CITY OF WARWICK, RHODE ISLAND HONORABLE JOSEPH J. SOLOMON JR, MAYOR

WARWICK SEWER AUTHORITY **GARY C. JARVIS, CHAIRMAN**

THOMAS H. CHADRONET CARLO E. PISATURO, JR GARY P. MARINO

JOHN S. JUSTO

EARL BOND, EXECUTIVE DIRECTOR



NOVEMBER 2019

SPECIFICATIONS FOR CONSTRUCTION OF

CONTRACT 86B PURCHASING CONTRACT BID2020-238 BAYSIDE SEWER SYSTEM PRESSURE SEWERS

GORDON R. ARCHIBALD, INC. **CIVIL AND ENVIRONMENTAL ENGINEERS 200 MAIN STREET** PAWTUCKET, RHODE ISLAND

CITY OF WARWICK RHODE ISLAND

WARWICK SEWER AUTHORITY

SPECIFICATIONS FOR CONSTRUCTION OF

BAYSIDE SEWER SYSTEM PRESSURE SEWERS

CONTRACT NO. 86B PURCHASING CONTRACT BID2020-238

NOVEMBER, 2019



GORDON R. ARCHIBALD, INC.
CIVIL AND ENVIRONMENTAL ENGINEERS

200 MAIN STREET PAWTUCKET, RHODE ISLAND 02860



SECTION 00010

TABLE OF CONTENTS

WARWICK SEWER AUTHORITY <u>CONTRACT NO. 86B</u> BAYSIDE SEWER SYSTEM PRESSURE SEWERS

DIVISION 00 - GENERAL REQUIREMENTS

Section	00030	Advertisement for Invitation for Bids
Section	00120	Information for Bidders
Section	00300	Bid Forms
Section	00310	Bid Bond
Section	00430	Proposed Subcontractors
Section	00500	Agreement
Section	00600	Payment Bond
Section	00610	Performance Bond
Section	00700	General Conditions
Section	00800	Supplemental Conditions
Section	00810	Special Conditions
Section	00850	State Revolving Fund (SRF) Program
Section	00870	Construction Management Forms
Section	00900	Rhode Island Department of Labor and Training Prevailing Wage Requirements

DIVISION 01 – GENERAL REQUIREMENTS

Section	01010	Summary of Work
Section	01014	Work Sequence
Section	01015	Contractor's Use of Premises
Section	01025	Measurement and Payment
Section	01090	Reference Standards
Section	01200	Project Meetings
Section	01310	Construction Schedule
Section	01340	Shop Drawings
Section	01370	Health and Safety Provisions
Section	01380	Environmental Protection
Section	01400	Quality Control
Section	01410	Testing Laboratory Services
Section	01500	Temporary Facilities and Controls
Section	01510	Utility Relocations
Section	01570	Traffic Control
Section	01605	Shipment, Protection and Storage
Section	01710	Final Cleanup
Section	01780	As-Built Drawings
Section	01800	Archaeological Provisions

DIVISION 02 – FEDERAL AND STATE REQUIREMENTS

Section 02100 R.I. Department of Environmental Management – Office of Water Resources Clean Waters State Revolving Fund Program – Contract Specifications Package

DIVISION 03 – EARTHWORK

Section	03040	Selective Site Demolition
Section	03100	Site Clearing
Section	03200	Earth Moving
Section	03350	Excavation and Fill
Section	03380	Rock Excavation
Section	03750	Dewatering Project Wide
Section	03800	Erosion and Sedimentation Controls
Section	03920	Turf and Grasses

DIVISION 04 – PAVEMENT

Section	04305	Asphalt Paving
Section	04310	Concrete Paving
Section	04400	Pavement Markings

DIVISION 05 - UTILITIES

Section	05150	Water Utilities
Section	05200	Storm Drainage Utilities
Section	05220	Storm Drain Structures, Frames, and Covers
Section	05400	Electrical Utility Services
Section	05500	Sanitary Sewer - Open Excavation
Section	05501	Sanitary Sewerage Manholes
Section	05610	Sanitary Sewer – Trenchless Technologies
Section	05812	Horizontal Directional Drilling
Section	05813	Geotechnical Instrumentation and Monitoring
Section	05814	Remove and Dispose Asbestos Cement Pipe (RI)

APPENDICIES

Appendix A	Geotechnical Report & Boring Logs
Appendix B	R.I. Coastal Resources Management Council Permit
Appendix C	R.I. Department of Environmental Management Order of Approval
Appendix D	Archaeological Report
Appendix E	Soil Erosion and Sediment Control Plan

END OF SECTION

SECTION 00030 ADVERTISEMENT FOR INVITATION FOR BIDS

Invitation for Bids
Contract No. 86B
Bayside Sewer System
Pressure Sewers

Owner: City of Warwick, Rhode Island

Acting Herein Through Its Warwick Sewer Authority

Engineer: Gordon R. Archibald, Inc.

Civil and Environmental Engineers

200 Main Street

Pawtucket, Rhode Island 02860

Tel. (401) 726 4084

Project: Bayside Sewer Systems

Contract No. 238

The Warwick Sewer Authority is issuing an Invitation for Bids (IFB) for the above-noted work to be performed in the City of Warwick, RI.

The work to be provided includes the installation of pressure sewer pipe using trenchless technologies, horizontal directional drilling and open trench excavation in accordance with the Contract Documents and Plans.

All bid items must be on a unit price or lump sum basis, with a total aggregate price of all unit items. Segregated bids will not be accepted.

The Warwick Sewer Authority will receive Bids until 1:00 p.m. prevailing time on the 24th day of January 2020 at the office of the Warwick Sewer Authority, 125 Arthur W. Devine Blvd., Warwick, Rhode Island. Bids will be opened and publicly read aloud on the same day and date at 1:00 p.m. prevailing time at the office of the Warwick Sewer Authority. All interested parties are invited to attend.

Electronic copies of the Contract Documents may be obtained on or after November 27th, 2019 at the office of the Warwick Sewer Authority from 9:00 AM to 3:30 PM, Monday through Friday. Electronic copies of the Contract Documents will also be available electronically online.

Each bidder must deposit with his Bid, security in the amount, form and subject to the conditions provided in the Information for Bidders (10% of Bid).

The bidder must agree to commence work on or before a date to be specified in a written "Notice to Proceed" by the Authority and to fully complete the project within 730 consecutive calendar days thereafter.

00030-1

No bidder may withdraw his Bid within 120 days after the actual date of the opening thereof.

Attention of bidders is particularly called to the requirements as to conditions of employment to be observed and wage rates to be paid under the Contract. In conformity with the provisions of Chapters 12 and 13 of Title 37, General Laws, Rhode Island, 1956, as amended, the minimum wages for a day's work paid to craftsman, teamsters and laborers shall not be less than the customary and prevailing rate of wages for a day's work in the locality where the work is undertaken. Such a schedule of wages has been established on a minimum hourly basis, and is on file in the office of the State Department of Labor.

The bidder's attention is also called to the "Equal Opportunity Clause", the "Nondiscrimination in Employment", and the Federal and State MBE/WBE requirements of the Contract as set for in the Contract Documents.

The bidders will be required to meet the established goal of not less than 10 percent of the contract bid price to the contractors, subcontractors, and/or suppliers which qualify as DISADVANTAGED BUSINESS ENTERPRISES, MBE/WBE.

Bidders shall be required to comply with the President's Executive Order No. 11246 and State of Rhode Island Executive Order No. 85-11, including any amendments or supplements relating thereto. The requirements of bidders and contractors under these orders are explained in the Contract Documents.

The Authority, being considered the sole and only judge, reserves the right to waive any informalities in, or to reject, any or all bids, should the Authority deem it to be in the public's best interest to do so.

A pre-bid conference for prospective bidders will be held at the office of:

The Warwick Sewer Authority 125 Arthur W. Devine Blvd. Warwick, Rhode Island 02886

at 1:00 p.m. on Tuesday December 17th, 2019.

END OF SECTION

00030 - 2

SECTION 00120

INFORMATION FOR BIDDERS

ARTICLE 1 - RECEIPT AND OPENING OF BIDS:

- A. The Warwick Sewer Authority (herein called the "WSA") invites bids on the forms attached hereto, all blanks of which must be appropriately filled in. Bids will be received by the WSA at its office at 125 Arthur W. Devine Boulevard, Warwick, RI 02886 on or before January 24th, 2020, to the attention of Earl Bond, Executive Director at which time they will be publicly opened and read aloud. The envelopes containing the Bids must be sealed, marked clearly with the BIDDER'S name, and designated as follows: "Bid Contract No. 86B Enclosed –Bayside Sewer System."
- B. Bids are to include information required within the Bid Price Package of this specification, Sections 00300 through Section 00430 and not the entire Specification book. The following items constitute a complete bid:

<u>Item</u>	Description	Section
1.	Bid Price Form	00300
2.	Bid Bond	00310
3.	Proposed Subcontractors	00430

C. The WSA may not consider any Bid that is not prepared and submitted in accordance with the provisions hereof and may waive any formalities or reject any and all Bids in the WSA's best interests. Any Bid may be withdrawn prior to the scheduled time and date for the opening of Bids or authorized postponement thereof. Any Bid received after the time and date specified shall not be considered. No BIDDER may withdraw a Bid within 120 days after the date of the opening thereof. The WSA may modify or amend technical specifications for this Project at any time prior to the opening of the Bids.

ARTICLE 2 - PRE-BID CONFERENCE AND QUESTIONS:

BIDDERS shall attend a non-mandatory Pre-Bid Conference at 125 Arthur W. Devine Boulevard, Warwick, RI 02886. The Pre-Bid Conference will be held at WSA'S Administrative Office at 125 Arthur W. Devine Boulevard, Warwick, RI 02886. Items of discussion will include overview of the Project scope and job conditions that may affect the bidding process. In addition, the Pre-Bid Conference will include the following:

- A. A review of submittals required with the Bid.
- B. A brief overview of the Project requirements.
- C. A bidder question and answer session.

Any other questions following the Pre-Bid Conference must be submitted in writing and directed to Gordon R. Archibald, Inc. via email (travenelle@graengs.com) however, the WSA will not be responsible for information that is not received, and it is the BIDDER'S responsibility to confirm the receipt of the questions. NO QUESTIONS WILL BE ACCEPTED AFTER January 13, 2020 at 1:00 PM. Responses to substantive questions either raised at the Pre-Bid Conference or received in writing will be forwarded to all prospective BIDDERS in advance of the submittal deadline.

ARTICLE 3 - PREPARATION OF BID:

- A. Each Bid must be submitted on the prescribed form, accompanied by a Bid Bond and any other requested information. All blank spaces for Bid prices must be filled in, in ink or typewritten, using numerical figures, unless otherwise requested. Should both written words and numerical figures be given, the written words shall apply in the event of conflict. All Bids shall be prepared in conformity with, and based upon and submitted subject to, all requirements of the Specifications and Drawings, together with all addenda thereto.
- B. Each Bid must be submitted in sealed inner and outer envelopes bearing on the outside of each envelope the name of the BIDDER, its address, and the name of the Project for which the Bid is submitted. Both envelopes shall be clearly labeled "BID DOCUMENTS" so as to guard against opening prior to the time set therefore. No blame shall be attached to any agent of the WSA for the opening of any Bid not so marked.
- C. The BIDDER is advised specifically that any person, firm, or other party to whom BIDDER proposes to award a subcontract under this Agreement must be acceptable to the WSA. Approval of any subcontract award will not be given by the WSA unless and until the proposed Subcontractor has submitted evidence showing that it has fully complied with any requirements to which it is subject.
- D. The BIDDER is advised that all construction work requiring directional drilling / trenchless technologies shall be performed by a pre-qualified Contractors with the Warwick Sewer Authority. The name of the pre-qualified Contractor shall be provided within the Bid.

ARTICLE 4 - FACSIMILE MODIFICATIONS:

Any BIDDER may modify its Bid by facsimile communication at any time prior to the scheduled closing time for receipt of Bids provided that such facsimile communication is received by the WSA prior to the closing time for Bids and, provided further, that the WSA is satisfied that a written confirmation of the facsimile modification over the signature of the BIDDER was mailed and postmarked prior to the closing time. The facsimile communication should not reveal the Bid price but must provide the addition or subtraction, or other modifications to the sealed Bid Price, so that the final prices or items will not be known by the WSA until the sealed Bid is opened. If written confirmation of the facsimile modification is not received within two working days after the closing time, no consideration will be given to the facsimile modification.

ARTICLE 5 - WITHDRAWAL OF BIDS:

Bids may be withdrawn personally or by written or facsimile request dispatched by the BIDDER in time for delivery to the WSA in the normal course of business prior to the time fixed for Bid submission; provided that written confirmation of any facsimile withdrawal over the signature of the BIDDER was mailed and postmarked prior to the closing time. Negligence on the part of the BIDDER in preparing its Bid confers no right of withdrawal or modification of its Bid after such Bid has been received as noted in Article 1 of this section.

ARTICLE 6 - METHOD OF BIDDING:

The WSA is seeking Unit Bid Prices for the complete construction of the Project, together with all related incidental and appurtenant work as described in these Specifications or as shown on the Drawings. The WSA may at its own discretion limit the scope of the Project.

ARTICLE 7 - QUALIFICATIONS OF BIDDERS:

The WSA may make such investigations as it deems necessary to determine the ability of the BIDDERS to perform the Work, and each BIDDER shall furnish to WSA all such information and data for this purpose as WSA may request. WSA reserves the right to reject any Bid if the evidence submitted by, or its investigation of, such BIDDER fails to satisfy the WSA that such BIDDER is properly qualified to carry out the obligations of the Contract and to complete the work contemplated therein within the time stated. A BIDDER will be disqualified if more than one Bid is received from an individual, firm, partnership, corporation or association, under the same or different names and such Bid will not be considered. All BIDDERS and Subcontractors must be licensed and authorized to do business in the State of Rhode Island.

ARTICLE 8 - BID SECURITY:

(To be made payable to the Warwick Sewer Authority)

Each Bid must be accompanied by a certified check, cashier's check, money order, or a Bid Bond prepared on the form of Bid Bond (Section 00310) attached hereto, duly executed by the BIDDER as principal and having as surety thereon a Surety company approved by the WSA and approved to do business in the State of Rhode Island, in the amount of ten (10) percent of the Bid Price. The Bid Price will be taken as the total price to perform all of the Bid Items listed in Section 00300 – Bid Price Forms. Any BIDDER withdrawing its Bid after submittal or failing to enter into a contract with the WSA no later than one hundred twenty (120) days after the Bid opening date shall forfeit its Bid Security to the WSA. The Bid Security will be returned to all but the successful BIDDER within a reasonable time following approval of Contract award. The Bid Security of the successful BIDDER will be returned promptly after the WSA and the successful BIDDER have executed the Contract. Failure to provide Bid Security will result in an invalid response. Such response will not be considered for award.

ARTICLE 9 - LIQUIDATED DAMAGES FOR FAILURE TO ENTER INTO CONTRACT:

The successful BIDDER, upon its failure or refusal to execute and deliver the Agreement and Performance and Payment Bonds required within 10 days after BIDDER has received notice of the acceptance of its Bid,

shall forfeit to the WSA, as liquidated damages for such failure or refusal, the security deposited with the Bid.

ARTICLE 10 - TIME OF COMPLETION AND LIQUIDATED DAMAGES:

BIDDER must agree to commence work on or before a date to be specified in a written Notice to Proceed issued by the WSA, and to fully complete all work associated with this project within 730 days from said date of the "Notice to Proceed". BIDDER also must agree to pay as liquidated damages, and not as a penalty, the sum of \$2,500.00 per day for each consecutive calendar day thereafter that the Project is not completed, as hereinafter provided in the General Conditions. The WSA reserves the right to "subtract or deduct" the liquidated damages against the contract price.

