEMORIAL
GRANITE MEMORIAL WITH
ROW OF BOULDERS
RIP RAP
12" HDPE INV.=11.2'
CONC. PAD / WATER FOUNTAIN
GRANITE
12" HDPE INV.=9.2'
MEAN HIGH WATER (MHW)
HIGHEST OBSERVABLE TIDE LINE (HOTL)
~GRAVEL EDGE~
~GRAVEL PARKING LOT~
HIGHEST OBSERVABLE TIDE LINE
ROW OF BUSHES
SGC
#4047
#4048
#4049
#4050
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#4054
#4055
#4056
#4057
#4058
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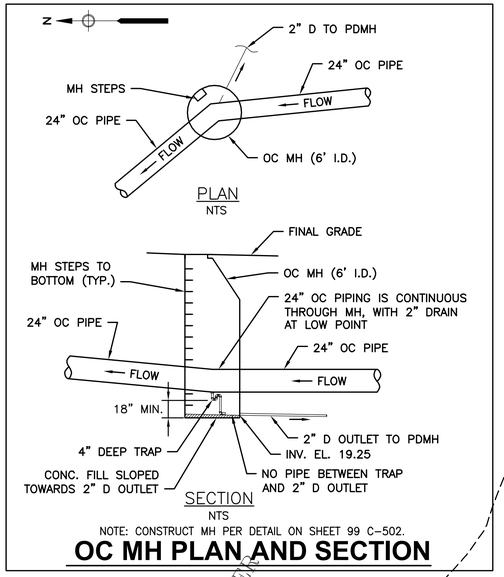
#4086

NOTES:

1. FOR LEGEND, ABBREVIATIONS AND GENERAL NOTES, SEE SHEET 00 C-001.
2. FOR DETAILS, SEE 99 SERIES OF CIVIL SHEETS.
3. FOR YARD PIPING KEY PLAN, SEE SHEET 00 C-115.
4. NOTE THAT THE EXISTING CONDITIONS SHOWN ON YARD PIPING PLANS ARE "POST-DEMOLITION", I.E. AFTER DEMOLITION OF MAJOR STRUCTURES AND PIPING. FOR PRE-DEMOLITION CONDITIONS, SEE SHEETS 00 C-101 AND 00 C-102.
5. THE STORM DRAIN STRUCTURES AND PIPING ARE SHOWN ON THIS PLAN FOR COORDINATION WITH OTHER YARD PIPING. FOR ADDITIONAL INFORMATION ON STORM DRAINAGE, SEE SHEETS 00 C-111 THRU 00 C-114.
6. THE PROPOSED ELECTRICAL MANHOLES, HANDHOLES AND DUCTBANKS ARE SHOWN ON THIS PLAN FOR COORDINATION WITH OTHER YARD PIPING. FOR ADDITIONAL INFORMATION, SEE ELECTRICAL DRAWINGS.
7. FOR PIPING PROFILES, SEE SHEETS 00 C-123 THRU 00 C-128.
8. FOR CONTINUATION OF PIPING WITHIN STRUCTURES, SEE D, M, P AND FP DRAWINGS.
9. NUMEROUS BURIED PIPES ARE TO BE LOCATED IN CLOSE PROXIMITY TO PROPOSED ELECTRICAL/CONTROL/COMMUNICATION DUCTBANKS. DUE TO THE SEQUENCE OF CONSTRUCTION, SOME OF THE DUCTBANKS MAY BE INSTALLED PRIOR TO THE PIPING. CONTRACTOR'S SEQUENCE OF CONSTRUCTION SHALL COORDINATE THE INSTALLATION OF THE PROPOSED DUCTBANKS WITH THE BURIED PIPING. CONTRACTOR MAY INSTALL SEGMENTS OF PROPOSED BURIED PIPING THAT CROSS DUCTBANKS PRIOR TO COMPLETING THE REMAINDER OF THE PIPING.
10. INSTALLATION OF WYE, VALVE AND BLIND FLANGE IS OPTIONAL. REFER TO SECTION 02602. LOCATION AND ORIENTATION OF WYE AND VALVE TO BE DETERMINED BASED ON CONTRACTOR PREFERENCE.
11. PROVIDE MIN. 4' COVER AND 2" RIGID INSULATION ACROSS FULL WIDTH OF THE TRENCH AT FORCE MAIN CROSSING. TEST PIT TO DETERMINE LOCATION OF EXISTING FORCE MAIN.
12. INSTALL 8" RWW AND 12" CW IN SEPARATE TRENCHES. WATER MAIN TO BE INSTALLED WITH MIN. 5' OF COVER AND TO BE A MIN. OF 18" ABOVE THE 8" RWW FORCE MAIN.



NOTE: CONSTRUCT MH PER DETAIL ON SHEET 99 C-502.

OC MH PLAN AND SECTION

HIGHEST OBSERVABLE TIDE LINE (HOTL)

HOTL

PISCATAQUA RIVER

STEPS

BENCH

"CLEAN UP AFTER YOUR DOG"

GRANITE RET. WALL

"NO PARKING"

GRAVEL TRAIL

EXIST. 18" AND 24" FORCE MAINS FROM MECHANIC STREET PUMP STATION

24" FORCE MAIN

18" FORCE MAIN

AIR REL. MH #1333 (PAVED OVER) RIM=35.1' TOP OF PIPE=29.0' SUMP=25.8'

30"x42" INCREASER

CONNECT TO EXIST. 30"x24" RED.

8" GATE VALVE

12" GATE VALVE

12" WYE AND 12"x8" REDUCER

12" GATE VALVE

18" GATE VALVE (IN HORIZONTAL)

BLIND FLANGE

24" GATE VALVE

24" WYE. SEE NOTE 10.

12" CW

42" 11.25° AND 45° BENDS

8" 45° BENDS

8" 11.25° BEND

42" RWW

45° BEND

SEE NOTE 11

42" 45° BEND (TYP.)

6" SAN FM

8" RWW NEW CASTLE RIVER ROAD PUMP STATION FORCE MAIN

12" CW

SEE NOTE 12

22 1/2° BEND (TYP.)

12' WIDE VEGETATED MAINTENANCE CORRIDOR

6' MIN. CLEARANCE

SEE NOTE 5

11 1/4° BEND (TYP.) OR DEFLECT AT PIPE JOINT

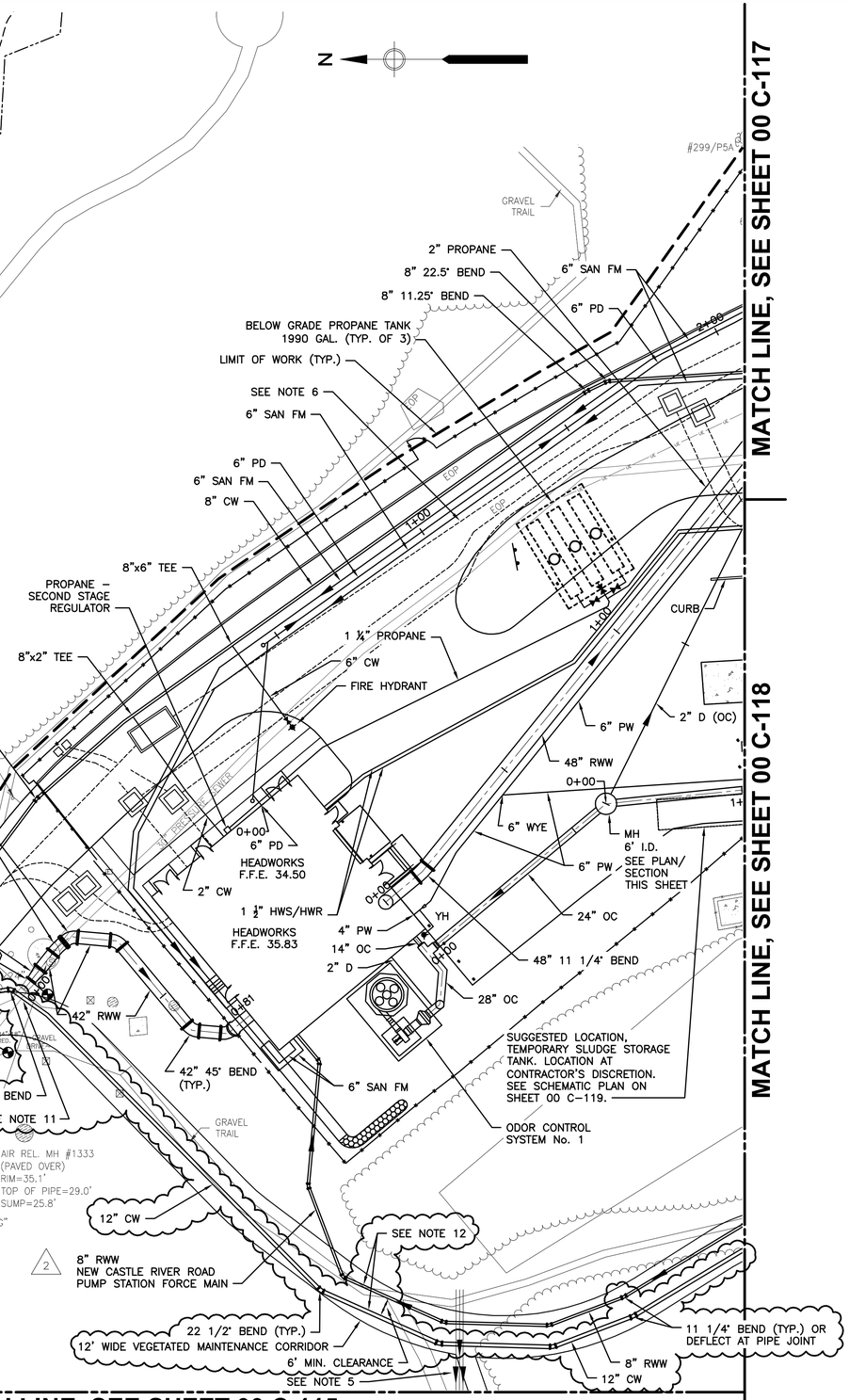
8" RWW

12" CW

MATCH LINE, SEE SHEET 00 C-115

MATCH LINE, SEE SHEET 00 C-117

MATCH LINE, SEE SHEET 00 C-118



PLAN

SCALE: 1"=20'

1" = 20' SCALE 0 20 40 60 FEET

MARK	DATE	MADE BY	CHECKED	DESCRIPTION
4	10/12/2016	ENM	JRP	12" WATER MAIN
3	6/2016	ENM	JRP	ADD. No. 6
2	4/2016	ENM	JRP	ADD. No. 3
1	2/2016	ENM	JRP	REVISED FOR BID

REVISIONS

AECOM TECHNICAL SERVICES, INC.
ADAM OSTROWSKI
CHELMSFORD, MA 01824
PHONE: (978) 905-2100
www.aecom.com

AECOM

CITY OF PORTSMOUTH, NH - DEPARTMENT OF PUBLIC WORKS
PEIRCE ISLAND WWTF UPGRADE

YARD PIPING PLAN II

REVISED WATER MAIN

PROJECT NO:	60301525
CAD DWG FILE:	00 C-116 - REV WATER MAIN
DESIGNED BY:	E. MESERVE
DRAWN BY:	C. BENZIGER
DEPT CHECK:	C. BENZIGER
PROJ CHECK:	E. MESERVE
DATE:	FEBRUARY 2016
SCALE:	AS NOTED

00 C-116

PATH/FILENAME: P:\60301525 - PORTSMOUTH WWTF UPGRADE\SHEETS\UBP-2\C\00 C-116 - REV WATER MAIN.DWG
LAST UPDATE: Wednesday, October 12, 2016 1:16:54 PM
PLOT DATE: Wednesday, October 12, 2016 1:18:13 PM
ANSI D - 12-Oct-16

NOTES:

1. FOR LEGEND, ABBREVIATIONS AND GENERAL NOTES, SEE SHEET 00 C-001.
2. FOR DETAILS, SEE 99 SERIES OF CIVIL SHEETS.
3. FOR YARD PIPING KEY PLAN, SEE SHEET 00 C-115.
4. NOTE THAT THE EXISTING CONDITIONS SHOWN ON YARD PIPING PLANS ARE "POST-DEMOLITION", I.E. AFTER DEMOLITION OF MAJOR STRUCTURES AND PIPING. FOR PRE-DEMOLITION CONDITIONS, SEE SHEETS 00 C-101 AND 00 C-102.
5. THE STORM DRAIN STRUCTURES AND PIPING ARE SHOWN ON THIS PLAN FOR COORDINATION WITH OTHER YARD PIPING. FOR ADDITIONAL INFORMATION ON STORM DRAINAGE, SEE SHEETS 00 C-111 THRU 00 C-114.
6. FOR PIPING PROFILES, SEE SHEETS 00 C-123 THRU 00 C-128.
7. THE PROPOSED ELECTRICAL MANHOLES, HANDHOLES AND DUCTBANKS ARE SHOWN ON THIS PLAN FOR COORDINATION WITH OTHER YARD PIPING. FOR ADDITIONAL INFORMATION, SEE ELECTRICAL DRAWINGS.
8. FOR CONTINUATION OF PIPING WITHIN STRUCTURES, SEE D, M, P AND FP DRAWINGS.
9. ALL GRIT, SLUDGE AND SCUM PIPING (SC, PSL, TSL) SHALL HAVE CLEANOUTS INSTALLED AT ALL 45° AND 90° BENDS IN THE PIPES AND WHERE INDICATED ON THE YARD PIPING DRAWINGS.
10. FINAL PIPE ALIGNMENT FOR 8" RWW IS SHOWN. CONTRACTOR TO TEMPORARILY RELOCATE FORCE MAIN AS NECESSARY DURING CONSTRUCTION. TEMPORARY PIPING SHALL USE RESTRAINED JOINTS.
11. NUMEROUS BURIED PIPES ARE TO BE LOCATED IN CLOSE PROXIMITY TO PROPOSED ELECTRICAL/CONTROL/COMMUNICATION DUCTBANKS. DUE TO THE SEQUENCE OF CONSTRUCTION, SOME OF THE DUCTBANKS MAY BE INSTALLED PRIOR TO THE PIPING. CONTRACTOR'S SEQUENCE OF CONSTRUCTION SHALL COORDINATE THE INSTALLATION OF THE PROPOSED DUCTBANKS WITH THE BURIED PIPING. CONTRACTOR MAY INSTALL SEGMENTS OF PROPOSED BURIED PIPING THAT CROSS DUCTBANKS PRIOR TO COMPLETING THE REMAINDER OF THE PIPING.
12. TEMPORARY 6" SAN FM TO BE INSTALLED TO PERMIT CONTINUED OPERATION OF THE EXISTING BELT FILTER PRESSES UNTIL SUCH TIME AS THE HEADWORKS IS OPERATIONAL.
13. (2) 4" BPF PIPES TO BE MAINTAINED IN OPERATION UNTIL SUCH TIME AS THE EXISTING BELT FILTER PRESSES ARE DEMOLISHED.
14. TEMPORARY 6" SAN FM TO BE INSTALLED TO PERMIT CONTINUED OPERATION OF THE EXISTING ADMIN. BUILDING 6" SAN UNTIL SUCH TIME AS THE ADMIN. BUILDING IS DEMOLISHED.
15. TERMINATE VENT PIPING UNDER SOFFIT.
16. REMOVE AND REPLACE EXISTING TWO 2" REINFORCED PVC HOSE HYPO LINES WITH NEW 8" PVC CONDUIT AND TWO NEW 2" REINFORCED PVC HOSES PER SPEC. SECT. 15370 FROM CHEM MH TO PRIM. CLARIF. EFFLUENT DISTRIBUTION BOX. TWO EXISTING CHEM MANHOLES DO NOT REQUIRE REPLACEMENT.
17. INSTALL 8" RWW AND 12" CW IN SEPARATE TRENCHES. WATER MAIN TO BE INSTALLED WITH MIN. 5' OF COVER AND TO BE A MIN. OF 18" ABOVE THE 8" RWW FORCE MAIN.

MEAN LOW WATER (MLW)
MEAN SEA LEVEL (MSL)
MEAN HIGH WATER (MHW)
HIGHEST OBSERVABLE TIDE LINE (HOTL)
LIMIT OF WORK (TYP.)
SAN MH
12" SAN CONNECT TO SAN PUMP STATION
8" PD CONNECT TO SAN PUMP STATION
SANITARY PUMP STATION No. 2 RIM EL. 14.25
VALVE CHAMBER HATCH EL. 14.60
6" SAN (TYP.)
6" D (NON-PERFORATED)
24" OUTFALL (EXIST.)
SEE NOTE 5 (TYP.)
2" PROPANE
PROPANE - SECOND STAGE REGULATOR
14" 45° BEND (TYP.)
1 1/2" PW
YH
GRANITE RET. WALL
YH WITH VACUUM BREAKER
6" SAN FM
6" PD
6" SAN SEE NOTE 14
4" SAN
4" D (TEMP.)
10" D (TEMP.)
6" D
3" V (SEE NOTE 15)
1" SB
4" D (SAN)
PARSHALL FLUME
EFFLUENT DISTRIBUTION BOX
FIRE HYDRANT
CHLORINE CONTACT TANKS
FLOW METER VAULT
OPERATIONS/LAB BUILDING
SHED
CONC. RET. WALL
12" & 16"
2" SB IN 4" CONTAIMENT PIPE
6" PW
4" TDW
6" TDW
2 ½" CW
6" FP
PROPANE - SECOND STAGE REGULATOR
1" SH
1 1/2" PW
SEE NOTE 16
CHEMICAL STORAGE BUILDING
HYPO
SEE NOTE 13
GENERATOR
1.5" PW
TRANS.
4" PD ELECT. BLDG.
14" 22 1/2° BEND (TYP.)
3" HWS/HWR
0+00
14" BW
2 ½" POL AND 1" FC
6" U (PERF. UNDERDRAIN)
1" SH
30" DNE
8" BW
6" FP
2" CW
4" PW
1 1/2" PW
6" PW
14" BW
8" BW
3" HWS/HWR
BAF BUILDING
1" CW
CHERRY
EXIST. 8" NEW CASTLE RIVER ROAD PUMP STATION FORCE MAIN
3/4" NON-FREEZE YARD HYDRANT (TYP.)
CONNECT 8" RWW TO EXIST. 8" FM
12' WIDE VEGETATED MAINTENANCE CORRIDOR
CONNECT 8" CW TO EXISTING 8" CW WITH 22 1/2° AND 11 1/4° BENDS
8" RWW SEE NOTE 10
8" CW
12"x8" REDUCER AND 8" 22 1/2° BEND
15' MIN.
12" GATE VALVE
22 1/2° BEND AND 11 1/4° BEND
12" CW
SEE NOTE 17
45° BEND
6' MIN. CLEARANCE
2" PROPANE
6" PD
PD MH
6" GV (TYP.)
2" D (OC)
6" SAN FM
SEE NOTE 7
8" CW
CONN. 8" CW TO EXIST. 8" CW
4" TDW
2 ½" POL AND 1" FC
FIRE HYDRANT
VALVE VAULT
6" SAN (TYP.)
4" PD. SLOPE CONTIN. TO SAN PS No. 1
C.O.
6" PW
12" PD
1+59
10" PR
12"x10" RED.
6" SAN
0+34
3" V (SEE NOTE 15)
SANITARY PUMP STATION No. 1 RIM EL. 20.30
36" PCE
3/4" CS
4" PW AND 1 1/2" PW AND YH
4" CW
6" FP
SOLIDS BUILDING
48" RWW
48"x30" RED.
14" BW
8" BW
6" SAN FM
6" CW CONNECT TO EXIST. 8" CW WITH 8"x6" TS&V
8" CW CONNECT TO EXIST. 8" CW WITH 8"x8" TS&V
PRIMARY CLARIFIER EFFLUENT DIST. BOX
CONNECT 48" RWW TO EXIST. 30" RWW
4" TDW
8" OC
CONVERT CW TO PW WITHIN LIMITS SHOWN DASHED
TEMPORARY 6" SAN FM. SEE NOTE 12.
2" FP
6" PW
4" PW
(2) 1" FC
6" SC. APPROX. ℄ EL. 27.73.
(2) 2 1/2" POL
6" CW CONNECT TO EXIST. 6" CW (HYDRANT)
6" SC
4" SC. APPROX. TIE-IN INV. EL. 16.25
4" TSL. APPROX. TIE-IN INV. EL. 16.50
8" SC
2" SAM
6" U (PERF. UNDERDRAIN)
6" TDW

MATCH LINE, SEE SHEET 00 C-116

MATCH LINE, SEE SHEET 00 C-118

PLAN

SCALE: 1"=20'

1" = 20' SCALE 0 20 40 60 FEET

MARK	DATE	MADE BY	CHECKED	DESCRIPTION
6	10/12/2016	ENM	JRP	12" WATER MAIN
5	6/2016	ENM	JRP	ADD. No. 6
4	6/2016	ENM	JRP	ADD. No. 5
3	5/2016	ENM	JRP	ADD. No. 4
2	3/2016	ENM	JRP	REVISED FOR BYPASS STRUCTURE
1	2/2016	ENM	JRP	REVISED FOR BID

REVISIONS

AECOM TECHNICAL SERVICES, INC.
40 SHATTUCK ROAD, SUITE 110
CHELMSFORD, MA 01824
TEL: 978-905-2100
www.aecom.com

CITY OF PORTSMOUTH, NH - DEPARTMENT OF PUBLIC WORKS
PEIRCE ISLAND WWTF UPGRADE

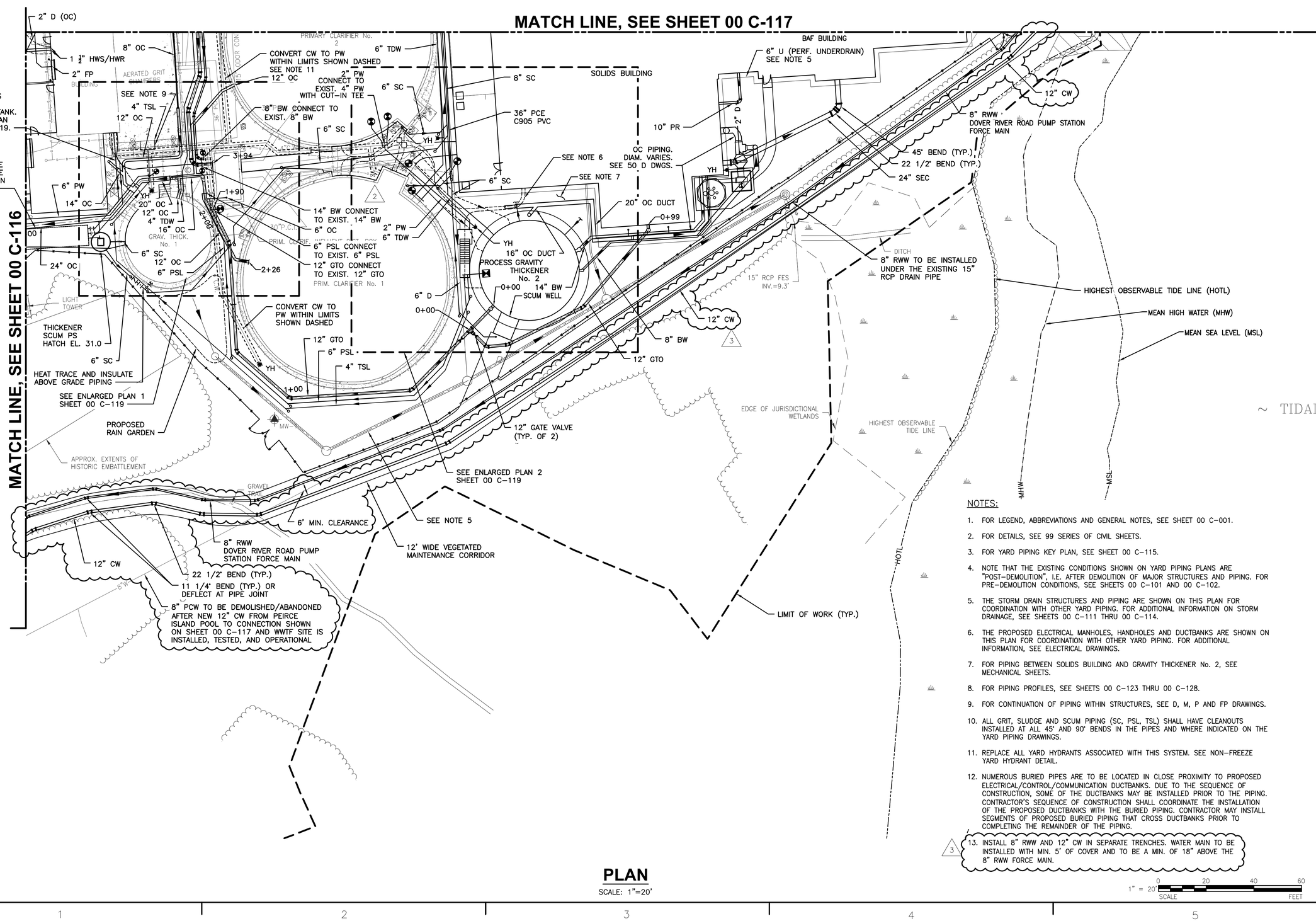
YARD PIPING PLAN III

REVISED WATER MAIN

PROJECT NO:	60301525
CAD DWG FILE:	00 C-117 - REV WATER MAIN
DESIGNED BY:	E. MESERVE
DRAWN BY:	C. BENZIGER
DEPT CHECK:	C. BENZIGER
PROJ CHECK:	E. MESERVE
DATE:	FEBRUARY 2016
SCALE:	AS NOTED

00 C-117

PATH/FILENAME: P:\60301525 - PORTSMOUTH WWTF UPGRADE\SHEETS\BP-2\C\00 C-117 - REV WATER MAIN.DWG
LAST UPDATE: Wednesday, October 12, 2016 1:29:37 PM
PLOT DATE: Wednesday, October 12, 2016 1:30:39 PM
ANSI D - 12-Oct-16



PLAN

SCALE: 1"=20'

NOTES:

1. FOR LEGEND, ABBREVIATIONS AND GENERAL NOTES, SEE SHEET 00 C–001.
2. FOR DETAILS, SEE 99 SERIES OF CIVIL SHEETS.
3. FOR YARD PIPING KEY PLAN, SEE SHEET 00 C–115.
4. NOTE THAT THE EXISTING CONDITIONS SHOWN ON YARD PIPING PLANS ARE "POST–DEMOLITION", I.E. AFTER DEMOLITION OF MAJOR STRUCTURES AND PIPING. FOR PRE–DEMOLITION CONDITIONS, SEE SHEETS 00 C–101 AND 00 C–102.
5. THE STORM DRAIN STRUCTURES AND PIPING ARE SHOWN ON THIS PLAN FOR COORDINATION WITH OTHER YARD PIPING. FOR ADDITIONAL INFORMATION ON STORM DRAINAGE, SEE SHEETS 00 C–111 THRU 00 C–114.
6. THE PROPOSED ELECTRICAL MANHOLES, HANDHOLES AND DUCTBANKS ARE SHOWN ON THIS PLAN FOR COORDINATION WITH OTHER YARD PIPING. FOR ADDITIONAL INFORMATION, SEE ELECTRICAL DRAWINGS.
7. FOR PIPING BETWEEN SOLIDS BUILDING AND GRAVITY THICKENER No. 2, SEE MECHANICAL SHEETS.
8. FOR PIPING PROFILES, SEE SHEETS 00 C–123 THRU 00 C–128.
9. FOR CONTINUATION OF PIPING WITHIN STRUCTURES, SEE D, M, P AND FP DRAWINGS.
10. ALL GRIT, SLUDGE AND SCUM PIPING (SC, PSL, TSL) SHALL HAVE CLEANOUTS INSTALLED AT ALL 45° AND 90° BENDS IN THE PIPES AND WHERE INDICATED ON THE YARD PIPING DRAWINGS.
11. REPLACE ALL YARD HYDRANTS ASSOCIATED WITH THIS SYSTEM. SEE NON–FREEZE YARD HYDRANT DETAIL.
12. NUMEROUS BURIED PIPES ARE TO BE LOCATED IN CLOSE PROXIMITY TO PROPOSED ELECTRICAL/CONTROL/COMMUNICATION DUCTBANKS. DUE TO THE SEQUENCE OF CONSTRUCTION, SOME OF THE DUCTBANKS MAY BE INSTALLED PRIOR TO THE PIPING. CONTRACTOR'S SEQUENCE OF CONSTRUCTION SHALL COORDINATE THE INSTALLATION OF THE PROPOSED DUCTBANKS WITH THE BURIED PIPING. CONTRACTOR MAY INSTALL SEGMENTS OF PROPOSED BURIED PIPING THAT CROSS DUCTBANKS PRIOR TO COMPLETING THE REMAINDER OF THE PIPING.

3 13. INSTALL 8" RWW AND 12" CW IN SEPARATE TRENCHES. WATER MAIN TO BE INSTALLED WITH MIN. 5' OF COVER AND TO BE A MIN. OF 18" ABOVE THE 8" RWW FORCE MAIN.

1" = 20' SCALE 0 20 40 60 FEET

MARK	DATE	MADE BY	CHECKED	DESCRIPTION
3	10/7/2016	ENM	JRP	12" WATER MAIN
2	4/4/2016	ENM	JRP	ADD. No. 3, REMOVED ELLIPSE
1	2/2016	ENM	JRP	REVISED FOR BID

REVISIONS

AECOM TECHNICAL SERVICES, INC.
ADVANCED WASTEWATER
CHELMSFORD, MA 01824
PHONE: (978) 905-2100
www.aecom.com

AECOM

CITY OF PORTSMOUTH, NH - DEPARTMENT OF PUBLIC WORKS
PEIRCE ISLAND WWTF UPGRADE

YARD PIPING PLAN IV

REVISED WATER MAIN

PROJECT NO:	60301525
CAD DWG FILE:	00 C-118 – REV WATER MAIN
DESIGNED BY:	E. MESERVE
DRAWN BY:	C. BENZIGER
DEPT CHECK:	C. BENZIGER
PROJ CHECK:	E. MESERVE
DATE:	FEBRUARY 2016
SCALE:	AS NOTED

00 C-118

PATH/FILENAME: P:\60301525 – PORTSMOUTH WWTF UPGRADE\SHEETS\BP-2\C\00 C-118 – REV WATER MAIN.DWG
LAST UPDATE: Friday, October 07, 2016 12:11:42 PM
PLOT DATE: Friday, October 07, 2016 12:13:30 PM
ANSI D – 7-Oct-16

AECOM
250 Apollo Drive Chelmford, MA 01824
www.aecom.com

Contract Modification Request: CMR 044A

Project:	Peirce Island WWTF Upgrade
Date:	4-28-2017
Description:	Peirce Island Parking Lots (Revision 1)
To:	Methuen Construction Co., Inc. Attn: Greg Galbraith
CC:	B. Dahlinghaus (AECOM)
From:	AECOM Erik Meserve and Jon Pearson

Comments:

Attached please find drawings and specifications indicating proposed modifications to the existing Four Tree Island Parking Lot and existing grassed overflow parking lot next to the Boat Ramp. The existing Four Tree Island Parking Lot is to be expanded and paved with porous pavement in addition to a new underdrain system and landscaping. The existing grassed overflow parking lot next to the Boat Ramp is to have a panel underdrain system installed and delineated using bucket and rope posts.