Bidders are alerted that time of completion is of the utmost importance. The successful BIDDER will be permitted to work, and should base its Bid on work hours within the time period of 7:00 A.M. to 4:30 P.M., Monday through Friday. Saturday work will only be allowed with prior consent from the City of Warwick and WSA. No work is to be performed outside of the hours specified without written consent of the City of Warwick and WSA.

ARTICLE 11 - CONDITIONS OF WORK:

BIDDERS are hereby informed of the following:

A. CONTRACTOR shall be responsible for furnishing all materials that are not furnished by the WSA but are required for the satisfactory completion of the Work.

In addition, each BIDDER must inform itself fully of the conditions relating to the construction and labor under which the Work is now or will be performed; failure to do so will not relieve the successful BIDDER of its obligation to furnish all materials and all labor necessary to carry out the provisions of the Contract Documents and to complete the contemplated Work for the consideration set forth in its Bid. Insofar as possible, CONTRACTOR, in the carrying out of its work, shall employ such methods or means as will not cause any interruption of or interference with: The operation of existing facilities; traffic; use of existing facility and utilities; locations of existing utilities and structures affecting the work or other similar conditions at the site; character of equipment and facilities needed preliminary to and during execution of the Work; requirements of owners and controlling authorities having jurisdiction over the various lands, existing structures, facilities, and utilities; and all other conditions affecting the Work to be done, and the labor and materials needed; and it shall make its Bid in sole reliance thereon, and shall not, at any time after submission of a Bid, assert that there was any misunderstanding in regard to the nature or amount of the Work to be done.

Additional conditions and requirements are presented in the Special Conditions of the Contract Documents.

ARTICLE 12 - ADDENDA AND INTERPRETATIONS:

No interpretation of the meaning of the Drawings, Specifications, or other pre-bid documents will be made to any BIDDER orally, and no reliance shall be placed on any oral statement that is made on these matters.

Every request for an interpretation shall be made in writing, addressed to Gordon R. Archibald, 200 Main Street, Pawtucket, Rhode Island 02860, ATTN: Todd Ravenelle. To be given consideration, each request must be received by January 13, 2020 at 1:00 PM. Any and all such interpretations and any supplemental instructions will be in the form of written addenda to the Specifications, which, if issued, will be emailed to all prospective BIDDERS (at the respective addresses furnished for such purposes), not later than five (5) days prior to the date fixed for the submission of Bids. Failure of any BIDDER to receive any such addenda or interpretations shall not relieve such BIDDER from any obligation under its Bid as submitted. All addenda so issued shall become part of the Contract Documents.

ARTICLE 13 - SECURITY FOR FAITHFUL PERFORMANCE:

Simultaneously with the delivery of the executed contract (the "Contract"), the CONTRACTOR shall furnish Performance and Payment Bond(s), in an amount specified in the General Conditions, as security for the faithful performance of its Contract, and for the payment of all persons performing labor in the Project under this Agreement, and furnishing materials in connection therewith. The Surety on such bonds shall be a duly authorized surety company satisfactory to the WSA, and authorized to do business in the State of Rhode Island. The cost of such Bonds shall be paid by the CONTRACTOR.

ARTICLE 14 - POWER OF ATTORNEY:

Attorneys-in-fact who sign Bid Bonds or Contract Bonds must file with each Bond a certified and effectively dated copy of their power of attorney.

ARTICLE 15 - NOTICE OF SPECIAL REQUIREMENTS:

Attention is called particularly to those parts of the Contract Documents and Specifications that deal with the following:

- Interference with existing utilities and structures (Section 00800 Supplemental Conditions).
- Inspection and testing.
- Regulatory Permits.
- Insurance requirements.
- Wage rates.
- Interpretation of Drawings and Specifications.
- Work within limits of municipally owned, privately owned, and State-owned property.
- Safety and health regulations.
- Equal Employment Opportunity.
- Archaeological Conditions and Requirements.
- Minority and Women Business Enterprises Hiring Requirement.
- Out-of-State Corporations
- HDD Prequalification

ARTICLE 16 - LAWS AND REGULATIONS:

The BIDDER'S attention is directed to the fact that all applicable Federal and State laws, municipal ordinances, and rules and regulations of authorities having jurisdiction over construction of the Project, shall apply to the Agreement throughout, and are hereby incorporated in this Agreement by reference and that the Contract shall be governed by the laws of the State of Rhode Island.

ARTICLE 17 - MINORITY AND WOMEN BUSINESS ENTERPRISE REQUIREMENTS:

The CONTRACTOR is required to seek minority and women business enterprise participation in the amounts required by R.I. Gen. Laws § 37-14.1-1 et seq. and applicable regulations.

ARTICLE 18 - OUT-OF-STATE CORPORATIONS:

If the CONTRACTOR is incorporated elsewhere, compliance with R.I. Gen. Laws § 7-1.2-1401 et seq. may be required. If applicable, the CONTRACTOR must obtain and furnish to WSA prior to contract execution a copy of a R.I. Certificate of Authority to Conduct Business and Registered Agent for Service of Process or a current Certificate of Good Standing. This Certificate is to be obtained from the R.I. Secretary of State's Office (401-222-3040).

ARTICLE 19 - NON-DISCRIMINATION IN EMPLOYMENT:

- A. Contracts for work under this Agreement will obligate the CONTRACTOR and subcontractors not to discriminate in employment practices.
- B. The CONTRACTOR will not discriminate against any employee or applicant for employment because of race, color, religion, sex, age, or national origin. The CONTRACTOR also will not discriminate against any employee or applicant for employment because of physical or mental handicap for any position for which the employee or applicant is qualified, and in the event of noncompliance, WSA may declare the CONTRACTOR in breach and take any necessary legal recourse, including termination or cancellation of the Agreement. The CONTRACTOR shall take affirmative action to ensure that applicants are employed and the employees are treated during employment without regard to their race, color, religion, sex, age, handicap, or national origin. Such actions shall include, but not be limited to the following: employment, upgrading, demotions, or transfer; recruitment or recruitment advertising, layoff or termination; rates of pay or other forms of compensation; selection for training including apprenticeship; and participation in recreational and educational activities. The CONTRACTOR agrees to post this nondiscrimination clause in conspicuous places available to employees and applicants for employment. The CONTRACTOR will in all solicitations or advertisements for employees placed by or on behalf of the CONTRACTOR state that all qualified applicants will receive consideration for employment without regard to race, color, religion, sex, age, handicap or national origin. The CONTRACTOR will cause the foregoing provisions to be inserted in all subcontracts for standard commercial supplies or raw materials.

- C. The CONTRACTOR shall keep such records and submit such reports concerning the racial and ethnic origin of applicants for employment and employees as the WSA may require as consistent with Federal and State law.
- D. The CONTRACTOR agrees to comply with such rules, regulations, or guidelines that the United States, the State of Rhode Island, or any other governing authority may issue to implement these requirements. The CONTRACTOR further warrants that it will comply with Title VI and VII of the Civil Rights Act of 1964.
- E. The successful BIDDER will be required to comply with Equal Opportunity Requirements. Prior to execution of the Agreement, the CONTRACTOR must obtain from the Department of Administration and furnish to the WSA a copy of an Equal Opportunity Compliance Certificate. For further information pertaining to this requirement, please contact:

R.I. Equal Opportunity Office One Capitol Hill Providence, RI 02908-5865 (Phone – 401-222-3090)

ARTICLE 20 - METHOD OF AWARD – EVALUATION OF BIDDERS:

Bids will be evaluated by WSA based upon the contents of the BIDDER'S package received in accordance with this Invitation for Bid (IFB), with only those clarifications or corrections which may be permitted by the WSA procurement rules. Recommendation for award will be subject to approval by the WSA Board of Directors.

The award shall be made to the lowest responsive and responsible BIDDER satisfying the WSA criteria and shall be made in accordance with the WSA procurement rules. A "responsive BIDDER" is a BIDDER who has submitted a Bid that conforms in all material respects to the IFB. A "responsible BIDDER" shall mean a qualified BIDDER who has the capability in all respects, including financial responsibility, to fully perform the contract requirements, and the integrity and reliability that will assure good faith performance.

It is of utmost importance that BIDDERS exhibit that they possess the capability, background, resources and experience to complete this Project in addition to proposing a competitive price for the Work. To aid in this determination, BIDDERS must: complete the provided form - STATEMENT OF BIDDER'S QUALIFICATIONS; and provide written project description of specific project experience including all of the data requested, and any other additional information required by the WSA during the evaluation of the Bids.

Awards will not be made at the bid opening. Awards will be made within one hundred twenty (120) days of the bid opening unless otherwise provided for in this IFB or extended by the WSA. All BIDDERS will be notified of the award in writing following approval of the recommendation for the award. Bids are considered to be irreversible and may not be withdrawn during this period without the express permission of the WSA.

00120-7

All Bids shall become the property of the WSA and will not be returned except as otherwise provided. As the property of the WSA, the Bids will be subject to public review. If any proprietary information is contained in or attached to the Bid, it must be <u>clearly identified</u> for the WSA to ensure protection of such information.

ARTICLE 21 - OBLIGATIONS OF BIDDER:

At the time of the opening of Bids, each BIDDER will be presumed to have inspected the site and to have read and to be thoroughly familiar with the Drawings, Specifications and Contract Documents (including all addenda). The failure or omission of any BIDDER to examine any form, instrument or document shall in no way relieve any BIDDER from any obligation with respect to its Bid. Reasonable evidence that any BIDDER has an ownership interest (direct or indirect) in more than one BIDDER submitting a Bid for the Work will cause the rejection of all such Bids. Any or all Bids will be rejected if it appears to the WSA that collusion exists among any BIDDERS, and all participants in such collusion will thereafter be barred from submitting future Bids or Bids for all or part of the same work. Each BIDDER shall immediately inform the WSA and ENGINEER of any discrepancies or omissions in the Contract Documents.

ARTICLE 22 - ITEMS NOT LISTED IN THE BID:

The Bid prices listed in the Schedule of Bid Items (Section 00300 – Bid Price Forms) are intended to cover all items of work to be done and materials and work to be furnished to fully complete the Work in accordance with the Contract Documents. Appurtenant items of work shown on the Drawings, specified or required, and parts of the Work, materials, and equipment not shown or specified to complete the Work shall be provided, and shall be considered as included in the Bid Prices. It shall be the responsibility of the BIDDER to verify any missing or incomplete data.

ARTICLE 23 - BALANCED BIDDING:

Bids should be made with reasonable relation to the probable cost of doing the Work included in such items. The WSA reserves the right to reject, in its entirety, at its sole discretion, any Bid on which an item or items thereof are obviously unbalanced in such a way as to affect or to be liable to affect adversely any interests of the WSA. The attention of the BIDDER is called to the fact that unbalancing of Bids may adversely affect the CONTRACTOR if certain portions of the Work are increased or decreased as provided in the Contract Documents.

ARTICLE 24 - PRICES:

A BIDDER shall state the proposed price for the Work by which the Bids will be compared. This price is to cover all expenses incidental to the completion of the Work in full conformity with the Contract, Specifications, and Drawings. No Bid will be accepted which does not contain a unit price or a lump sum as indicated for each of the applicable items enumerated in the Schedule of Bid Items (Section 00300 – Bid Price Forms).

ARTICLE 25 - UNCERTAINTY OF QUANTITIES:

- A. The quantities listed in the Schedule of Bid Items are approximate. The WSA does not expressly or by implication represent that the actual amounts of work will even approximately correspond therewith, and calls particular attention to the uncertainty in the quantities of the Work involved which cannot be predicted in advance. The Work under certain items may be materially greater or less than those given in the Bid, in order in the judgment of the WSA, to complete the Work contemplated in the Contract. Attention is particularly called to the fact that the quantity of work to be done under some Bid items may be largely dependent on subsurface and ground conditions encountered and, therefore, the quantities of work to be done under such items may vary substantially from the estimated quantities or may even be omitted.
- B. Under the Contract, the WSA reserves the right to increase or decrease the approximate quantities for, or to omit entirely, any of the items listed in the Bid.
- C. Only such quantities of the respective items of work actually performed and accepted will be paid for. An increase or decrease in the quantity for any item shall not be regarded as grounds for an increase or decrease in the Bid prices.

ARTICLE 26 - AGREEMENT:

An Agreement in the form set forth hereinafter will be required to be executed by the successful BIDDER and the WSA. The attention of all BIDDERS, therefore, is called to the form of said proposed Contract and the provisions thereof. (See Section 00500 – Agreement.)

ARTICLE 27 - WORK ON STATE, MUNICIPAL, AND PRIVATE PROPERTY:

Particular attention is hereby directed to the fact that portions of the Work included under this Contract may be done within the limits of properties that are State-owned, municipally owned, or privately owned. The CONTRACTOR shall be responsible for coordinating the prosecution of the Work of this Contract with the property owner and for providing the Work in accordance with any additional requirements as specified herein under "SPECIAL CONDITIONS."

ARTICLE 28 - PAYMENT FOR DRAWINGS & DOCUMENTS:

See Section 00030 – Advertisement for Invitation for Bids.

ARTICLE 29 - CORRECTIONS:

Erasures or other changes in the Bid must be explained or noted over the signature of the BIDDER.

ARTICLE 30 - PERSONAL EXAMINATION:

BIDDERS are required to submit their Bids upon the following express conditions which shall apply to and become a part of every Bid received: BIDDERS must satisfy themselves by personal examination of the

site of the proposed Work. This shall be done by a complete review of the data available and by such other means as they may prefer as to the actual condition, requirements, and limits of the proposed Work, and as to the accuracy of information and statements herein contained. The submission of any Bid will be accepted by the WSA as satisfactory proof that the BIDDER has satisfied itself in these respects. The CONTRACTOR shall not, at any time after the submission of a Bid, dispute or complain of any statements and information contained herein, nor assert that there was any misunderstanding in regard to the nature or amount of work to be done.

ARTICLE 31 - PRECONSTRUCTION CONFERENCE:

The CONTRACTOR shall attend a preconstruction conference scheduled by the WSA after award of the Contract, but prior to the actual commencement of the Work.

ARTICLE 32 - WAGES:

Each BIDDER should submit its Bid based upon payment of applicable RI Wage Rates in accordance with Title 37, Chapter 13, of the Rhode Island General Laws, or if the BIDDER does not submit its Bid with applicable RI Wage Rates and is awarded the Contract, then it shall be required to indemnify and hold the WSA harmless from any resulting legal actions. WSA reserves the right to review the CONTRACTOR'S payroll documentation so as to verify compliance with this provision.

The BIDDER shall adhere to the provisions of RIGL § 37-13-6 which reads as follows:

§ 37-13-6 Ascertainment of prevailing rate of wages and other payments – Specification of rate in call for bids and in contracts. – Before awarding any contract for public works to be done, the proper authority shall ascertain from the director of labor and training the general prevailing rate of the regular, holiday, and overtime wages paid and the general prevailing payments on behalf of employees only, to lawful welfare, pension, vacation, apprentice training, and educational funds (payments to the funds must constitute an ordinary business expense deduction for federal income tax purposes by contractors) in the city, town, village, or other appropriate political subdivision of the state in which the work is to be performed, for each craft, mechanic, teamster, laborer, or type of worker needed to execute the contract for the public works. The proper authority shall also specify in the call for bids for the contract and in the contract itself the general prevailing rate of the regular, holiday, and overtime wages paid and the payments on behalf of employees only, to the welfare, pension, vacation, apprentice training, and educational funds existing in the locality for each craft, mechanic, teamster, laborer, or type of worker needed to execute the contract or work.

ARTICLE 33 - RHODE ISLAND SALES TAX:

Pursuant to the Rhode Island Sales and Use Tax Act, the WSA is exempt from the payment of sales tax for purchase of materials and supplies. BIDDERS are requested to submit bids on the basis that no Sales Tax will be imposed on purchases of materials and supplies used in the Work.

An exemption certificate, applying to materials purchased for and actually incorporated in the Work, may be obtained by the successful BIDDER from the WSA.

00120-10

ARTICLE 34 - BIDDER'S DISCLOSURE:

For the purposes of this Article only, the word BIDDER shall be defined as any person, firm or corporation that has submitted or intends to submit a Bid for the Work. The submission of an actual Bid by any person, firm, or corporation, shall constitute acknowledgment that the BIDDER had formed the intent to submit a Bid at least three calendar days prior to the Bid submission date. A BIDDER (hereinafter called BIDDER A) shall give written notice of its status as BIDDER to any other BIDDER (hereinafter called BIDDER B) if such BIDDER B:

- A. Is known to BIDDER A, or identifies itself to BIDDER A as a BIDDER for the Work; and
- B. Requests or has requested (for the purpose of preparing its Bid) a bid price from BIDDER A for BIDDER A's services as a Subcontractor or as a major supplier.
 - 1. For the purposes of this Article, BIDDER A would be a major supplier if it proposes to provide for Work, equipment or materials whose cost would be in excess of 20% of its own (BIDDER A's) total Contract Bid. Whenever possible, notice under this Article shall be given concurrently with any bid price submitted. In all cases, this notice shall be given at least three calendar days prior to the actual opening of Bids (or at the time of the initial request for a bid price, if later). If, having received notice under this Article, BIDDER B submits a Bid based in whole or in part on the bid price of that other BIDDER (BIDDER A) who gives such notice, BIDDER B thereby waives any objection to a subsequent contract award that is based on the adequacy of BIDDER A's bid price or on BIDDER A's status as a BIDDER.

ARTICLE 35 – NOT USED

ARTICLE 36 - RELATIONSHIP AS INDEPENDENT CONTRACTOR:

The CONTRACTOR'S relationship with the WSA under the Agreement shall be that of independent contractor. Nothing in the Agreement shall be construed to designate the CONTRACTOR, or any of his employees or Subcontractors, as employees, agents, joint venture or partners of the WSA.

ARTICLE 37 - CONFLICT OF INTEREST:

A CONTRACTOR filing a Bid certifies that: No officer, agent, employee of the WSA has a pecuniary interest in the Bid or has participated in contract negotiations on the part of the CONTRACTOR; the Bid is made in good faith without fraud, collusion, or connection of any kind with any other BIDDER for the same call for IFB; and the CONTRACTOR is competing solely in his/her/its own behalf without connection with, or obligation to, any undisclosed person or firm. Further, no person or firm who is listed as a Subcontractor shall be eligible to become a qualified Bidder in the Bid to which he/she/it is a named Subcontractor.

ARTICLE 38 - STEEL PRODUCTS PROCUREMENT ACT:

The CONTRACTOR shall comply with the provisions of R.I. Gen. Laws § 37-2.1-3 et seq. concerning the purchasing of domestic steel.

ARTICLE 39 – STREAM/STORM CHANNEL FLOW DIVERSION

The CONTRACTOR shall take precautions necessary to control the discharge of soil and sediment. Adequate controls and methods shall be utilized to prevent erosion and sedimentation as approved by the WSA and in accordance with the Soil Erosion and Sediment Control Plan.

ARTICLE 40 - "DIG SAFE" LAW:

The CONTRACTOR shall take precautions against damaging of paving, utilities, or private properties and promptly shall repair, at its own expense, any damage to such paving, utilities or private property to the satisfaction of the WSA or its representative. In this regard, the CONTRACTOR will be required to show written evidence that it has contacted the various utility companies with service in the area in accordance with Title 39 of the General Laws of the State of Rhode Island entitled Public Utilities and Carriers, stating the name of the individual contacted and locations of any potential conflicts with the indicated work program, and DIG SAFE CALL CENTER at 1-888-344-7233. The requirements include the filling of all drill holes, patching pavement, and the reseeding or sodding of any areas where grass is damaged. Any abutting property which is damaged as the result of the CONTRACTOR'S operations shall be repaired at the CONTRACTOR'S expense to the satisfaction of the WSA or its representative.

ARTICLE 41 - NON-INTERFERENCE WITH ONGOING PROJECTS:

The CONTRACTOR shall be aware of all ongoing WSA projects and shall perform all Work without interference therewith:

ARTICLE 42 – ELECTRICAL WORK:

Bidder must comply with the provisions of RIGL § 5-6-2 with respect to any electrical work to be performed pursuant to the terms of that general law. To the extent the Bidder is not licensed and certified pursuant to RIGL § 5-6-2, the Bidder shall identify as part of its response to either an invitation for bid (IFB) or a request for proposal (RFP), and shall use on the project, a subcontractor licensed and certified pursuant to said general law.

ARTICLE 43 - PROHIBITED CONTACTS:

All Bidders, including persons affiliated with or in any way related to them, are prohibited from contacting WSA Board Members, the WSA staff, consultants or attorneys for the WSA on any matter having to do in any respect with this IFB other than with the consent of the WSA Executive Director or her designee. Failure of any Bidder to adhere to this prohibition may, at the sole discretion of the WSA, result in disqualification and rejection of any Bid. Any and all contacts with such persons associated with the WSA shall be made only through and in coordination with the Executive Director and shall be required to be in writing.

ARTICLE 44 - NOTICE TO BIDDERS:

In any case where there are references or attachments that contain language which is contrary to the language found within this IFB, the language contained in the IFB shall supersede.

ARTICLE 45 - WSA'S RIGHTS:

This IFB does not commit the WSA to contract with any BIDDER nor does it commit the WSA to an exclusive agreement with the selected Contractor for these services. The WSA reserves the following rights:

- To withdraw this IFB at any time;
- To reject any and all Bids or BIDDERS;
- To eliminate any of the tasks in the Scope of Services of this IFB and to issue a contract with a correspondingly reduced Project Work Program;
- To issue subsequent IFBs at the WSA's sole discretion;
- To postpone award of the contract;
- To accept the Bid that the WSA finds to be the most advantageous, cost-effective and/or beneficial to the WSA;
- To split the award or to make multiple awards;
- To negotiate the Bid to further refine, clarify, amend, or expand any and all aspects of the
- Bid;
- To accept Bids that do not offer the lowest cost;
- To confirm all references and contact further references obtained from other sources as deemed necessary;
- To request BIDDERS to send representatives to Warwick, Rhode Island for interviews at their own cost;
- To waive any informalities or technicalities in any Bid; and
- To apply any additional rights as may be allowed under applicable purchasing laws and rules.

ARTICLE 46 – FEDERAL FUNDING:

To the extent this IFB is funded either partially or completely through the use of federal funds, BIDDER shall comply with any rules and regulations attached to said funding.

END OF SECTION

SECTION 00300

BID FORMS

TO: WARWICK SEWER AUTHORITY

(Numerical)

125 Arthur W. Devine Boulevard Warwick, RI 02886

BID FOR: Contract No. 86B – Bayside Sewer System, Pressure Sewers

The undersigned BIDDER, having read and examined the Specifications and associated Contract Documents for the above-designated Work, does hereby propose to perform the Work and provide the services set forth in this Bid. All prices stated herein are firm and shall not be subject to escalation provided this Bid is accepted within one hundred twenty (120) days after the time set for receipt of Bids.

The BIDDER, in compliance with the Invitation for Bid for Contract No. 86B Bayside Sewer System in the ıts on ıll he ď"

City of Warwick, Rhode Island, having examined the Drawings and Specifications with related documents
and the site of the proposed Work and being familiar with all of the conditions surrounding the construction
of the proposed Project, including the availability of materials and labor, hereby proposes to furnish all
labor, materials, supplies, supervision and anything else required or necessary in order to construct the
Project in accordance with the Contract Documents within 730 calendar days from the "Notice to Proceed"
and in accordance with the prices stated in the Schedule of Bid Items.
This Bid is accordingly submitted in the sum of
Dollars
(Written in Words)
(\$)
(Numerical)
for the Contract No. 86B Bayside Sewer System. These prices cover all costs of performing the Work required under the Contract Documents of which this Bid is a part.
BIDDER hereby agrees to commence work under this Contract on a date to be specified in a written "Notice to Proceed" by the Warwick Sewer Authority, and to fully complete the project within 765 calendar days of said notice, or as otherwise mutually agreed upon by the Warwick Sewer Authority and BIDDER. BIDDER further agrees to pay as liquidated damages, the sum of \$2,500.00 for each consecutive calendar Day thereafter until the Project is completed.
Upon receipt of written notice of the acceptance of this Bid, BIDDER shall execute the formal Contract attached within ten (10) calendar Days, and deliver surety Bonds and insurance certificates as required in the General Conditions. In the event the Contract and Bond are not executed within the time set forth above, the Bid Security attached in the sum of (10% of the Bid Price)
Dollars
(Written in Words)
(\$

BAYSIDE SEWER SYSTEM Date: 11/2019 **BID PRICE FORMS**

shall become the property of the Warwick Sewer Authority as liquidated damages for the delay and additional expense to the Warwick Sewer Authority caused thereby.

No	Dated:
No	Dated:
the requirements of the will be performed in s	by declares that the following list states any and all variations from and exceptions to the Contract Documents and that, otherwise, it is the intent of this bid that the Work strict accordance with the Contract Documents. If the BIDDER takes no exceptions, one" in the space provided.
	(Add additional pages as required)

The Owner reserves the right to reject any BID which includes variations from and exceptions to the requirements of the Contract Documents.

A.1 SCHEDULE OF BID ITEMS

The BIDDER agrees to perform the Work described in the Specifications and shown on the Drawings for the following lump sum or unit prices. All prices must be given in numerical figures and must be typewritten or printed legibly.

Due to the length and nature of this request, only the Total Bid Price will be read aloud at the Bid Opening. The prices for the individual items will not be read aloud, but following the Bid Opening, a Bid Abstract will be prepared, and it will be made available to all interested parties upon request.

TOTAL BASE BID PRICE (In Figures):

\$_____

Note: In case of error in the extension of prices, the unit price will govern.

The BIDDER warrants that it has available or under its control, labor, equipment, materials, and resources of the character and in the amount required to complete the proposed Work within the specified time.

A.2 <u>ALTERNATES</u>

The Warwick Sewer Authority reserves the right to include one or more alternates identified herein to/from the scope of the project; provided, however, that said alternates shall only be selected by the Warwick Sewer Authority in the order in which they are listed. Bidders are required to submit a bid price for each and every alternate. Failure to submit a bid price for each and every alternate will result in the entire proposal being deemed to be nonresponsive to the solicitation.

Alternates are listed in numerical sequence in order of Warwick Sewer Authority's priority. In determining the lowest responsive bid the awarding authority shall consider alternates in descending numerical sequence such that no individual alternate shall be considered until every alternate preceding it on the list has been added to the base bid price.

Bidder understands that the Warwick Sewer Authority reserves the right to reject any and all bids, and to waive any irregularities in the bidding and accept the bid, with or without alternates, as deemed to be in the best interest of the Warwick Sewer Authority.

A.3 <u>EXTRA WORK</u>

Payment for extra work, if any performed, shall be in accordance with Section 00700 – General Conditions of the Contract Documents, and shall be computed in one of the following methods:

- A. A lump sum agreed upon by the Contractor, the Warwick Sewer Authority, and the Engineer.
- B. The unit price proposed by the Contractor.
- C. Actual costs as defined by Section 00700 General Conditions.

00300-3

BAYSIDE SEWER SYSTEM Date: 11/2019 BID PRICE FORMS

A.4 <u>ENGINEER'S ESTIMATE OF QUANTITIES</u>

Quantities are provided for informational purposes only for use by the BIDDERS in developing a total Bid price. BIDDERS are advised to develop their own material takeoff quantities from the Contract Documents.

A.5 DECLARATION AND SIGNATURES

The undersigned hereby declares that, in regard to all conditions affecting the Work to be done and the labor and materials required, this Bid is based on its investigations and findings, and the WARWICK SEWER AUTHORITY, their officers, agents and employees of the WARWICK SEWER AUTHORITY shall not in any manner be held responsible for the accuracy of, or be bound by, any estimates, borings, indications of borings, soils, rock, water, or underground conditions relative to the proposed Work indicated in this or in the other Contract Documents; that no warranty or representation has been made by the WARWICK SEWER AUTHORITY, its officers, agents and employees as to subsurface soil or rock conditions, groundwater conditions, or other underground and similar conditions.

A.6 BIDDER CONTRACTOR QUALIFICATIONS

The Bidder shall meet the minimum qualification requirements provided below.

A.6.1 Required Bidder Qualification Statement

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

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

- 1. Name of Bidder.
- 2. Permanent Main Office address.
- 3. When organized?
- 4. Where incorporated?
- 5. Is bidder registered with the Secretary of the State to do business in Rhode Island?

6.	For how many years has your firm engaged in the contracting business under its present name? Also state names and dates of previous firm names, if any.
7.	Contracts on hand. (Schedule these, showing gross amount of each contract and the approximate anticipated dates of completion.)
8.	General character of work performed by your company.
9.	Have you ever failed to complete any work awarded you in the scheduled contract time, including approved time extensions?(Yes)(No).
	If so, where and why?
10.	Have you ever defaulted on a contract?(Yes)(No).
	If so, where and why?
11.	Have you ever had liquidated damages assessed on a contract?(Yes)(No).
	If so, where and why?
12.	List the more important contracts recently executed by your company, stating approximate cost for each, and the month and year completed.
13.	List your major equipment available for this contract.
14.	List your key personnel such as Project Superintendent and foreman available for this contract.
15.	With what banks do you conduct business?
Do y	you grant the Engineer permission to contact this (these) institutions?(Yes)(No)
	00300- 5

00300- 5

process.	ra
Projects of Similar Size and Complexity Demonstrating BIDDER possess Minimum BIDDE Qualifications	R
Project 1	
Project Name:	
Project Location:	
Year Completed:	
Construction Cost:	
Owner and Contact Information:	
Engineer and Contact Information:	
Reference Contact Information:	
Scope of Work:	
Projects of Similar Size and Complexity Demonstrating BIDDER possess Minimum BIDDE Qualifications	R
Project 2	
Project Name:	
Project Location:	
Year Completed:	
Construction Cost:	
Owner and Contact Information:	
00300- 6	

Engineer and Contact Information:
Reference Contact Information:
Scope of Work:

A.6.2 DIRECTIONAL DRILLING CONTRACTOR

The BIDDER or BIDDER's subcontractor shall either be chosen from the prequalified subcontractor list below or be qualified by meeting the minimum qualification requirements provided below.

Prequalified Subcontractor List

- Directional Technologies, Inc. 77 N. Plains Industrial Road Wallingford, CT 06492 1-877-788-4479
- S.J. Louis Construction 1351 Broadway St. W., PO Box 459 Rockville, MN 56369 (320) 253-9291

DIRECTIONAL DRILLING QUALIFICATIONS

I. Submission Requirements

In order to conduct a reasonable and efficient evaluation of the contractor, the WSA requires that firms prepare qualification statements which are clear and concise, and which follow the format outlined below.

- 1. Cover Letter. The respondent shall include a cover letter, signed by an individual authorized to submit information for the contractor. In the cover letter, the contractor must:
 - a. Certify that the information contained in the submittal is true and accurate.
 - b. Certify that the personnel for the horizontal directional drilling operations listed in their submittal will be directly involved with the project for its duration.
 - c. Disclose if the contractor or any member of its team is currently debarred from doing business with any governmental agency or is a party to any pending or current litigation which would adversely affect performance on the project.
 - d. Disclose if the firm or any member of the firm has filed for protection of US Bankruptcy court in the last 7 years. If yes, then describe the circumstances and evidence of the firm's ability to complete the project.