There have not been any changes to the specifications since this CMR was originally issued. The changes to the drawings based on the permitting process have been clouded for clarity. They include, but are not limited to, revisions to the highest observable tide line and associated offsets, the addition of temporary fencing around the work areas, leaving in place a section of haybale and silt fence, and changes to the porous pavement section.

A revised Sheet 00 C-104 is also included. This sheet was revised as part of the Wetlands Permit process. The changes to this drawing include relocating the Pool Protection Fencing to the north and south side of Peirce Island Road. Where the fence was previously shown extending to the Mean High Water, it now should be placed along the highest observable tide line.

Attached also for reference please find the geotechnical information for these areas.

The City has applied for and received both an Alteration of Terrain Permit and Wetlands Permit from NHDES for these modifications. Both permits are attached. Please note the conditions associated with these permits. Please provide the services of an Environmental Monitor as described in Item 8 of the Alteration of Terrain Permit.

Please provide a revised cost proposal to do this work as soon as possible. This is a high priority project as the City requires that construction of these modifications be substantially complete by June 15, 2017.

If you have any questions, please contact me.

Sincerely:

Erik Meserve
Project Engineer
AECOM

SPECIFICATION

SECTION 02745

POROUS ASPHALT PAVEMENT

PART 1 - GENERAL

1.01 DESCRIPTION:

A. Work under this Section shall consist of providing porous asphalt paving, as indicated on the Drawings and as specified herein including:

1. Furnishing porous asphalt pavement composed of mineral aggregate, asphalt binder material, stabilizing additives and anti-strip additive (if required), mixed in a central mixing plant and placed on a prepared drainage course in accordance with these Specifications and in conformance to the lines, grades, thicknesses and specified cross sections as shown on the Drawings or as directed by the Engineer and recorded in a daily field report;

2. Saw cutting and removal of existing/adjacent pavements;

3. Installation of geotextile fabric, and underdrain and other associated infrastructure within the permeable pavement system;

4. Preparation of the base and subbase layers (choker course, filter course, pea stoneand reservoir course) required for porous asphalt paving;

5. Installation of the base and subbase layers required for porous asphalt paving;

6. Installation of porous asphalt pavement, including surface preparation.

7. Protection of the permeable pavement system installation during and after construction (including protection from vehicular loading and sediment and/or debris deposition).

1.02 REFERENCES:

A. Standard Specification for Roads and Bridge Construction, State of New Hampshire Department of Transportation, latest edition, section 401 as amended and supplemented. (Referred to herein as the Standard Specification or Standard Specifications).

B. Annual Book of ASTM Standards, American Society for Testing and Materials, Philadelphia, PA, 2014 or latest edition

C. Standards of the American Association of State Highway and Transportation Officials (AASHTO), 2014, or latest edition.

D. UNHSC Design Specifications for Porous Asphalt Pavement and Infiltration Beds,

(http://www.unh.edu/unhsc/sites/default/files/media/unhsc_pa_spec_-_feb-2014_-rev_9-16.pdf)

1.03 EXPERIENCE:

A. The pavement producer and installer shall exhibit experience in the production and placement of porous pavements.

1.04 SUBMITTALS:

A. A set of three project references for previous production and installation of porous pavements of similar size and use are required by the pavement producer and installer a minimum of 10 days prior to production.

B. No porous asphalt pavement shall be produced until a Job Mix Formula (JMF) has been submitted by the Contractor in writing at least 10 days prior to the start of paving operations. Paving shall not begin until the JMF has been reviewed and approved by the Engineer.

C. The JMF shall provide the minimum criteria listed below:

1. Percent of aggregate passing each sieve size; percentage to be used of each portion of aggregate;

2. Percent of the Performance Graded Asphalt Binder (PGAB) in the porous asphalt;

3. PGAB certified test results and a material certificate for compliance with AASHTO AASHTO M 320;

4. Penetration Grade (PG), including source, location and any type of modification, if applicable;

5. Mixing temperature (290°F to 350°F or as per PGAB supplier);

6. Required compaction temperature;

7. Percent anti-stripping additive if required by Tensile Strength Ratio (TSR) testing;

8. Percent polymer additive (Styrene Butadiene Rubber (SBR) or Styrene Butadiene Styrene (SBS));

9. Percent and size of fibers added.

D. At the time of JMF submittal, the Contractor shall identify and make available the stockpiles of all proposed aggregates at the plant site. A minimum stockpile size of 150 tons for stone stockpiles and 75 tons for sand stockpiles will be required in order for the Engineer to obtain a representative sample.

1.05 MATERIAL SUBMISSIONS:

A. Submit a list of materials proposed for work under this Section including the name and address of the material producers and the locations from which the materials are to be obtained.

B. Submit certificates, signed by the material producers and the relevant subcontractors, stating that materials meet or exceed the specified requirements for review and approval by the Engineer. See Table 1 below.

C. Submit samples of materials for review and approval if requested by the Engineer.

Table 1 - Material Submittal Requirements

Material	**Properties on Certificate**
PGAB	AASHTO M320 PGAB Certification
Coarse Aggregate	Gradation (AASHTO T-11 / ASTM C117), Los Angeles Wear (AASHTO T-96 / ASTM C131), Micro-Deval (AASHTO T-327), Coarse Aggregate Angularity (AASHTO TP-61 / ASTM D5821) Flat and Elongated Particles (ASTM D4791 5:1)
Fine Aggregate	Gradation (AASHTO T-11 / ASTM C117), Fine Aggregate Angularity (AASHTO T-304 / ASTM C1252-A), Sand Equivalent (AASHTO T-176 / ASTM D2419), Plasticity Index (AASHTO T-90)
Choker Course	Gradation, max. wash loss, min. durability index, max. abrasion loss
Reservoir Course	Gradation, max. wash loss, min. durability index, max. abrasion loss, air voids
Filter Course	Gradation, permeability/sat. hydraulic conductivity
Geotextile filter fabric	Manufacturer’s certification, AOS/EOS, tensile strength
Mineral Filler (optional)	Manufacturer’s Cert.
Hydrated Lime (required)	Manufacturer’s Cert.
Fibers (required)	Manufacturer’s Cert.
SBS/SBR additive	Manufacturer’s Cert.
Anti-stripping Additive	Manufacturer’s Cert.

1.06 COORDINATION:

A. The Contractor shall coordinate paving with all other work, with specific focus on underground utility protection/re-location/construction, to prevent damage or covering up unfinished or uninspected work and loss of time or labor by improper scheduling. Any rework required due to insufficient coordination shall be done at no cost to Owner.

PART 2 - PRODUCTS

2.01 POROUS ASPHALT PAVEMENT

A. Porous Asphalt for porous paving shall be placed in two lifts with one (1) 2-inch thick base course and one (1) 2-inch thick surface course, with an asphalt binder content of 6.0% to 6.5% by weight of dry aggregate. If more absorptive aggregates are used in the mix, then the amount of binder is to be based on the testing procedures outlined in the National Asphalt Pavement Association's Information Series 131 – "Porous Asphalt Pavements" (2003). Draindown of the binder shall be no greater than 0.3% in accordance with ASTM-D 6390.

B. Hydrated lime shall be added at a dosage rate of 1.0% by weight of dry aggregate to mixes containing granite. Hydrated lime shall meet the requirements of ASTM C977 – "Standard Specification for Quicklime and Hydrated Lime for Soil Stabilization". The hydrated lime must be able to prevent the separation of the asphalt binder from the aggregate and achieve a required tensile strength ratio (TSR) of at least 80% when tested in accordance with AASHTO T-283 – "Standard Method of Test for Resistance of Compacted Asphalt Mixtures to Moisture-Induced Damage". The mix shall also be tested for its resistance to stripping by water in accordance with ASTM D1664 – "Test Method for Coating and Stripping of Bitumen-Aggregate Mixtures". If the estimated coating area is not above 95 percent or the TSR falls below 80%, additional anti-stripping additives will be required.

2.02 ASPHALT BINDER:

A. Pre-Blended or Post-Blended PG 64-22 or PG 64-28 modified with Styrene-butadiene-styrene (SBS) polymer. The PGAB shall meet the applicable requirements of AASHTO M320 – "Standard Specification for Performance Grade Asphalt Binder". The Contractor shall provide the Engineer with an approved copy of the Quality Control Plan for PGAB in accordance with AASHTO R 26-01 Certifying Suppliers of PGAB.

B. A sample of the liquid must be taken at the mixing plant representing the first hour of production and turned over to the Engineer.

C. If Post-Blended SBR PGAB is to be used, a QC Plan must be submitted as specified herein.

D. Post-Blended Styrene Butadiene Rubber (SBR) Binder QC Plan Requirements:

1. General:

    a. Company name and address;

    b. Plant location and address;

    c. Type of facility;

    d. Contact information for the QC Plan Administrator;

    e. QC tests to be performed on each PGAB;

    f. Name of QC testing lab to perform QC;

    g. Actions to be taken for PGAB and SBR in non-compliance;

    h. List of mechanical controls (requirements below);

    i. List of process controls and documentation (below);

    j. This Plan shall be submitted to the Engineer 10 days before production.

2. List of Mechanical Controls:

    a. Liquid SBR no-flow alert system with an “alert” located in the control room and automatic documentation of a no flow situation on the printout;

    b. Provide means of calibrating the liquid SBR metering system to a delivery tolerance of 1%;

    c. A batching tolerance at the end of each day’s production must be within 0.5% of the amount of SBR solids specified;

    d. Mag-flow meter (other metering system may be considered);

    e. Method of sampling liquid SBR.

3. List of Process Controls and Documentation:

    a. Printouts of liquid SBR and PG binder quantities must be synchronized within one minute of each other;

    b. SBR supplier certification showing the percent of SBR solids in liquid SBR;

    c. Test results of a lab sample blended with the specified dosage of SBR. At a minimum, provide the name of the PGAB and liquid SBR suppliers, and PGAB information such as grade and lot number, and SBR product name used for the sample;

d. MSDS sheet for liquid SBR;

e. Handling, storage, and usage requirements will be followed as required by the liquid SBR manufacturer;

f. At a minimum, provide a table showing proposed rate of SBR liquid in relation to the Hot Mix Asphalt (HMA) production rate in tons per hour (TPH) for the percent solids in liquid SBR, quantity of SBR specified for HMA production, and the specific gravity of the SBR;

g. Quality Control Technician (QCT) or QC Plan Administrator must be responsible for documenting quantities; ensuring actual use is within tolerance, etc. All printouts, calculations, supplier certifications etc. must be filed and retained as part of the QCT's daily records;

h. Method and Frequency of testing at the HMA plant, including initial testing and specification testing.

2.03 COARSE AGGREGATE:

A. Coarse aggregate shall be that part of the aggregate retained on the No. 4 sieve; it shall consist of clean, tough, durable fragments of crushed stone, or crushed gravel of uniform quality throughout. Coarse aggregate shall have a percentage of wear as determined by Los Angeles Wear (AASHTO T96) of not more than 40 percent or by Micro-Deval (AASHTO T327) not more than 18 percent. In the mixture, at least 75 percent, by weight of the material coarser than the No. 4 sieve, shall have at least two fractured faces, and 90 percent shall have one or more fractured faces (ASTM D5821). Coarse aggregate shall be free from clay balls, organic matter, deleterious substances, and not more than 8.0% of flat or elongated pieces (>3:1) as specified in ASTM D4791.

2.04 FINE AGGREGATE:

A. Fine Aggregate shall be that part of the aggregate mixture passing the No. 4 sieve and shall consist of sand, screenings, or a combination thereof with uniform quality. Fine aggregate shall consist of durable particles, free from injurious foreign matter. Screenings shall be of the same or similar materials as specified for coarse aggregate. The plasticity index (AASHTO T90) of that part of the fine aggregate passing the No. 40 sieve shall be not more than 6. The angularity of the fine aggregate shall be measured with the fine aggregate angularity test (AASHTO TP56, Method A) and shall be 45 or higher. The Sand Equivalent (AASHTO T176) shall be a minimum of 50.

2.05 TACK COAT (VERTICAL SURFACES ONLY):

A. Emulsified asphalt: AASHTO M140/ASTM D 997 or AASHTO M 208/ASTM D 2397, RS-1 or CRS-1; CSS-1, CSS-1h, SS-1, SS-1h.

B. No tack coat shall be applied on any part of the permeable pavement horizontal surface.

2.06 ANTI-STRIPPING ADDITIVE:

A. The mix shall be tested for moisture susceptibility and asphalt stripping from the aggregate by AASHTO T283. If the retained tensile strength ratio (TSR) is less than 80% upon testing, a heat-stable additive shall be furnished to improve the anti-stripping properties of the asphalt binder. Test with one freeze-thaw cycle (rather than five recommended in NAPA IS 115). The amount and type of additive (e.g. fatty amines or additional hydrated lime) to be used shall be based on the manufacturer's recommendations, the mix design test results, and shall be approved by the Engineer.

2.07 FIBERS:

A. Fibers are required, either mineral or cellulose. The dosage rate for mineral fibers shall be approximately 0.4 percent by total mixture weight and sufficient to prevent draindown. The dosage rate for cellulose fibers shall be approximately 0.3 percent by total mixture weight and sufficient to prevent draindown. Cellulose fibers shall conform to AASHTO MP8-02.

B. Additional fibers may be necessary consistent with NAPA IS 115 recommendations if the draindown requirement cannot be met (<0.3% via ASTM D6390 – "Standard Test Method for Determination of Draindown Characteristics in Uncompacted Asphalt Mixtures") provided that the air void content requirement is met (>18%).

C. Mineral fibers shall conform to the following properties:

1. Sieve Analysis:

a. Fiber Length (determined according to the Bauer McNett fractionation): 0.25 inches and reported as the maximum mean test value.

b. Thickness (determined by measuring >200 fibers in a phase contrast microscope): 0.0002 inches and reported as the maximum mean test value.

c. Shot Content (determined as a measure of non-fibrous material on vibrating sieves):

(Two sieves, No. 60 and the No. 230 are typically utilized. ASTM C612):

No.60 Sieve: 90 +/- % Passing;

No. 230 Sieve: 70 +/- % Passing.

2.08 MINERAL FILLER:

A. Mineral filler shall consist of finely divided mineral matter such as rock or limestone dust or other suitable material. At the time of use it shall be sufficiently dry to flow freely and essentially free from agglomerations. Filler shall be free from organic impurities and have a plastic index not greater than 4 as determined using AASHTO

T90. Filler material for the mix shall meet AASHTO M17, except that the gradation requirements of AASHTO M17 shall not apply.

2.09 POROUS ASPHALT MIX

A. Porous Asphalt Mix Composition and Design: The Contractor shall submit a mix design at least 10 days prior to the beginning of production. The Contractor shall make available samples of coarse aggregate, fine aggregate, mineral filler, fibers and a sample of the PGAB that will be used in the design of the mixture. A certified test report of the PGAB will be submitted with the mix design. The test results shall be certified by a laboratory meeting the requirements of AASHTO R18. The Laboratory will be certified by the state DOT, a regional equivalent agency (e.g. NorthEast Transportation Technician Certification Program (NETTCP)), and/or be qualified under ASTM D3666. Technicians will be certified/qualified by the regional equivalent agency (e.g. NETTCP) in the discipline of HMA Plant Technician.

1. Selection of the design gradation should entail blending selected aggregate stockpiles to produce three trial blends. For each trial gradation, compact specimens between 6.0% and 6.5% asphalt binder using 50 gyrations of a Superpave gyratory compactor. Subsequently, determine air void contents from the bulk specific gravity of the compacted specimens and the theoretical maximum specific gravity of the loose mixture. Bulk specific gravity shall be calculated using ASTM D6752 (automatic vacuum sealing, e.g. Corelok).

2. Conduct the Cantabro abrasion test on unaged and aged compacted samples. (ASTM Method C131).

3. The optimum asphalt binder content is selected when the mixture meets the criteria for Air Voids, Abrasion Loss on Unaged Specimens, Abrasion Loss on Aged Specimens and Draindown. See Table 2 below.

Table 2 – Porous Asphalt Mix Design Criteria

Sieve Size (inch/mm)	**Percent Passing**
0.75/19.0	100
0.50/12.5	85 – 100
0.375/9.5	55 – 75
No.4/4.75	10 – 25
No.8/2.36	5 – 10
No.200/0.075	2 – 4
Test Criteria	**Specification**
PGAB, Percent	6.0 – 6.5%
Temperature of Mix (F)	265 – 325°F
Mixture Coating (AASHTO T195)	Min. 95%
Fiber Content by total mix weight	0.3% cellulose

	or 0.4% mineral
Rubber Solids by weight of binder	1.5% to 3% or TBD
Air Void Content	18% – 22%
Draindown (ASTM D6390)	< 0.3%
Retained Tensile Strength*	> 80%
Cantabro Abrasion test On Unaged samples	< 20%
Cantabro Abrasion test On 7-day Aged Samples	< 30%

*Note: if the TSR value falls fall below 80% when tested by AASHTO T 283 as modified by NAPA IS 131 (with a single freeze thaw cycle rather than 5), then the Contractor shall employ an anti-strip additive in the mixture design process to raise the TSR value above 80%.

B. Changes to the Mix: No change in the job-mix formula (JMF) may be made without written approval of the Engineer. The JMF must fall within the master range specified in the mix design criteria. Should there be a change in the sources of materials, a new JMF must be developed and approved before the new material is used.

1. The Engineer may order a change in any part of the job-mix formula if placement, finishing, or compaction characteristics are determined by the Engineer to be unsatisfactory.

2.10 CHOKER COURSE AND RESERVOIR COURSE

A. The choker and reservoir course shall conform to their respective gradation requirements as provided in the Porous Pavement Section Detail in the Construction plans (Drawing No. 99 C-206).

B. Material for the choker course and reservoir course shall meet the following:

1. Maximum Wash Loss of 0.5%

2. Minimum Durability Index of 35

3. Maximum Abrasion Loss of 10% for 100 revolutions, and maximum of 50% for 500 revolutions.

2.11 FILTER COURSE

A. The filter coarse material shall conform to the Gravel Filter Course gradation requirements as provided in the Porous Pavement Section Detail in the Construction plans (Drawing No. 99 C-206).

B. Filter course material shall have a hydraulic conductivity of 10 to 60 ft/day (0.0036 to 0.022 cm/sec) at 95% compaction unless otherwise approved by the Engineer.

2.12 GEOTEXTILE FABRIC

A. Non-woven geotextile filter shall be Mirafi 160N, or approved equivalent.

PART 3 - EXECUTION

3.01 GENERAL:

A. The Contractor shall install subbase, base and porous pavement system components including associated drainage appurtenances in conformance with the plans and specifications.

B. Equipment shall be in good operating condition and breakdowns shall be corrected immediately so as not to delay paving operations.

C. Protection of Existing Infrastructure:

1. Protect adjacent infrastructure/work from splashing of paving materials. Remove stains from adjacent exposed surfaces including paving, structures, and grounds. Remove waste and spillage completely.

2. Do not damage or disturb existing infrastructure, property or vegetation. Provide suitable protection where required before starting work and maintain protection throughout the course of the work.

3. Restore damaged infrastructure, property, improvements, including existing paving on or adjacent to the site that has been damaged as a result of construction work.

D. Owner shall be notified at least 48 hours prior to porous paving work or as required by the local jurisdiction.

E. Check frames, covers, grates, water valve boxes and other miscellaneous castings that are located in the proposed pavement areas to ensure that they have been correctly positioned and set to the proper slope and elevation a minimum of 24 hours prior to paving.

3.02 PREPARATION:

A. Subgrade Preparation:

1. Existing subgrade under porous pavement areas shall NOT be compacted or subject to excessive construction equipment traffic prior to subbase placement. The infiltration rate of the in-situ un-compacted subgrade material shall be no less than 5-30 ft/day or 50% of the hydraulic conductivity (per ASTM D2434) at 95% standard proctor compaction. The infiltration test will be conducted on three subgrade samples based on a uniform lot subdivision (1 entrance, 1 south side, 1 north side).

2. If accumulation of fine materials and/or surface ponding occurs, this material shall be removed with in a manner that does not cause further compaction to the underlying soils. The soils must subsequently be scarified to a minimum depth of 6 inches with the appropriate scarification equipment.

3. Bring subgrade to line, grade, and elevations indicated in Plans and Specifications. Fill and lightly re-grade any areas damaged by erosion or ponding, before the placing of stone. Subgrade should be generally level unless otherwise indicated.

B. Subbase and Base Installation:

1. The Engineer shall be notified at least 24 hours prior to all porous media bed and porous pavement work. The completed subgrade work shall be inspected by the Engineer prior to Contractor proceeding with subbase and base installation.

2. Subbase and base aggregate shall be placed immediately after approval of subgrade preparation.

3. Install Reservoir Course in 8-inch maximum lifts. Compact each layer with a 60 kN plate compactor machine (or other approved equipment) with a compaction indicator until no visible movement of the stone, keeping equipment movement on Reservoir Course to a minimum. Install Reservoir Course as indicated on Plans and Specifications. The existing native subgrade material shall not be compacted or subject to excessive construction equipment traffic prior to the to the placement of the reservoir course.

4. Install Choker Course in 4-inch maximum lifts over the surface of Filter Course. Notify Engineer for inspection prior to porous asphalt paving. Compact each layer with a 60 kN plate compactor machine (or other approved equipment) with a compaction indicator until no visible movement of the stone, keeping equipment movement on Choker Course to a minimum. Install Choker Course as indicated on Plans and Specifications.

5. The infiltration rate of the compacted filter course shall be determined by ASTM D2434 or an approved alternate at the discretion of the engineer. The infiltration testing will be conducted once per material.

3.03 APPLICATION:

A. <u>Tack Coat:</u>

1. NO tack coat or other asphalt sealant shall be applied between layers of the porous asphalt pavement system. An emulsified asphalt tack coat shall be applied to vertical contact surfaces of all cement concrete and other surfaces abutting or projecting into the permeable pavement system.

2. All vertical surfaces of structures and existing concrete surfaces in contact with new the porous asphalt pavement system shall be painted with a uniform coating

of an approved tack coat material. Take extreme care in the application of this material to prevent splattering or staining of surfaces that will be exposed after the paving is completed. Surfaces that are stained as a result of the Contractor's operation shall be repaired or replaced by the Contractor at no additional cost to the Owner.

3. The vertical applications of tack coat shall be allowed adequate time to cure prior to receiving paving.

B. Weather Limitations:

1. Construct pavement when atmospheric temperature is above 55°F, the ground temperature is above 55°F and there is not any film of water (free standing water) on the base to be paved. The pavement shall not be installed on wet aggregate or treated bases when atmospheric temperature is less than 55°F. The atmospheric and base temperature requirements may only be modified at the discretion of the Engineer. The Contractor shall not pave on days when rain is forecast for the day, unless change in the weather results in favorable conditions as determined by the Engineer.

3.04 POROUS ASPHALT PAVEMENT PRODUCTION AND PLACEMENT:

A. Production

1. Asphalt Binder Material: The Contractor shall maintain documentation in the form of a Materials Certificate of each shipment. Material shall conform to the specification requirements for the applicable performance grade as specified herein.

2. Mixing Plants: Mixing plants shall be in conformance with NAPA IS 131 and applicable sections of the state DOT's specification for the Plant requirements in regard to asphalt mixtures. The use of surge bins shall not be permitted.

3. Silo/Truck Storage: The plant produced porous mixture shall be retained in a silo or truck bed for no more than ±2 hours unless otherwise approved by the Engineer. Any excessive draindown observed due to the extended storage will be rejected by the Engineer and all costs associated will be the responsibility of the Contractor.

4. Contractor Quality Control (QC) During Production: The Contractor shall provide at the Contractor's expense a Quality Control Plan meeting the approval of the Engineer. The QC Plan shall include material inspection, staking and layout control, testing and inspection of site grading and pavement work, documentation, communication to the Engineer, and all test reports signed by the Quality Control Plan Administrator. This material should be provided sequentially as accepted and maintained in a QC binder at the plan.

The QC Plan shall detail the process control and documentation of mix production and placement by certified/qualified (e.g. NETTCP or equal)

technicians/inspectors. All mix testing results during production shall be submitted to the Engineer within 24 hours. The QC Plan may be altered at the discretion of the Engineer and based on feasible testing as suggested in the Plan. Certain QC test requirements during production may not be feasible for small projects in which limited mix is generated. This feasibility should be assessed with the Engineer and the producer. The Contractor shall sample, test, inspect and evaluate the mix in accordance with the methods and minimum frequencies shown in Table 3 and the maintain mixture production with the allowable Production and Suspension Limits shown in Table 4.

Table 3 – QC Testing Frequencies

Test	Min. Frequency	Test Method
Temp. of Mix In Truck @ Plant	6 times per day	Stem Style Thermometer
Gradation	Greater of either: 1 per 500 tons 2 per day 3 per job	AASHTO T30
Binder Content	Greater of either: 1 per 500 tons 2 per day 3 per job	AASHTO T164 AASHTO T308
Air Void Content	Greater of either: 1 per 500 tons 2 per day 3per job	ASTM D6752
Binder Draindown	Greater of either: 1 per 500 tons 2 per day 3 per job	ASTM D6390

Table 4 – QC Production and Suspension Limits

Sieve Size (inch/mm)	Production Limits	Suspension Limits
0.75/19.0	+/- 0%	+/- 0%
0.50/12.5	+/- 6%	+/- 9%
0.375/9.5	+/- 6%	+/- 9%
No.4/4.75	+/- 6%	+/- 9%
No.8/2.36	+/- 5%	+/- 7%
No.200/0.075	+/- 1.0%	+/- 1.5%
Test Criteria		
PGAB, Percent	+/- 0.4%	+/- 0.7%
Temperature of Mix (F)	+/- 10°F	+/- 20°F
Air Void Content	-2 / +4%	-3 / +6%
Draindown (ASTM D6390)	+0.05	+0.10

5. Hot Mix Asphalt Production Corrective Action: The Contractor's QC system shall include an appropriate action to be taken when the process is believed to be out of tolerance. The Contractor should review production on a continuous basis making adjustments to the process when necessary to keep the product consistent. As a minimum, a process shall be deemed out of control and production stopped and corrective action taken, if:

    a. Design Air Voids fall outside the Suspension Limits for an individual measurement; or

    b. Design Air Voids and two or more criteria fall outside the Production Limits for individual measurements; or

    c. Design Air Voids fall outside the Production Limit and one point falls outside the Suspension Limit for individual measurements; or

    d. Three tests in a row fall outside the Production Limits for individual measurements; or

    e. Three nonconsecutive tests fall outside the Production Limits for individual measurements in five successive samples.

B. Placement

1. Hauling Equipment: The Porous mixture shall be transported in clean vehicles with tight, smooth dump beds that have been sprayed with a sufficient coating of non-petroleum release agent to prevent the mixture from adhering to the dump bodies. Mineral, fine aggregate, slag dust, etc. shall not be used to dust truck beds. The porous mixture shall be covered at all times with a suitable material of such size sufficient to protect the mix from the weather and to minimize mix cooling and the prevention of mixture conglomeration. When necessary, to ensure the delivery of material at the specified temperature, truck bodies shall be insulated, and covers pinned securely at the sides. Long hauls, particularly those in excess of 35 miles, may result in undesired mixture thermal segregation. Avoid haul distances greater than 50 miles.

2. Placing Equipment: The paver shall be a self-propelled unit with an activated screed capable of being heated and capable of spreading the mixture uniformly without segregation for the widths and thicknesses required. A track paver shall be used to place the porous asphalt. The screed shall be adjustable to provide the desired cross-sectional shape. The finished surface shall be of uniform texture and evenness and shall not show any indication of tearing, shoving or pulling of the mixture. The machine shall, at all times, be in good mechanical condition and shall be operated by competent personnel.

a. The paver shall be equipped with the necessary attachments, designed to operate electronically, for controlling grade of the finished surface.

3. Compacting Equipment: Rollers shall be in good mechanical condition, operated by competent personnel, capable of reversing without backlash, and operated at speeds slow enough to avoid displacement of the asphalt mixture. The weight of the rollers shall be sufficient to compact the mixture to the required density without crushing of the aggregate. Rollers shall be equipped with tanks and sprinkling bars for wetting the rolls. Rollers shall be two-axle tandem rollers with a gross weight of not less than 8 tons and not more than 12 tons and shall be capable of providing a minimum compactive effort of 250 pounds per inch of width of the drive roll. All rollers shall be at least 42 inches in diameter.

4. Existing Surface Conditions: Contact surfaces such as curbing, gutters, and manholes shall be painted with a thin, uniform coat of Type RS-1 emulsified asphalt immediately before the porous pavement mixture is placed against them.

5. Temperature Requirements: The temperature of the Porous Asphalt mixture, at the time of discharge from the haul vehicle and at the paver, shall be between 265°F to 325°F, or within 10°F of the approved job mix formula for compaction.

6. Spreading and Finishing: Porous Asphalt for porous paving shall be placed in two lifts with (1) 2-inch thick base and (1) 2- inch thick top coat. Take care between lifts to insure that the porous asphalt layers bond completely. Keep time between layer placements to a minimum. Keep the first layer clear from dust and moisture, and minimizing traffic on the underlying layer. The Contractor shall protect exposed surfaces that are not to be treated from damage during all phases of the paving operation. On areas where irregularities or unavoidable obstacles make the use of mechanical spreading and finishing equipment impractical, the mixture shall be spread, raked, and luted by hand tools. No material shall be produced so late in the day as to prohibit the completion of spreading and compaction of the mixture during daylight hours, unless night paving has been approved for the project. No construction equipment will be permitted on material placed until the material has been thoroughly compacted and has been permitted to cool to below 100°F for subsequent pavement lifts. The use of water to cool the pavement is permitted. No construction equipment will be allowed on the pavement after surface course placement for a recommended minimum of 48 hours.

   a. The Engineer reserves the right to require that all work adjacent to the pavement, such as guardrail, cleanup, and turf establishment, is completed prior to placing the surface course when this work could cause damage to the pavement.

7. Compaction: Immediately after the asphalt mixture has been spread, struck off, and surface irregularities adjusted, it shall be thoroughly and uniformly compacted by rolling. The compaction objective is 16% - 19% in place void content.

a. The surface shall be rolled when the mixture is in the proper condition and when the rolling does not cause undue displacement, cracking, or shoving.

b. Rollers or oscillating rollers, ranging from 8-12 tons, shall be used for compaction. The number, weight, and type of rollers furnished shall be sufficient to obtain the required compaction while the mixture is in a workable condition. Generally, one breakdown roller will be needed for each paver used in the spreading operation.

c. To prevent adhesion of the mixture to the drums, drums shall be kept moist with water or water mixed with very small quantities of detergent or other approved material. Excess liquid will not be permitted.

d. Along forms, curbs, headers, walls, and other places not accessible to the rollers, the mixture shall be thoroughly compacted with hot hand tampers, smoothing irons or with mechanical tampers.

e. Other combinations of rollers and/or methods of compacting may be used, provided the compaction requirements are met. Generally, three coverages (one pass) of a static steel roller are sufficient.

f. Unless otherwise specified, the longitudinal joints shall be rolled first. Next, the Contractor shall begin rolling at the low side of the pavement and shall proceed towards the center or high side with lapped passes parallel to the centerline. The speed of the roller shall be slow and uniform to avoid displacement of the mixture, and the roller should be kept in as continuous operation as practical. Rolling shall continue until all roller marks and ridges have been eliminated.

g. Rollers will not be permitted to stop or be parked on any porous pavement.

h. It shall be the responsibility of the Contractor to conduct whatever process control the Contractor deems necessary. Acceptance testing will be conducted by the Owner using cores taken by the Contractor, witnessed by the Engineer and tested in the Owner’s contracted laboratory.

i. Any mixture that becomes loose and broken, mixed with dirt, or is in any way defective shall be removed and replaced with fresh hot mixture. The mixture shall be compacted to conform to the surrounding area. Any area showing an excess or deficiency of bitumen shall be removed and replaced. These replacements shall be at the Contractor’s expense.

j. The Contractor assumes full responsibility for the cost of repairing damages that may occur to roadway or parking lot components and adjacent property if vibratory compaction equipment is used. After final rolling, no vehicular traffic shall be permitted on the surface until cooling and hardening has taken place and not less than the recommended 48 hours. Provide barriers as necessary at no cost to the Owner to prevent vehicular use.

8. Joints: Joints between old and new pavements, and between successive days work, shall be made to ensure continuous bond between adjoining works. Construction joints shall have the same texture, density, and smoothness as other sections of paving. Whenever the spreading process is interrupted long enough for the mixture to attain its initial stability, the paver shall be removed from the mat and a joint constructed.

    a. Butt joints shall be formed by cutting the pavement in a vertical plane at right angles to the centerline and not extend into the underlying pavement layer. The butt joint shall be thoroughly coated with Type RS-1 emulsified asphalt just prior to depositing the paving mixture when paving resumes.

9. Surface Tolerances: The surface will be tested by the Engineer using a straightedge at least 10 feet in length at selected locations. Any variations of the surface course exceeding 1/4 inches between any two contact points shall be deemed unsatisfactory. Allowances will be calculated for vertical curve areas.

10. Surface Protection: Work shall be done expertly throughout, without staining or injury to other work. Transition to adjacent impervious asphalt paving shall be merged neatly with flush, clean line. Finished paving shall be even, without pockets, and graded to elevations and grades shown on drawing.

    a. Porous pavement aggregate beds or finished areas shall not be used for equipment or materials storage during construction, and under no circumstances shall vehicles be allowed to deposit soil on paved porous surfaces.

11. Repair of Damaged Paving: Any existing pavement on or adjacent to the site that has been damaged as a result of construction work shall be repaired to the satisfaction of the Owner without additional cost to the Owner.

12. Contractor Quality Control During Placement:

    a. The full permeability of the pavement surface shall be tested by application of clean water at the rate of at least 5 gpm over the surface, using a hose or other distribution device at no extra cost to the Owner. All applied water shall infiltrate directly without puddle formation or surface runoff, and shall be observed by the Engineer.

    b. Continually check for mixture temperature uniformity such that the paved mat is kept within +/- 10°F of the JMF using random temperature readings.

    c. Inspect each truckload of material for draindown, segregation and other material qualities per the QC Plan prior to offloading.

    d. Test in-place base/surface course for compliance with requirements for thickness, in-place air voids and grade. Repair or remove and replace unacceptable work as directed by the Engineer. Establish and maintain

required lines and elevations. The Engineer shall be notified for review of final stake lines before construction work is to begin. Finished surfaces shall be true to grade and even, free of roller marks and free of low spots/depressions. All areas must drain.

e. Test finished surface for smoothness using a 10 foot straightedge applied parallel with and at right angles to the centerline of the paved area. Surface will not be accepted if gaps or ridges exceed ¼".

f. If, in the opinion of the Owner, based upon Contractor Quality Control Reports of the testing services and inspections, the quality of the work is below the standards which have been specified, additional work and testing will be required until satisfactory results are obtained at no additional cost to the owner.

3.05 MATERIAL ACCEPTANCE

A. Acceptance Sampling and Testing: All acceptance sampling and testing necessary to determine conformance with the requirements specified in this section may be performed by the Owner or the Engineer.

1. Plant Produced Material: Plant produced material may be tested for gradation, asphalt binder content, air voids and draindown on a random basis.

2. Field Placed Material: Material placed in the field may be tested for in-place air voids, compacted thickness, and surface tolerance on a random basis, in accordance with ASTM D3665.

B. Acceptance Criteria: Acceptance will be based on the following characteristics of the hot mix asphalt and completed pavement on a material course.

1. Material Acceptance:

a. Plant Produced Material

(1) Adherence to the Quality Control Plan

(2) Plant air voids

(3) Gradation

(4) Asphalt binder content

(5) Mixture Temperature

(6) Fiber content

(7) PGAB Documentation

b. Field Placed Material

(1) Adherence to the Quality Control Plan

(2) In-Place Air Voids

(3) Thickness

(4) Inferior Material/Segregation

(5) Draindown

(6) Smoothness

(7) Grade

(8) Permeability

2. Inferior Material: Material not conforming to specification requirements shall be subject to corrective action, production suspension, rejection, removal, or reduced payment as determined by the Owner.

a. The Engineer may at any time, not withstanding previous acceptance, notify the Contractor of inferior material and recommend the rejection of any Porous Asphalt which is rendered unfit for use due to contamination, segregation, incomplete coating of aggregate, draindown, or improper mix temperature. Such recommendation may be based on only visual inspection or temperature measurements.

3. Grade: The finished surface of the pavement shall not vary from the gradeline elevations and cross sections shown on the plans by more than 1/2 inch; however positive drainage must be achieved. The Contractor shall remove deficient areas and replace with new material. Sufficient material shall be removed to allow at least 1.5 inches (37.5mm) of porous hot mix asphalt to be placed. Milling or skin patching for correcting low areas shall not be permitted. The Contractor shall make tests for conformity with the specified crown and grade immediately after initial compaction. Any variation shall be corrected by the removal or addition of materials and by continuous rolling.

4. Shaping Edges: Edges shall be beveled while still hot with the back of a lute or smoothing iron and thoroughly compacted by tampers or by other satisfactory methods.

C. Corrective Methods:

1. The corrective method(s) chosen by the Contractor shall be performed at the Contractor's expense, including all necessary equipment and traffic control.

a. Areas of removal and replacement shall be removed the full width of the paver pass. The removal areas shall be reconstructed with a transverse butt joint, using a transverse saw cut perpendicular to the paver pass.

b. Replacement materials shall be placed in sufficient quantity so the finished surface will conform to grade and smoothness requirements. The corrective area shall conform to all material and compaction specification requirements.

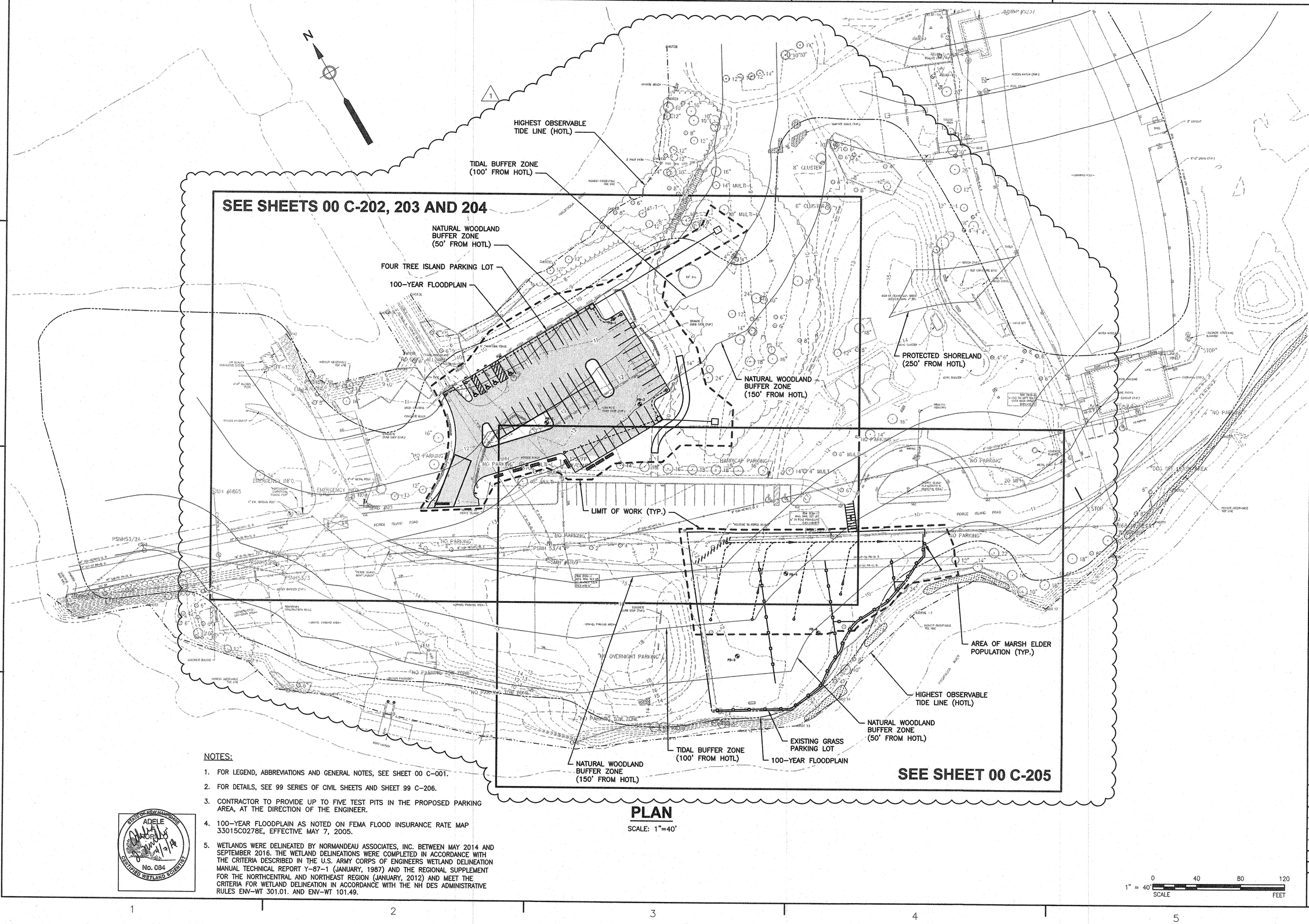
c. When the corrective work consists of an overlay, the overlay shall cover those paver passes sufficient to correct the defects. The area overlaid shall be placed with a transverse butt joint using a transverse saw cut and asphalt removal.

d. All materials shall meet contract requirements. The overlay shall be placed so the finished surface will conform to grade and smoothness requirements. The overlay area shall be compacted to the specified density.

e. The Engineer may retest any sections where corrections were made to verify that the corrections produced a surface that conforms to the grade and smoothness requirements.

END OF SECTION

DRAWINGS



NOTES:

1. FOR LEGEND, ABBREVIATIONS AND GENERAL NOTES, SEE SHEET 00 C-001.
2. FOR DETAILS, SEE 99 SERIES OF CIVIL SHEETS AND SHEET 99 C-206.
3. CONTRACTOR TO PROVIDE UP TO FIVE TEST PITS IN THE PROPOSED PARKING AREA, AT THE DIRECTION OF THE ENGINEER.
4. 100-YEAR FLOODPLAIN AS NOTED ON FEMA FLOOD INSURANCE RATE MAP 33015C0278E, EFFECTIVE MAY 7, 2005.
5. WETLANDS WERE DELINEATED BY NORMANDEAU ASSOCIATES, INC. BETWEEN MAY 2014 AND SEPTEMBER 2016. THE WETLAND DELINEATIONS WERE COMPLETED IN ACCORDANCE WITH THE CRITERIA DESCRIBED IN THE U.S. ARMY CORPS OF ENGINEERS WETLAND DELINEATION MANUAL TECHNICAL REPORT Y-87-1 (JANUARY, 1987) AND THE REGIONAL SUPPLEMENT FOR THE NORTHCENTRAL AND NORTHEAST REGION (JANUARY, 2012) AND MEET THE CRITERIA FOR WETLAND DELINEATION IN ACCORDANCE WITH THE NH DES ADMINISTRATIVE RULES ENV-WT 301.01. AND ENV-WT 101.49.

STATE OF NEW HAMPSHIRE — ADELE M. BEVERLY — No. 084 — CERTIFIED WETLAND SCIENTIST — 4/7/17

PLAN

SCALE: 1"=40'

1" = 40' SCALE — 0, 40, 80, 120 FEET

REVISIONS				
MARK	DATE	MADE BY	CHECKED	DESCRIPTION
1	3/2017	ENM	JRP	MODIFICATIONS TO HOTL AND BUFFER ZONES

AECOM TECHNICAL SERVICES, INC.
200 APOLLO DRIVE
CHELMSFORD, MA 01824
PHONE (978) 905-2100
www.aecom.com

STATE OF NEW HAMPSHIRE — LORI S. AHO No. 9851 — LICENSED PROFESSIONAL ENGINEER — 4/5/2017

CITY OF PORTSMOUTH, NH - DEPARTMENT OF PUBLIC WORKS

PEIRCE ISLAND WWTF UPGRADE

PARKING LOT KEY PLAN

PARKING LOTS

PROJECT NO:	60301525
CAD DWG FILE:	00 C-201
DESIGNED BY:	K. SHAEFFER
DRAWN BY:	C. BENZIGER
DEPT CHECK:	C. BENZIGER
PROJ CHECK:	E. MESERVE
DATE:	FEBRUARY 2017
SCALE:	AS NOTED

00 C-201

PATH/FILENAME: P:\60301525 - PORTSMOUTH WWTF UPGRADE\SHEETS\BP-2\C\00 C-201.DWG
LAST UPDATE: Thursday, March 30, 2017 1:01:43 PM
PLOT DATE: Thursday, March 30, 2017 1:19:36 PM
ANSI D - 30-Mar-17

LAYOUT POINT TABLE		
POINT	NORTHING	EASTING
1	210832.93	1229803.94
2	210837.93	1229803.67
3	210845.57	1229807.58
4	210848.16	1229813.18
5	210830.28	1229889.12
6	210825.50	1229892.98
7	210808.33	1229893.28
8	210809.99	1229986.77
9	210823.99	1229986.52
10	210829.08	1229991.43
11	210829.33	1230005.43
12	210914.31	1230003.92
13	210914.06	1229989.92
14	210918.98	1229984.83
15	210933.97	1229984.57
16	210931.51	1229846.09
17	210915.52	1229846.37
18	210912.46	1229843.43
19	210914.72	1229840.24
20	210923.88	1229824.75
21	210871.48	1229798.55
22	210857.92	1229781.62
23	210852.34	1229770.56

LAYOUT POINT TABLE		
POINT	NORTHING	EASTING
24	210874.61	1229833.66
25	210867.25	1229836.84
26	210854.08	1229892.74
27	210859.04	1229898.88
28	210870.44	1229898.68
29	210869.53	1229847.69
30	210885.53	1229847.40
31	210888.48	1229844.35
32	210886.96	1229940.78
33	210857.35	1229949.92
34	210852.44	1229955.01
35	210852.47	1229957.01
36	210857.56	1229961.92
37	210885.55	1229961.42
38	210890.46	1229956.33
39	210890.43	1229954.33
40	210885.34	1229949.42

CURVE TABLE		
CURVE	RADIUS	LENGTH
C1	5.00'	5.25'
C2	15.00'	19.94'
C3	5.00'	6.60'
C4	5.00'	7.85'
C5	5.00'	7.85'
C6	3.00'	4.80'
C7	3.00'	4.19'
C8	5.00'	9.30'
C9	5.00'	9.10'
C10	3.00'	4.70'
C11	3.00'	3.10'
C12	5.00'	7.85'
C13	5.00'	7.85'
C14	5.00'	7.85'
C15	5.00'	7.85'
C16	70.00'	60.44'
C17	30.00'	12.48'

NATURAL WOODLAND BUFFER ZONE (50' FROM HOTL)
100-YEAR FLOODPLAIN
HIGHEST OBSERVABLE TIDE LINE (HOTL)
EXIST. CONC. CURB STOPS TO REMAIN (TYP.) (22 TOTAL). PROVIDE ADDITIONAL NEW CONC. CURB STOPS IF REQUIRED.
SILT FENCE AND STRAW BALE EROSION CONTROL (TYP.)
PROPOSED POROUS PAVEMENT (TYP.)
HP STALLS - 4" PAINTED YELLOW LINES WITH HP SYMBOL. SEE DETAIL.
ACCESSIBLE PARKING SIGN (TYP.)
MEET AND MATCH EXIST. GRAVEL DRIVE
BRICK COLUMNS TO REMAIN
CONCRETE BLOCK TO REMAIN
REMOVE EXIST. BIT. CONC. PAVEMENT
EXIST. GRANITE BLOCKS TO BE RELOCATED
50' STABILIZED CONSTRUCTION EXIT DURING CONSTRUCTION
EXIST. SIGN TO BE RELOCATED
EXIST. GRANITE BLOCKS TO REMAIN
STOP SIGN
EXIST. SIDEWALK TO REMAIN
STOP LINE
POROUS PAVEMENT (TYP.). MEET AND MATCH EXIST. PAVEMENT. SAW CUT EXIST. PAVEMENT.
CONTRACTOR TO PROVIDE ACCESS THROUGH FENCE AS REQUIRED FOR CONSTRUCTION VEHICLES
SWEEP PEIRCE ISLAND ROAD DAILY AT A MINIMUM
TIDAL BUFFER ZONE (100' FROM HOTL)
EXIST. GRANITE BLOCKS TO REMAIN
EXTEND EXIST. GRAVEL PATH TO NEW CURB
GRANITE CURB STOP TO REMAIN
MEET AND MATCH EXIST. PATH GRADE
6' HIGH TEMPORARY CHAIN LINK FENCE (TYP.)
ORANGE CONSTRUCTION FENCING (TYP.)
RELOCATE 6' WIDE GRAVEL PATH. SEE DETAIL ON SHT. 99 C-506.
REMOVE SECTION OF EXIST. PATH
LIMIT OF WORK (TYP.)
MEET AND MATCH EXIST. PATH GRADE
NATURAL WOODLAND BUFFER ZONE (150' FROM HOTL)
EXISTING ACCESSIBLE RAMP
SLOPED GRANITE CURB (TYP.)
PLANTING AREA. SEE LANDSCAPE PLAN.
REMOVE TREE
RELOCATED "NO PARKING" SIGN
RELOCATED GRANITE BLOCKS (TYP.)
4" WHITE PAINTED LINE (TYP.)
8.5'x19' PARKING SPACE (TYP.)
FLUSHING CLEANOUT
12" PANEL DRAIN (TYP.)
POROUS PAVEMENT SIGN
EXIST. SIGN TO REMAIN
EXIST. SIDEWALK TO REMAIN
EXIST. ELECTRICAL CONDUIT TO REMAIN (SEE NOTE 5)
SEE NOTE 6
PEIRCE ISLAND ROAD
PISCATAQUA DRIVE
"FOUR TREE ISLAND" "NO DOGS ALLOWED"
"PEIRCE ISLAND BOAT LAUNCH"
"PORTSMOUTH COMMERCIAL FISHING PIER"
"WELCOME TO PEIRCE ISLAND"
BROKEN PAVEMENT
CONCRETE CURB STOP (TYP.)
SURFACE LEDGE (TYP.)
LIMIT OF WOOD CHIPS
JERSEY BARRIER (TYP.)
6' HIGH CHAIN LINK FENCE 148.5'
11 SP. @ 8.5'=93.5'
12 SP. @ 8.5'=102'
6 SP. @ 8.5'=51'
10 SP. @ 8.5'=85'
TBM 3539-J MAG. NAIL SET UP 6" IN POLE PSNH53/4 ELEV.=15.12'
TBM 3539-K MAG. NAIL SET UP 6" IN POLE PSNH53/5 ELEV.=10.97'
L=174 L.F.
L=50 L.F.
PB-1
PB-2
PB-3
PB-4
SMH #6885
SMH #6169
PSNH53/4
PSNH53/5
PSNH53PB
PSNH53/3
FOR CONTINUATION, SEE SHEET 00 C-205

NOTES:

1. FOR LEGEND, ABBREVIATIONS AND GENERAL NOTES, SEE SHEET 00 C-001.
2. FOR DETAILS, SEE 99 SERIES OF CIVIL SHEETS AND SHEET 99 C-206.
3. REFER TO LANDSCAPE DRAWING, SHEET 00 C-204, FOR DISPOSITION OF EXISTING PLANTINGS AND LOCATIONS OF NEW PLANTINGS.
4. LOAM AND SEED DISTURBED AREAS AFTER COMPLETION OF CONSTRUCTION.
5. CONTRACTOR SHALL LOCATE EXISTING UNDERGROUND CONDUIT. CONTRACTOR TO PROVIDE INFORMATION ON THE DEPTH OF CONDUIT PRIOR TO PLACING PAVEMENT SUBGRADE. CONDUIT SHALL BE PROTECTED DURING CONSTRUCTION OF THE PARKING LOT.
6. CONTRACTOR SHALL REMOVE AND REPLACE EXISTING WOODEN METER PIT AND COVER WITH A NEW PRECAST CONCRETE STRUCTURE AND COVER RATED FOR H-20 LOADING AND IN CONFORMANCE WITH CITY OF PORTSMOUTH STANDARD SPECIFICATIONS.
7. 100-YEAR FLOODPLAIN AS NOTED ON FEMA FLOOD INSURANCE RATE MAP 33015C0278E, EFFECTIVE MAY 7, 2005.

NOTES: (CONTINUED)

8. WETLANDS WERE DELINEATED BY NORMANDEAU ASSOCIATES, INC. BETWEEN MAY 2014 AND SEPTEMBER 2016. THE WETLAND DELINEATIONS WERE COMPLETED IN ACCORDANCE WITH THE CRITERIA DESCRIBED IN THE U.S. ARMY CORPS OF ENGINEERS WETLAND DELINEATION MANUAL TECHNICAL REPORT Y-87-1 (JANUARY, 1987) AND THE REGIONAL SUPPLEMENT FOR THE NORTHCENTRAL AND NORTHEAST REGION (JANUARY, 2012) AND MEET THE CRITERIA FOR WETLAND DELINEATION IN ACCORDANCE WITH THE NH DES ADMINISTRATIVE RULES ENV-WT 301.01. AND ENV-WT 101.49.

PLAN
SCALE: 1"=20'

STATE OF NEW HAMPSHIRE — CHRISTOPHER L. MILLER — No. 084 — CERTIFIED WETLAND SCIENTIST — 4/3/17

1" = 20' SCALE 0 20 40 60 FEET

MARK	DATE	MADE BY	CHECKED	DESCRIPTION
1	3/2017	ENM	JRP	MODIFICATIONS TO HOTL, BUFFER ZONES, TEMP. FENCE

REVISIONS

AECOM TECHNICAL SERVICES, INC.
250 APOLLO DRIVE
CHELMSFORD, MA 01824
PHONE: (978) 905-2100
www.aecom.com

STATE OF NEW HAMPSHIRE — LORI S. MILLER — No. 9901 — LICENSED PROFESSIONAL ENGINEER — 4/5/2017

CITY OF PORTSMOUTH, NH - DEPARTMENT OF PUBLIC WORKS
PEIRCE ISLAND WWTF UPGRADE

FOUR TREE ISLAND PARKING LOT - CONSTRUCTION PLAN

PARKING LOTS

PROJECT NO:	60301525
CAD DWG FILE:	00 C-202
DESIGNED BY:	K. SCHAEFFER
DRAWN BY:	C. BENZIGER
DEPT CHECK:	C. BENZIGER
PROJ CHECK:	E. MESERVE
DATE:	FEBRUARY 2017
SCALE:	AS NOTED

00 C-202

PATH/FILENAME: P:\60301525 - PORTSMOUTH WWTF UPGRADE\SHEETS\BP-2\C\00 C-202.DWG
LAST UPDATE: Wednesday, April 05, 2017 9:43:52 AM
PLOT DATE: Wednesday, April 05, 2017 9:44:10 AM
ANSI D - 5-Apr-17

NATURAL WOODLAND BUFFER ZONE (50' FROM HOTL)

PLUNGE POOL. SEE DETAIL.

TIDAL BUFFER ZONE (100' FROM HOTL)

OUTFALL INV. EL. 7.20
WITH BEVELED END.
SEE DETAILS.
N210933.8
E1230112.9

8" HDPE
L=130 L.F.
S=0.0050 FT./FT.

CATCH BASIN
RIM EL. 10.55
INV. EL. IN (S) 7.96
INV. EL. IN (W) 7.96
INV. EL. OUT 7.85
N210931.4
E1229982.0
SEE NOTE 5

100-YEAR FLOODPLAIN

HIGHEST OBSERVABLE TIDE LINE (HOTL)

ACCESSIBLE PARKING SIGN (TYP.)

6" PERFORATED PVC UNDERDRAIN
L=130 L.F.
S=0.0035 FT./FT.

CLEAN OUT
RIM EL. 10.80
INV. EL. OUT 8.21
N210911.7
E1230001.4

NATURAL WOODLAND BUFFER ZONE (150' FROM HOTL)

CLEAN OUT
RIM EL. 11.00
INV. EL. 8.41
N210929.0
E1229848.1

6" CHAIN LINK FENCE

GRANITE CURB STOP (TYP.)

MEET AND MATCH EXIST. PATH GRADE

6" PERF. PVC
L=32 L.F.

6" PERFORATED PVC UNDERDRAIN
L=20 L.F.
S=0.00 FT./FT.

"FOUR TREE ISLAND"
"NO DOGS ALLOWED"

HIGHEST OBSERVABLE TIDE LINE

CLEAN OUT
RIM EL. 11.40
INV. EL. OUT 8.81
N210831.8
E1230002.8

MEET AND MATCH EXIST. GRAVEL PATH

RELOCATION OF GRAVEL PATH

GRAVEL PATH

LIMIT OF WOOD CHIPS

6" PERF. PVC
L=32 L.F.

CONCRETE CURB STOP (TYP.)

OUTFALL INV. EL. 8.20
WITH BEVELED END.
SEE DETAILS.
N210786.8
E1230023.4

PLUNGE POOL. SEE DETAIL.

8" HDPE
L=45 L.F.
S=0.0069 FT./FT.

CLEAN OUT
RIM EL. 11.00
INV. EL. 8.41
N210928.6
E1229826.2

CONCRETE CURB STOP (TYP.)

CATCH BASIN
RIM EL. 11.20
INV. EL. IN (N) 8.61
INV. EL. IN (W) 8.61
INV. EL. OUT 8.51
N210812.5
E1229984.1
SEE NOTE 5

ADJUST MH FRAME AND COVER TO NEW GRADE

MEET AND MATCH EXIST. PATH GRADE

6" PERFORATED PVC UNDERDRAIN
L=90 L.F.
S=0.0078 FT./FT.

CLEAN OUT
RIM EL. 11.90
INV. EL. 9.31
N210829.0
E1229894.1

RELOCATED GRANITE BLOCKS (TYP.)

BIT. CONC. PAVEMENT (TYP.).
MEET AND MATCH EXIST. PAVEMENT.
SAW CUT EXIST. PAVEMENT.

PEIRCE ISLAND ROAD

TBM 3539-K
MAG. NAIL SET UP
6" IN POLE PSNH53/5
ELEV.=10.87'

TBM 3539-J
MAG. NAIL SET UP
6" W/ POLE 53/4
ELEV.=15.12'

NATURAL WOODLAND BUFFER ZONE (150' FROM HOTL)

"PORTSMOUTH COMMERCIAL FISHING PIER"

"PEIRCE ISLAND BOAT LAUNCH"

"WELCOME TO PEIRCE ISLAND"

JERSEY BARRIER (TYP.)

PLAN

SCALE: 1"=20'

FOR CONTINUATION, SEE SHEET 00 C-205

NOTES:

1. FOR LEGEND, ABBREVIATIONS AND GENERAL NOTES, SEE SHEET 00 C-001.
2. FOR DETAILS, SEE 99 SERIES OF CIVIL SHEETS AND SHEET 99 C-206.
3. SPOT ELEVATIONS SHOWN AT CURB ARE THE BOTTOM OF CURB ELEVATION.
4. PROVIDE UNIFORM SLOPE BETWEEN SPOT GRADES AND CONTOURS.
5. CATCH BASINS SHALL HAVE NH DOT TYPE B GRATE, H-20 RATED.

NOTES: (CONTINUED)

6. 100-YEAR FLOODPLAIN AS NOTED ON FEMA FLOOD INSURANCE RATE MAP 33015C0278E, EFFECTIVE MAY 7, 2005.
7. WETLANDS WERE DELINEATED BY NORMANDEAU ASSOCIATES, INC. BETWEEN MAY 2014 AND SEPTEMBER 2016. THE WETLAND DELINEATIONS WERE COMPLETED IN ACCORDANCE WITH THE CRITERIA DESCRIBED IN THE U.S. ARMY CORPS OF ENGINEERS WETLAND DELINEATION MANUAL TECHNICAL REPORT Y-87-1 (JANUARY, 1987) AND THE REGIONAL SUPPLEMENT FOR THE NORTHCENTRAL AND NORTHEAST REGION (JANUARY, 2012) AND MEET THE CRITERIA FOR WETLAND DELINEATION IN ACCORDANCE WITH THE NH DES ADMINISTRATIVE RULES ENV-WT 301.01. AND ENV-WT 101.49.

STATE OF NEW HAMPSHIRE
ADELE M. FIORILLO
No. 084
CERTIFIED WETLAND SCIENTIST

1" = 20'
0 20 40 60
SCALE FEET

MARK	DATE	MADE BY	CHECKED	DESCRIPTION
1	3/2017	ENM	JRP	MODIFICATIONS TO HOTL AND BUFFER ZONES

REVISIONS

AECOM
ALTUS ENGINEERING, INC.