- **2. Firm Background.** The HDD Contractor must be an established business with the experience, equipment and qualified personnel in the area of trenchless technology/horizontal directional drilling. Provide a general description of the firm, services provided, office locations, number and type of personnel involved in the providing the services offered, years in business. The firm must have a **minimum of 10 years providing horizontal directional drilling services**.
- **3. Equipment, Condition, Size and Capacity**. The HDD Contractor must demonstrate they possess the necessary directional drilling and ancillary equipment of adequate size, capacity and condition to execute the project with consideration of existing /subsurface conditions. The Contractor shall provide a listing of the following:
 - a. Make, model, serial number, year manufactured, rated torque and thrust/pull capacity of HDD equipment owned or proposed to be acquired / rented by the Contractor.
 - b. Make, model, serial number, year manufactured, rated torque and thrust/pull capacity of HDD equipment of choice for use on this project.
 - c. Type, manufacturer, model and accuracy of tool detection/location/guidance systems.
 - d. Means for recording and information to be recorded detailing drilling history for as-built drawings and documentation.
- 4. Personnel. The HDD Contractor shall provide information on the capabilities and experience of the management, project staff, and field personnel anticipated to be assigned to the project (i.e. Project Manager, Site Superintendent, Crew Foreman, Directional Drilling Equipment Operators and other relevant staff). The Superintendent, Crew Foreman and directional drilling equipment operator(s) shall have at least 3 years of experience using directional drilling equipment/installation techniques on at least 5 projects similar in size, scope and setting to the project described above. Provide a resume for each showing their name, title, including a detailed description of their role and job responsibilities, education, construction experience, years with the firm and a list of all the projects completed that they have had direct/indirect experience on similar projects of size and scope.
- **5. Project Experience.** The HDD contractor must include a record of experience on 5 projects of similar size, scope and setting completed in the last 10 years. For each project, provide information on:
 - a. The project name and client
 - b. Description of the project
 - c. Scope of services provided
 - d. Pipe diameters, pipe material and lengths
 - e. HDD technology used
 - f. Problems encountered and how they were resolved
 - g. Any claims and how they were resolved.
 - h. The original and final contract sum
 - i. Start and completion dates
 - j. The owners name, address, telephone number and contact for project
- **6. References.** Provide reference information for the following:
 - a. Project References
 - Provide the following reference information for each project listed under the project experience section.
 - Project Name
 - Name, address, telephone, and email of Owner

- Name, address, telephone, and email of Owner's representative or Engineer
- Name of Contact person, title, telephone and email for each
- 7. Financial Stability. The contractor must submit proof of their financial stability. This will include an audited financial statement for the most recent completed year, information demonstrating available bonding and a letter from the firm's banking institution indicating their line of credit available to cover project cash flow. The surety/bonding company must be licensed to do business in the State of Rhode Island. Any and all financial information requested and/or submitted shall be maintained as confidential upon request.
- **8. Safety Record.** Provide a 3-year history of the Contractor's worker's compensation experience modifier rating and documentation from their insurance carrier supporting the rating history provided.
- **9. Insurance.** The Contractor should demonstrate that they maintain adequate insurance coverage and provide evidence of such coverages.

BIDDER certifies that materials and means and methods used to construct above projects are similar in nature to the Work of this Contract.

Respectfully submitted,			
		Date	
Name of Company*			
Ву			_
(Signature)	(Printed or Type	ed)	
Title			
Business Address			
	S	EAL	
(Seal if Bid is by a Corpora	tion)		
		ive the state of incorporation,	
		, who serves as	
company, is dury authorized	i to enter into any result	ing contract with the OWNER	. .
	President		
	Vice President		
	Secretary		
	Treasurer		

END OF SECTION

00300- 10

BAYSIDE SEWER SYSTEM Date: 11/2019

Item Approx. Unit Items w/Unit Bid Prices Unit Bid Amount **Measure Written in Words** No. Quantity \$ Price \$ Bid The Bidder agrees to perform all the construction work described in the CONTRACT DOCUMENTS, for the following unit and lump sum prices. BIDS shall include applicable fees. Site Preparation and Mobilization L.S. Per L.S. At_ 2 200 C.Y. Rock Excavation (Open Cut Excavation) At Per C.Y. 3 300 C.Y. Rock Excavation (Trenchless - Open Cut Excavation) _____ Per C.Y. _____ At 200 L.F. Rock Excavation (Trenchless - Drilling - All Diameters) 4 At 5 1,043 C.Y. Earth Excavation (Test Pits - Utilities) Per C.Y. _____ 500 C.Y. Earth Excavation - Unsuitable Materials Per C.Y. At 412 C.Y. Earth Excavation - Archeological Investigations ____ Per C.Y. _____ At 250 C.Y. Additional Selected Material 8 __ Per C.Y. _____ At 9 15 TON Calcium Chloride Per TON Αt 10 750 C.Y. Additional Gravel Borrow ____ Per C.Y. _____ At___ 11 100 L.F. 1 1/2" Pipe Open Cut Excavation - Lateral _____ Per L.F. _____ ___ At

Item No.	Approx. Quantity	Unit Measu	Items w/Unit Bid Prices	Unit Bid \$ Price	Amount \$ Bid
12	10,482	L.F.		•	•
At			Per L.F		
13	9,809	L.F.	3" Pipe - Open Cut Excavation - Lateral		
At			Per L.F		
14	2,465	L.F.	4" Pipe - Open Cut Excavation - Lateral		
At			Per L.F		
15	1,115	L.F.	6" Pipe - Open Cut Excavation - Lateral		
At			Per L.F		
16	67,186	L.F.	1 1/4" Trenchless - Service		
At			Per L.F		
17			2" Trenchless - Lateral		
At			Per L.F		
18			3" Trenchless - Lateral		
	•		Per L.F.		
19	100	L.F.			
At			Per L.F		
20			6" Trenchless - Lateral		
At			Per L.F		
21	1,425	L.F.			
At			Per L.F		
22	45	L.F.	16" Ductile Iron Gravity Sewer		
At			Per L.F		
23	1	EA.	Sewer Manhole (Gravity)		
At			Per EA		
24	26	EA.	Pressure Sewer Manhole - Open Cut Exc	avation - Main	
At			End Manhole Per EA		
25	24	EA.	Pressure Sewer Manhole - Open Cut Exc Junction / Intersection Cleanout	avation -	
At			Per EA		

Item No.	Approx. Quantity	Unit Measur	Items w/Unit Bid Prices Written in Words	Unit Bid \$ Price	Amount \$ Bid
26	16	EA.	Pressure Sewer Manhole - Open Cleanout	Cut Excavation - Bend	
At			Per I	EA	
27	13	EA.	Pressure Sewer Manhole - Open Straight Cleanout	Cut Excavation -	
At			Per I	EA	
28	39	EA.	Trenchless - Type A - End Cleand	out	
At			Per l	EA	
29	1	EA.	Trenchless - Type B - In Line Clea	anout	
At			Per I	EA	
30	4	EA.	Trenchless - Type C - 3 Way / 4 V Connection	Way Intersection	
At			Per I	EA	
31	940	EA.	Trenchless - Type D - Service Co	nnection	
At			Per I	EA	
32	10	EA.	Air Release Sewer Manhole (All S	Sizes)	
At			Per I	EA	
33	47,586	S.Y.	Remove Bituminous Surface by C	Cold Planing (Gutters)	
At			Per S	S.Y	
34	23,871	L.F.	2" Bituminous Pavement Patch Li	near, HMA CL 9.5	
At			Per L	F	
35	6,663	S.Y.	2" Bituminous Pavement Square,	HMA CL 9.5	
At			Per S	S.Y	
36	14,149	TON	1-1/2" Permanent Pavement Ove	rlay, HMA CL 9.5	
At			Per T	ON	
37	1,422	TON	2" Permanent Pavement Overlay	(Tidewater Drive),	
At			HMA Per T	ON	
38	5,929	TON	2-1/2" Driveways & Sidewalks HM	1A CL 9.5 Surface	
At			Course Per T	ON	

Item No.	Approx. Quantity	Unit Measu	Items w/Unit Bid Prices re Written in Words	Unit Bid \$ Price	Amount \$ Bid
39	2,677	L.F.	Bituminous Berm RI STD 7.5.1		
At			Pe	er L.F	·
40	13,340	L.F.	Saw-cutting Bituminous Concre	ete Driveways	
At			Pe	er L.F	
41	937	EA.	Saw-cutting Operation / Recep	tion Pits	
At			P	er EA	
42	100	C.Y.	Controlled Low Strength Concr	rete Material	
At			Pe	er C.Y	
43	100	C.Y.	Miscellaneous Concrete		
At			Pe	er C.Y	
44	2,702	L.F.	8" Compost Filter Sock		
At			Pe	er L.F	
45	330	EA.	Silt Sack Protection		
At			P	er EA	
46	500	S.Y.	4" Loam and Seed		
At			Pe	er S.Y	
47	10	EA.	Precast Drainage Structures -	All Depths	
At			P	er EA	
48	500	L.F.	Remove and Dispose Drainage	e Pipe - All Sizes	
At			Pe	er L.F	
49	10	EA.	Remove and Dispose Existing Sizes	Drainage Structures - All	[
At			P	er EA	
50	400	L.F.	12" RCP Drainage Pipe		
At			Pe	er L.F	
51	400	L.F.	12" D.I. Drainage Pipe		
At			Pe	er L.F	

Item No.	Approx. Quantity	Unit Measu	Items w/Unit Bid Prices re Written in Words	Unit Bid \$ Price	Amount \$ Bid
52	100	L.F.	18" RCP Drainage Pipe		
At			Per L	F	
53	100	L.F.	18" D.I. Drainage Pipe		
At			Per L	F	
54	200	L.F.	Remove and Reset Drainage Pipe All Types	e - 12-inches or less -	
At			Per L	F	-
55	100	L.F.	Remove and Reset 18-inch Drain	age Pipe - All Types	
At			Per L	F	
56	50	L.F.	Remove and Reset 24-inch Drain	age Pipe - All Types	
At			Per L	F	
57	28	EA.	Isolate and Reactivate Water Mai	ns - Less Than 40	
At			Feet Per I	EA	
58	28	EA.	Isolate and Reactivate Water Mai	ns - 40 to 80 Feet	
At			Per I	EA	
59	110	EA.	Overhead Utility House Services - Reactivate - All Types	- Disconnect &	
At			Per I	EA	
60	500	L.F.	6" PVC Water Pipe (Sewer Confli	cts)	
At			Per L	F	
61	500	L.F.	8" PVC Water Pipe (Sewer Confli	cts)	
At			Per L	F	
62	40	EA.	Water Service Connections		
At			Per I	EA	
63	8	EA.	6" Water Gate Valve		
At			Per I	EA	
64	8	EA.	8" Water Gate Valve		
At			Per I	EA	

Item		Approx.		Items w/Unit Bid Price	es	Unit Bid	Amount
No.		Quantity		Written in Words	.l . All O'	\$ Price	\$ Bid
65		1	EA.	Tapping Sleeve and Va	aive - Ali Sizes		
٨٠					Dor EA		
At_					Per EA		
66		2	FΔ	Fire Hydrants			
00		2	LA.	i iic riyalants			
Δt					Per FA		
,							
67		1	L.S.	Construction Road Sign	ns		
At_					Per L.S		
68		1	L.S.	Traffic Barrels w/Type	A or Type C Light		
					5 0		
At_					Per L.S		
69		1	I S	Traffic Barricades			
03		'	L.O.	Traine Dameades			
At					Per L.S.		
70		1	L.S.	Vibration Monitoring			
At_					Per L.S		
74			1.0	NAC II LICUS NAC			
71		1	L.S.	Miscellaneous Utility W	ork (Allowance)		
	At	Two h	ındrad th	ousand dollars	Dorl C	\$200,000	\$200,000
	Λι	1 WO III	andieu in	ousanu uonars	F & L.S.	φ200,000	φ200,000
72		1	L.S.	Asbestos Containing M	laterials (Allowance	e)	
				ŭ	,	,	
	At	One	e hundred	thousand dollars	Per L.S.	\$100,000	\$100,000
73		1	L.S.	Gas Main Relocation (A	Allowance)		
	Δ.	0			D. J. O.	* 400.000	# 400.000
	At	One nu	<u>inarea tn</u>	ousand dollars	Per L.S	\$100,000	\$100,000
74		1	L.S.	Soil Compaction Testin	ng (Allowance)		
		•	L.O.	Con Compaction Tooling	ig (/ iiiowanoo)		
	At	Twenty	thousand	d dollars	Per L.S.	\$20,000	\$20,000
						+,	
75		1	L.S.	Tree Trimming (Allowa	nce)		
	<u>At</u>	Twenty	Five thou	usand dollars	Per L.S.	\$25,000	\$25,000
				D.P. D. C.			
76		1	L.S.	Police Protection			
		Daid l	\Ma======	k Cowar Authorite		¢ 0	* ^
		Paid b	y warwic	k Sewer Authority		\$0	\$0

At_			Per EA		
67		1 L.S. Construction Roa	ad Signs		
At_			Per L.S		
68		1 L.S. Traffic Barrels w/	Type A or Type C Ligh	nt	
At_			Per L.S		
69		1 L.S. Traffic Barricades	S		
At_			Per L.S		
70		1 L.S. Vibration Monitor	ing		
At_			Per L.S		
71		1 L.S. Miscellaneous Ut	cility Work (Allowance)		
	<u>At</u>	Two hundred thousand dollars	Per L.S	\$200,000	\$200,000
72		1 L.S. Asbestos Contair	ning Materials (Allowar	nce)	
	<u>At</u>	One hundred thousand dollar	s Per L.S	\$100,000	\$100,000
73		1 L.S. Gas Main Reloca	tion (Allowance)		
	At	One hundred thousand dollars	Per L.S	\$100,000	\$100,000
74		1 L.S. Soil Compaction	Testing (Allowance)		
	<u>At</u>	Twenty thousand dollars	Per L.S	\$20,000	\$20,000
75		1 L.S. Tree Trimming (A	Allowance)		
	<u>At</u>	Twenty Five thousand dollars	Per L.S.	\$25,000	\$25,000
76		1 L.S. Police Protection			
		Paid by Warwick Sewer Authority	y	\$0	\$0
		TOTAL OF BID (ITEMS 1 THRO	OUGH 76):	\$	
		TOTAL BID WRITTEN IN W	,	(Fig	gures)
					Dollars

Page Total _____ P-9

SECTION 00310 BID BOND

KNOW ALL MEN B	Y THESE PRESENTS,	tnat we, the und	ersigned,	
				, as Principal, and,
			, as Surety, ar	e hereby held and firmly
bound unto the Warwi	ck Sewer Authority, as	Owner, in the pe	enal sum of	
		Dolla	rs (\$), for the
	ors, successors and assi		atly and severally bi	ind ourselves, our heirs,
Signed, this	day of	, 20	·	
the Warwick Sewer A	uthority a certain Bid a	attached hereto a	nd hereby made a pa	rincipal has submitted to art hereof to enter into a ters in Warwick, Rhode
NOW THEREFORE,	if said Bid shall be reject	cted, or		
attached hereto (prope performance of said C connection therewith, said Bid, then this obl expressly understood a event exceed the pena stipulates and agrees the by an extension of the waive notice of any su	orly completed in according to the payment and shall in all other religation shall be void. (and agreed that the liabil amount of this obligation at the obligations of sale time within which the och extension.	dance with said I ment of all perso espects perform Otherwise the sa ility of the Surety tion as herein sta id Surety and its e Owner may ac	Bid) and shall furnish ons performing labor the Agreement creat me shall remain in f y for any and all clain ated. The Surety, for bond shall in no way except such Bid, and s	in the Form of Contract h a Bond for his faithful r, furnishing materials in ted by the acceptance of force and effect; it being ms hereunder shall in no r value received, hereby y be impaired or affected said Surety does hereby
of them as have cause	-	to be hereto affi		ands and seals, and such nts to be signed by their
Princi	pal			
By				
(Suret	.y)			

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

END OF SECTION

00310-1

BAYSIDE SEWER SYSTEM Date: 11/2019 BID BOND

SECTION 00430 PROPOSED SUBCONTRACTORS

The BIDDER shall state the names of all Subcontractors that it proposes to use. *Description of work _____ Proposed Subcontractor, Name _____ Address *Description of work_____ Proposed Subcontractor, Name_____ Address *Description of work_____ Proposed Subcontractor, Name_____ Address *Insert description of work and Subcontractors' names as may be required. This is to certify that the names of the above-mentioned Subcontractors are submitted with full knowledge and consent of the respective parties. The BIDDER warrants that none of the proposed Subcontractors have any conflict of interest as respects this Contract. To the extent that the Contractor uses additional or substitute Subcontractors, the WSA shall be notified within 48 hours of said selection. Any proposed additional or substitute Subcontractors shall possess qualifications and experience that meet or exceed the specified minimum qualifications and experience. Use of additional or substitute Subcontractors shall be subject to the approval of the WSA. BIDDER____ (Fill in name) (Signature and Title) END OF SECTION

00430-1

SECTION 00500

AGREEMENT

		day of ter called "the OWNER		, is by and between the
	(Name o	f Contractor)		
doing business as) (a partnership) (a cor		
of the City of		, County of	f	and State of
		, hereinafter	called "Contrac	tor."