STATE OF NEW HAMPSHIRE - JEFFREY CLIFFORD No. 6324 - PROFESSIONAL ENGINEER - 5/17

STATE OF NEW HAMPSHIRE - LORI S. AHO No. 9631 - PROFESSIONAL LAND SURVEYOR - 5/17/2017

CITY OF PORTSMOUTH, NH - DEPARTMENT OF PUBLIC WORKS
PEIRCE ISLAND WWTF UPGRADE

FOUR TREE ISLAND PARKING LOT - GRADING PLAN

PARKING LOTS

PROJECT NO:	60301525
CAD DWG FILE:	00 C-203
DESIGNED BY:	K. SCHAEFFER
DRAWN BY:	C. BENZIGER
DEPT CHECK:	C. BENZIGER
PROJ CHECK:	E. MESERVE
DATE:	FEBRUARY 2017
SCALE:	AS NOTED

00 C-203

PATH/FILENAME: P:\60301525 - PORTSMOUTH WWTF UPGRADE\SHEETS\BP-2\C\00 C-203.DWG
LAST UPDATE: Thursday, March 30, 2017 1:19:02 PM
PLOT DATE: Thursday, March 30, 2017 1:23:33 PM
ANSI D - 30-Mar-17

PLANT SCHEDULE

QTY	KEY	BOTANICAL NAME	COMMON NAME	INSTALL SIZE	COMMENTS
SHADE TREES					
3	AR	*ACER RUBRUM*	RED MAPLE	2.5-3" CAL., B&B	MATCHING SPECIMEN
1	QB	*QUERCUS BICOLOR*	SWAMP WHITE OAK	2.5-3" CAL., B&B	
ORNAMENTAL TREES					
2	AM	*AMELANCHIER LAEVIS*	ALLEGHENY SERVICEBERRY	8-10', MULTISTEM	MATCHING SPECIMEN
3	BP	*BETULA PAPYRIFERA*	PAPER BIRCH	10-12', MULTISTEM	MATCHING SPECIMEN
SHRUBS					
14	CA	*CLETHRA ALNIFOLIA*	SUMMERSWEET	#7 CONT.	NATIVE STOCK
19	IV	*ILEX VERTICILLATA*	WINTERBERRY	#7 CONT.	NATIVE STOCK
22	JC	*JUNIPERUS COMMUNIS*	COMMON JUNIPER	#5 CONT.	NATIVE STOCK
9	MG	*MYRICA GALE*	SWEET GALE	#5 CONT.	NATIVE STOCK
6	RV	*ROSA VIRGINIANA*	VIRGINIA ROSE	#3 CONT.	NATIVE STOCK
11	VC	*VACCINIUM CORYMBOSUM*	HIGHBUSH BLUEBERRY	#5 CONT.	NATIVE STOCK
GROUNDCOVER					
550	AU	*ARCTOSTAPHYLOS UVA-URSI*	BEARBERRY	#1 CONT.	12" O.C. TYP.

NATURAL WOODLAND BUFFER ZONE (50' FROM HOTL)
TIDAL BUFFER ZONE (100' FROM HOTL)
100-YEAR FLOODPLAIN
HIGHEST OBSERVABLE TIDE LINE (HOTL)
LIMIT OF MULCHED PLANTING BED (TYP)
NATURAL WOODLAND BUFFER ZONE (150' FROM HOTL)
GRANITE CURB STOP (TYP.)
CONCRETE CURB STOP (TYP.)
SURFACE LEDGE (TYP.)
6' CHAIN LINK FENCE
"FOUR TREE ISLAND" NO DOGS ALLOWED
AIR QUALITY MONITORING SYSTM
4"x4" WOODEN POST
BROKEN PAVEMENT
BRICK CHIMNEYS
CONCRETE BLOCK
4"x4" METAL POST
EMERGENCY INFO
"PORTSMOUTH COMMERCIAL FISHING PIER"
6" DIA. WOODEN POST
MH #6865
"WELCOME TO PEIRCE ISLAND"
PEIRCE ISLAND ROAD
"PEIRCE ISLAND BOAT LAUNCH"
JERSEY BARRIER (TYP.)
"NO PARKING"
HANDICAP PARKING
WOODEN COVER
WOODEN BOARDWALK
GRAVEL PATH
LIMIT OF WOOD CHIPS
REMOVE TREE
TBM 3539-K MAG. NAIL SET UP 8" IN POLE PSNH53/5 ELEV.=10.87'
TBM 3539-J MAG. NAIL SET UP 21" IN POST PSNH 53/4 ELEV.=15.12'
SMH #6869
PSNH53/5
PSNH53/4
PSNH53/3

1-AR, 75-AU, 6-VC, 6-MG, 3-JC, 7-IV, 1-AM, 100-AU, 3-MG, 1-QB, 5-VC, 2-BP, 200-AU, 3-RV, 3-IV, 8-CA, 6-CA, 1-BP, 4-JC, 3-JC, 6-IV, 5-JC

PLAN
SCALE: 1"=20'

NOTES:

1. FOR LEGEND, ABBREVIATIONS AND GENERAL NOTES, SEE SHEET 00 C-001.
2. FOR DETAILS, SEE 99 SERIES OF CIVIL SHEETS AND SHEET 99 C-206.
3. LOAM AND SEED DISTURBED AREAS AFTER COMPLETION OF CONSTRUCTION.
4. 100-YEAR FLOODPLAIN AS NOTED ON FEMA FLOOD INSURANCE RATE MAP 33015C0278E, EFFECTIVE MAY 7, 2005.

STATE OF NEW HAMPSHIRE — ADELE M. BRILLO — 4/7/19 — No. 084 — CERTIFIED WETLAND SCIENTIST

NOTES: (CONTINUED)

5. WETLANDS WERE DELINEATED BY NORMANDEAU ASSOCIATES, INC. BETWEEN MAY 2014 AND SEPTEMBER 2016. THE WETLAND DELINEATIONS WERE COMPLETED IN ACCORDANCE WITH THE CRITERIA DESCRIBED IN THE U.S. ARMY CORPS OF ENGINEERS WETLAND DELINEATION MANUAL TECHNICAL REPORT Y-87-1 (JANUARY, 1987) AND THE REGIONAL SUPPLEMENT FOR THE NORTHCENTRAL AND NORTHEAST REGION (JANUARY, 2012) AND MEET THE CRITERIA FOR WETLAND DELINEATION IN ACCORDANCE WITH THE NH DES ADMINISTRATIVE RULES ENV-WT 301.01. AND ENV-WT 101.49.

1" = 20' SCALE — 0, 20, 40, 60 FEET

MARK	DATE	MADE BY	DESCRIPTION
1	3/2017	ENM	JRP MODIFICATIONS TO HOTL AND BUFFER ZONES

REVISIONS

AECOM TECHNICAL SERVICES, INC.
250 APOLLO DRIVE
CHELMSFORD, MA 01824
PHONE (978) 905-2100
www.aecom.com

LORAYNE A. BLACK — LICENSED LANDSCAPE ARCHITECT — STATE OF NEW HAMPSHIRE — 1317

CITY OF PORTSMOUTH, NH - DEPARTMENT OF PUBLIC WORKS
PEIRCE ISLAND WWTF UPGRADE

FOUR TREE ISLAND PARKING LOT - LANDSCAPING PLAN

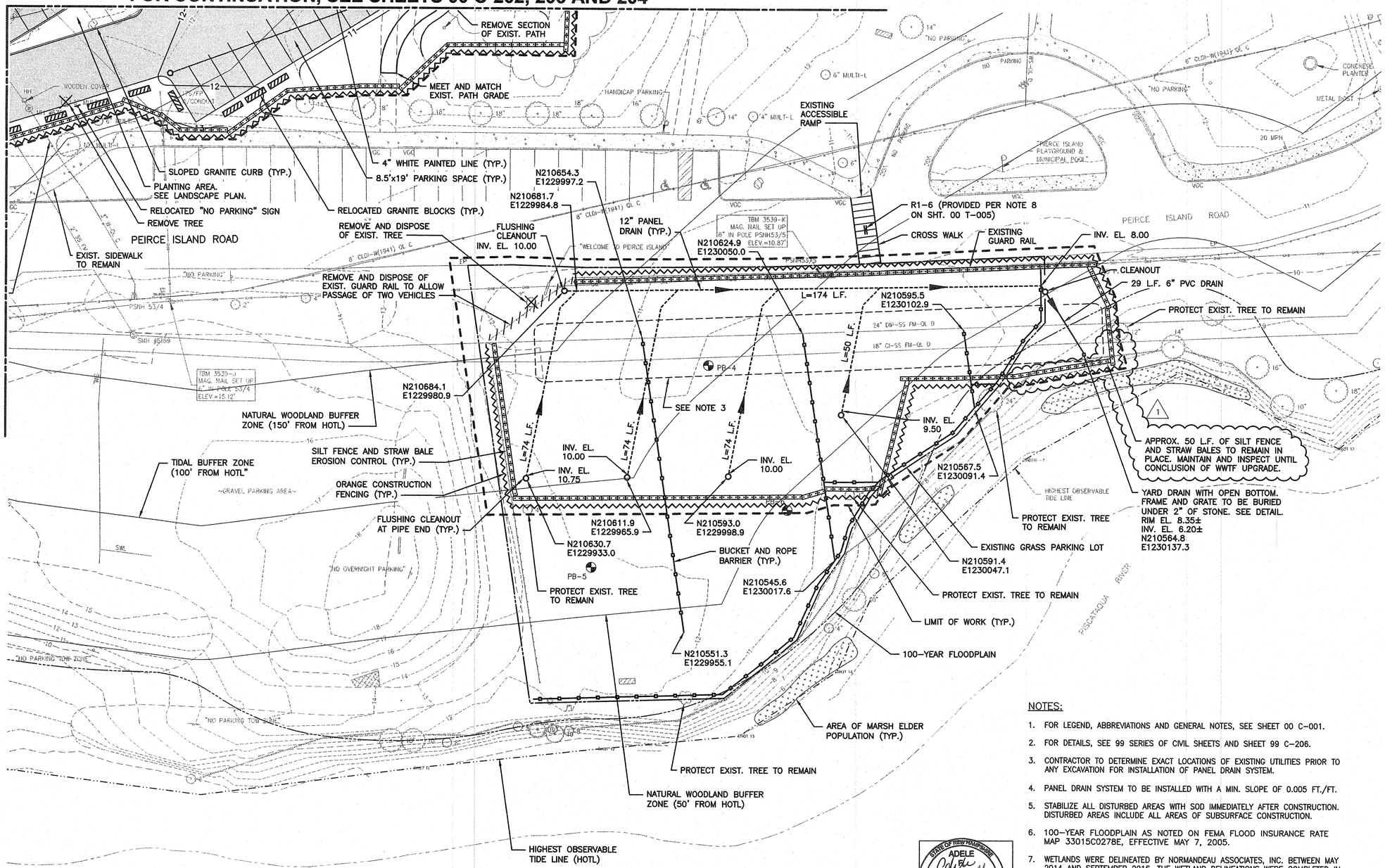
PARKING LOTS

PROJECT NO:	60301525
CAD DWG FILE:	00 C-204
DESIGNED BY:	L. BLACK
DRAWN BY:	O. BENNETT
DEPT CHECK:	L. BLACK
PROJ CHECK:	E. MESERVE
DATE:	FEBRUARY 2017
SCALE:	AS NOTED

00 C-204

PATH/FILENAME: P:\60301525 - PORTSMOUTH WWTF UPGRADE\SHEETS\BP-2VC\00 C-204.DWG
LAST UPDATE: Monday, February 27, 2017 12:40:06 PM
PLOT DATE: Thursday, March 30, 2017 1:24:39 PM
ANSI D — 27-Feb-17

FOR CONTINUATION, SEE SHEETS 00 C-202, 203 AND 204



PLAN

SCALE: 1"=20'

NOTES:

1. FOR LEGEND, ABBREVIATIONS AND GENERAL NOTES, SEE SHEET 00 C-001.
2. FOR DETAILS, SEE 99 SERIES OF CIVIL SHEETS AND SHEET 99 C-206.
3. CONTRACTOR TO DETERMINE EXACT LOCATIONS OF EXISTING UTILITIES PRIOR TO ANY EXCAVATION FOR INSTALLATION OF PANEL DRAIN SYSTEM.
4. PANEL DRAIN SYSTEM TO BE INSTALLED WITH A MIN. SLOPE OF 0.005 FT./FT.
5. STABILIZE ALL DISTURBED AREAS WITH SOD IMMEDIATELY AFTER CONSTRUCTION. DISTURBED AREAS INCLUDE ALL AREAS OF SUBSURFACE CONSTRUCTION.
6. 100-YEAR FLOODPLAIN AS NOTED ON FEMA FLOOD INSURANCE RATE MAP 33015C0278E, EFFECTIVE MAY 7, 2005.
7. WETLANDS WERE DELINEATED BY NORMANDEAU ASSOCIATES, INC. BETWEEN MAY 2014 AND SEPTEMBER 2016. THE WETLAND DELINEATIONS WERE COMPLETED IN ACCORDANCE WITH THE CRITERIA DESCRIBED IN THE U.S. ARMY CORPS OF ENGINEERS WETLAND DELINEATION MANUAL TECHNICAL REPORT Y-87-1 (JANUARY, 1987) AND THE REGIONAL SUPPLEMENT FOR THE NORTHCENTRAL AND NORTHEAST REGION (JANUARY, 2012) AND MEET THE CRITERIA FOR WETLAND DELINEATION IN ACCORDANCE WITH THE NH DES ADMINISTRATIVE RULES ENV-WT 301.01. AND ENV-WT 101.49.

STATE OF NEW HAMPSHIRE — ADELE M. GORILLO — No. 084 — CERTIFIED WETLAND SCIENTIST — 11/7/17

1" = 20' SCALE: 0, 20, 40, 60 FEET

MARK	DATE	MADE BY	CHECKED	DESCRIPTION
1	3/2017	ENM	JRP	APPROX. 50 L.F. SILT FENCE AND STRAW BALES TO REMAIN

REVISIONS

AECOM TECHNICAL SERVICES, INC.
250 APOLLO DRIVE
CHELMSFORD, MA 01824
PHONE (978) 905-2100
www.aecom.com

AECOM

AITUS ENGINEERING, INC.

JEFFREY K. CLIFFORD No. 6334 — LICENSED PROFESSIONAL ENGINEER — STATE OF NEW HAMPSHIRE — 11/7/2017

LORI A. HO No. 9651 — REGISTERED LANDSCAPE ARCHITECT — STATE OF NEW HAMPSHIRE — 11/7/2017

CITY OF PORTSMOUTH, NH - DEPARTMENT OF PUBLIC WORKS

PEIRCE ISLAND WWTF UPGRADE

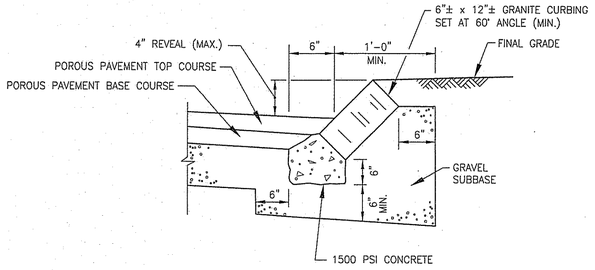
EXISTING GRASS PARKING LOT

PARKING LOTS

PROJECT NO:	60301525
CAD DWG FILE:	00 C-205
DESIGNED BY:	K. SCHAEFFER
DRAWN BY:	C. BENZIGER
DEPT CHECK:	C. BENZIGER
PROJ CHECK:	E. MESERVE
DATE:	FEBRUARY 2017
SCALE:	AS NOTED

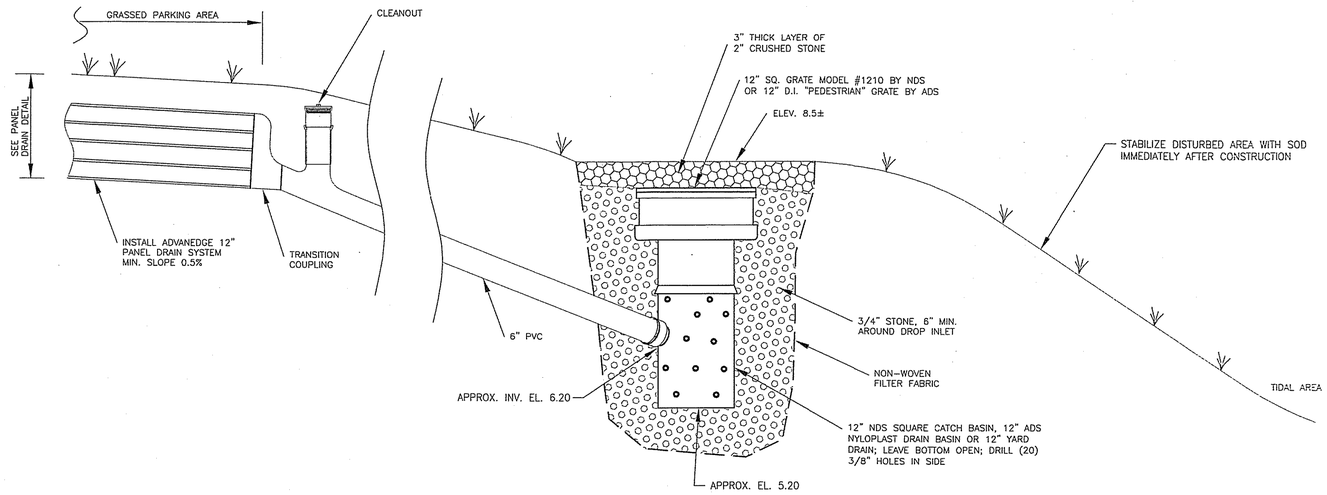
00 C-205

PATH/FILENAME: P:\60301525 - PORTSMOUTH WWTF UPGRADE\SHEETS\BP-2\C\00 C-205.DWG
LAST UPDATE: Thursday, March 30, 2017 8:08:44 AM
PLOT DATE: Thursday, March 30, 2017 1:26:23 PM
ANSI D - 30-Mar-17



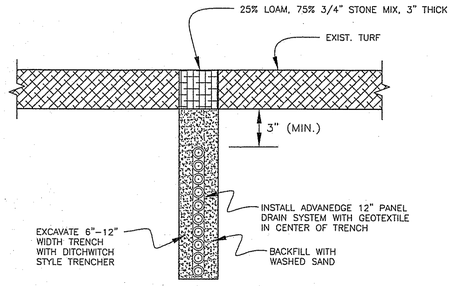
SLOPED GRANITE CURB WITH CONCRETE BASE

NOT TO SCALE



YARD DRAIN FOR GRASSED PARKING DRAINAGE SYSTEM

NOT TO SCALE

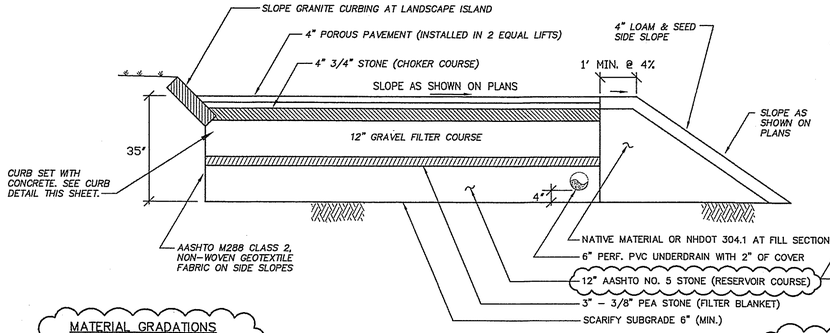


PERFORATED PANEL DRAINAGE SYSTEM

NOT TO SCALE

NOTES FOR PERFORATED PANEL DRAINAGE SYSTEM:

1. PROVIDE ADVANEDGE COUPLINGS AND FITTINGS AS NEEDED TO INSTALL THE SYSTEM AS SHOWN.
2. PROVIDE END CAPS AT TERMINATION POINTS TO PREVENT SOIL INFILTRATION INTO THE SYSTEM.
3. PANEL DRAINAGE SYSTEM TO BE INSTALLED IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS.



MATERIAL GRADATIONS

RESERVOIR COURSE

SIEVE SIZE	% PASSING BY WEIGHT
1-1/2"	100
1"	90 - 100
3/4"	20 - 55
1/2"	0 - 10
3/8"	0 - 5

1

CHOKER COURSE STONE

SIEVE SIZE	% PASSING BY WEIGHT
1-1/2"	100
1"	95 - 100
1/2"	25 - 60
# 4	0 - 10
# 8	0 - 5

3/8" PEA STONE

SIEVE SIZE	% PASSING BY WEIGHT
1/2"	100
3/8"	85 - 100
# 4	10 - 30
# 8	0 - 10
# 16	0 - 5

GRAVEL FILTER COURSE

SIEVE SIZE	% PASSING BY WEIGHT
3"	100
#4	70 - 100
#200	0 - 6

1 2

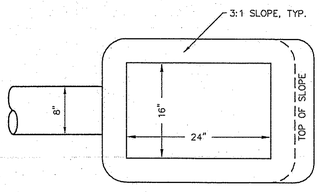
POROUS PAVEMENT SECTION

NOT TO SCALE

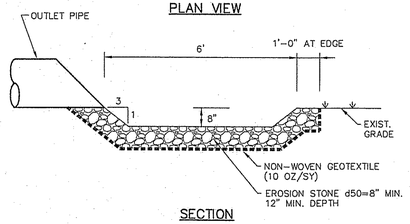
POROUS PAVEMENT NOTES:

2

1. CONSTRUCTION OF POROUS PAVEMENT SHALL BE IN ACCORDANCE WITH SPECIFICATION SECTION 02745 POROUS PAVEMENT (BASED ON THE UNH STORMWATER CENTER MODEL "DESIGN SPECIFICATION FOR POROUS ASPHALT PAVEMENT AND INFILTRATION BEDS").
2. CONTRACTOR SHALL PROVIDE SUBMITTALS FOR POROUS PAVEMENT AS NOTED IN THE SPECIFICATIONS A MINIMUM OF 14-DAYS PRIOR TO COMMENCING CONSTRUCTION.
3. CONTRACTOR SHALL NOTIFY ENGINEER A MINIMUM OF 7 DAYS IN ADVANCE OF WORK SO THAT THE ENGINEER CAN OBSERVE INSTALLATION OF POROUS PAVEMENT CROSS SECTION.
4. CONTRACTOR TO REMOVE ANY EXISTING BURIED LAYERS OF LOAM OR UNSUITABLE MATERIAL DURING THE EXCAVATION OF THE PARKING AREA AND/OR WHENEVER ENCOUNTERED IN TRENCHES.
5. AT AREAS REQUESTED BY ENGINEER, PROOF ROLL PRIOR TO SCARIFYING THE SUBGRADE.



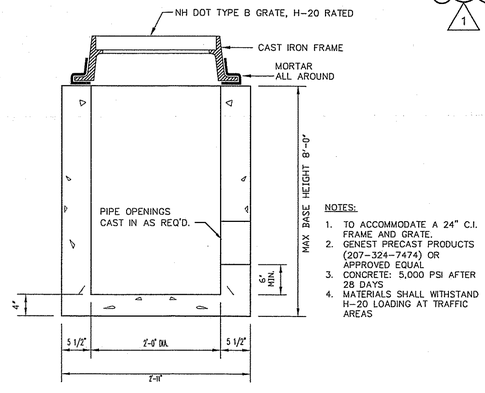
PLAN VIEW



SECTION

PLUNGE POOL

NOT TO SCALE

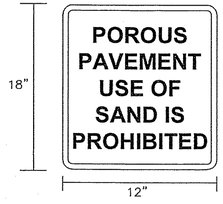


NOTES:

1. TO ACCOMMODATE A 24" C.I. FRAME AND GRATE, GENEST PRECAST PRODUCTS (207-324-7474) OR APPROVED EQUAL
3. CONCRETE: 5,000 PSI AFTER 28 DAYS
4. MATERIALS SHALL WITHSTAND H-20 LOADING AT TRAFFIC AREAS

DROP INLET STRUCTURE

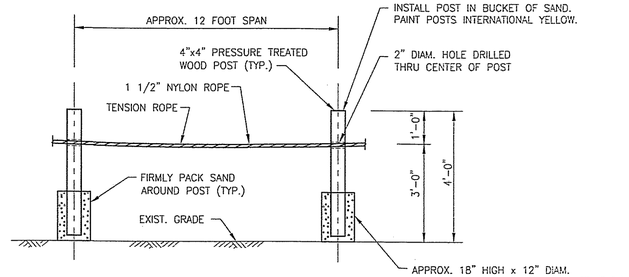
NOT TO SCALE



BLACK LETTERS ON WHITE BACKGROUND

POROUS PAVEMENT SIGN

NOT TO SCALE



BUCKET AND ROPE BARRIER

NOT TO SCALE

MARK	DATE	MADE BY	CHECKED	DESCRIPTION
2	4/2017	EJM	JRP	REV. POROUS PVMT. NOTES AND GRAVEL FILTER SIEVE SIZE
1	3/2017	EJM	JRP	AOT PERMIT

REVISIONS

AECOM TECHNICAL SERVICES, INC.
250 APOLLO DRIVE
CHELMSFORD, MA 01824
PHONE: (978) 905-2100
www.aecom.com

AECOM

ATTUS ENGINEERING, INC.

JEFFREY K. CLIFFORD No. 6534 - STATE OF NEW HAMPSHIRE - PROFESSIONAL ENGINEER - LICENSED

LORI S. ALFIO No. 18081 - STATE OF NEW HAMPSHIRE - LICENSED PROFESSIONAL ENGINEER

4/26/2017

CITY OF PORTSMOUTH, NH - DEPARTMENT OF PUBLIC WORKS
PEIRCE ISLAND WWTF UPGRADE

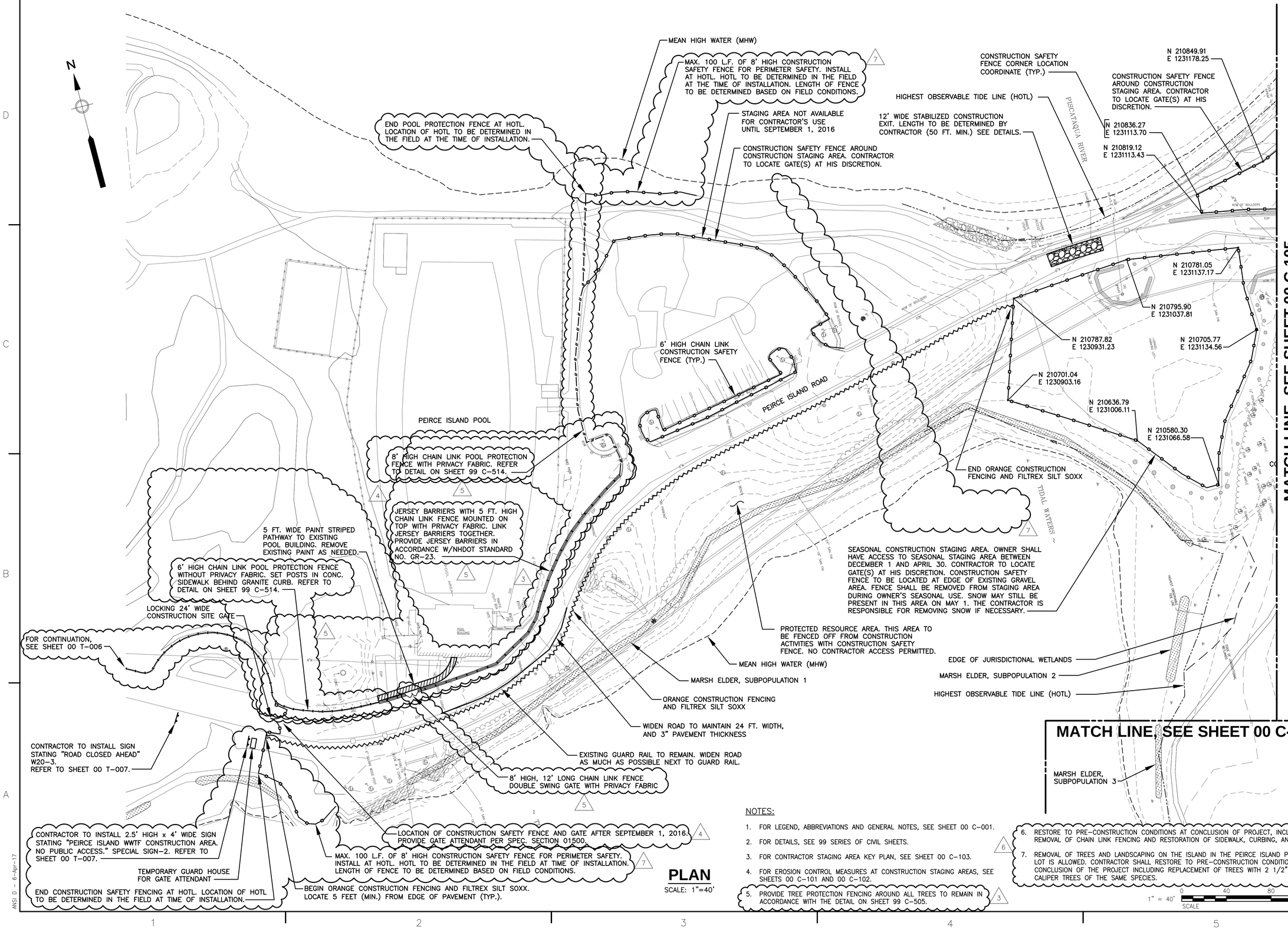
PARKING LOT DETAILS

PARKING LOTS

PROJECT NO:	60301525
CAD DWG FILE:	99 C-206
DESIGNED BY:	K. SHAEFFER
DRAWN BY:	C. BENZIGER
DEPT CHECK:	C. BENZIGER
PROJ CHECK:	E. WESERVE
DATE:	FEBRUARY 2017
SCALE:	AS NOTED

99 C-206

PATH/FILENAME: P:\60301525 - PORTSMOUTH WWTF UPGRADE\SHEETS\DP-2\C\99 C-206.DWG
LAST UPDATE: Wednesday, April 26, 2017 10:15:21 AM
PLOT DATE: Wednesday, April 26, 2017 11:28:23 AM
ANSI D - 26-Apr-17



PLAN

SCALE: 1"=40'

NOTES:

1. FOR LEGEND, ABBREVIATIONS AND GENERAL NOTES, SEE SHEET 00 C-001.
2. FOR DETAILS, SEE 99 SERIES OF CIVIL SHEETS.
3. FOR CONTRACTOR STAGING AREA KEY PLAN, SEE SHEET 00 C-103.
4. FOR EROSION CONTROL MEASURES AT CONSTRUCTION STAGING AREAS, SEE SHEETS 00 C-101 AND 00 C-102.
5. PROVIDE TREE PROTECTION FENCING AROUND ALL TREES TO REMAIN IN ACCORDANCE WITH THE DETAIL ON SHEET 99 C-505. 3
6. RESTORE TO PRE-CONSTRUCTION CONDITIONS AT CONCLUSION OF PROJECT, INCLUDING REMOVAL OF CHAIN LINK FENCING AND RESTORATION OF SIDEWALK, CURBING, AND LAWN AREA. 6
7. REMOVAL OF TREES AND LANDSCAPING ON THE ISLAND IN THE PEIRCE ISLAND POOL PARKING LOT IS ALLOWED. CONTRACTOR SHALL RESTORE TO PRE-CONSTRUCTION CONDITIONS AT THE CONCLUSION OF THE PROJECT INCLUDING REPLACEMENT OF TREES WITH 2 1/2" TO 3" CALIPER TREES OF THE SAME SPECIES.

1" = 40' SCALE: 0 40 80 120 FEET

MARK	DATE	MADE BY	CHECKED	DESCRIPTION
REVISIONS				
7	4/2017	ENM	JRP	WETLAND PERMIT MODS.
6	6/2016	ENM	JRP	ADD. No. 6
5	6/2016	ENM	JRP	ADD. No. 5
4	5/2016	ENM	JRP	ADD. No. 4
3	4/2016	ENM	JRP	ADD. No. 3
2	3/9/2016	ENM	JRP	REVISED FOR ORANGE CONSTRUCTION FENCING
1	2/2016	ENM	JRP	REVISED FOR BID

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AECOM TECHNICAL SERVICES, INC.
257 SIMARANO DRIVE, SUITE 101
CHELMSFORD, MA 01824
PHONE: (978) 905-2100
www.aecom.com

STATE OF NEW HAMPSHIRE
JASON R. PEARSON
No. 17700
LICENSED PROFESSIONAL ENGINEER
12-Dec-16

CITY OF PORTSMOUTH, NH - DEPARTMENT OF PUBLIC WORKS
PEIRCE ISLAND WWTF UPGRADE

CONSTRUCTION STAGING AREA - ENLARGED PLAN I

CIVIL

PROJECT NO:	60301525
CAD DWG FILE:	00 C-104
DESIGNED BY:	H. FRANZ
DRAWN BY:	N. YEE
DEPT CHECK:	C. BENZIGER
PROJ CHECK:	E. MESERVE
DATE:	FEBRUARY 2016
SCALE:	AS NOTED

00 C-104

PATH/FILENAME: P:\60301525 - PORTSMOUTH WWTF UPGRADE\SHEETS\BP-2\C\00 C-104.DWG
LAST UPDATE: Thursday, April 06, 2017 8:15:28 AM
PLOT DATE: Thursday, April 06, 2017 8:17:15 AM
ANSI D - 6-Apr-17

GEOTECHNICAL INFORMATION

AECOM

GEOTECHNICAL DATA REPORT

Subsurface Investigation Results for the
Peirce Island Parking Facilities
Portsmouth, NH

I. INTRODUCTION

This Geotechnical Data Report (GDR) is prepared in support of the construction and design of the Peirce Island Parking Facilities off Peirce Island Road in Portsmouth, NH. New England Boring Contractors Inc. of Derry, NH performed the drilling from September 13 to 19, 2016. The drilling was observed by an AECOM representative. The locations of the test borings are shown on the attached Boring Location Plan.

II. EXPLORATION PROGRAM

A total of six (6) test borings for the proposed project were drilled. All borings were Vacuum cleared from 5.3 to 7.0 feet below the ground surface. The test boring depths range from 6.5 to 14.0 feet below the ground surface. Standard split spoon samples were collected as indicated on boring logs.

Depth to groundwater table was estimated during drilling and noted on the boring logs. Groundwater levels may fluctuate with tide, precipitation, season, construction activities, run-off controls, and other factors. As a result, water levels during construction may vary from those observed during the subsurface investigation.

All boreholes were backfilled with cuttings, tamped and topped with asphalt patch or sod cutouts. All borehole logs from the exploration program are provided in Attachment 1.

III. LABORATORY TESTING

A laboratory testing program consisting of eleven (11) Moisture Content, eleven (11) Grain Size Analyses, and eleven (11) Atterberg Limit tests was performed by GeoTesting Express, Inc. of Acton, MA. The submitted report is provided as Attachment 2.

(Date: October, 2016)

Boring Location Plan

Peirce Island Parking Facilities

PB-1
PB-2
PB-3
PB-4
PB-5
PB-6

TBM 3539-D
X-CUT ON LEFT BOLT
OVER MAIN OUTLET
ELEV.=12.75'

TBM 3539-J
MAG. NAIL SET UP
6" IN POLE 53/4
ELEV.=15.12'

TBM 3539-K
MAG. NAIL SET UP
6" IN POLE PSNH53/5
ELEV.=10.87'

PEIRCE ISLAND ROAD

PISCATAQUA RIVER

ATTACHMENT 1

TEST BORING LOGS

AECOM

GEOLOGIC LOG

PROJECT: Peirce Island WWTF, Parking Lot, Portsmouth NH		SHEET	BORING NO.
SITE LOCATION:	JOB NO.: 60301525	1 of 1	PB- 1
SEE SKETCH	LOCATION: N: 210912 E: 1229993	Elevation: 10.7	Total Depth: 14.0'
DRILL CONTRACTOR: NE Boring Contr.	ENG/GEO: William Checchi	BEGUN: 9/13/2016	
DRILL RIG: 9/13/16--Vacmaster 4000 9/19/16-Mobile B50 bombardier	DRILLER: Vacmaster: B.Walsh Drill: M.Soucy	FINISHED: 9/19/2016	

Hole Size: 2.25" ID, 6" OD	Weather: 9/13/16 clear, 79 F 9/19/16 cloudy, 71 F	Ground Water (Date/Depth): 9/13/16 = 5.3'
Drilling Method: Vacmaster to 5.5' Hollow Stem Auger	Drilling Fluid: none	Top of Rock (Depth/Elev.): not encountered

Depth (ft)	Sample Type/No.	N Value	Blow Count (per 6 in.) or Drilling Rate(min/ft)	Sample Recovery or REC & RQD	SAMPLE DESCRIPTION	pocket penetro meter (tsf)	STRATIGRAPHIC DESCRIPTION *(dashed where inferred)*
					~2.5" bituminous concrete pavement		parking area
					Dense,Orange-brown,silty, sandy GRAVEL, Dry		
					1.5'		
	GRAB 1				Very dense,Tan,silty,sandy,GRAVEL, occasional red brick pieces, Dry		FILL
					4'		
5					Very dense, Gray, silty,sandy, GRAVEL, occasional Cobble, Dry		
5.3					▽ (9/13/16 - vacuum depth)		
	SS-2	8	3 - 4		Loose,Gray,gravelly,sandy, SILT, Wet		
7			4 - 4	4			
	GRAB 3				Loose, Gray, fine sandy, SILT, Wet		
10							SILT and CLAY
	SS-4	2	woh/12"		Very soft, Gray, fine sandy,silty CLAY, Wet		
12			2 - 2	22			
	SS-5	7	2 - 2		Loose,Gray,fine sandy,clayey SILT, Wet		
14			5 - 14	20	Med.Dense, Gray, fine SAND and SILT, Wet		SAND + SILT
15					bottom of borehole 14'		

Sample Types:		trace	0 to 5%
SS	Split Spoon	few	5 to 10%
ST	Shelby Tube	little	15 to 25%
R	Rock Core	some	30 to 45%
▒	Lab Sample	mostly	>50%

SPT Resistance		Approve/Date
Cohesionless Density:	Cohesive Consistency:	
5-9 Loose, 10-29 Med. Dense 0-4 Very Loose, 30-49 Dense 50+ Very Dense	0-2 Very Soft, 3-4 Soft 5-8 Med. Stiff, 9-15 Stiff 16-30 Very Stiff, 31+ Hard	

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GEOLOGIC LOG

PROJECT : **Peirce Island WWTF, Parking Lot, Portsmouth NH**		SHEET	BORING NO.
SITE LOCATION:	JOB NO.: **60301525**	1 of 1	**PB- 2**
SEE SKETCH	LOCATION: N: **210860** E: **1229894**	Elevation: **12.00**	Total Depth: **12.0**
DRILL CONTRACTOR : NE Boring Contr.	ENG/GEO : **William Checchi**	BEGUN :	**9/13/2016**
DRILL RIG : **9/13/16-Vacmaster 4000** **9/19/16-Mobile B50 bombardier**	DRILLER : **Vacmaster: B.Walsh** **Drill: M.Soucy**	FINISHED :	**9/19/2016**

Hole Size : **2.25" ID, 6" OD**	Weather : **9/13/16 clear 79 F** **9/19/16 cloudy 71 F**	Ground Water (Date/Depth) : **9/19/16 est 7' [sample]**
Drilling Method : **Vacmaster to 7'** **Hollow Stem Auger**	Drilling Fluid : none	Top of Rock (Depth/Elev.) : not encountered

Depth (ft)	Sample Type/No.	N Value	Blow Count (per 6 in.) or Drilling Rate(min/ft)	Sample Recovery or REC & RQD	SAMPLE DESCRIPTION	pocket penetro meter (tsf)	STRATIGRAPHIC DESCRIPTION *(dashed where inferred)*
					~2" bituminous concrete pavement		parking area
					Very dense,Red-brown,silty, sandy GRAVEL,		
					Very dense,Brown,silty, sandy GRAVEL, occasional cobble		
	GRAB 1						
5					**bituminous concrete pieces**		FILL
7					(9/13/16 vacuum depth)		
	SS-2	27	2 - 4		**Med.stiff,Olive brown,fine sandy,CLAY, moist**	pp 1.75	Sandy CLAY
9			23 - 14	14	**Very stiff,Olive brown,CLAY, moist to wet**	pp 2.5	
10							CLAY
	SS-3	12	5 - 8				
12			4 - 5	12	**Stiff,Olive brown,silty,CLAY, Wet**	pp 1.0	
					bottom of borehole 12'		
15							

Sample Types:		trace	0 to 5%
SS	Split Spoon	few	5 to 10%
ST	Shelby Tube	little	15 to 25%
R	Rock Core	some	30 to 45%
	Lab Sample	mostly	>50%

SPT Resistance		Approve/Date
Cohesionless Density:	Cohesive Consistency:	
5-9 Loose, 10-29 Med. Dense 0-4 Very Loose, 30-49 Dense 50+ Very Dense	0-2 Very Soft, 3-4 Soft 5-8 Med. Stiff, 9-15 Stiff 16-30 Very Stiff, 31+ Hard	

AECOM

GEOLOGIC LOG

PROJECT : **Peirce Island WWTF, Parking Lot, Portsmouth NH**		SHEET	BORING NO.
SITE LOCATION:	JOB NO.: **60301525**	1 of 1	**PB- 3**
SEE SKETCH	LOCATION: N: **210832** E: **1229976**	Elevation: **10.5**	Total Depth: **14.0'**
DRILL CONTRACTOR : NE Boring Contr.	ENG/GEO : **William Checchi**	BEGUN :	**9/13/2016**
DRILL RIG : **9/13/16-Vacmaster 4000** **9/19/16-Mobile B50 bombardier**	DRILLER : **Vacmaster: B.Walsh** **Drill: M.Soucy**	FINISHED :	**9/19/2016**

Hole Size : **2.25" ID, 6" OD**	Weather : **9/13/16 clear 79 F** **9/19/16 cloudy 71 F**	Ground Water (Date/Depth) : **9/13/16 = 6'**
Drilling Method : **Vacmaster to 7'** **Hollow Stem Auger**	Drilling Fluid : none	Top of Rock (Depth/Elev.) : not encountered

Depth (ft)	Sample Type/No.	N Value	Blow Count (per 6 in.) or Drilling Rate(min/ft)	Sample Recovery or REC & RQD	SAMPLE DESCRIPTION	pocket penetro meter (tsf)	STRATIGRAPHIC DESCRIPTION *(dashed where inferred)*
					~6" Grass and root mat		Grass + Topsoil
					Light brown, silty, fine SAND		
					bituminous concrete pieces		
	GRAB 1				Very dense, Orange-brown,silty, sandy,GRAVEL, concrete and red brick pieces, occasional cobble,Dry		FILL
5					Very dense,Olive gray,gravelly,silty,CLAY, moist red brick pieces, occasional cobble		
6					▼		
7					(9/13/16 - vacuum depth)		
	SS-2	5	2 - 2		Med.stiff,Olive gray, mottled CLAY	pp 0.5	
9			3 - 4	22			CLAY
10							
	SS-3	4	1 - 2		Soft,Olive gray,silty,CLAY, Wet	pp 0.1	
12			2 - 2	24			
	SS-4	47	10- 21		Med.Dense,Olive gray, silty,fine SAND, Wet		Silty SAND
14			26 - 32	24	Dense,Olive brown,silty, fine SAND, Wet		
15					bottom of borehole 14'		

Sample Types:		trace	0 to 5%
SS	Split Spoon	few	5 to 10%
ST	Shelby Tube	little	15 to 25%
R	Rock Core	some	30 to 45%
▒	Lab Sample	mostly	>50%

SPT Resistance		Approve/Date
Cohesionless Density:	Cohesive Consistency:	
5-9 Loose, 10-29 Med. Dense 0-4 Very Loose, 30-49 Dense 50+ Very Dense	0-2 Very Soft, 3-4 Soft 5-8 Med. Stiff, 9-15 Stiff 16-30 Very Stiff, 31+ Hard	

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GEOLOGIC LOG

PROJECT : **Peirce Island WWTF, Parking Lot, Portsmouth NH**		SHEET	BORING NO.
SITE LOCATION:	JOB NO.: **60301525**	1 of 1	**PB- 4**
SEE SKETCH	LOCATION: N: **210633** E: **1230014**	Elevation: **11.0**	Total Depth: **12.0'**
DRILL CONTRACTOR : NE Boring Contr.	ENG/GEO : **William Checchi**	BEGUN :	**9/14/2016**
DRILL RIG : **9/14/16-Vacmaster 4000** **9/19/16-Mobile B50 bombardier**	DRILLER : **Vacmaster: B.Walsh** **Drill: M.Soucy**	FINISHED :	**9/19/2016**

Hole Size : **2.25" ID, 6" OD**	Weather : **9/14/16 clear 79 F** **9/19/16 cloudy 71 F**	Ground Water (Date/Depth) : **9/19/16 est. 8' [sample]**
Drilling Method : **Vacmaster to 7'** **Hollow Stem Auger**	Drilling Fluid : none	Top of Rock (Depth/Elev.) : not encountered

Depth (ft)	Sample Type/No.	N Value	Blow Count (per 6 in.) or Drilling Rate(min/ft)	Sample Recovery or REC & RQD	SAMPLE DESCRIPTION	pocket penetro meter (tsf)	STRATIGRAPHIC DESCRIPTION *(dashed where inferred)*
1					~8" Grass and root mat, light brown, silty fine SAND		Grass + Topsoil
1.5	auger 1				Very dense,Light brown,silty, clayey, gravelly, SAND		Gravellly SAND FILL
2							
2.5	auger 2				Very dense,Red-brown,silty,clayey,gravelly SAND		
					3' Dense,Olive brown,clayey,sandy,SILT, roots, trace moist		SILT
5					5'		
	GRAB 3				Med.dense,Olive, silty,clayey,fine SAND , moist		Clayey SAND
7					(9/14/16 - vacuum depth)		
	SS-4	24	4 - 9			pp	
9			15 - 21	17	Med.dense,Olive brown, silty,clayey, SAND, Wet 9'	0.75	
10							
	SS-5	34	8 - 17		Dense,Olive brown,silty,fine SAND, wet		Silty SAND
12			17 - 17	17			
					bottom of borehole 12'		
15							

Sample Types:		trace	0 to 5%
SS	Split Spoon	few	5 to 10%
ST	Shelby Tube	little	15 to 25%
R	Rock Core	some	30 to 45%
	Lab Sample	mostly	>50%

SPT Resistance		Approve/Date
Cohesionless Density:	Cohesive Consistency:	
5-9 Loose, 10-29 Med. Dense 0-4 Very Loose, 30-49 Dense 50+ Very Dense	0-2 Very Soft, 3-4 Soft 5-8 Med. Stiff, 9-15 Stiff 16-30 Very Stiff, 31+ Hard	

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GEOLOGIC LOG

PROJECT : **Peirce Island WWTF, Parking Lot, Portsmouth NH**		SHEET	BORING NO.
SITE LOCATION:	JOB NO.: **60301525**	1 of 1	**PB- 5**
SEE SKETCH	LOCATION: N: **210590** E: **1229937**	Elevation: **12.0**	Total Depth: **6.5'**
DRILL CONTRACTOR : NE Boring Contr.	ENG/GEO : **William Checchi**	BEGUN :	**9/14/2016**
DRILL RIG : **9/14/16-Vacmaster 4000** **9/19/16-Mobile B50 bombardier**	DRILLER : **Vacmaster: B.Walsh** **Drill: M.Soucy**	FINISHED :	**9/19/2016**

Hole Size : **2.25" ID, 6" OD**	Weather : **9/14/16 clear 79 F** **9/19/16 cloudy 71 F**	Ground Water (Date/Depth) : not encountered
Drilling Method : **Vacmaster to 6.5'** **Hollow Stem Auger**	Drilling Fluid : none	Top of Rock (Depth/Elev.) : **Vacuum and Auger Refusal 6.5'**

Depth (ft)	Sample Type/No.	N Value	Blow Count (per 6 in.) or Drilling Rate(min/ft)	Sample Recovery or REC & RQD	SAMPLE DESCRIPTION	pocket pewnetr ometer (tsf)	STRATIGRAPHIC DESCRIPTION *(dashed where inferred)*
1					**~6" Grass and root mat**		**Grass + Topsoil**
1.5	**auger 1**				**Loose,Light brown,gravelly, silty, fine SAND**		
2.5					**Very dense, Orange-brown,gravelly,silty,clayey, SAND**		
3	**auger 2**						**FILL**
5					**Very dense,Orange-brown,silty,clayey, sandy, GRAVEL, occasional cobble, Dry**		
5.5	**auger 3**						
6.5					**9/14/16 - vacuum depth, 9/19/16 Auger Refusal bottom off borehole 6.5'**		
10							
15							

Sample Types:		trace	0 to 5%
SS	Split Spoon	few	5 to 10%
ST	Shelby Tube	little	15 to 25%
R	Rock Core	some	30 to 45%
▒	Lab Sample	mostly	>50%

SPT Resistance		Approve/Date
Cohesionless Density:	Cohesive Consistency:	
5-9 Loose, 10-29 Med. Dense 0-4 Very Loose, 30-49 Dense 50+ Very Dense	0-2 Very Soft, 3-4 Soft 5-8 Med. Stiff, 9-15 Stiff 16-30 Very Stiff, 31+ Hard	

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GEOLOGIC LOG

PROJECT : **Peirce Island WWTF, Parking Lot, Portsmouth NH**		SHEET	BORING NO.
SITE LOCATION:	JOB NO.: **60301525**	1 of 1	**PB- 6**
SEE SKETCH	LOCATION: N: **210571** E: **1230012**	Elevation: **11.4**	Total Depth: **12.0'**
DRILL CONTRACTOR : NE Boring Contr.	ENG/GEO : **William Checchi**	BEGUN :	**9/14/2016**
DRILL RIG : **9/14/16--Vacmaster 4000 9/19/16-Mobile B50 bombardier**	DRILLER : **Vacmaster: B.Walsh Drill: M.Soucy**	FINISHED :	**9/19/2016**

Hole Size : **2.25" ID, 6" OD**	Weather : **9/14/16 clear 79 F** **9/19/16 cloudy 71 F**	Ground Water (Date/Depth) : **9/19/16 est 8' [sample]**
Drilling Method : **Vacmaster to 7' Hollow Stem Auger**	Drilling Fluid : none	Top of Rock (Depth/Elev.) : not encountered

Depth (ft)	Sample Type/No.	N Value	Blow Count (per 6 in.) or Drilling Rate(min/ft)	Sample Recovery or REC & RQD	SAMPLE DESCRIPTION	pocket penetro meter (tsf)	STRATIGRAPHIC DESCRIPTION *(dashed where inferred)*
					~6" Grass and root mat, light brown, silty SAND		Grass + Topsoil
1							
1.5	auger 1				Dense,Orange-brown,silty, sandy,GRAVEL		
2.0							
2.5	auger 2				Dense,Brown,silty,sandy,GRAVEL,occasional cobble,small boulder, Dry		FILL
					4.5'		
5					Med.dense,Gray,sandy,SILT,with,roots, Dry 6'		
6					Med.dense,Olive brown,clayey,sandy,SILT, Dry		SILT
6.5	auger 3				(9/14/16 - vacuum depth)	pp 3.0	
7							
	SS-4	25	5 - 9 / 16 - 26	18	Med.dense,Olive brown,silty,clayey,fine SAND, Wet	pp 0.5	
9							Silty SAND
10							
	SS-5	28	9 - 15 / 13 - 13	14	Med.dense,Yellow-brown,silty,fine SAND, Wet		
12							
					bottom of borehole 12'		
15							

Sample Types:		trace	0 to 5%
SS	Split Spoon	few	5 to 10%
ST	Shelby Tube	little	15 to 25%
R	Rock Core	some	30 to 45%
▒	Lab Sample	mostly	>50%

SPT Resistance		Approve/Date
Cohesionless Density:	Cohesive Consistency:	
5-9 Loose, 10-29 Med. Dense 0-4 Very Loose, 30-49 Dense 50+ Very Dense	0-2 Very Soft, 3-4 Soft 5-8 Med. Stiff, 9-15 Stiff 16-30 Very Stiff, 31+ Hard	

ATTACHMENT 2

LABORATORY TESTING RESULTS

GeoTesting EXPRESS

Client:	AECOM				
Project:	Peirce Island Parking Lot				
Location:	Portsmouth, NH			Project No:	GTX-305372
Boring ID:	---	Sample Type:	---	Tested By:	GA
Sample ID:	---	Test Date:	10/04/16	Checked By:	emm
Depth :	---	Test Id:	392883		

USCS Classification - ASTM D2487

Boring ID	Sample ID	Depth	Group Name	Group Symbol	Gravel, %	Sand, %	Fines, %
PB-1	S4	10-12 ft	Silty clay	CL-ML	0.0	9.9	90.1
PB-2	S3	10-12 ft	Lean clay	CL	0.0	2.0	98.0
PB-3	S2	7-9 ft	Lean clay	CL	0.0	0.5	99.5
PB-3	S4	12-14 ft	Silty sand	SM	0.0	73.6	26.4
PB-4	auger 1+2	1-2.5 ft	Silty, clayey sand with gravel	SC-SM	27.3	44.4	28.3
PB-4	S4	7-9 ft	Clayey sand	SC	0.0	59.2	40.8
PB-4	S5	10-12 ft	Silty sand	SM	0.0	86.3	13.7
PB-5	auger 1-3	1-5.5 ft	Silty, clayey sand with gravel	SC-SM	21.1	48.1	30.8
PB-6	auger 1-2	1-2.5 ft	Silty sand with gravel	SM	24.9	54.4	20.7

Remarks: Grain Size analysis performed by ASTM D422 results enclosed
Atterberg Limits performed by ASTM D4318, results enclosed

Client:	AECOM				
Project:	Peirce Island Parking Lot				
Location:	Portsmouth, NH			Project No:	GTX-305372
Boring ID:	---	Sample Type:	---	Tested By:	GA
Sample ID:	---	Test Date:	09/30/16	Checked By:	emm
Depth :	---	Test Id:	392871		

Moisture Content of Soil and Rock - ASTM D2216

Boring ID	Sample ID	Depth	Description	Moisture Content, %
PB-1	S4	10-12 ft	Moist, dark gray silty clay	29.7
PB-2	S3	10-12 ft	Moist, olive brown clay	28.5
PB-3	S2	7-9 ft	Moist, dark olive gray clay	35.6
PB-3	S4	12-14 ft	Moist, olive brown silty sand	21.7
PB-4	auger 1+2	1-2.5 ft	Moist, olive brown silty, clayey sand with gravel	8.4
PB-4	S4	7-9 ft	Moist, olive brown clayey sand	22.5
PB-4	S5	10-12 ft	Moist, olive brown silty sand	20.6
PB-5	auger 1- 3	1-5.5 ft	Moist, olive brown silty, clayey sand with gravel	10.5

Notes: Temperature of Drying : 110° Celsius

Client:	AECOM				
Project:	Peirce Island Parking Lot				
Location:	Portsmouth, NH			Project No:	GTX-305372
Boring ID:	---	Sample Type:	---	Tested By:	GA
Sample ID:	---	Test Date:	10/04/16	Checked By:	emm
Depth :	---	Test Id:	392874		

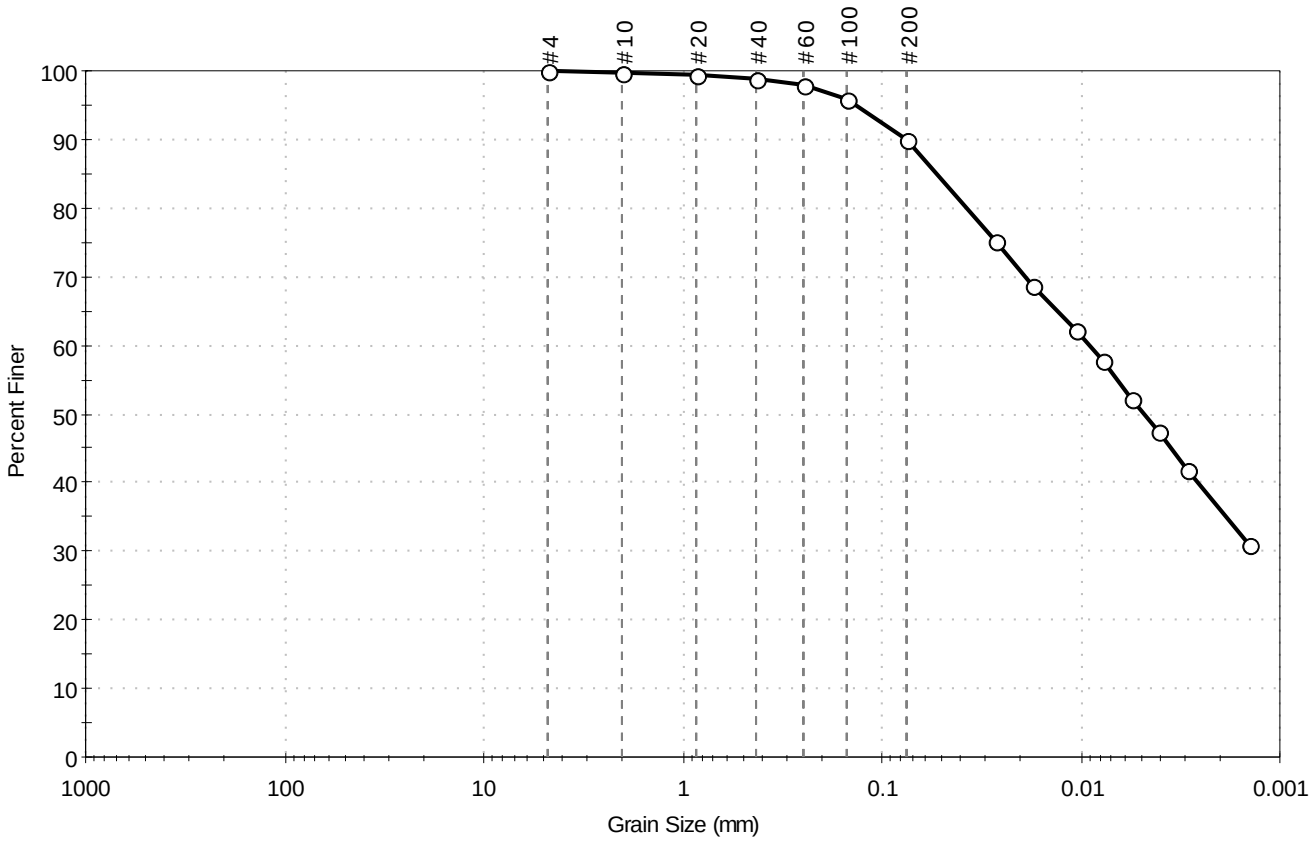
Moisture Content of Soil and Rock - ASTM D2216

Boring ID	Sample ID	Depth	Description	Moisture Content, %
PB-6	auger 1- 2	1-2.5 ft	Moist, dark olive brown silty sand with gravel	7.5
PB-6	S4	7-9 ft	Moist, olive brown silty sand	22.6
PB-6	S5	10-12 ft	Moist, yellowish brown silty sand	19.9

Notes: Temperature of Drying : 110º Celsius

Client:	AECOM				
Project:	Peirce Island Parking Lot				
Location:	Portsmouth, NH			Project No:	GTX-305372
Boring ID:	PB-1	Sample Type:	jar	Tested By:	GA
Sample ID:	S4	Test Date:	10/04/16	Checked By:	emm
Depth :	10-12 ft	Test Id:	392888		
Test Comment:	---				
Visual Description:	Moist, dark gray silty clay				
Sample Comment:	---				

Particle Size Analysis - ASTM D422



%Cobble	%Gravel	%Sand	%Silt & Clay Size
---	0.0	9.9	90.1

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
#4	4.75	100		
#10	2.00	100		
#20	0.85	99		
#40	0.42	99		
#60	0.25	98		
#100	0.15	96		
#200	0.075	90		
---	Particle Size (mm)	Percent Finer	Spec. Percent	Complies
---	0.0269	75		
---	0.0176	69		
---	0.0105	62		
---	0.0078	58		
---	0.0056	52		
---	0.0041	48		
---	0.0029	42		
---	0.0014	31		

Coefficients

D_{85} = 0.0527 mm	D_{30} = N/A
D_{60} = 0.0090 mm	D_{15} = N/A
D_{50} = 0.0048 mm	D_{10} = N/A
C_u = N/A	C_c = N/A

Classification

ASTM Silty clay (CL-ML)

AASHTO Silty Soils (A-4 (3))

Sample / Test Description

Sand/Gravel Particle Shape : ---

Sand/Gravel Hardness : ---

Dispersion Device : Apparatus A - Mech Mixer

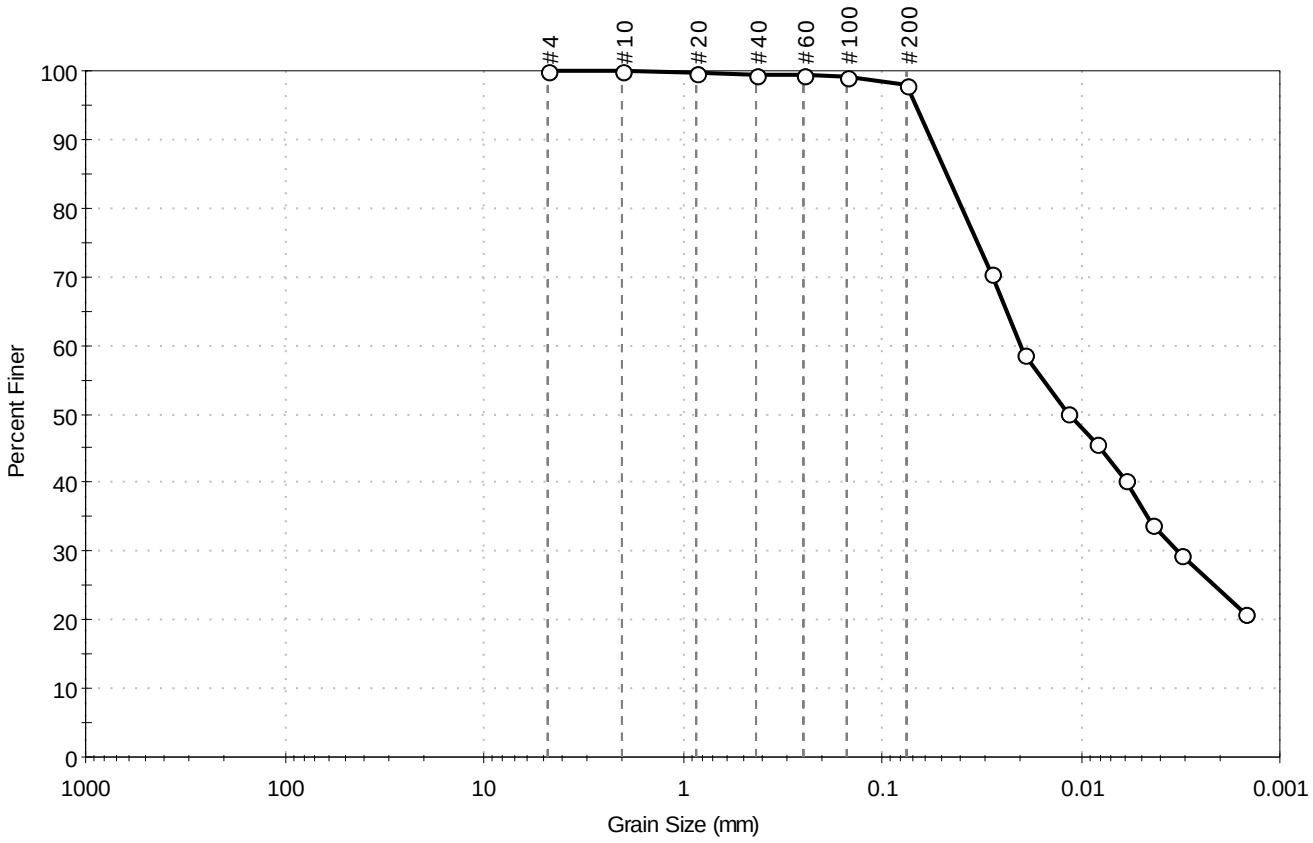
Dispersion Period : 1 minute

Specific Gravity : 2.65

Separation of Sample: #200 Sieve

Client:	AECOM				
Project:	Peirce Island Parking Lot				
Location:	Portsmouth, NH			Project No:	GTX-305372
Boring ID:	PB-2	Sample Type:	jar	Tested By:	GA
Sample ID:	S3	Test Date:	10/04/16	Checked By:	emm
Depth :	10-12 ft	Test Id:	392889		
Test Comment:	---				
Visual Description:	Moist, olive brown clay				
Sample Comment:	---				