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

- 1. The Contractor acknowledges that it has received, read, and understands the Invitation for Bids, Information for Bidders, the Bid (which shall include any post-Bid documentation submitted prior to the Notice of Award and attached to the Agreement), the Bonds, the Specifications and Drawings, and the General Conditions and any Supplementary Conditions provided by the Owner (those documents and any amendments, modifications, supplements, or Addenda thereto are hereinafter collectively referred to as the "Contract Documents"). The terms and conditions of the Contract Documents, and all attachments thereto, are hereby incorporated in this Agreement by reference, except to the extent such terms and conditions are inconsistent with any terms and conditions of this Agreement. In any case where specific terms and conditions included in this Agreement differ from those terms and conditions set forth in the Contract Documents, the terms of this Agreement shall govern.
- 2. The Contractor will commence and complete the Influent Sewer Rehabilitation Project, in Warwick, Rhode Island (The Project).
- 3. The Contractor will furnish all other material, supplies, tools, equipment, labor and other services necessary for the construction and completion of the Project.
- 4. The Contractor will commence the work required by the Contract Documents on a date to be specified in a written Notice to Proceed (the "Commencement Date"), and will complete fully the Project within three (3) calendar months of said Commencement Date, unless the period for completion is extended by the OWNER in writing or by the Contract Documents. The Contractor further agrees to pay as liquidated damages the sum of \$2,500.00 for each calendar day that the Project is not completed after the anticipated completion date, as provided in SECTION 00700 GENERAL CONDITIONS and SECTION 00120 INFORMATION FOR BIDDERS.

5.	The Contractor agrees to perform all of the comply with the terms therein, for the Bid Pri	Work described in the Contract Documents, and to ice of
	\$, as shown in Section 00300 – Bid Price Forms.

- 6. The Owner will pay the Contractor in the manner and at such times as are set forth in the Contract Documents the amounts set forth in the Contract Documents.
- 7. Nothing herein or in the Contract Documents shall be construed to create any personal liability on the part of any officer, agent, employee, or director of Owner, nor shall the Contract Documents be construed to give any rights or benefits hereunder to anyone other than the Owner and the Contractor.
- 8. The Contractor will indemnify and hold the Owner harmless from any and all loss, damages, suits, penalties, costs, liabilities and expenses (including, but not limited to, reasonable investigation and legal expenses) arising out of any claim including claims for loss of or damage to property, including Owner's property, and injuries to or death of persons, including Owner's employees, caused by or resulting from Contractor negligence or willful misconduct or breach of this Agreement. In any instance in which Owner claims indemnity under this paragraph, Contractor shall have the duty to defend the Owner in any litigation arising out of the occurrence from which the Owner claims that Contractor's indemnity obligation exists.
- 9. The Contractor warrants that neither it nor any of its principals, officers, agents or representatives authorized to make commitments on its behalf have ever been convicted of violating any statute relating to bribery, fraud, or bid-rigging in this state or in any other state in this country. Further, the Contractor agrees to perform all services and provide all goods called for by this Agreement in compliance with all Rhode Island laws.
- 10. This Agreement and the Contract Documents represent the entire understanding of the Owner and Contractor with respect to the Project. No prior oral or written understanding shall be of any force or effect with respect to any matter covered hereunder. This Agreement may not be modified or altered except in writing signed by both parties.
- 11. This Agreement shall be governed by and interpreted under the laws of the State of Rhode Island. All claims, disputes, and other matters in question arising out of or relating to this Contract or the performance or interpretation thereof shall be submitted to arbitration pursuant to the terms of Title 37, Chapter 16, of the Rhode Island General Laws, as amended.
- 12. This Agreement shall be binding upon the parties hereto and their respective heirs, executors, administrators, successors, and assigns. The Contractor shall not be permitted to assign this Agreement except with the written consent of the Owner.

IN WITNESS WHEREOF, the parties hereto have executed or caused to be executed by their duly authorized officials, this Agreement in two (2) copies, each of which shall be deemed an original, on the date first above written.

WARWICK SEWER AUTHORITY (OWNER)			
BY:			
BY:			
(CONTRACTOR)			
BY:			
	(Title)		
	(Address)		

00500-3

END OF SECTION

SECTION 00600

PAYMENT BOND

KNOW ALL MEN	BY THESE PRESENTS, that we	, as Contractor,
of		
and	, hereinafter called the	e "Surety," are held and firmly bound unto the
Warwick Sewer Au	thority, 125 Arthur W. Devine Bouley	vard, Warwick, Rhode Island, 02886, hereinafter
called the "Owner,"	and to such persons, firms and corpora	ations which may furnish materials for or perform
labor on the Work,	construction, or improvements, conter	mplated in the Agreement hereinafter mentioned,
or which may have	any suits or claims for injury or damag	ge to persons or property resulting from or arising
out of the Work		
done under this Ag	reement in the penal sum of	Dollars
		the United States of America) for the payment
	•	mselves and their heirs, executors, administrators,
successors, and assi	igns, jointly and severally, firmly by th	iese presents.
		THAT, WHEREAS THE CONTRACTOR has by
		wner for Contract No. 86B Bayside Sewer System
Pressure Sewer Pro	ject, and related work and other incide	entals (the Project) for the sum of approximately
		Dollars
(\$).	

NOW, THEREFORE, the condition of this obligation is such that if the Contractor shall promptly make payment to all persons, firms, subcontractors, and corporations furnishing materials for or performing labor in the prosecution of the Work provided for in such Contract, and any authorized extensions or modification thereof, including all amounts due for materials, lubricants, oil, gasoline, coal and coke, repairs on machinery, equipment, and tools consumed or used in connection with the construction of such Work, and all insurance premiums on said Work, and for all labor performed in such work whether by Subcontractors or otherwise, then this obligation shall be void; otherwise to remain in full force and effect.

PROVIDED, HOWEVER, THAT (except as to the Owner) no suit, action, or proceeding, by reason of any default whatever shall be brought on this Bond after two years from the day on which the final payment under the Agreement falls due.

AND PROVIDED, that any alterations which may be made in the terms of the Agreement or in the Work to be done under it or any assignment, transfer, or subletting of any part of the Work, or the giving by the Owner of any extension of time for the performance of the Agreement or any other forbearance on the part of either the OWNER or the Contractor to the other, shall not in any way release the Contractor and the Surety or Sureties, or either or any of them their heirs, executors, administrators, successors or assigns from their liability hereunder, notice to the Surety or Sureties of any such alterations, assignment, transfer, subletting extension of forbearance being hereby waived.

AND PROVIDED FURTHER, the Surety, for value received, hereby stipulates and agrees that no change, extension of time, alteration, or addition to the terms of the Agreement, the Work to be performed thereunder or the Specifications accompanying the same shall in any way affect its obligations on this Bond, and it does hereby waive notice of any such change, extension of time, alternation or addition to the terms of the Agreement, the Work, or to the Specifications.

IN WITNESS WHER	REOF, said Contr	where claim may be unsatisfied. actor and Surety have hereunto set their respective names this
WITNESSES:		
		(Contractor) (Seal)
Name		By: (Signature and Title)
Address		Surety: (Signature and Title)
Name		By: (Signature and Title)
Address		Attorney-in-fact

AND PROVIDED, FURTHER, that no final settlement between the Owner and the Contractor shall abridge

POWER OF ATTORNEY

Any attorney-in-fact who signs Contract Bonds must file with each Bond a certified copy of his or her power of attorney to sign said Bonds.

NOTE: The date of the BOND must not be before the date of the Agreement. If Contractor is a Partnership, all partners should execute BOND.

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

END OF SECTION

SECTION 00610

PERFORMANCE BOND

KNOW ALL MEN BY THESE PRESENTS, that we	, as
Contractor, of, and	, hereinafter
called the "Surety," are held and firmly bound unto the Warwick Sewer Authority, 12	25 Arthur W. Devine
Boulevard, Warwick, Rhode Island, 02886, hereinafter called the "Owner," and to such	ch persons, firms and
corporations which may furnish materials for or perform labor on the Work, construction	ion, or improvements
contemplated in the Agreement hereinafter mentioned, or which may have any suits of	or claims for injury or
damage to persons or property resulting from or arising out of the Work done under t	this Agreement in the
penal sum of	
Dollars	
(\$) (lawful money of the United States of Ame	erica) for the payment
whereof the CONTRACTOR and the Surety or Sureties bind themselves and the	neir heirs, executors,
administrators, successors and assigns, jointly and severally, firmly by these presents.	
THE CONDITION OF THIS OBLIGATION IS SUCH THAT, WHEREAS THE CO	NTRACTOR has by
means of a written agreement dated on theday of	
(the Agreement) entered into a written contract with the Owner for the Bayside Se	
Sewers Project, and related work and other incidentals (the Project) for the su	•
Doll	* *
(\$).	

NOW, THEREFORE, the condition of this obligation is such that if the Contractor shall faithfully perform the Agreement on its part and during the life of any guarantee or warranty, including warranty for defective materials and workmanship required under this Agreement, and satisfy all claims and demands incurred for the same; and shall fully indemnify and save harmless the Owner from all cost and damage which may suffer by reason of failure to do so, and shall fully reimburse and repay the Owner all outlay and expense which the Owner may incur in making good any such fault, and shall promptly make payment to all persons supplying labor or materials for use in the prosecution of the Work provided for in said Agreement; and shall indemnify and save harmless the said Owner, its officers, agents, employees, and directors from any and all suits or claims for injury or damage to persons or property resulting from or arising out of work done under this Agreement, then this obligation shall be null and void; otherwise it shall remain in full force and effect.

PROVIDED, HOWEVER, THAT (except as to the Owner) no suit, action, or proceeding, by reason of any default whatever shall be brought on this Bond after two years from the day on which the final payment under the Agreement falls due.

AND PROVIDED, that any alterations which may be made in the terms of the Agreement or in the Work to be done under it, or any assignment, transfer, or subletting of any part of the Work, or the giving by the Owner of any extension of time for the performance of the Agreement or any other forbearance on the part of either the Owner or the Contractor to the other, shall not in any way release the Contractor and the Surety or Sureties, either or any of them, their heirs, executors, administrators, successors or assigns from their liability hereunder, notice to the Surety or Sureties of any such alterations, assignments, transfer, subletting, extension or forbearance being hereby waived.

AND PROVIDED FURTHER, the Surety, for value received, hereby stipulates and agrees that no change, extension of time, alteration, or addition to the terms of the Agreement, the Work to be performed thereunder or the Specifications accompanying the same shall in any way affect its obligations on this Bond, and it does hereby waive notice of any such change, extension of time, alteration or addition to the terms of the Agreement, the Work, or to the Specifications.

AND PROVIDED, FURTHER, that no final settlement between the Owner and the Contractor shall abridge the right of any beneficiary hereunder, where claim may be satisfied.

	WHEREOF, said day of					set their	respective	names	this
WITNESSES:									
		(COI	NTRA	ACTOR) (Sea	11)				
Name		_	B	y: (Signature	and Title)				
Address		_	Sı	urety: (Signa	ture and T	itle)			
Name		_	B	y: (Signature	and Title)				
Address		_	At	ttorney-in-fac	et				

POWER OF ATTORNEY

Any attorney-in-fact who signs Contract Bonds must file with each Bond a certified copy of his or her power of attorney to sign said Bonds.

NOTE: The date of the BOND must not be before the date of the Agreement. If Contractor is a Partnership, all partners should execute Bonds.

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

END OF SECTION

00610-2

BAYSIDE SEWER SYSTEM Date: 11/2019 PERFORMANCE BOND

SECTION 00700

GENERAL CONDITIONS

ARTICLE 1 - DEFINITIONS

Wherever the words hereinafter defined or pronouns used in their stead occur in the Contract Documents, they shall have the following meaning indicated which shall be applicable to both the singular and plural thereof:

<u>ADDENDA</u> - Written or graphic instruments prior to the opening of Bids, which clarify, correct or change the Bidding Requirements or Contract Documents.

<u>AGREEMENT</u> - the written contract between Authority and Contractor covering the Work to be performed.

"AS DIRECTED," "AS ORDERED," "AS REQUESTED," "AS REQUIRED", "AS PERMITTED," or words of like import are used, it shall be understood that the direction, order, requirement, or permission of the Engineer is intended.

<u>"APPROVED," "ACCEPTABLE," "SUITABLE," "SATISFACTORY,"</u> and words of like import shall mean approved by, acceptable to, suitable to, or satisfactory to the Engineer.

<u>APPLICATION FOR PAYMENT</u> - Form used by Contractor in requesting progress or final payments, format to be acceptable to the Engineer.

<u>BID</u> - The offer or proposal of the bidder submitted on the prescribed form setting forth the prices for the Work to be performed.

BIDDER - Any person, firm or corporation submitting a bid for the work.

<u>CHANGE ORDER</u> - A document recommended by the Engineer, which is signed by the Contractor and Authority authorizing the addition, deletion or revision in the Work, or adjustment in the Contract Price or Contract Time, issued on or after the effective date of the Agreement.

<u>CONTRACTOR</u> - The person, firm or corporation with whom the Authority has entered into the Agreement.

<u>CONTRACT BONDS</u> - Bid, Performance, and Labor and Materials Bonds and other instruments of security furnished by the Contractor and his surety in accordance with the Contract Documents.

<u>CONTRACT DOCUMENTS</u> - The Agreement, Addenda, Bid, Post Bid documentation submitted prior to the Notice Award, The Notice to Proceed, Bonds, These General Conditions, the Supplemental Conditions, the Miscellaneous Conditions, the Specifications, the Drawings, all written Amendments, Change Orders, Field Orders, and Engineers written interpretations and clarifications

00700 - 1

Date: 11/2019

BAYSIDE SEWER SYSTEM

GENERAL CONDITIONS

<u>CONTRACT PRICE</u> - The total monies payable to the Contractor under the terms and conditions of the Contract Documents.

<u>CONTRACT TIME</u> - The number of calendar days stated in the Contract Documents for the completion of the Work.