Particle Size Analysis - ASTM D422



%Cobble	%Gravel	%Sand	%Silt & Clay Size
---	0.0	2.0	98.0

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
#4	4.75	100		
#10	2.00	100		
#20	0.85	100		
#40	0.42	99		
#60	0.25	99		
#100	0.15	99		
#200	0.075	98		
---	Particle Size (mm)	Percent Finer	Spec. Percent	Complies
---	0.0280	71		
---	0.0191	59		
---	0.0116	50		
---	0.0084	46		
---	0.0060	40		
---	0.0044	34		
---	0.0031	30		
---	0.0015	21		

Coefficients

D_{85} = 0.0471 mm	D_{30} = 0.0032 mm
D_{60} = 0.0199 mm	D_{15} = N/A
D_{50} = 0.0115 mm	D_{10} = N/A
C_u = N/A	C_c = N/A

Classification

ASTM Lean clay (CL)

AASHTO Clayey Soils (A-6 (16))

Sample / Test Description

Sand/Gravel Particle Shape : ---

Sand/Gravel Hardness : ---

Dispersion Device : Apparatus A - Mech Mixer

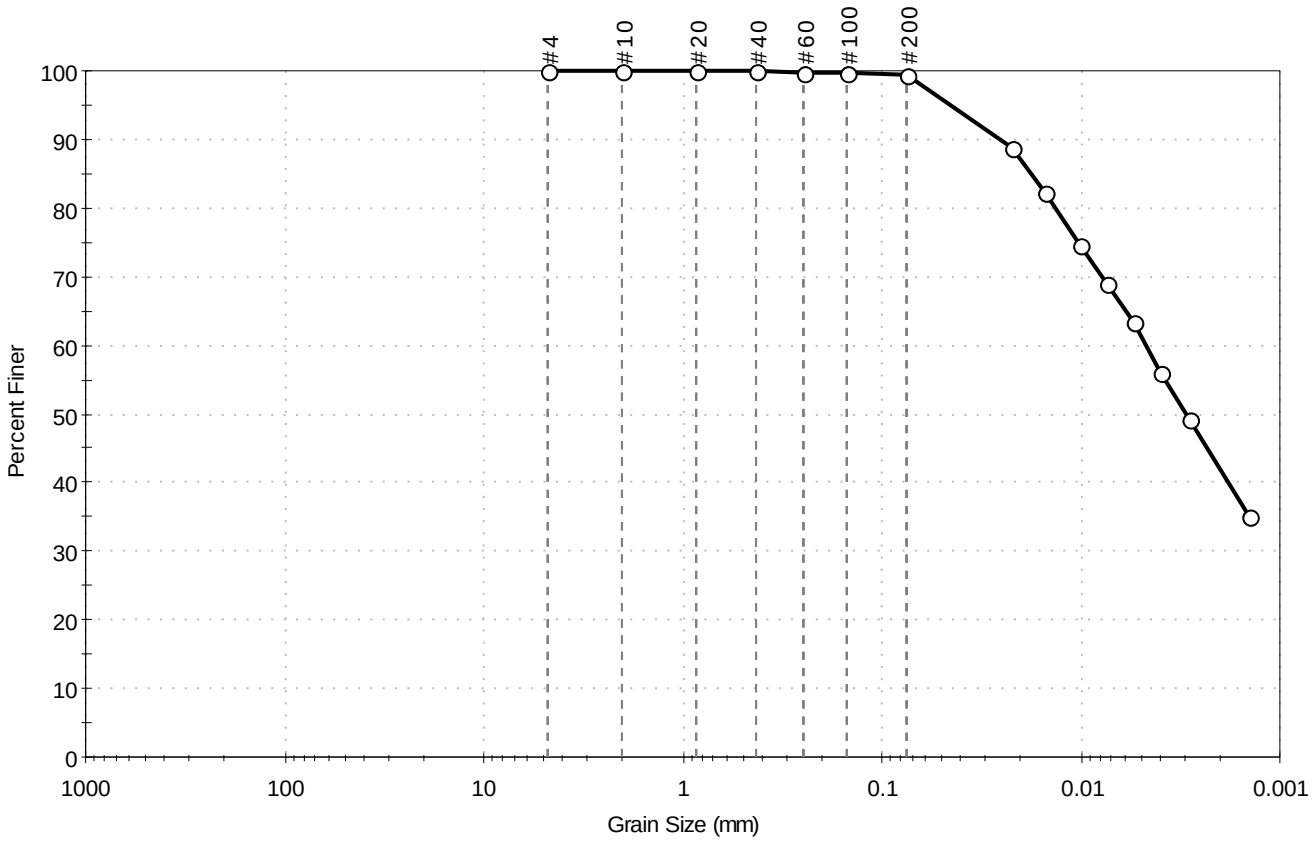
Dispersion Period : 1 minute

Specific Gravity : 2.65

Separation of Sample: #200 Sieve

Client:	AECOM				
Project:	Peirce Island Parking Lot				
Location:	Portsmouth, NH			Project No:	GTX-305372
Boring ID:	PB-3	Sample Type:	jar	Tested By:	GA
Sample ID:	S2	Test Date:	10/04/16	Checked By:	emm
Depth :	7-9 ft	Test Id:	392890		
Test Comment:	---				
Visual Description:	Moist, dark olive gray clay				
Sample Comment:	---				

Particle Size Analysis - ASTM D422



% Cobble	% Gravel	% Sand	% Silt & Clay Size
---	0.0	0.5	99.5

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
#4	4.75	100		
#10	2.00	100		
#20	0.85	100		
#40	0.42	100		
#60	0.25	100		
#100	0.15	100		
#200	0.075	99		
---	Particle Size (mm)	Percent Finer	Spec. Percent	Complies
---	0.0222	89		
---	0.0152	82		
---	0.0101	75		
---	0.0074	69		
---	0.0054	63		
---	0.0039	56		
---	0.0029	49		
---	0.0014	35		

Coefficients

D_{85} = 0.0177 mm	D_{30} = N/A
D_{60} = 0.0047 mm	D_{15} = N/A
D_{50} = 0.0030 mm	D_{10} = N/A
C_u = N/A	C_c = N/A

Classification

ASTM Lean clay (CL)

AASHTO Clayey Soils (A-6 (15))

Sample / Test Description

Sand/Gravel Particle Shape : ---

Sand/Gravel Hardness : ---

Dispersion Device : Apparatus A - Mech Mixer

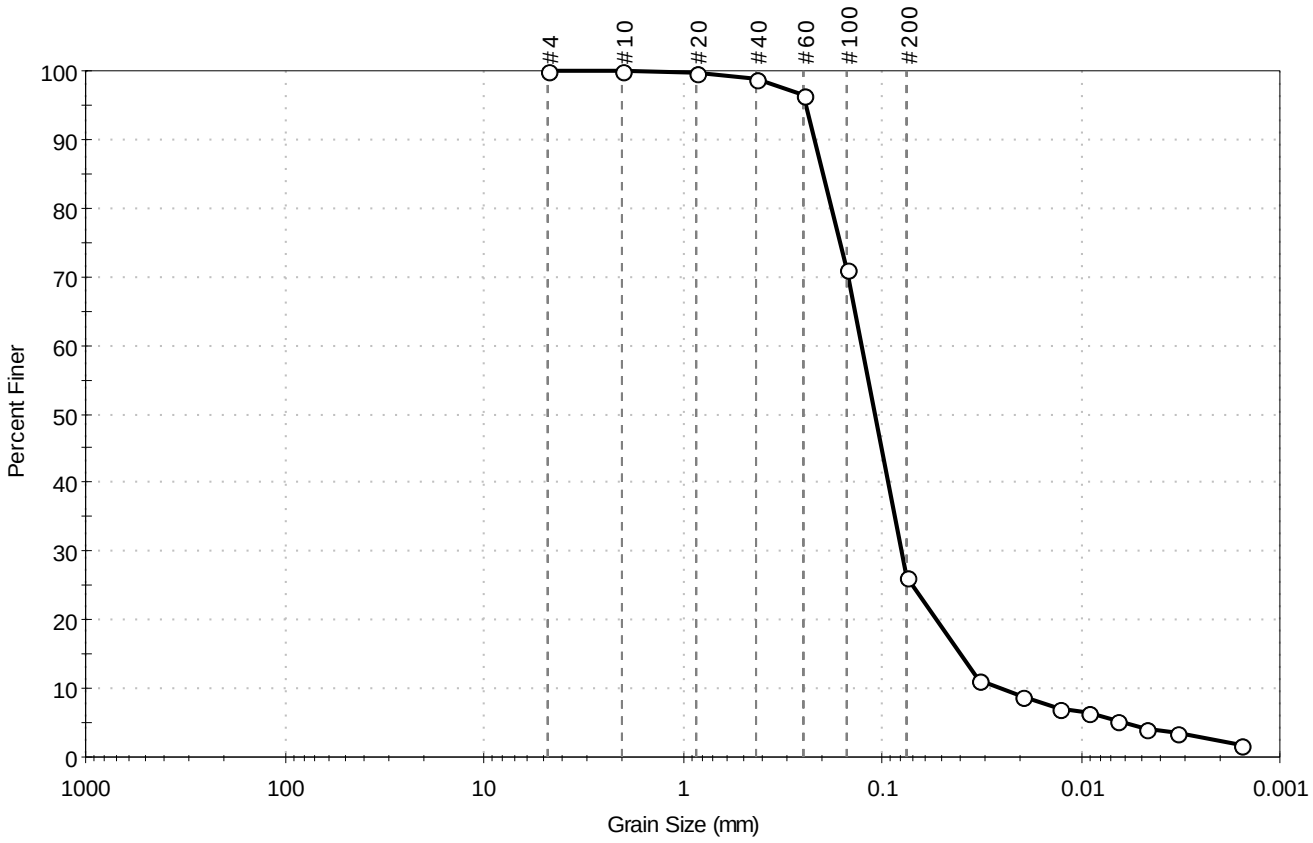
Dispersion Period : 1 minute

Specific Gravity : 2.65

Separation of Sample: #200 Sieve

Client:	AECOM				
Project:	Peirce Island Parking Lot				
Location:	Portsmouth, NH			Project No:	GTX-305372
Boring ID:	PB-3	Sample Type:	jar	Tested By:	GA
Sample ID:	S4	Test Date:	10/04/16	Checked By:	emm
Depth :	12-14 ft	Test Id:	392891		
Test Comment:	---				
Visual Description:	Moist, olive brown silty sand				
Sample Comment:	---				

Particle Size Analysis - ASTM D422



% Cobble	% Gravel	% Sand	% Silt & Clay Size
---	0.0	73.6	26.4

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
#4	4.75	100		
#10	2.00	100		
#20	0.85	100		
#40	0.42	99		
#60	0.25	96		
#100	0.15	71		
#200	0.075	26		
---	Particle Size (mm)	Percent Finer	Spec. Percent	Complies
---	0.0325	11		
---	0.0200	9		
---	0.0129	7		
---	0.0092	6		
---	0.0066	5		
---	0.0047	4		
---	0.0033	4		
---	0.0016	2		

Coefficients

D_{85} = 0.1987 mm	D_{30} = 0.0793 mm
D_{60} = 0.1264 mm	D_{15} = 0.0402 mm
D_{50} = 0.1082 mm	D_{10} = 0.0258 mm
C_u = 4.899	C_c = 1.928

Classification

ASTM Silty sand (SM)

AASHTO Silty Gravel and Sand (A-2-4 (0))

Sample / Test Description

Sand/Gravel Particle Shape : ---

Sand/Gravel Hardness : ---

Dispersion Device : Apparatus A - Mech Mixer

Dispersion Period : 1 minute

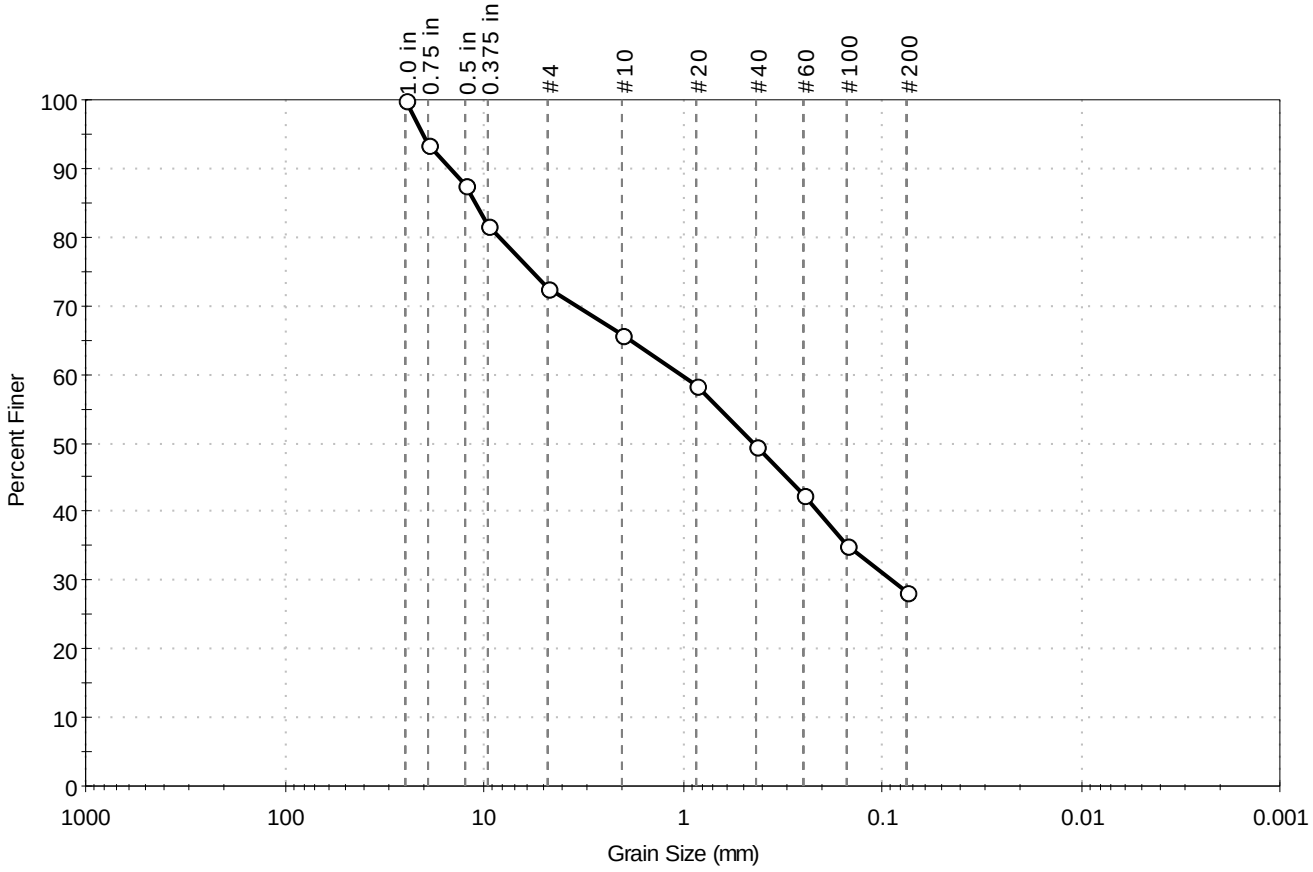
Specific Gravity : 2.65

Separation of Sample: #200 Sieve

Client:	AECOM				
Project:	Peirce Island Parking Lot				
Location:	Portsmouth, NH			Project No:	GTX-305372
Boring ID:	PB-4	Sample Type:	jar	Tested By:	GA
Sample ID:	auger 1+2	Test Date:	09/30/16	Checked By:	emm
Depth :	1-2.5 ft	Test Id:	392896		

Test Comment: ---
Visual Description: Moist, olive brown silty, clayey sand with gravel
Sample Comment: ---

Particle Size Analysis - ASTM D422



%Cobble	%Gravel	%Sand	%Silt & Clay Size
---	27.3	44.4	28.3

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
1.0 in	25.00	100		
0.75 in	19.00	93		
0.5 in	12.50	88		
0.375 in	9.50	82		
#4	4.75	73		
#10	2.00	66		
#20	0.85	58		
#40	0.42	50		
#60	0.25	43		
#100	0.15	35		
#200	0.075	28		

Coefficients

D_{85} = 11.1071 mm	D_{30} = 0.0895 mm
D_{60} = 1.0195 mm	D_{15} = N/A
D_{50} = 0.4379 mm	D_{10} = N/A
C_u = N/A	C_c = N/A

Classification

ASTM Silty, clayey sand with gravel (SC-SM)

AASHTO Silty Gravel and Sand (A-2-4 (0))

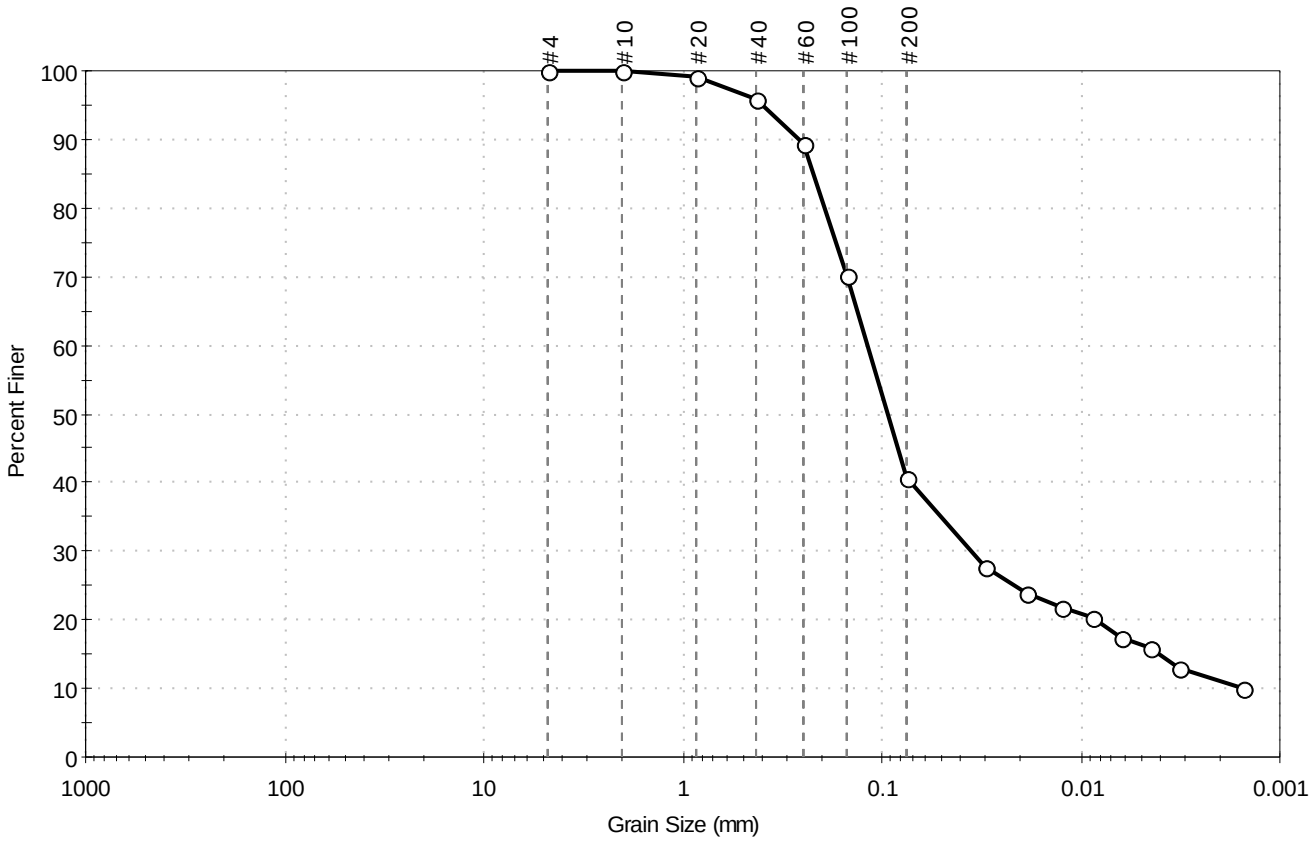
Sample / Test Description

Sand/Gravel Particle Shape : ANGULAR

Sand/Gravel Hardness : HARD

Client:	AECOM				
Project:	Peirce Island Parking Lot				
Location:	Portsmouth, NH			Project No:	GTX-305372
Boring ID:	PB-4	Sample Type:	jar	Tested By:	GA
Sample ID:	S4	Test Date:	10/04/16	Checked By:	emm
Depth :	7-9 ft	Test Id:	392892		
Test Comment:	---				
Visual Description:	Moist, olive brown clayey sand				
Sample Comment:	---				

Particle Size Analysis - ASTM D422



% Cobble	% Gravel	% Sand	% Silt & Clay Size
---	0.0	59.2	40.8

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
#4	4.75	100		
#10	2.00	100		
#20	0.85	99		
#40	0.42	96		
#60	0.25	89		
#100	0.15	70		
#200	0.075	41		
---	Particle Size (mm)	Percent Finer	Spec. Percent	Complies
---	0.0307	28		
---	0.0187	24		
---	0.0124	22		
---	0.0088	20		
---	0.0063	17		
---	0.0045	16		
---	0.0032	13		
---	0.0015	10		

Coefficients

D_{85} = 0.2230 mm	D_{30} = 0.0359 mm
D_{60} = 0.1182 mm	D_{15} = 0.0041 mm
D_{50} = 0.0933 mm	D_{10} = 0.0016 mm
C_u = 73.875	C_c = 6.815

Classification

ASTM Clayey sand (SC)

AASHTO Silty Soils (A-4 (1))

Sample / Test Description

Sand/Gravel Particle Shape : ---

Sand/Gravel Hardness : ---

Dispersion Device : Apparatus A - Mech Mixer

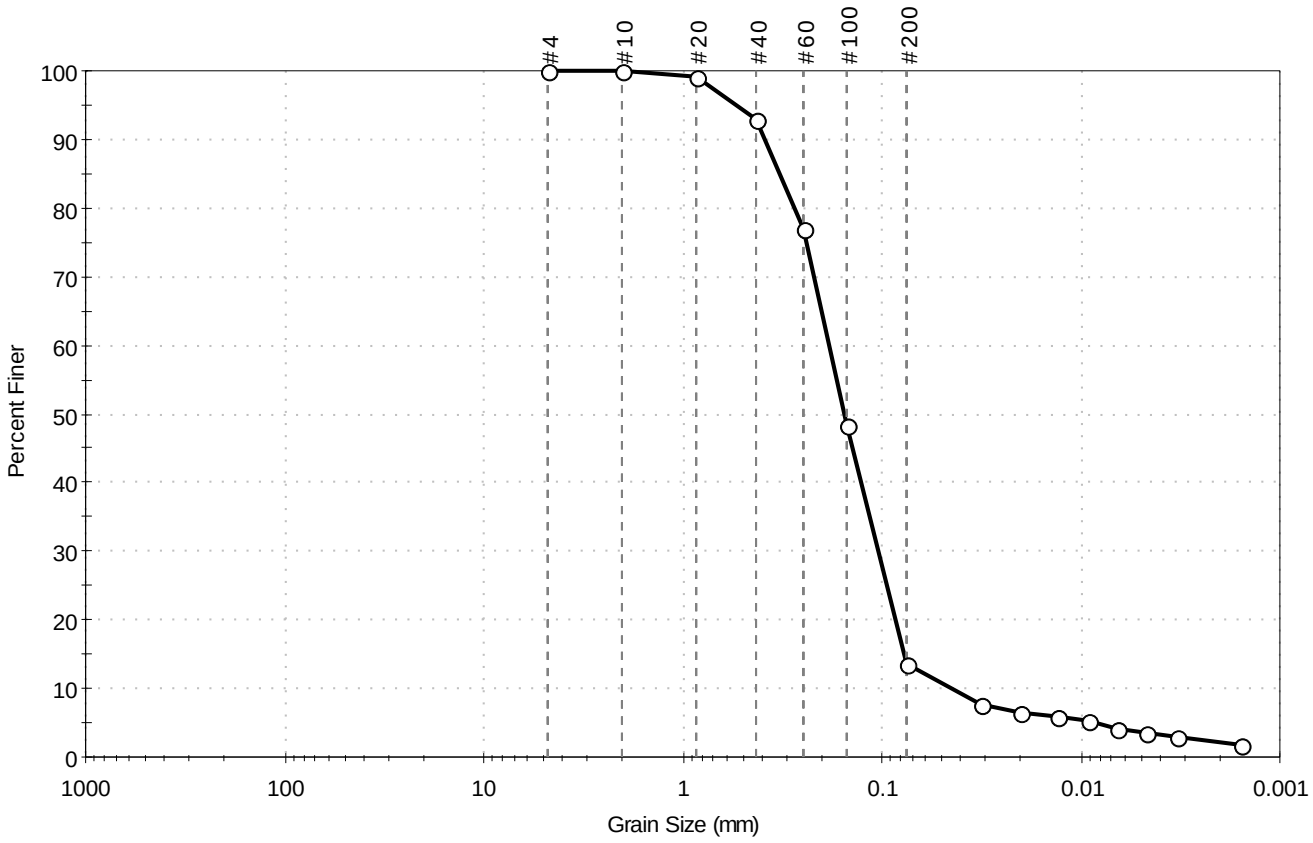
Dispersion Period : 1 minute

Specific Gravity : 2.65

Separation of Sample: #200 Sieve

Client:	AECOM				
Project:	Peirce Island Parking Lot				
Location:	Portsmouth, NH			Project No:	GTX-305372
Boring ID:	PB-4	Sample Type:	jar	Tested By:	GA
Sample ID:	S5	Test Date:	10/04/16	Checked By:	emm
Depth :	10-12 ft	Test Id:	392893		
Test Comment:	---				
Visual Description:	Moist, olive brown silty sand				
Sample Comment:	---				

Particle Size Analysis - ASTM D422



% Cobble	% Gravel	% Sand	% Silt & Clay Size
---	0.0	86.3	13.7

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
#4	4.75	100		
#10	2.00	100		
#20	0.85	99		
#40	0.42	93		
#60	0.25	77		
#100	0.15	48		
#200	0.075	14		
---	Particle Size (mm)	Percent Finer	Spec. Percent	Complies
---	0.0314	8		
---	0.0203	7		
---	0.0130	6		
---	0.0093	5		
---	0.0066	4		
---	0.0047	4		
---	0.0033	3		
---	0.0016	2		

Coefficients

D_{85} = 0.3271 mm	D_{30} = 0.1039 mm
D_{60} = 0.1847 mm	D_{15} = 0.0770 mm
D_{50} = 0.1544 mm	D_{10} = 0.0441 mm
C_u = 4.188	C_c = 1.325

Classification

ASTM Silty sand (SM)

AASHTO Silty Gravel and Sand (A-2-4 (0))

Sample / Test Description

Sand/Gravel Particle Shape : ---

Sand/Gravel Hardness : ---

Dispersion Device : Apparatus A - Mech Mixer

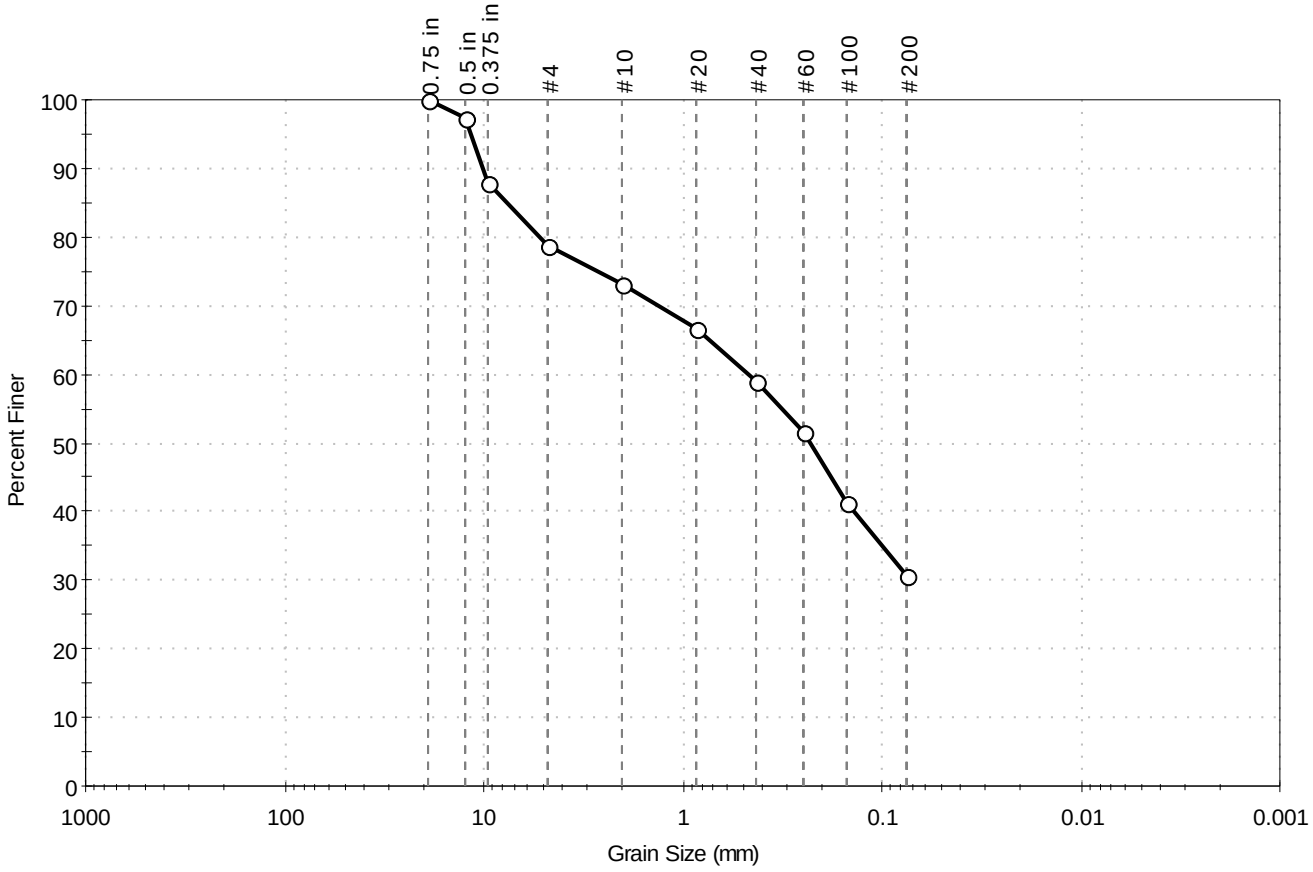
Dispersion Period : 1 minute

Specific Gravity : 2.65

Separation of Sample: #200 Sieve

Client:	AECOM				
Project:	Peirce Island Parking Lot				
Location:	Portsmouth, NH			Project No:	GTX-305372
Boring ID:	PB-5	Sample Type:	jar	Tested By:	GA
Sample ID:	auger 1-3	Test Date:	09/30/16	Checked By:	emm
Depth :	1-5.5 ft	Test Id:	392897		
Test Comment:	---				
Visual Description:	Moist, olive brown silty, clayey sand with gravel				
Sample Comment:	---				