<u>CONSTRUCTION SUPERINTENDENT</u> - That person designated by the Contractor to carry out the provisions of the Contract.

<u>DATUM OR LEVELS</u> - The figures given in the Contract and Specifications or upon the Drawings after the work elevation or abbreviation of it, shall mean the distance in feet above mean sea level, the base of the State of Rhode Island and the United States Geodetic Survey (U.S.G.S.).

<u>DRAWINGS</u> - The part of the Contract Drawings which shows the characteristics and scope of the Work to be performed and which have been prepared or approved by the Engineer.

<u>EARTH</u> - Wherever used as the name of an excavated material or material to be excavated, shall mean all kinds of material other than rock as defined in this section.

<u>ELEVATION</u> - The figures given on the Drawings or in the other Contract Documents after the work "elevation" or abbreviation of it shall mean the distance in feet above the datum adopted by the Engineer.

<u>ENGINEER</u> -The word "Engineer" shall mean the person or persons, partnership or corporation holding the position or acting in the capacity of Engineer for the Authority in respect to this Contract, whether acting directly or through his properly authorized agents, such agents acting only within the scope of the particular duties entrusted to them. The Engineer designated is the corporation of Gordon R. Archibald, Inc., 200 Main Street, Pawtucket, Rhode Island, 02860.

<u>FIELD ORDER</u> - A written order issued by the Engineer which orders minor changes in the Work which do not involve a change in the Contract Price or an extension of the Contract time.

GENERAL REQUIREMENTS – The first section of the Technical Specifications.

"HEREIN," "HEREINAFTER," "HEREUNDER," and words of like import shall be deemed to refer to the Contract Documents.

NOTICE OF AWARD - The written notice of the acceptance of the Bid from the Authority to the successful Bidder.

<u>NOTICE TO PROCEED</u> - Written communication issued by the Authority to the Contractor authorizing him to proceed with the Work and establishing the date of commencement of the Work.

<u>CITY</u> - The City of Warwick, Rhode Island acting through its Warwick Sewer Authority.

PROJECT OR CONTRACT - The undertaking to be performed in the Contract Documents.

<u>PROJECT REPRESENTATIVE</u> - The authorized representative of the Authority who is assigned to the project site or any part thereof.

<u>ROCK</u> - wherever used as the name of an excavated material to be excavated, shall mean only boulders and pieces of concrete and masonry exceeding 1 cu. yd. in volume, or igneous, sedimentary, metamorphic, and conglomerate 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."

<u>SHOP DRAWINGS</u> - All drawings, diagrams, schedules and other data or information prepared for and submitted by the Contractor, to illustrate portions of the Work.

<u>SPECIFICATIONS</u> - The portions of the Contract Documents consisting of written technical descriptions of materials, equipment, construction systems, standards and workmanship as applied to the Work and certain administrative details applicable thereto.

<u>SUBCONTRACTOR</u> - An individual, firm or corporation, approved by the Authority and Engineer having a direct contract with the Contractor or with any other Sub-Contractor for the performance of a part of the Work on the Project.

<u>SUBSTANTIAL COMPLETION</u> - Where the Work has progressed to the point where, in the opinion of the Engineer, the Work is sufficiently complete, in accordance with the Contract Documents, so that the Work can be utilized for the purpose intended.

<u>SUPPLEMENTARY CONDITIONS</u> - The part of the Contract Documents which amends or supplements these General Conditions.

<u>SUPPLIER</u> - Any person or organization who supplies materials or equipment for the Work, including that fabricated to a special design, but who does not perform labor at the site.

<u>WRITTEN NOTICE</u> - Any notice to any party of the Agreement relative to any part of this Agreement in writing and considered delivered and the service thereof completed when posted by certified or registered mail to the said party at his last given address or delivered in person to said party or his authorized representative on the Work.

<u>WORK</u> - The entire completed construction or the various separately identifiable parts thereof required to be furnished under the Contract Documents. Work includes and is the result of performing or furnishing labor and furnishing and incorporating materials and equipment into the construction, and performing or furnishing services and furnishing documents, all as required by the Contract Documents.

ARTICLE 2 - THE CONTRACT DOCUMENTS.

The Agreement, the Information to Bidders, the Contractor's Bid as accepted by the Authority, the Specifications, the Drawings, and all Addenda and amendments to any of the foregoing collectively constitute the Contract Documents, and are sometimes herein referred to as the "Contract".

- 2.1 The Contract Documents are complementary, and what is called for by any one shall be as binding as if called for by all. In the event of any conflict or inconsistency between the provisions of the Agreement and the provisions of any of the other Contract Documents, the provisions of the Agreement shall prevail.
- 2.2. Reference to standard specifications, manuals or codes of any technical society, organization or association, or to the laws or regulations of any governmental authority, whether such reference be specific or by implication, shall mean the edition of the standard specification, manual, code or laws or regulations identified in the reference. In the event a particular edition is not identified, the reference shall mean the latest amended edition in effect at the time of receipt of the Bid. However, no provision of any referenced standard specification, manual or code (whether or not specifically incorporated by reference in the Contract Documents) shall change the duties and responsibilities of the Authority, the Contractor or the Designer, or any of their consultants, agents or employees from those set forth in the Contract Documents, nor shall it be effective to assign to the Engineer, or any of the Engineer's consultants, agents or employees, any duty or authority to supervise or direct the furnishing or performance of the work or any duty or authority to undertake responsibility contrary to the provisions of the Agreement.

ARTICLE 3 - OBLIGATIONS AND LIABILITY OF CONTRACTOR.

- 3.1. The Contractor shall do all the work and perform and furnish all the labor, services, materials, equipment, plant, machinery, apparatus, appliances, tools, supplies and all other things (except as otherwise expressly provided herein) necessary and as herein specified for the proper performance and completion of the Work in the manner and within the time hereinafter specified, in strict accordance with the Drawings, Specifications and other Contract Documents, in conformity with the directions and to the satisfaction of the Engineer, and at the prices herein agreed upon therefor.
- 3.2. All parts of the Work and all fixtures, equipment, apparatus and other items indicated on the Drawings and not mentioned in the Specifications, or vice versa, and all work and material usual and necessary to make the work complete in all its parts, including all incidental work necessary to make it complete and satisfactory and ready for use and operation, whether or not they are indicated on the Drawings or mentioned in the Specifications, shall be furnished and executed the same as if they were called for both by the Drawings and by the Specifications.
- 3.3. The Contractor shall coordinate his operations with those of any other contractors who may be employed on other work of the Authority, shall avoid interference therewith, and shall cooperate in the arrangements for storage of materials and equipment.
- 3.4. The Contractor shall conduct his work so as to interfere as little as possible with private business and public travel. Wherever and whenever necessary or required, he shall maintain fences, furnish watchmen, maintain lights, and take such other precaution as may be necessary to protect life and property.

00700-4

BAYSIDE SEWER SYSTEM Date: 11/2019 GENERAL CONDITIONS

- 3.5 The Contractor shall indemnify and save harmless the Authority and the Engineer and their officers, agents, servants and employees, from and against any and all claims, demands, suits, proceedings, liabilities, judgments, awards, losses, damages, costs and expenses, including attorneys' fees, on account of bodily injury, sickness, disease or death sustained by any person or persons or injury or damage to or destruction of any property, directly or indirectly arising out of, relating to or in connection with the Work, whether or not due or claimed to be due in whole or in part to the active, passive or concurrent negligence or fault of the Contractor, his officers, agents, servants or employees, any of his subcontractors, or any of their respective officers, agents, servants or employees and/or any other person or persons, and whether or not such claims, demands, suits or proceedings are just, unjust, groundless, false or fraudulent; and the Contractor shall and does hereby assume and agrees to pay for the defense of all such claims, demands, suits and proceedings, provided, however, that the Contractor shall not be required to indemnify the Engineer, his officers, agents, servants or employees, against any such damages occasioned solely by defects in maps, plans, drawings, designs or specifications prepared, acquired or used by the Engineer and/or solely by the negligence or fault of the Engineer; and provided further, that the Contractor shall not be required to indemnify the Authority, its officers, agents, servants or employees, against any such damages occasioned solely by acts or omissions of the Authority other than supervisory acts or omissions of the Authority in the Work.
- 3.6 The Contractor shall have complete responsibility for the Work and the protection thereof, and for preventing injuries to persons and damage to the Work and property and utilities on or about the Work, until final completion and final acceptance thereof. He shall in no way be relieved of his responsibility by and right of the Engineer to give permission or directions relating to any part of the Work, by any such permission or directions given, or by failure of the Engineer to give such permission or directions. The Contractor shall bear all costs, expenses, losses and damages on account of the quantity or character of the Work or the nature of the land (including but not limited to subsurface conditions) in or under or on which the Work is done being different from that indicated or shown in the Contract Documents or from what was estimated or expected, or on account of the weather, elements, or other causes.
- 3.7 The Contractor shall conduct his operations so as not to damage existing structures or work installed either by him or by other contractors. In case of any such damage resulting from his operations, he shall repair and make good as new the damaged portions at his own expense with the consent of the damaged party. In the event that consent is not given, the Contractor shall continue liable for the damage caused.
- 3.8 The Contractor shall be as fully responsible to the Authority for the acts and omissions of his subcontractors, their officers, agents, servants and employees as he is for his own acts and omissions and those of his own officers, agents, servants and employees.
- 3..9 Should the Contractor sustain any loss, damage or delay through any act or omission of any other contractor or any subcontractor of any such other contractor, the Contractor shall have no claim against the Authority therefor, other than for an extension of time, but shall have recourse solely to such other contractor or subcontractor.
- 3.10. If any other contractor or any subcontractor of any such other contractor shall suffer or claim to have suffered loss, damage or delay by reason of the acts or omissions of the Contractor or of any of his subcontractors, the Contractor agrees to assume the defense against any such claim and to reimburse such other contractor or subcontractor for such loss or damage.

- 3.11 The Contractor agrees to and does hereby indemnify and save harmless the Authority from and against any and all claims by such other contractors or subcontractors alleging such loss, damage or delay from and against any and all claims, demands, suits, proceedings, liabilities, judgments, awards, losses, damages, costs and expenses, including attorneys' fees, arising out of, relating to or resulting from such claims.
- 3.12 The Contractor shall promptly pay all federal, state and local taxes which may be assessed against him in connection with the Work or his operations under the AGREEMENT and/or the other Contract Documents, including, but not limited to, taxes attributable to the purchase of material and equipment, to the performance of services, and the employment of persons in the prosecution of the Work.

ARTICLE 4 - AUTHORITY OF THE ENGINEER.

- 4.1 The Engineer shall be the sole judge of the intent and meaning of the Drawings and Specifications and his decisions thereon and his interpretation thereof shall be final, conclusive and binding on all parties.
- 4.2 The Engineer shall be the Authority's representative during the life of the Contract and he shall observe the Work in progress on behalf of the Authority. He shall have authority (a) to act on behalf of the Authority to the extent expressly provided in the Contract or otherwise in writing; (b) to determine the amount, quality, acceptability and fitness of all work, materials and equipment required by the Contract; and (c) to decide all questions which arise in relation to the Work, the execution thereof, and the fulfillment of the Contract.
- 4.3 The Contractor shall proceed without delay to perform the work as directed, instructed, determined or decided by the Engineer and shall comply promptly with such directions, instructions, determinations or decisions. If the Contractor has any objection thereto he may, within ten (10) days of having received any such direction, instruction, determination or decision, require that any such direction, instruction, determination or decision be put in writing and within ten (10) days after receipt of any such writing he may file a written protest with the Authority stating clearly and in detail his objections, the reasons therefor, and the nature and amount of additional compensation, if any, to which he claims he will be entitled thereby. A copy of such protest shall be filed with the Engineer at the same time it is filed with the Authority. Unless the Contractor requires that any such direction, instruction, determination or decision be put in writing within ten (10) days of having received such direction, instruction, determination or decision and unless the Contractor files such written protest with the Authority and Engineer within such ten (10) day period, he shall be deemed to have waived all grounds for protest of such direction, instruction, determination, or decision and all claims for additional compensation or damages occasioned thereby, and shall further be deemed to have accepted such direction, instruction, determination, or decision as being fair, reasonable, and finally determinative of his obligations and rights under the Contract.

00700-6

BAYSIDE SEWER SYSTEM Date: 11/2019 GENERAL CONDITIONS

ARTICLE 5 - SUPERVISION OF WORK.

- 5.1 The Contractor shall be solely responsible for supervision of the Work, shall give the work the constant attention necessary to ensure the expeditious and orderly progress thereof, and shall cooperate with the Engineer in every possible way.
- 5.2 At all times, the Contractor shall have his agent on the Work a competent superintendent capable of reading and thoroughly understanding the Drawings and Specifications, with full authority to execute the directions of the Engineer without delay and to supply promptly such labor, services, materials, equipment, plant, apparatus, appliances, tools, supplies and other items as may be required. Such superintendent shall not be removed from the Work without the prior written consent of the Engineer. If, in the opinion of the Engineer, the superintendent or any successor proves incompetent, the Contractor shall replace him with another person approved by the Engineer; such approval, however, shall in no way relieve or diminish the Contractor's responsibility for supervision of the Work.
- 5.3 Whenever the Contractor or his agent or superintendent is not present on any part of the Work where it may be necessary to give directions or instructions with respect to such work, such directions or instructions may be given by the Engineer to and shall be received and obeyed by the designated foreman or any other person in charge of the particular work involved.

ARTICLE 6 - INSURANCE

- 6.1 The Contractor shall assume full responsibility for the safety of his employees, injury to persons other than his employees, and damage to property arising out of work performed by the Contractor.
- 6.2 The Contractor shall indemnify and hold harmless the Authority and the Engineer from and against any liability imposed by law or otherwise upon the Authority and the Engineer, their officers, representatives, agents and employees for injury or death of persons and for loss of damage to property caused by fault or negligence of Contractor and its officers, representatives, subcontractors, and employees in the performance of the services under this Agreement.
- 6.3 Contractor shall defend any claim or suit brought against the Authority or the Engineer based upon such injury, death, loss or damage as described in the previous paragraph, and shall pay all costs and expenses (including legal fees) in connection with such claim or suit, provided the Engineer shall give Contractor prompt notice of such claim or suit, and shall provide such reasonable assistance in connection therewith as Contractor may request.
- 6.4 The Contractor shall carry insurance in the usual form with the following minimum limits:
 - a. <u>Comprehensive General Liability</u> Comprehensive General Liability including personal injury and property damage liability with a combined single limit of \$1,000,000 per occurrence, \$2,000,000 aggregate. Policy to include Owner's and Contractor's Protective Liability, Contractual Liability assumed under this contract, and Broad Form Property Damage Liability.
 - b. Worker's Compensation and Employer's Liability Worker's Compensation (Coverage A) in accordance with the laws of the State of Rhode Island; and Employer's Liability (Coverage B) with a limit of liability of \$500,000 each accident, \$500,000 disease policy limit, and \$500,000 disease each employee.
 - c. <u>Comprehensive Auto Liability</u> Comprehensive Auto Liability including bodily injury and

property damage endorsed to include owned, hired and non-owned vehicle liability. A combined single limit of \$1,000,000 per accident for bodily injury and property damage liability shall be required.

- Alternately, if the Contractor owns no vehicles, then it should provide a certificate of insurance which evidences that it has in effect a Non-Owned and Hired Vehicle Insurance Policy with bodily injury \$1,000,000 per accident.
- The Contractor shall furnish the Engineer with certificates of insurance indicating full coverage for these limits before starting any of its operations under this Agreement. Certificates shall be endorsed with the requirement that cancellation or changes of a policy will not be made until after thirty (30) working days written notice to the Engineer.
- 6.7 By doing the work called for under this Agreement, the Contractor shall become liable for any claim growing out of the fraudulent or negligent submissions of subsurface data by the Contractor, including any professional liability claim which might be brought against the Authority and the Engineer arising out of such fraudulent or negligent submission.
- 6.8 The carrying of any of the insurance required hereunder shall not be interpreted as relieving Contractor of any responsibility to the Authority or the Engineer.