Particle Size Analysis - ASTM D422



%Cobble	%Gravel	%Sand	%Silt & Clay Size
---	21.1	48.1	30.8

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
0.75 in	19.00	100		
0.5 in	12.50	97		
0.375 in	9.50	88		
#4	4.75	79		
#10	2.00	73		
#20	0.85	67		
#40	0.42	59		
#60	0.25	52		
#100	0.15	41		
#200	0.075	31		

Coefficients

D_{85} = 7.5517 mm	D_{30} = N/A
D_{60} = 0.4648 mm	D_{15} = N/A
D_{50} = 0.2299 mm	D_{10} = N/A
C_u = N/A	C_c = N/A

Classification

ASTM Silty, clayey sand with gravel (SC-SM)

AASHTO Silty Gravel and Sand (A-2-4 (0))

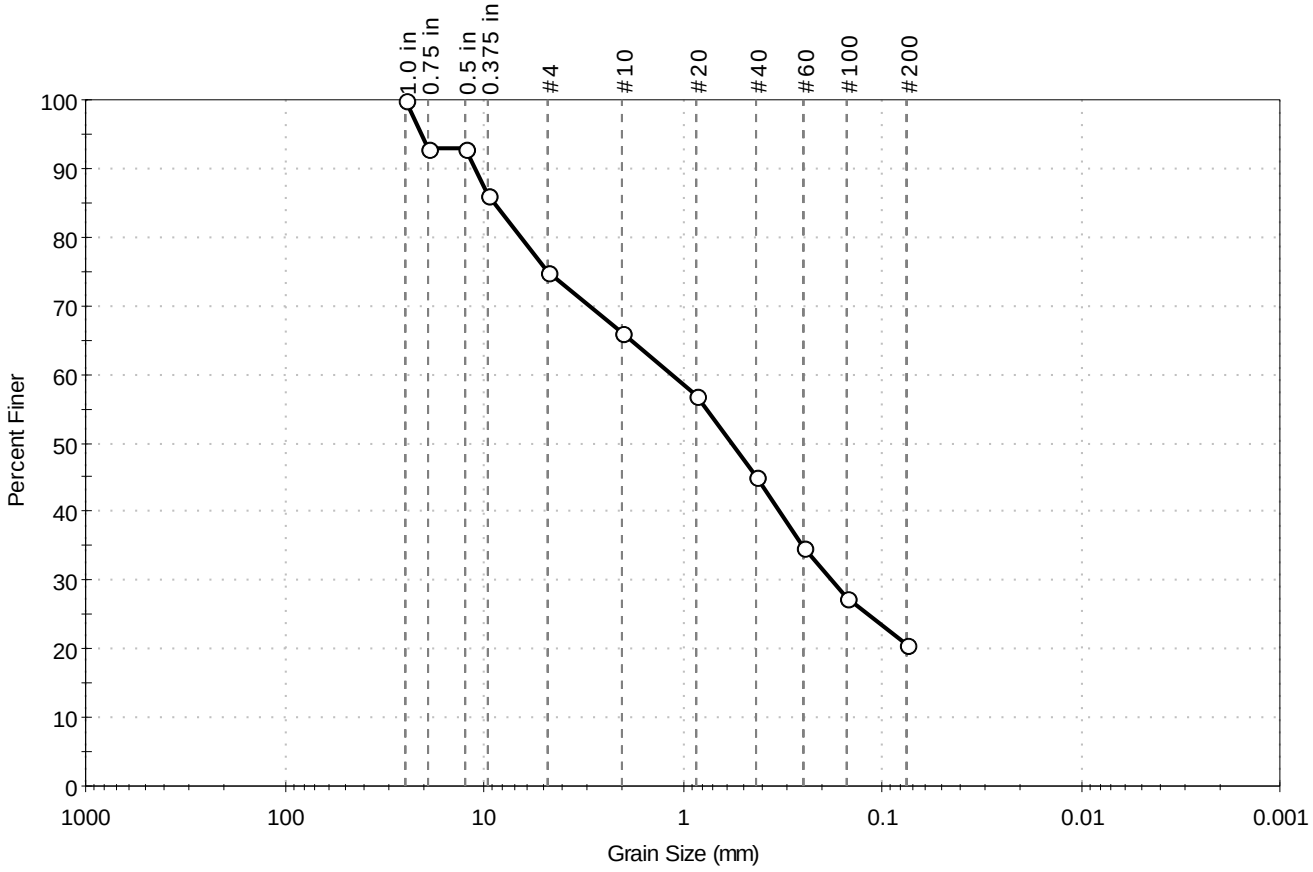
Sample / Test Description

Sand/Gravel Particle Shape : ANGULAR

Sand/Gravel Hardness : HARD

Client:	AECOM				
Project:	Peirce Island Parking Lot				
Location:	Portsmouth, NH			Project No:	GTX-305372
Boring ID:	PB-6	Sample Type:	jar	Tested By:	GA
Sample ID:	auger 1-2	Test Date:	09/30/16	Checked By:	emm
Depth :	1-2.5 ft	Test Id:	392898		
Test Comment:	---				
Visual Description:	Moist, dark olive brown silty sand with gravel				
Sample Comment:	---				

Particle Size Analysis - ASTM D422



%Cobble	%Gravel	%Sand	%Silt & Clay Size
---	24.9	54.4	20.7

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
1.0 in	25.00	100		
0.75 in	19.00	93		
0.5 in	12.50	93		
0.375 in	9.50	86		
#4	4.75	75		
#10	2.00	66		
#20	0.85	57		
#40	0.42	45		
#60	0.25	35		
#100	0.15	27		
#200	0.075	21		

Coefficients

D_{85} = 8.8207 mm	D_{30} = 0.1788 mm
D_{60} = 1.1334 mm	D_{15} = N/A
D_{50} = 0.5670 mm	D_{10} = N/A
C_u = N/A	C_c = N/A

Classification

ASTM — Silty sand with gravel (SM)

AASHTO — Stone Fragments, Gravel and Sand (A-1-b (0))

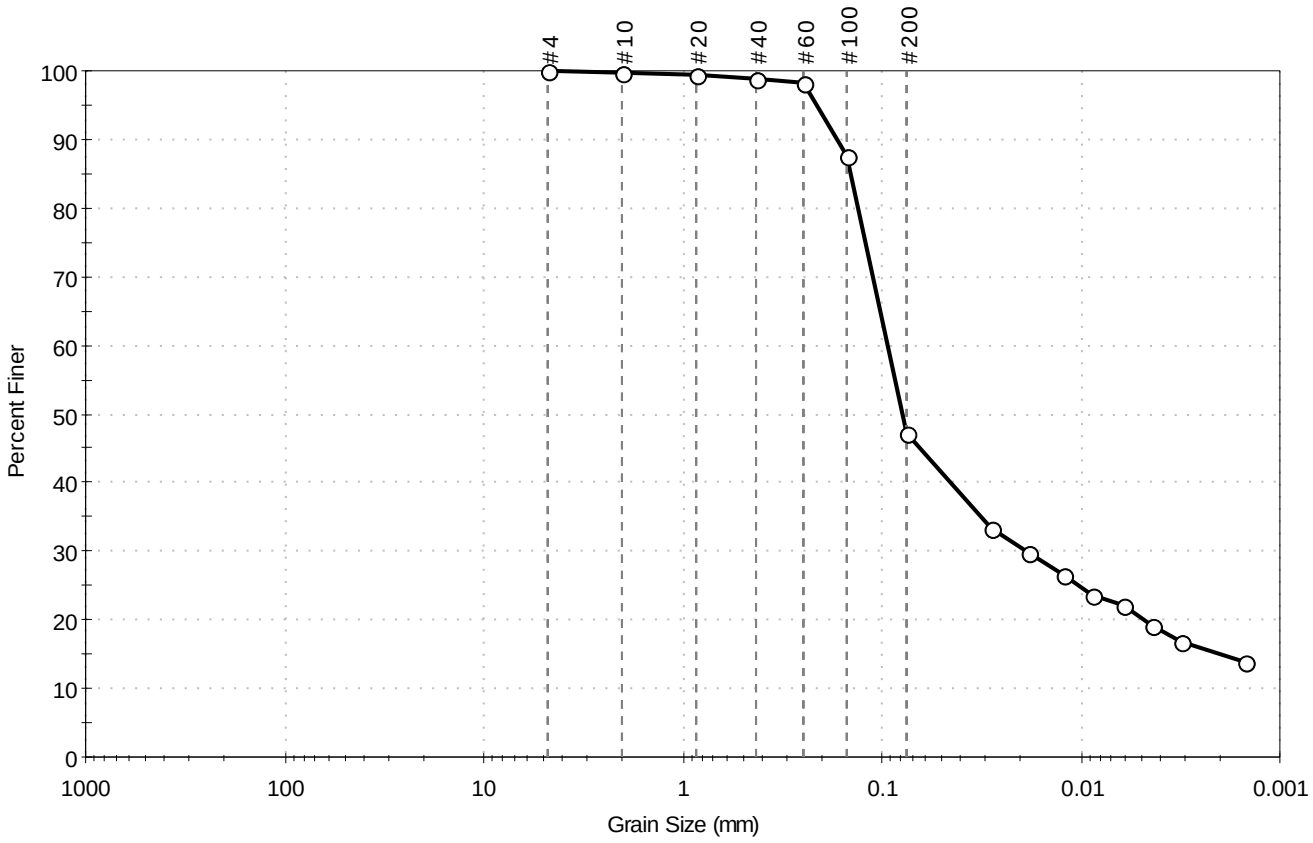
Sample / Test Description

Sand/Gravel Particle Shape : ANGULAR

Sand/Gravel Hardness : HARD

Client:	AECOM				
Project:	Peirce Island Parking Lot				
Location:	Portsmouth, NH			Project No:	GTX-305372
Boring ID:	PB-6	Sample Type:	jar	Tested By:	GA
Sample ID:	S4	Test Date:	10/04/16	Checked By:	emm
Depth :	7-9 ft	Test Id:	392894		
Test Comment:	---				
Visual Description:	Moist, olive brown silty sand				
Sample Comment:	---				

Particle Size Analysis - ASTM D422



% Cobble	% Gravel	% Sand	% Silt & Clay Size
---	0.0	52.8	47.2

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
#4	4.75	100		
#10	2.00	100		
#20	0.85	99		
#40	0.42	99		
#60	0.25	98		
#100	0.15	88		
#200	0.075	47		
---	Particle Size (mm)	Percent Finer	Spec. Percent	Complies
---	0.0285	33		
---	0.0185	30		
---	0.0121	27		
---	0.0087	24		
---	0.0062	22		
---	0.0044	19		
---	0.0032	17		
---	0.0015	14		

Coefficients

D_{85} = 0.1432 mm	D_{30} = 0.0192 mm
D_{60} = 0.0933 mm	D_{15} = 0.0020 mm
D_{50} = 0.0786 mm	D_{10} = N/A
C_u = N/A	C_c = N/A

Classification

ASTM Silty sand (SM)

AASHTO Silty Soils (A-4 (0))

Sample / Test Description

Sand/Gravel Particle Shape : ---

Sand/Gravel Hardness : ---

Dispersion Device : Apparatus A - Mech Mixer

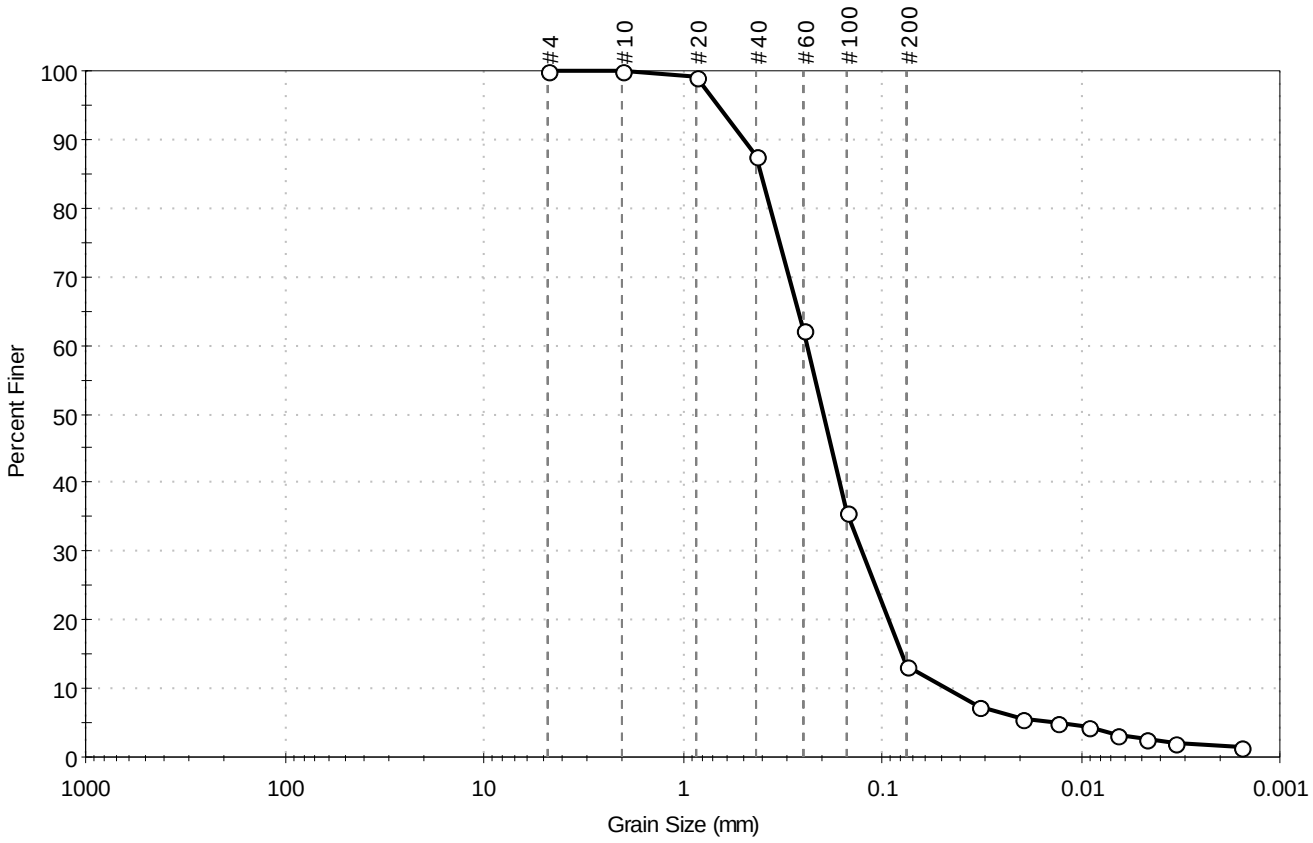
Dispersion Period : 1 minute

Specific Gravity : 2.65

Separation of Sample: #200 Sieve

Client:	AECOM				
Project:	Peirce Island Parking Lot				
Location:	Portsmouth, NH			Project No:	GTX-305372
Boring ID:	PB-6	Sample Type:	jar	Tested By:	GA
Sample ID:	S5	Test Date:	10/04/16	Checked By:	emm
Depth :	10-12 ft	Test Id:	392895		
Test Comment:	---				
Visual Description:	Moist, yellowish brown silty sand				
Sample Comment:	---				

Particle Size Analysis - ASTM D422



% Cobble	% Gravel	% Sand	% Silt & Clay Size
---	0.0	86.8	13.2

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
#4	4.75	100		
#10	2.00	100		
#20	0.85	99		
#40	0.42	88		
#60	0.25	62		
#100	0.15	36		
#200	0.075	13		
---	Particle Size (mm)	Percent Finer	Spec. Percent	Complies
---	0.0324	7		
---	0.0197	6		
---	0.0131	5		
---	0.0093	4		
---	0.0066	3		
---	0.0047	3		
---	0.0033	2		
---	0.0016	1		

Coefficients

D_{85} = 0.4023 mm	D_{30} = 0.1257 mm
D_{60} = 0.2393 mm	D_{15} = 0.0793 mm
D_{50} = 0.1974 mm	D_{10} = 0.0476 mm
C_u = 5.027	C_c = 1.387

Classification

ASTM Silty sand (SM)

AASHTO Silty Gravel and Sand (A-2-4 (0))

Sample / Test Description

Sand/Gravel Particle Shape : ---

Sand/Gravel Hardness : ---

Dispersion Device : Apparatus A - Mech Mixer

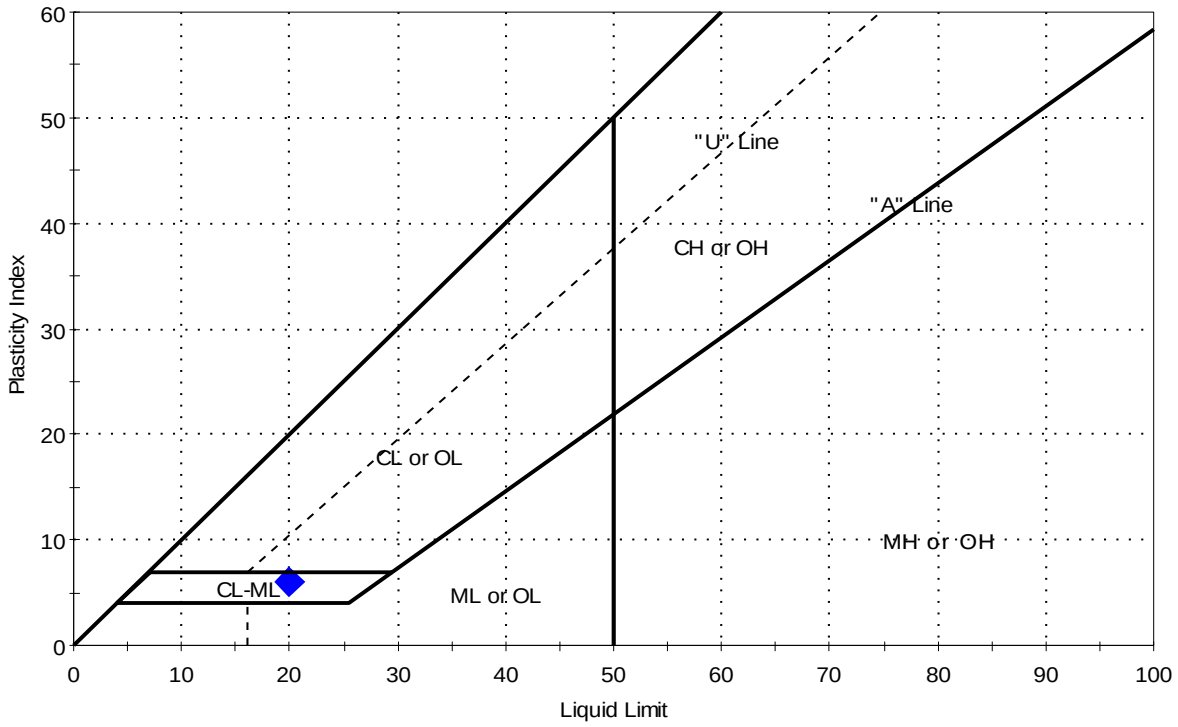
Dispersion Period : 1 minute

Specific Gravity : 2.65

Separation of Sample: #200 Sieve

Client:	AECOM				
Project:	Peirce Island Parking Lot				
Location:	Portsmouth, NH			Project No:	GTX-305372
Boring ID:	PB-1	Sample Type:	jar	Tested By:	GA
Sample ID:	S4	Test Date:	09/30/16	Checked By:	emm
Depth :	10-12 ft	Test Id:	392853		
Test Comment:	---				
Visual Description:	Moist, dark gray silty clay				
Sample Comment:	---				

Atterberg Limits - ASTM D4318



Symbol	Sample ID	Boring	Depth	Natural Moisture Content, %	Liquid Limit	Plastic Limit	Plasticity Index	Liquidity Index	Soil Classification
◆	S4	PB-1	10-12 ft	30	20	14	6	2.6	Silty clay (CL-ML)

Sample Prepared using the WET method

1% Retained on #40 Sieve

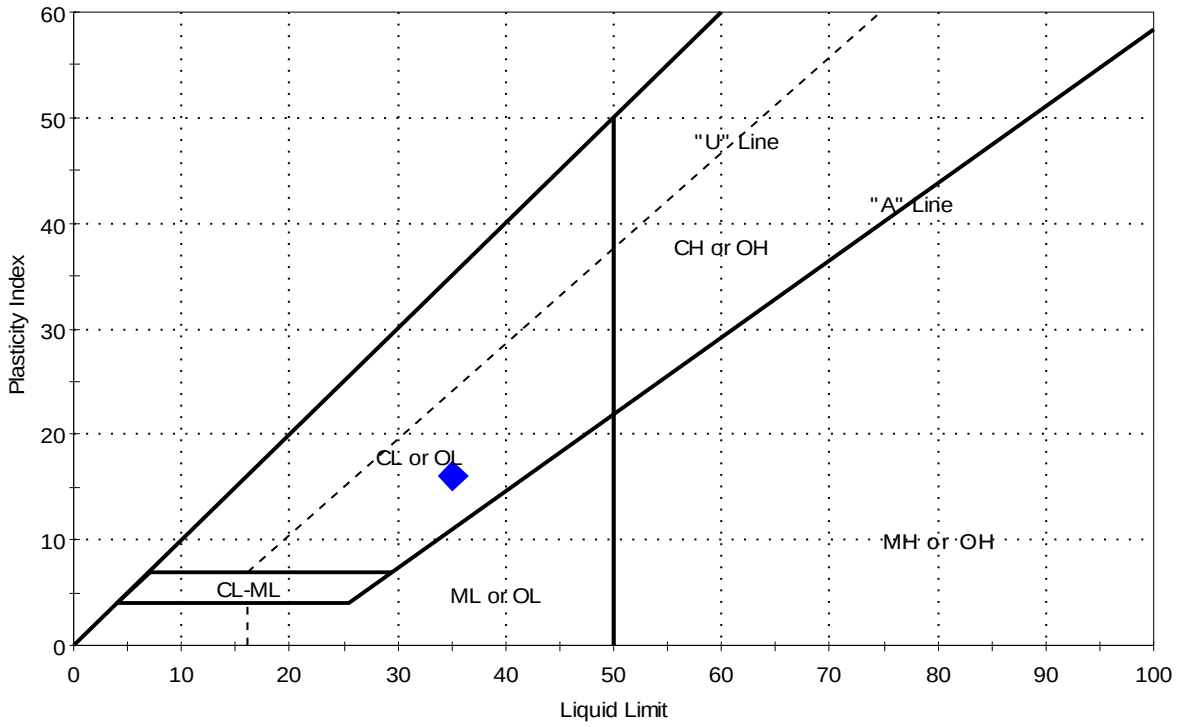
Dry Strength: VERY HIGH

Dilatancy: SLOW

Toughness: MEDIUM

Client:	AECOM				
Project:	Peirce Island Parking Lot				
Location:	Portsmouth, NH			Project No:	GTX-305372
Boring ID:	PB-2	Sample Type:	jar	Tested By:	GA
Sample ID:	S3	Test Date:	09/30/16	Checked By:	emm
Depth :	10-12 ft	Test Id:	392854		
Test Comment:	---				
Visual Description:	Moist, olive brown clay				
Sample Comment:	---				

Atterberg Limits - ASTM D4318



Symbol	Sample ID	Boring	Depth	Natural Moisture Content, %	Liquid Limit	Plastic Limit	Plasticity Index	Liquidity Index	Soil Classification
◆	S3	PB-2	10-12 ft	28	35	19	16	0.6	Lean clay (CL)

Sample Prepared using the WET method

1% Retained on #40 Sieve

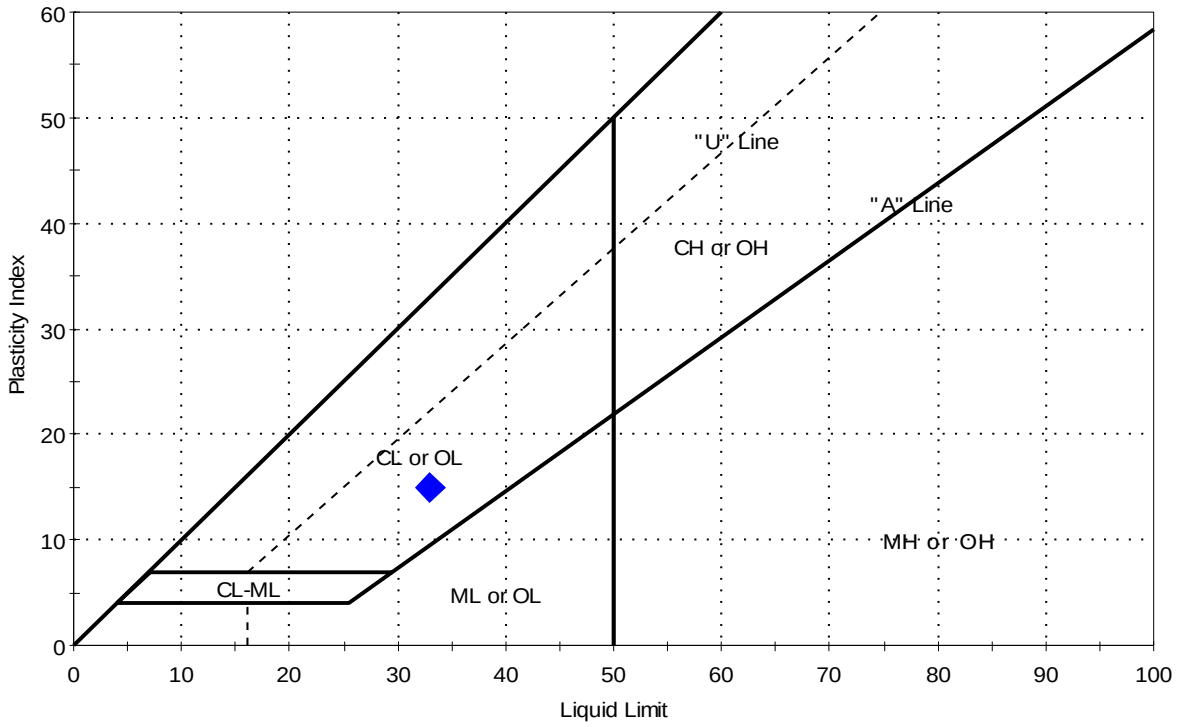
Dry Strength: VERY HIGH

Dilatancy: NONE

Toughness: MEDIUM

Client:	AECOM				
Project:	Peirce Island Parking Lot				
Location:	Portsmouth, NH			Project No:	GTX-305372
Boring ID:	PB-3	Sample Type:	jar	Tested By:	GA
Sample ID:	S2	Test Date:	09/30/16	Checked By:	emm
Depth :	7-9 ft	Test Id:	392855		
Test Comment:	---				
Visual Description:	Moist, dark olive gray clay				
Sample Comment:	---				

Atterberg Limits - ASTM D4318



Symbol	Sample ID	Boring	Depth	Natural Moisture Content, %	Liquid Limit	Plastic Limit	Plasticity Index	Liquidity Index	Soil Classification
◆	S2	PB-3	7-9 ft	36	33	18	15	1.2	Lean clay (CL)

Sample Prepared using the WET method

0% Retained on #40 Sieve

Dry Strength: VERY HIGH

Dilatancy: SLOW

Toughness: MEDIUM

Client:	AECOM				
Project:	Peirce Island Parking Lot				
Location:	Portsmouth, NH			Project No:	GTX-305372
Boring ID:	PB-3	Sample Type:	jar	Tested By:	GA
Sample ID:	S4	Test Date:	09/29/16	Checked By:	emm
Depth :	12-14 ft	Test Id:	392856		
Test Comment:	---				
Visual Description:	Moist, olive brown silty sand				
Sample Comment:	---				

Atterberg Limits - ASTM D4318

Sample Determined to be non-plastic

Symbol	Sample ID	Boring	Depth	Natural Moisture Content, %	Liquid Limit	Plastic Limit	Plasticity Index	Liquidity Index	Soil Classification
◆	S4	PB-3	12-14 ft	22	n/a	n/a	n/a	n/a	Silty sand (SM)