ARTICLE 7 - PATENTS.

- 7.1 The Contractor's attention is directed to the following "Patent Indemnity Clause" illustrating the format and/or required wording therefore which shall be used by all manufacturers and/or suppliers, as deemed necessary by the Authority and Engineer, as an Indemnification and Hold Harmless Agreement.
- 7.2 This Agreement shall be accepted and approved in form by the Authority and Engineer prior to the approval and/or installation of the product.

PATENT INDEMNITY CLAUSE

"In Consideration for their purchase and use of the (Name of product and/or equipment) manufactured by (name of Manufacturer) and for other good and valuable consideration, (Name of Manufacturer) agrees to defend and hold harmless (Name of Contractor), Gordon R. Archibald, Inc., and the Authority of Warwick, Rhode Island, and their employees and agents, from and against any liability, loss, cost, expense or damage including reasonable attorneys' and accountants' fees incurred by these entities in defending or prosecuting any claim for such liability, loss, cost, expense or damage resulting or arising out of a claim that the use of the above mentioned product and/or equipment delivered hereunder directly infringes any United States Patent, provided that (Name of Manufacturer) is given authority, information, and assistance for the defense of such suit, and (Name of Manufacturer) shall pay all damages and costs assessed against the above named entities for the use of such produce and/or equipment provided, however, that this indemnification shall not apply to equipment of (Name of Contractor) design, and provided further that if the use of such product and/or equipment is enjoined in any suit, (Name of Manufacturer) shall at its own expense and its option either procure for (name of Contractor) the right to continue the normal use of such produce and/or equipment, replace said product and/or equipment, modify said equipment or refund the purchase price thereof; and provided further that (Name of Manufacturer) indemnity as to use shall not apply to infringement resulting from the use of the produce and/or equipment

00700-8

delivered hereunder in combination with other items where use of the product and/or equipment per se does not constitute infringement."

ARTICLE 8 - COMPLIANCE WITH LAWS.

8.1 The Contractor shall keep himself fully informed of all existing and future federal, state, and local laws, ordinances, rules, and regulations affecting those engaged or employed on the Work, the materials and equipment used in the Work or the conduct of the Work, and of all orders, decrees and other requirements of bodies of tribunals having any jurisdiction or authority over the same. If any discrepancy or inconsistency is discovered in the Drawings, Specifications or other Contract Documents in relation to any such law, ordinance, rule, regulation, order, decree or other requirement, the Contractor shall forthwith report the same to the Engineer in writing. The Contractor shall at all times observe and comply with, and cause all his agents, with all such existing and future laws, ordinances, rules, regulations, orders, decrees and other requirements, and he shall protect, indemnify and save harmless the Authority, its officers, agents, servants and employees, from and against any and all claims, demands, suits, proceedings, liabilities, judgments, penalties, losses, damages, costs and expenses, including attorneys' fees, arising from or based upon any violation or claimed violation of any such law, ordinance, rule, regulation, order, decree or other requirement, whether committed by the Contractor or any of his agents, servants, employees or subcontractors.

ARTICLE 9 - PROVISIONS REQUIRED BY LAW DEEMED INSERTED.

9.1 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.

ARTICLE 10 - PERMITS.

10.1 The Contractor shall, at his own expense, take out and maintain all necessary permits from the county, municipal, or other public authorities; shall give the notices required by law; and shall post all bonds and pay all fees and charges incident to the due and lawful prosecution of the Work.

ARTICLE 11 - NOT TO SUBLET OR ASSIGN.

- 11.1 The Contractor shall constantly give his personal attention to the faithful prosecution of the Work, shall keep the same under his personal control, shall not assign the Contract or sublet the Work or any part thereof without the previous written consent of the Authority, and shall not assign any of the moneys payable under the Contract, or his claim thereto, unless by and with the like written consent of the Authority and the Surety on the Contract Bonds. Any assignment or subletting in violation hereof shall be void and unenforceable.
- The Contractor shall not sublet or assign work to a subcontractor(s), for a total in excess of fifty (50) percent of the Contract Price, without prior written approval of the Authority and Engineer.
- 11.3 The Contractor shall be fully responsible to the Authority for the acts and omissions of his subcontractors, suppliers, and of persons either directly or indirectly employed by them as he is for the acts and omissions of persons directly employed by him.

- 11.4 The Contractor shall cause appropriate provisions, and applicable State or Federal regulations, to be inserted in all subcontractors relative to the work to bind subcontractors to the Contractor by the terms of the Contract Documents insofar as applicable to the work of subcontractors, and to give the Contractor the same power as regards terminating any subcontract that the Authority may exercise over the Contractor under any provision of the Contract Documents.
- 11.5 The Contractor's attention is directed to the fact that nothing contained in this Contract shall create any contractual relation between any subcontractor and the Authority.

ARTICLE 12 - DELAY BY CITY.

12.1 The Authority may delay the beginning of the Work or any part thereof if the necessary lands or rights-of-way for such work shall not have been obtained. The Contractor shall have no claim for additional compensation or damages on account of such delay, but shall be entitled only to any extension of time as hereinafter provided.

ARTICLE 13 - TIME FOR COMPLETION.

- Provisions related to delays and time for completion of the work follow: The rate of progress shall be such that the Work shall be performed and completed in accordance with the Contract before the expiration of the time limits within 730 consecutive calendar days after the acceptance of the Notice to Proceed, except as otherwise expressly provided herein.
- 13.2 It is agreed that the rate of progress herein required has been purposely made low enough to allow for the ordinary and foreseeable delays incident to construction work of this character. No extension of time will be given for ordinary or foreseeable delays, inclement weather, or accidents, and the occurrence of such will not relieve the Contractor from the necessity of maintaining this rate of progress and completing the Work within the stipulated time limit.
- 13.3 If delays are caused by acts of God, acts of Government, unavoidable strikes, extra work, or other cause or contingencies clearly beyond the control or responsibility of the Contractor, the Contractor may be entitled to additional time to perform and complete the Work, provided that the Contractor shall, within ten (10) days from the beginning of such delay notify the Authority in writing, with a copy to the Engineer, of the cause and particulars of the delay. Upon receipt of such notification, the Authority shall review and evaluate the cause and extent of the delay. If, under the terms of the AGREEMENT, the delay is properly excusable, the Authority will, in writing, appropriately extend the time for completion of the Work. (This paragraph will be interpreted to include delays in receipt of equipment provided that the Contractor placed his order and submitted shop drawings for such equipment promptly after execution of the Contract, that he has shown due diligence in following the progress of the order, and that the time required for delivery is in accordance with conditions generally prevailing in the industry.) The Contractor agrees that he shall not have or assert any claim for nor shall he be entitled to any additional compensation or damages on account of such delays.
- 13.4 The time in which the Work is to be performed and completed is of the essence of this AGREEMENT.

ARTICLE 14 - LIQUIDATED DAMAGES.

14.1 In case the Contractor fails to complete the Work satisfactorily on or before the date of completion or interim milestone fixed herein or as duly extended as hereinbefore provided, the Contractor agrees that the Authority shall deduct from the payments due the Contractor each month the sum of \$2,500.00 for each calendar day of delay, which sum is agreed upon not as a penalty, but as fixed and liquidated damages for each day of such delay. If the payments due the Contractor are less than the amount of such liquidated damages, said damages shall be deducted from any other moneys due or to become due the Contractor, and, in case such damages shall exceed the amount of all moneys due or to become due the Contractor, the Contractor or his Surety shall pay the balance to the Authority.

ARTICLE 15 - NIGHT AND SUNDAY WORK.

- 15.1 No work shall be done at night or on Saturday or Sunday except (1) usual protective work, such as pumping and the tending of lights and fires, (2) work done in case of emergency threatening injury to persons or property, (3) if all of the conditions set forth in the next paragraph below are met or (4) Contract activities specifically specified elsewhere to be conducted at night or on Saturday or Sunday. Work may be allowed on Saturday if the work will be to the advantage of the Authority, and the Engineer has given written permission for such work on Saturday.
- 15.2 No work other than that included in (1) and (2) above shall be done at night except when (a) in the sole judgment of the Authority, the work will be of advantage to the Authority and can be performed satisfactorily at night, (b) the work will be done by a crew organized for regular and continuous night work, and (c) in the sole judgment of the Authority and Engineer, adequate noise prevention measures are incorporated into the Work by the Contractor to minimize any noise impact within the work area and (d) the Engineer has given written permission for such night work. (e) Night work is defined as work between the hours of 4:30 p.m. and 7:00 a.m.

ARTICLE 16 - EMPLOY COMPETENT PERSONS.

16.1 The Contractor shall employ only competent persons on the Work and shall not employ persons or means which may cause strikes, work stoppages or any disturbances by persons employed by the Contractor, any subcontractor, the Authority, the Engineer or any other contractor. Whenever the Engineer notifies the Contractor in writing that in his opinion any person on the Work is incompetent, unfaithful, disorderly, or otherwise unsatisfactory, or not employed in accordance with the provisions of the Contract, such person shall be discharged from the Work and shall not again be employed on it, except with the written consent of the Engineer.

ARTICLE 17 - EMPLOY SUFFICIENT LABOR AND EQUIPMENT.

17.1 If in the sole judgment of the Engineer the Contractor is not employing sufficient labor, plant, equipment or other means to complete the Work within the time specified, the Engineer may, after giving written notice, require the Contractor to employ such additional labor, plant, equipment and other means as the Engineer deems necessary to enable the Work to progress properly.

ARTICLE 18 - INTOXICATING LIQUORS AND/OR DRUGS.

18.1 The Contractor shall not sell and shall neither permit nor suffer the introduction and/or use of intoxicating liquors and/or drugs upon or about the Work.

ARTICLE 19 - ACCESS TO WORK.

19.1 The Authority, the Engineer, and their officers, agents, servants and employees may at any and all times and for any and all purposes, enter upon the Work and the site thereof and the premises used by the Contractor, and the Contractor shall at all times provide safe and proper facilities therefor.

ARTICLE 20 - EXAMINATION OF WORK.

- 20.1 The Engineer shall be furnished by the Contractor with every reasonable facility for examining and inspecting the Work and for ascertaining that the Work is being performed in accordance with the requirements and intent of the Contract, even to the extent of requiring the uncovering or taking down portions of furnished work by the Contractor.
- 20.2 Should the work thus uncovered or taken down prove satisfactory, the cost of uncovering or taking down and the replacement thereof shall be considered as extra work unless the original work was done in violation of the Contract in point of time or in the absence of the Engineer or his inspector and without his written authorization, which case said cost shall be borne by the Contractor. Should the work uncovered or taken down prove unsatisfactory, said cost shall likewise borne by the Contractor.
- 20.3 Examination of inspection of the Work shall not relieve the Contractor of any of his obligations to perform and complete the Work as required by the Contract.

ARTICLE 21 - DEFECTIVE WORK, ETC.

- 21.1 Until acceptance and during the applicable guarantee period thereafter, the Contractor shall promptly, without charge, repair, correct or replace work, equipment, materials, apparatus or parts thereof which are defective, damaged or unsuitable or which in any way fail to comply with or be in strict accordance with the provisions and requirements of the Contract or applicable guarantee and shall pay to the Authority all resulting costs, expenses, losses or damages suffered by the Authority.
- 21.2 If any material, equipment, apparatus or other items brought upon the site for use or incorporation in the Work, or selected for the same, is rejected by the Engineer as unsuitable or not in conformity with the Specifications or any of the other Contract Documents, the Contractor shall forthwith remove such materials, equipment, apparatus and other items from the site of the Work and shall at his own cost and expense make good and replace the same and any material furnished by the Authority which shall be damaged or rendered defective by the handling or improper installation by the Contractor, his agents, servants, employees or subcontractors.

00700-12

BAYSIDE SEWER SYSTEM Date: 11/2019 GENERAL CONDITIONS

ARTICLE 22 - PROTECTION AGAINST WATER AND STORM.

22.1 The Contractor shall take all precautions necessary to prevent damage to the Work by storms or by water entering the site of the Work directly or through the ground. In case of damage by storm or water, the Contractor shall at his own cost and expense make such repairs or replacements or rebuild such parts of the Work as the Engineer may require in order that the finished Work may be completed as required by the Contract.

ARTICLE 23 - RIGHT TO MATERIALS.

23.1 Nothing in the Contract shall be construed as vesting in the Contractor any right of property in the materials, equipment, apparatus and other items furnished after they have been installed or incorporated in or attached or affixed to the Work or the site, but all such materials, equipment, apparatus and other items shall, upon being so installed, incorporated, attached or affixed, become the property of the Authority. Nothing in this subsection shall relieve the Contractor of his duty to protect and maintain all such materials, equipment, apparatus and other items.

ARTICLE 24 - CHANGES IN THE CONTRACT.

- 24.1 **Right to Change**. The Engineer reserves the right to make changes in the Contract at any time during the progress of the work as are necessary to satisfactorily complete the Project. Such changes shall not invalidate the Contract nor release the Surety. The Contractor agrees to perform the work as directed by the Engineer. Any costs applicable to such changes will be paid for by the execution of an appropriate Contract Addendum.
- 24.2 **Causes for Changes**. Changes in the Contract may result from any of the following causes, all of which are defined below by the indicated Subsections of the Rhode Island Standard Specifications for Road and Bridge Construction, 2004 Edition.
 - A. Differing site conditions; Subsection 104.03.
 - B. Alterations in the Plans or Details; additions to, reductions in, or elimination of an existing item of work contained in the Proposal; Subsection 104.04.
 - C. Extra or unforeseen work for which there is no item of work in the Proposal; Subsection 104.05
 - D. Suspension of the work for any reason; Subsection 104.06.
 - E. Significant changes in the character of the work; Subsection 104.07.

ARTICLE 25 - <u>DIFFERING SITE CONDITIONS, CHANGES, EXTRA WORK AND FORCE</u> ACCOUNT.

- 25.1 **Methods of Payment**. Differing site conditions, changes, extra work, and significant changes in the character of the work, all performed in accordance with Section 01010 Scope of Work, Rhode Island Standard Specifications for Road and Bridge Construction, 2004 Edition, will be paid for in accordance with the following methods as appropriate:
 - A. Contract unit prices.
 - B. Unit prices agreed upon in the order authorizing the work.
 - C. An agreed upon lump sum amount.
 - D. If directed by the Authority, on a Force Account Basis to be compensated in the following manner:

i. <u>Labor</u>. For all labor and foremen in direct charge of the specific operations, the Contractor shall receive the rate of wage actually paid as shown by its certified payroll, which rate shall be at least the prevailing rate of wage (or scale), for each and every hour that said labor and foremen are actually engaged in the work.

No part of the salary or expenses of anyone connected with the Contractor's forces above the grade of foreman, and having general supervision of the work, will be included in the labor item as specified above. The Engineer reserves the right to determine the number and type of labor employed.

The Contractor shall receive the actual costs paid to, or in behalf of, workers by reason of subsistence and travel allowances, health and welfare benefits, pension fund benefits or other benefits, when such amounts are required by collective bargaining agreement or other employment contract generally applicable to the classes of labor employed on the work.

An amount equal to 20 percent of the sum of the above items will also be paid the Contractor.