1% Retained on #40 Sieve

Dry Strength: NONE

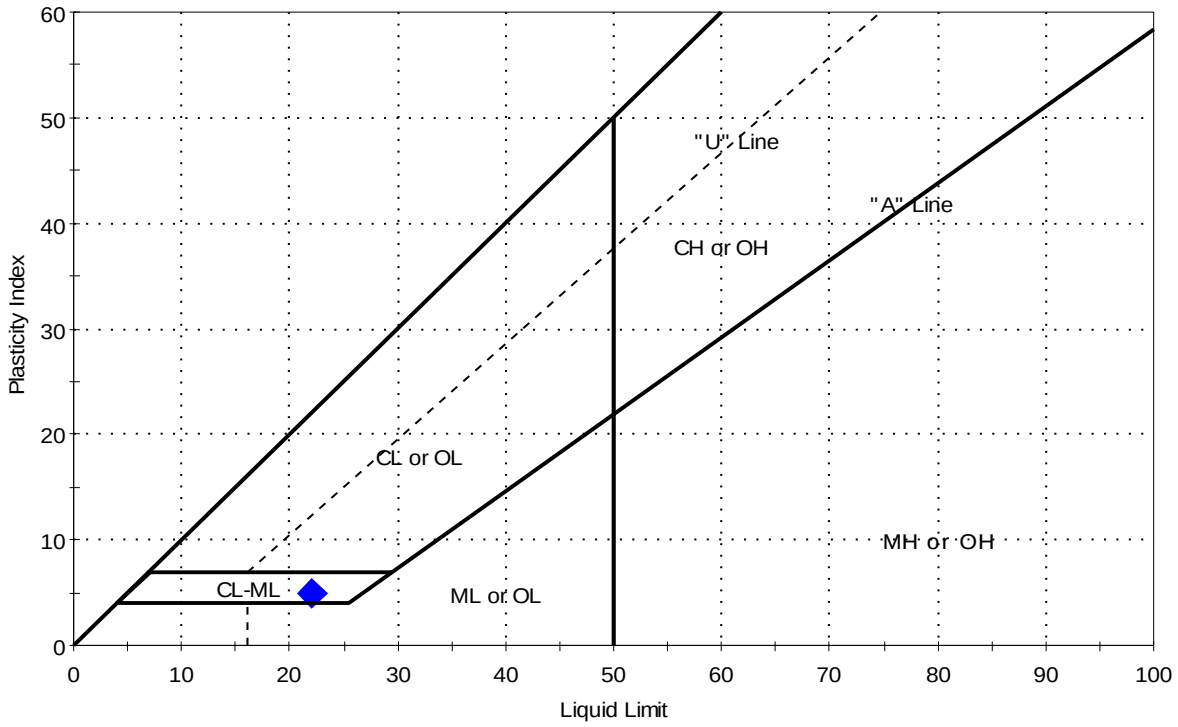
Dilatancy: RAPID

Toughness: n/a

The sample was determined to be Non-Plastic

Client:	AECOM				
Project:	Peirce Island Parking Lot				
Location:	Portsmouth, NH			Project No:	GTX-305372
Boring ID:	PB-4	Sample Type:	jar	Tested By:	GA
Sample ID:	auger 1+2	Test Date:	09/30/16	Checked By:	emm
Depth :	1-2.5 ft	Test Id:	392857		
Test Comment:	---				
Visual Description:	Moist, olive brown silty, clayey sand with gravel				
Sample Comment:	---				

Atterberg Limits - ASTM D4318



Symbol	Sample ID	Boring	Depth	Natural Moisture Content, %	Liquid Limit	Plastic Limit	Plasticity Index	Liquidity Index	Soil Classification
◆	auger 1+2	PB-4	1-2.5 ft	8	22	17	5	-1.7	Silty, clayey sand with gravel (SC-SM)

Sample Prepared using the WET method

50% Retained on #40 Sieve

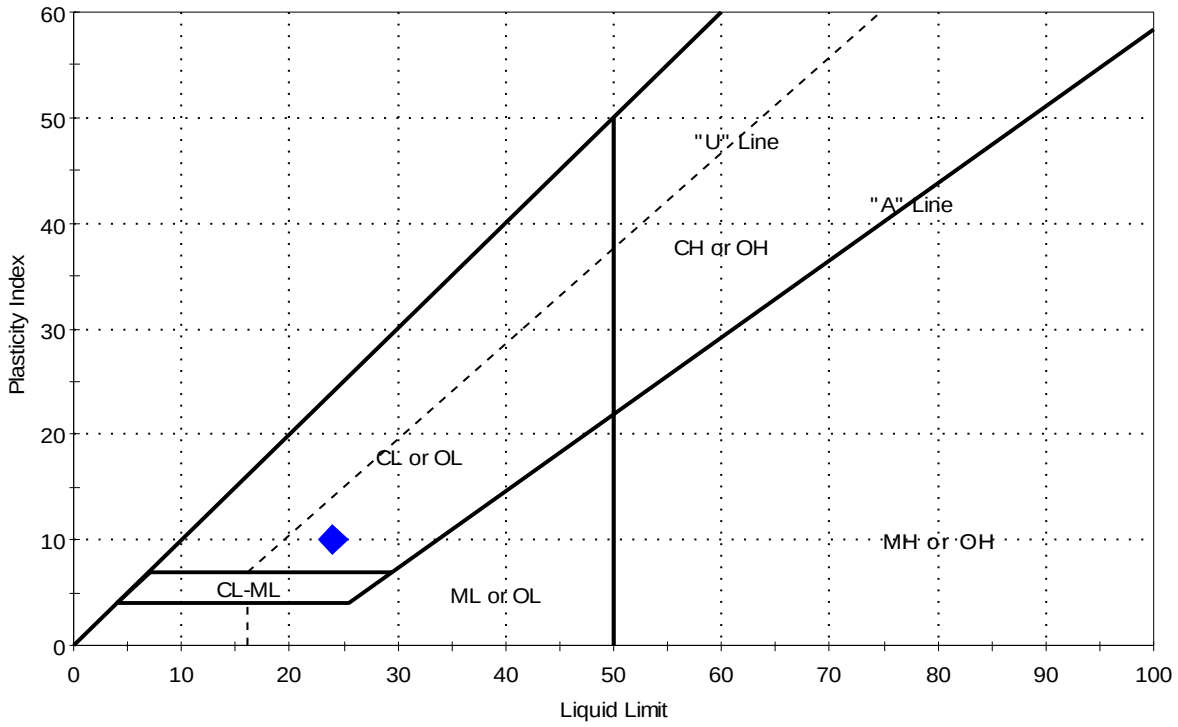
Dry Strength: VERY HIGH

Dilatancy: SLOW

Toughness: MEDIUM

Client:	AECOM				
Project:	Peirce Island Parking Lot				
Location:	Portsmouth, NH			Project No:	GTX-305372
Boring ID:	PB-4	Sample Type:	jar	Tested By:	GA
Sample ID:	S4	Test Date:	09/30/16	Checked By:	emm
Depth :	7-9 ft	Test Id:	392858		
Test Comment:	---				
Visual Description:	Moist, olive brown clayey sand				
Sample Comment:	---				

Atterberg Limits - ASTM D4318



Symbol	Sample ID	Boring	Depth	Natural Moisture Content, %	Liquid Limit	Plastic Limit	Plasticity Index	Liquidity Index	Soil Classification
◆	S4	PB-4	7-9 ft	22	24	14	10	0.8	Clayey sand (SC)

Sample Prepared using the WET method

4% Retained on #40 Sieve

Dry Strength: VERY HIGH

Dilatancy: NONE

Toughness: MEDIUM

Client:	AECOM				
Project:	Peirce Island Parking Lot				
Location:	Portsmouth, NH			Project No:	GTX-305372
Boring ID:	PB-4	Sample Type:	jar	Tested By:	GA
Sample ID:	S5	Test Date:	09/29/16	Checked By:	emm
Depth :	10-12 ft	Test Id:	392859		
Test Comment:	---				
Visual Description:	Moist, olive brown silty sand				
Sample Comment:	---				

Atterberg Limits - ASTM D4318

Sample Determined to be non-plastic

Symbol	Sample ID	Boring	Depth	Natural Moisture Content, %	Liquid Limit	Plastic Limit	Plasticity Index	Liquidity Index	Soil Classification
◆	S5	PB-4	10-12 ft	21	n/a	n/a	n/a	n/a	Silty sand (SM)

7% Retained on #40 Sieve

Dry Strength: NONE

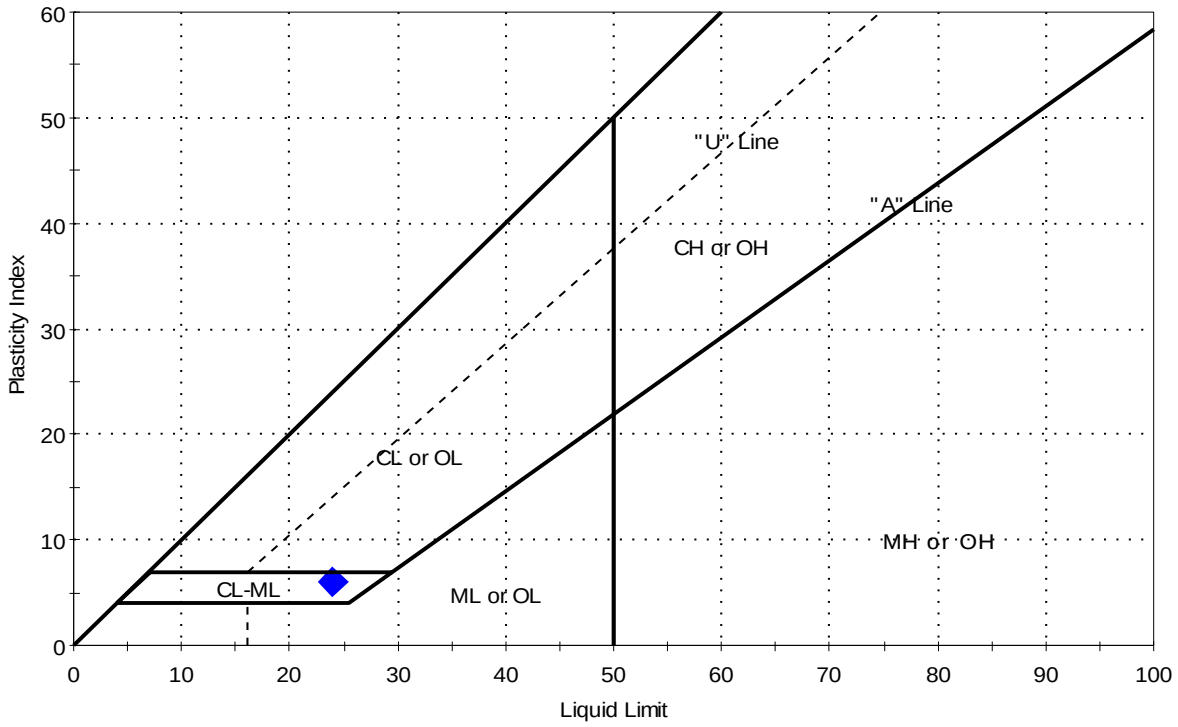
Dilatancy: RAPID

Toughness: n/a

The sample was determined to be Non-Plastic

Client:	AECOM				
Project:	Peirce Island Parking Lot				
Location:	Portsmouth, NH			Project No:	GTX-305372
Boring ID:	PB-5	Sample Type:	jar	Tested By:	GA
Sample ID:	auger 1-3	Test Date:	09/30/16	Checked By:	emm
Depth :	1-5.5 ft	Test Id:	392860		
Test Comment:	---				
Visual Description:	Moist, olive brown silty, clayey sand with gravel				
Sample Comment:	---				

Atterberg Limits - ASTM D4318



Symbol	Sample ID	Boring	Depth	Natural Moisture Content, %	Liquid Limit	Plastic Limit	Plasticity Index	Liquidity Index	Soil Classification
◆	auger 1-3	PB-5	1-5.5 ft	10	24	18	6	-1.3	Silty, clayey sand with gravel (SC-SM)

Sample Prepared using the WET method

41% Retained on #40 Sieve

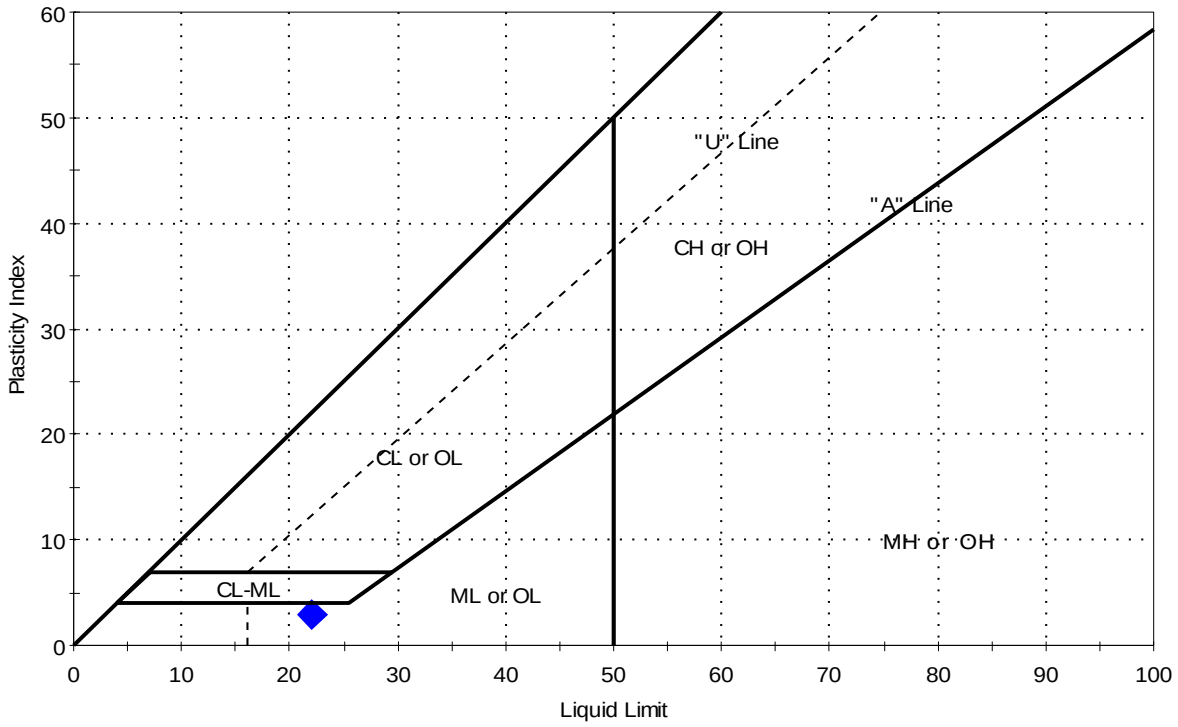
Dry Strength: MEDIUM

Dilatancy: SLOW

Toughness: MEDIUM

Client:	AECOM				
Project:	Peirce Island Parking Lot				
Location:	Portsmouth, NH			Project No:	GTX-305372
Boring ID:	PB-6	Sample Type:	jar	Tested By:	GA
Sample ID:	auger 1-2	Test Date:	09/30/16	Checked By:	emm
Depth :	1-2.5 ft	Test Id:	392861		
Test Comment:	---				
Visual Description:	Moist, dark olive brown silty sand with gravel				
Sample Comment:	---				

Atterberg Limits - ASTM D4318



Symbol	Sample ID	Boring	Depth	Natural Moisture Content, %	Liquid Limit	Plastic Limit	Plasticity Index	Liquidity Index	Soil Classification
◆	auger 1-2	PB-6	1-2.5 ft	8	22	19	3	-3.8	Silty sand with gravel (SM)

Sample Prepared using the WET method
55% Retained on #40 Sieve
Dry Strength: HIGH
Dilatancy: SLOW
Toughness: MEDIUM

Client:	AECOM				
Project:	Peirce Island Parking Lot				
Location:	Portsmouth, NH			Project No:	GTX-305372
Boring ID:	PB-6	Sample Type:	jar	Tested By:	GA
Sample ID:	S4	Test Date:	09/30/16	Checked By:	emm
Depth :	7-9 ft	Test Id:	392862		
Test Comment:	---				
Visual Description:	Moist, olive brown silty sand				
Sample Comment:	---				

Atterberg Limits - ASTM D4318

Sample Determined to be non-plastic

Symbol	Sample ID	Boring	Depth	Natural Moisture Content, %	Liquid Limit	Plastic Limit	Plasticity Index	Liquidity Index	Soil Classification
◆	S4	PB-6	7-9 ft	23	n/a	n/a	n/a	n/a	Silty sand (SM)

1% Retained on #40 Sieve

Dry Strength: NONE

Dilatancy: RAPID

Toughness: n/a

The sample was determined to be Non-Plastic

Client:	AECOM				
Project:	Peirce Island Parking Lot				
Location:	Portsmouth, NH			Project No:	GTX-305372
Boring ID:	PB-6	Sample Type:	jar	Tested By:	GA
Sample ID:	S5	Test Date:	09/29/16	Checked By:	emm
Depth :	10-12 ft	Test Id:	392863		
Test Comment:	---				
Visual Description:	Moist, yellowish brown silty sand				
Sample Comment:	---				

Atterberg Limits - ASTM D4318

Sample Determined to be non-plastic

Symbol	Sample ID	Boring	Depth	Natural Moisture Content, %	Liquid Limit	Plastic Limit	Plasticity Index	Liquidity Index	Soil Classification
◆	S5	PB-6	10-12 ft	20	n/a	n/a	n/a	n/a	Silty sand (SM)

12% Retained on #40 Sieve

Dry Strength: NONE

Dilatancy: RAPID

Toughness: n/a

The sample was determined to be Non-Plastic

WETLANDS PERMIT

The State of New Hampshire
Department of Environmental Services

Clark B. Freise, Assistant Commissioner

April 25, 2017

CITY OF PORTSMOUTH
C/O TERRY L DESMARAIS
680 PEVERLY HILL RD
PORTSMOUTH NH 03801

RE: NHDES Wetlands File # 2017-00574 City Of Portsmouth –Four Tree Island/Peirce Island - Portsmouth Tax Map/Lot # 208 / 1; Block

Dear Mr. Desmarais:

Attached please find Wetlands Permit # 2017-00574 to permanently impact 18,747 square feet in the developed upland tidal buffer zone to reconstruct and expand an existing parking lot adjacent to Four Tree Island park; temporarily impact 6,793 square feet in the developed upland tidal buffer zone to install drainage under an area of grass parking for outdoor swimming pool area, all on City of Portsmouth Peirce Island. Install 200 linear feet (two 100' sections in two different locations) of chain link security fence in the developed upland tidal buffer zone to prevent access to the Peirce Island wastewater treatment facility construction site from the public park areas.

The decision to approve this application was based on the following findings:

1. This is a minor impact project per Administrative Rule Env-Wt 303.03 (b) projects that involve work within 50 feet of a saltmarsh that do not meet the criteria of Env-Wt 303.02.
2. The need for the proposed impacts has been demonstrated by the applicant per Env-Wt 302.01. The construction of the City of Portsmouth Peirce Island wastewater treatment facility has resulted in a loss of parking for the public who use the public pool and Peirce Island/Four Tree Island park area. The expanded and temporary grass parking as proposed will allow continued use of the portions of Peirce Island which remain open to the public. The fence is a necessary security measure to segregate the construction and public use areas.
3. The applicant has provided evidence which demonstrates that this proposal is the alternative with the least adverse impact to areas and environments under the department's jurisdiction per Env-Wt 302.03. The permanent impact involves reconstruction of existing paved parking with only minimal expansion into non-paved areas; the temporary impact for drain installation will allow proper stormwater management during temporary use of a grassed area for overflow parking.
4. The applicant has demonstrated by plan and example that each factor listed in Env-Wt 302.04(a) Requirements for Application Evaluation, has been considered in the design of the project. The populations of State-threatened marsh elder (iva frutescens) have been field located and protective measures developed in coordination with NH Natural Heritage Bureau, and the permit has been conditioned accordingly.
5. The Portsmouth Conservation Commission recommended approval of the project.

Any person aggrieved by this decision may appeal to the New Hampshire Wetlands Council (the Council) by filing an appeal that meets the requirements specified in RSA 482-A:10, RSA 21-O:14, and the rules adopted by the Council, Env-WtC 100-200. The appeal must be filed **directly with the Council within 30 days** of the date of this decision and must set forth fully **every ground** upon which it is claimed that the decision complained of is unlawful or unreasonable. Only those grounds set forth in the notice of appeal can be considered by the Council.

Information about the Council, including a link to the Council's rules, is available at <http://nhec.nh.gov/> (or more directly at <http://nhec.nh.gov/wetlands/index.htm>.) Copies of the rules also are available from the New Hampshire Department of Environmental Services (NHDES) Public Information Center at (603) 271-2975.

Your permit must be signed, and a copy must be posted in a prominent location on site during construction.

If you have any questions, please contact our office at (603) 559-1507.

Sincerely,

Dori Wiggin
East Region Supervisor
NHDES Wetlands Bureau

cc: Portsmouth Conservation Commission
Portsmouth Municipal Clerk
Normandeau Associates
NH Natural Heritage Bureau

The State of New Hampshire

DEPARTMENT OF ENVIRONMENTAL SERVICES

Thomas S. Burack, Commissioner

NOTICE TO RECIPIENTS OF MINOR IMPACT N.H. WETLANDS PERMITS

Your permit was approved by the New Hampshire Wetlands Bureau as a minor impact project, and your project will be reviewed by the U.S. Army Corps. of Engineers for possible approval under the Army Corps New Hampshire State Programmatic General Permit - SPGP. The Army Corps will notify you within thirty (30) days if they will require additional information or an individual federal permit application.

If you do not hear from the Army Corps within thirty (30) days, and your project meets the conditions of the SPGP (attached), your project will automatically be approved under the SPGP. You should contact the Army Corps, at 1-800-343-4789, if your project does not meet the conditions of the SPGP.

NO WORK SHOULD BE DONE WITHOUT AUTHORIZATION FROM THE ARMY CORPS UNLESS THIRTY (30) DAYS HAVE PASSED AFTER N.H. WETLANDS BUREAU APPROVAL, AND ALL CONDITIONS OF THE SPGP ARE MET.

THESE APPROVALS DO NOT RELIEVE YOU FROM OBTAINING ANY NECESSARY LOCAL PERMITS THAT MAY BE REQUIRED BY YOUR TOWN.

IF YOU HAVE ANY QUESTIONS, PLEASE FEEL FREE TO GIVE US A CALL AT 603-271-2147

****

THIS NOTICE WAS SENT WITH MINOR IMPACT PERMIT #2017-574 ON 4-25-17 BY DAC

CC: U.S. ARMY CORPS. OF ENGINEERS

The State of New Hampshire
Department of Environmental Services

Clark B. Freise, Assistant Commissioner

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WETLANDS AND NON-SITE SPECIFIC PERMIT 2017-00574

NOTE CONDITIONS

Permittee:	**CITY OF PORTSMOUTH,** **C/O TERRY L DESMARAIS** **680 PEVERLY HILL RD** **PORTSMOUTH NH 03801**
Project Location:	**99 PIERCE ISLAND ROAD, PORTSMOUTH** **TAX MAP/LOT NO: 208 / 1**
Waterbody:	**PISCATAQUA RIVER**

APPROVAL DATE: **APRIL 25, 2017** **EXPIRATION DATE:** **APRIL 25, 2022**

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Based upon review of the above referenced application, in accordance with RSA 482-A and RSA 485-A:17, a Wetlands Permit and Non-Site Specific Permit was issued. This permit shall not be considered valid unless signed as specified below.

PERMIT DESCRIPTION: Permanently impact 18,747 square feet in the developed upland tidal buffer zone to reconstruct and expand an existing parking lot adjacent to Four Tree Island park; temporarily impact 6,793 square feet in the developed upland tidal buffer zone to install drainage under an area of grass parking for outdoor swimming pool area, all on City of Portsmouth Peirce Island. Install 200 linear feet (two 100' sections in two different locations) of chain link security fence in the developed upland tidal buffer zone to prevent access to the Peirce Island wastewater treatment facility construction site from the public park areas.

THIS APPROVAL IS SUBJECT TO THE FOLLOWING PROJECT SPECIFIC CONDITIONS:

1. All work shall be in accordance with revised plans by AECOM Technical Services dated 4/5/2017, as received by the NH Department of Environmental Services (DES) on 4/12/2017.
2. This permit is contingent upon field location, and verification of that location by DES, of the highest observable tide line, prior to the installation of the sections of security fence proposed to be located in jurisdiction.
3. Any further alteration of areas on this property that are subject to RSA 482-A jurisdiction will require a new application and further permitting.
4. The contractor responsible for completion of the work shall use techniques described in the New Hampshire Stormwater Manual, Volume 3, Erosion and Sediment Controls During Construction (December 2008).
5. There shall be no use of welded plastic or any other form of erosion control "netting" or products containing such on the site in order to protect wildlife resources.
6. Appropriate siltation, erosion, and turbidity controls shall be in place prior to construction, shall be maintained during construction, and remain in place until the area is stabilized. Silt fence(s) must be removed once the area is stabilized.
7. Exceptional vigilance shall be applied to maintenance of the erosion/sedimentation controls adjacent to the locations of the populations of marsh elder near the proposed grass parking area. Erosion/sedimentation controls in this area shall be checked and maintained daily. Any failure of the controls shall be reported to DES and NH Heritage Bureau immediately.
8. Within three days of final grading or temporary suspension of work, all exposed soil areas shall be stabilized by seeding and mulching during the growing season, or if not within the growing season, by mulching with tack or netting

and pinning on slopes steeper than 3:1.

9. All construction-related debris shall be properly disposed of outside of the areas subject to RSA 482-A.

GENERAL CONDITIONS THAT APPLY TO ALL NHDES WETLANDS PERMITS:

1. A copy of this permit shall be posted on site during construction in a prominent location visible to inspecting personnel;
2. This permit does not convey a property right, nor authorize any injury to property of others, nor invasion of rights of others;
3. The Wetlands Bureau shall be notified upon completion of work;
4. This permit does not relieve the applicant from the obligation to obtain other local, state or federal permits, and/or consult with other agencies as may be required (including US EPA, US Army Corps of Engineers, NH Department of Transportation, NH Division of Historical Resources (NH Department of Cultural Resources), NHDES-Alteration of Terrain, etc.);
5. Transfer of this permit to a new owner shall require notification to and approval by NHDES;
6. This project has been screened for potential impacts to **known** occurrences of protected species and exemplary natural communities in the immediate area. Since many areas have never been surveyed, or have only received cursory inventories, unidentified sensitive species or communities may be present. This permit does not absolve the permittee from due diligence in regard to state, local or federal laws regarding such communities or species.
7. Review enclosed sheet for status of the US Army Corps of Engineers' federal wetlands permit.

APPROVED: _____

Dori Wiggin, East Region Supervisor
NHDES Wetlands Bureau

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BY SIGNING BELOW I HEREBY CERTIFY THAT I HAVE FULLY READ THIS PERMIT AND AGREE TO ABIDE BY ALL PERMIT CONDITIONS.

_____ OWNER'S SIGNATURE (required)

_____ CONTRACTOR'S SIGNATURE (required)

ALTERATION OF TERRAIN PERMIT

The State of New Hampshire
Department of Environmental Services

Clark B. Freise, Assistant Commissioner

April 27, 2017

Terry Desmarais
City of Portsmouth, Dept of Public Works
680 Peverly Hill Road
Portsmouth, NH 03801

Re: Peirce Island Wastewater Treatment Facility Upgrade
200 Peirce Island Road
Tax Map 208, Lot 1, Portsmouth, NH

Permit: AoT-1061B
Original permit issuance: April 5, 2016

Dear Applicant:

Based upon a recent request, we are hereby amending RSA 485-A:17 Alteration of Terrain Permit AoT-1061A. **The amendment consists of expanding and improving the existing paved Four Tree Island Parking Lot located west of the pool and improving the drainage at an existing grassed overflow parking area located east of the boat launch area.** The amended permit number is AoT-1061B and is subject to the following conditions:

1. Activities shall not cause or contribute to any violations of the surface water quality standards established in Administrative Rule Env-Wq 1700.

2. You must submit revised plans for permit amendment prior to any changes in construction details or sequences. You must notify the Department in writing within ten days of a change in ownership.

3. You must notify the Department in writing prior to the start of construction and upon completion of construction. Forms are available at: http://des.nh.gov/organization/divisions/water/aot/categories/forms.htm.

4. The plans, latest revision dated April, 2017, and supporting documentation in the permit file are a part of this approval.

5. All stormwater practices shall be inspected and maintained in accordance with Env-Wq 1507.08 and the project Inspection and Maintenance (I&M) Manual. All record keeping required by the I&M Manual shall be maintained by the identified responsible party, and be made available to the department upon request.

6. **This permit expires on April 5, 2021.** No earth moving activities shall occur on the project after this expiration date unless the permit has been extended by the Department. If requesting an extension, the request must be received by the department before the permit expires. The Amendment Request form is available at: http://des.nh.gov/organization/divisions/water/aot/categories/forms.htm

7. No construction activity or equipment staging will occur outside of erosion control limits, approximately 40 feet from the Marsh Elder populations. Construction safety fencing shall be installed along either side of Peirce Island Road during construction. During the construction season **(May 1 – Nov 30)**, erosion control fencing will be installed around the seasonal construction trailer/staging area, located adjacent to the eastern end of Subpopulation 1. Before construction fencing is removed at the end of the construction season and /or upon termination of the project, care should be taken to remove any sediments that have collected along the fence, so that they do not run off with stormwater and impact the Marsh Elder.

8. The following monitoring conditions shall apply:
   a. The permittee shall employ the services of an environmental monitor ("Monitor"). The Monitor shall be a Certified Professional in Erosion and Sediment Control or a Professional Engineer licensed in the State of New Hampshire and shall be employed to inspect the site from the start of alteration of terrain activities until the alteration of terrain activities are completed and the site is considered stable.
   b. During this period, the Monitor shall inspect the subject site at least once a week, and if possible, during any ½ inch or greater rain event (i.e. ½ inch of precipitation or more within a 24 hour period). If unable to be present during such a storm, the Monitor shall inspect the site within 24 hours of this event.
   c. The inspections shall be for the purposes of determining compliance with the permit. The Monitor shall submit a written report to the Department within 24 hours of the inspections. The reports shall describe, at a minimum, whether the project is being constructed in accordance with the approved sequence, shall identify any deviation from the conditions of this permit and the approved plans, and identify any other noted deficiencies.
   d. The Monitor shall provide technical assistance and recommendations to the Contractor on the appropriate Best Management Practices for Erosion and Sediment Controls required to meet the requirements of RSA 485-A:17 and all applicable DES permit conditions.
   e. Within 24 hours of each inspection, the Monitor shall submit a report to DES via email (to Gloria S. Andrews, PE at: gloria.andrews@des.nh.gov).

9. This permit does not relieve the applicant from the obligation to obtain other local, state or federal permits that may be required (e.g., from US EPA, US Army Corps of Engineers, etc.). Projects disturbing over 1 acre may require a federal stormwater permit from EPA. Information regarding this permitting process can be obtained at: http://des.nh.gov/organization/divisions/water/stormwater/construction.htm.

10. If applicable, no activity shall occur in wetland areas until a Wetlands Permit is obtained from the Department. Issuance of this permit does not obligate the Department to approve a Wetlands Permit for this project.

11. **This project has been screened for potential impact to known occurrences of protected species and exemplary natural communities in the immediate area. Since many areas have never been surveyed, or have not been surveyed in detail, unidentified sensitive species or communities may be present. This permit does not absolve the permittee from due diligence in regard to state, local or federal laws regarding such communities or species.**

Sincerely,

Gloria S. Andrews, P.E.
Alteration of Terrain Bureau

cc: Portsmouth Planning Board

ec: Jon Pearson, PE, AECOM (Email: jon.pearson@aecom.com)
Jeff Clifford, PE, Altus Engineering (Email: jclifford@altus-eng.com)
Dennis Greene, PE; NHDES WW (Email: dennis.greene@des.nh.gov)
Daniel Dudley, PE; NHDES WW (Email: Daniel.dudley@des.nh.gov)