- ii. <u>Bond, Insurance and Tax.</u> For property damage, liability, worker's compensation insurance premiums, unemployment insurance contributions, and social security taxes incurred on force account work, the Contractor shall receive the actual cost, to which cost a surcharge of 6-percent will be added. The Contractor shall furnish satisfactory evidence of the rate or rates paid for such bonds, insurances and taxes.
- iii. <u>Materials</u>. For materials accepted by the Engineer and used in the work, the Contractor shall receive the actual cost of such materials delivered to the site, including transportation charges paid (exclusive of machinery rentals as hereinafter set forth), to which cost a surcharge of 15 percent will be added. The Contractor will not be reimbursed for any penalty or carrying charge incurred due to late or delayed payment for materials used in the work.
- iv. <u>Equipment</u>. For any machinery or special equipment (other than small tools) including transportation cost, the use of which has been authorized by the Engineer, the Contractor shall receive either the "hourly rental rates" as prescribed herein by the Authority, or the actual documented cost plus an amount equal to 10 percent of said actual documented cost, whichever is less. Under no circumstance shall the payment exceed the replacement cost of the equipment.

All rental rates shall include the estimated operating cost as indicated for that equipment in either the Rental Rate Blue Book or the Rental Rate Blue Book for Older Equipment, including the Rate Adjustment Tables approved for projects wholly or partially funded by the Federal Highway Administration (FHWA). Operators' wages are not included in the estimated operating cost and are paid separately, except for certain specified equipment in which the operator's wages are included. Rental rates shall be submitted to the Authority prior to the start of construction work.

The "hourly rental rate" for an individual piece of equipment shall be determined by dividing the associated monthly rate, modified by the Rate Adjustment Tables, as contained in the Rental Rate Blue Book by one hundred seventy-six (176). There will be no adjustment to the hourly rate for the period of use.

For rented equipment, the cost shall be based on the actual documented cost plus an amount equal to 10 percent of said actual documented cost, subject to the conditions set forth below. The actual documented cost shall consist of the paid invoice for rented equipment plus other documented operating costs (i.e., fuel, maintenance, repairs, etc.).

Actual documented costs plus 10 percent of said costs shall not exceed the cost as calculated from the RENTAL RATE BLUE BOOK or the RENTAL RATE BLUE BOOK FOR OLDER CONSTRUCTION EQUIPMENT. The Contractor shall submit documentation for both the hourly rental rates and actual documented costs to determine that the actual documented costs plus 10 percent of said costs does not exceed the calculated rental rate costs. No percentage surcharges will be added to the "Blue Book" rates as prescribed herein for rented equipment.

For equipment which is already on the project, the rental period shall start when such equipment is ordered to work by the Engineer, and shall continue until ordered to stop work.

For equipment which has to be brought to the project specifically for use on force account work, the Authority will pay all loading and unloading costs, and all transportation costs to and from the project, including assembling and dismantling, provided, however, that the cost of return transportation shall not exceed that of moving the equipment to the project. Loading, unloading and transportation costs will not be paid if the equipment is used for work other than force account work while on the project. The rental period shall start at the time the equipment is ready for operation, and shall extend during the period of time the equipment is actually utilized on force account work. The rental period shall end when the equipment is released by the Engineer.

All equipment, including trucks, shall in the judgment of the Engineer, be in good working condition and suitable for the purpose intended. The Engineer reserves the right to determine the number of units of the various types of equipment to be employed on force account work. The manufacturer's model identification shall be the basis for identifying the type of equipment for payment purposes. Certification for the model year of the equipment will be required.

- v. <u>Subcontracting</u>. For work performed by a subcontractor, the Contractor shall accept as full payment therefore, an amount equal to the actual cost to the Contractor of such work performed by the subcontractor as determined by the Engineer, plus 10 percent of said cost.
- vi <u>Miscellaneous</u>. No additional allowance will be made for general superintendence, the use of small tools, or other costs for which no specific allowance is herein provided.
- vii. <u>Compensation</u>. The Contractor's representative and the Engineer shall daily compare records of work completed on a force account basis. The Engineer will then prepare the daily work sheets and said sheets will be signed by the Contractor's representative no later than noon of the next working day.
- viii. <u>Statements</u>. No payment will be made for work performed on a force account basis until the Contractor has furnished the Engineer with six copies of itemized statements of the cost of such work, incurred on a daily basis, and detailed as follows:
 - Name, classification, date, daily hours, total hours, rate and extension for each laborer and foreman.
 - 2) Designation, dates, daily hours, total hours, rental rate, and extension for each unit of machinery and equipment.
 - 3) Quantities of materials, prices, and extensions.
 - 4) Transportation of materials.
 - 5) Cost of property damage, liability and worker's compensation insurance premiums, unemployment insurance contributions, and social security taxes.

Statements shall be accompanied and supported by certified payrolls, and receipted invoices for all materials used and transportation charges. However, if materials used on the force account work are not specifically purchased for such work but are taken from the Contractor's stock, then in lieu of the invoices, the Contractor shall furnish an affidavit certifying that such materials were taken from its stock, that the quantity claimed was actually used, and that the price and transportation claimed represent the actual cost to the Contractor.

ARTICLE 26 - EXTENSION OF TIME ON ACCOUNT OF EXTRA WORK.**

When extra work is ordered near the completion of the Contract or at any time during the progress of the Work which unavoidably increases the time for the completion of the Work, and extension of time shall be granted as hereinbefore provided.

ARTICLE 27 - CHANGES NOT TO AFFECT BONDS.

27.1 It is expressly agreed and understood that any changes made in the Work or the Drawings or Specifications therefor (whether such changes increase or decrease the amount thereof or the time required for its performance) or any changes in the manner of time of payments made by the Authority to the Contractor, or any other modifications of the Contract, shall in no way annul, release, diminish or affect the liability of the Surety on the CONTRACT BONDS given by the Contractor, it being the intent hereof that notwithstanding such changes the liability of the Surety on said bonds continue and remain in full force and effect.

00700-16

ARTICLE 28 - CLAIMS FOR DAMAGES.

- 28.1 If the Contractor makes claim for any damages alleged to have been sustained by breach of contract or otherwise, he shall, within ten (10) days after occurrence of the alleged breach or within ten (10) days after such damages are alleged to have been sustained, whichever date is the earlier, file by Certified Mail with the Engineer and Authority a written, itemized statement in triplicate of the details of the alleged breach and the details and amount of the alleged damages. The Contractor agrees that unless such statement is made and filed as so required, his claim for damages shall be deemed waived, invalid and unenforceable, and that he shall not be entitled to any compensation for any such alleged damages. Within ten (10) days after the timely filing of such statement, the Engineer shall file with the Authority one copy of the statement, together with his recommendations for action by the Authority.
- The Contractor shall not be entitled to claim any additional compensation for damages by reason of any direction instruction, determination or decision of the Engineer, nor shall any such claims be considered, unless the Contractor shall have complied in all respects with **Para. 4.a.1.** of this Section entitled "**Authority of the Engineer,**" including, but not limited to the filing of a written protest in the manner and within the time therein provided.

ARTICLE 29. ABANDONMENT OF WORK OR OTHER DEFAULT.

29.1 If the Work shall be abandoned, or any part thereof shall be sublet without previous written consent of the Authority, or the Contract or any moneys payable hereunder shall be assigned otherwise than as herein specified, or if at any time the Engineer shall be of the opinion, and shall so certify in writing, that the conditions herein specified as to rate of progress are not being complied with, or that the Work or any part thereof is being unnecessarily or unreasonably delayed, or that the Contractor has violated or is in default under any of the provisions of the Contract, or if the Contractor becomes bankrupt or insolvent or goes or is put into liquidation or dissolution, either voluntarily or involuntarily, or petitions for an arrangement or reorganization under the Bankruptcy Act, or makes a general assignment for the benefit of creditors or otherwise acknowledges insolvency, the happening of any of which shall be and constitute a default under the Contract, the Authority may notify the Contractor in writing, with a copy of such notice mailed to the Surety, to discontinue all Work or any part thereof; thereupon the Contractor shall discontinue such Work or such part thereof as the Authority may designate; and the Authority may, upon giving such notice, by contract or otherwise as it may determine, complete the Work or such part thereof and charge the entire cost and expense of so completing the Work or such part thereof to the Contractor. In addition to the said entire cost and expense of completing the Work, the Authority shall be entitled to reimbursement from the Contractor and the Contractor agrees to pay to the Authority any losses, damages, costs and expenses, including attorney's fees, sustained or incurred by the Authority by reason of any of the foregoing causes. For the purposes of such completion the Authority may for itself or for any Contractors employed by the Authority take possession of and use or cause to be used any and all materials, equipment, plant, machinery, appliances, tools, supplies and such other items of every description that may be found or located at the site of the Work.

All costs, expenses, losses, damages, attorney's fees and any and all other charges incurred by the Authority under this subsection shall be charged against the Contractor and deducted and/or paid by the Authority out of any moneys due of payable or to become due or payable under the Contract to the Contractor; in computing the amounts chargeable to the Contractor, the Authority shall not be held to a basis of the lowest prices for which the completion of the Work or any part thereof might have been accomplished, but all sums actually paid or obligated therefor to effect its prompt completion shall be charged to and against the account of the Contractor. In case the costs, expenses, losses, damages, attorney's fees and other charges together with all payments theretofore made to or for the account of the Contractor are less than the sum which would have been payable under the Contract if the Work had been properly performed and completed by the Contractor, the Contractor shall be entitled to receive the difference, and, in case such costs, expenses, losses, damages, attorneys' fees and other charges, together with all payments theretofore made to or for the account of the Contractor, shall exceed the said sum, the Contractor shall pay the amount of the excess to the Authority.

ARTICLE 30 - PRICES FOR WORK.

30.1 The Authority shall pay and the Contractor shall receive the prices stipulated in the BID made a part hereof as full compensation for everything performed and furnished and for all risks and obligations undertaken by the Contractor under and as required by the Contract.

ARTICLE 31 - MONEYS MAY BE RETAINED.

31.1 The Authority may at any time retain from any moneys which would otherwise be payable hereunder so much thereof as the Authority may deem necessary to complete the Work hereunder and to reimburse it for all costs, expenses, losses, damage and damages chargeable to the Contractor hereunder.

ARTICLE 32 - FORMAL ACCEPTANCE.

32.1 This Agreement constitutes an entire contract for one whole and complete Work or result. Fixing of the date of completion and acceptance of the Work or a specified part thereof shall only be effective when accomplished by a writing specifically so stating and signed by the Authority.

ARTICLE 33 - PROGRESS ESTIMATES.

- 33.1 Once a month, except as hereinafter provided, the Engineer shall make an estimate in writing of the total amount and value of the work done to the first of the month by the Contractor. The Authority shall retain 5% of such estimated value as part security for fulfillment of the Contract by the Contractor and shall deduct from the balance all previous payments made to the Contractor, all sums chargeable against the Contractor and all sums to be retained under the provisions of the Contract. The Authority shall pay monthly to the Contractor the balance not deducted and/or retained as aforesaid, except that payment may be withheld at any time if, in the sole judgment of the Engineer, the work is not proceeding in accordance with the Contract. If the Authority deems it expedient to do so, it may cause estimates and payments to be made more frequently than one in each month. No progress estimate or payment need be made when, in the sole judgment of the Engineer, the total value of the work done since the last estimate amounts to less than \$10,000.
- Estimates of lump-sum items shall be based on a schedule 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 must be submitted by the Contractor for and must have the approval of the Engineer before the first estimate becomes due.
- 33.3 If the Engineer determines that the progress of the Work will be benefited by the delivery to the site of certain materials and equipment, when available, in advance of actual requirement therefor and if such materials and equipment are delivered and properly stored, protected and insured as determined by the Engineer, the cost to the Contractor or subcontractor as established by invoices or other suitable vouchers satisfactory to the Engineer, less the retained percentages as above provided, may be included in the progress estimates; provided always that there be duly executed and delivered by the Contractor to the Engineer at the same time a Bill of Sale in form satisfactory to the Authority, transferring and assigning to the Authority full ownership and title to such materials or equipment.

ARTICLE 34 - PARTIAL ACCEPTANCE.

- 34.1 The Authority may, at any time in a written order to the Contractor (a) declare that he intends to use a specified part of the Work which in his opinion is sufficiently complete, in accordance with the Contract Documents, to permit its use; (b) enclose a tentative list of items remaining to be completed or corrected, and (c) fix the date of acceptance of that specified part of the Work.
- Within 45 days after acceptance under this subsection, the Engineer shall make an estimate in writing of the amount and value of the part of the Work so accepted. The Authority shall pay said amount to the Contractor after deducting therefrom all previous payments, all charges against the Contractor as provided for hereunder, and all amounts to be retained under the provisions of the Contract, said payment to be made at the time of the next monthly progress estimate.
- 34.3 Acceptance by the Authority under this subsection shall not relieve the Contractor of any obligations under the Contract Documents except to the extent agreed upon in writing between the Authority and the Contractor.
- 34.4 The Authority shall have the right to exclude the Contractor from any part of the Work which has been accepted, but the Authority will allow the Contractor reasonable access thereto to complete or correct items on the tentative list.

ARTICLE 35 - FINAL ESTIMATE AND PAYMENT.

- 35.1 All quantities shown on progress estimates and all prior payments shall be subject to correction in the final estimate and payment as determined by the Engineer.
- 35.2 The acceptance by the Contractor of final payment shall be and shall operate as a release to the Authority of all claims and all liability to the Contractor under or by virtue of this Agreement; and upon satisfactory completion of the work performed under this Agreement, as a condition before final payment under this Agreement or as a termination settlement under this Agreement the Contractor shall execute and deliver to the Authority a release of all claims against the Authority arising under or by virtue of, this Agreement, except claims which are specifically exempted by the Contractor to be set forth herein. Unless otherwise provided in this Agreement, by State law or otherwise expressly agreed to be the parties to this Agreement, any payment, including final payment under, this Agreement or settlement upon termination of this Agreement shall not

00700-19

constitute a waiver of the Authority's claims against the Contractor or his sureties under this Agreement or applicable Performance and Labor and Materials Bonds.

ARTICLE 36 - LIENS.

36.1 If at any time any notices of lien are filed and labor performed or materials or equipment manufactured, furnished, or delivered to or for the Work, the Contractor shall, at its own cost and expense, promptly discharge, remove or otherwise dispose of the same, and until such discharge, removal or disposition, the Authority shall have the right to retain from any moneys payable hereunder an amount which, in its sole judgment, it deems necessary to satisfy such liens and pay the costs and expenses, including attorneys' fees, of defending any actions brought to enforce the same, or incurred in connection therewith or by reason thereof.

ARTICLE 37 - CLAIMS.

37.1 If at any time there be any evidence of any claims for which the Contractor is or may be liable or responsible hereunder, the Contractor shall promptly settle or otherwise dispose of the same, and until such claims are settled or disposed of, the Authority may retain from any moneys which would otherwise be payable hereunder so much thereof as, in its sole judgment, it may deem necessary to settle or otherwise dispose of such claims and to pay the costs and expenses, including attorney's fees, of defending any actions brought to enforce such claims, or incurred in connection therewith or by reason thereof.

ARTICLE 38 - APPLICATION OF MONEYS RETAINED.

38.1 The Authority may apply any moneys retained hereunder to reimburse itself for any and all costs, expenses, losses, damage and damages, liabilities, suits, judgments and awards incurred, suffered or sustained by the Authority and chargeable to the Contractor hereunder or as determined hereunder.

ARTICLE 39 - NO WAIVER.

39.1 Neither the inspection by the Authority or the Engineer, nor any order, measurement, approval, determination, decision or certificate by the Engineer, nor any order by the Authority for the payment of money, nor any payment for or use, occupancy, possession or acceptance of the whole or any part of the Work by the Authority, nor any extension of time, nor any other act or omission of the Authority or of the Engineer shall constitute or be deemed to be an acceptance of any defective or improper work, materials, or equipment nor operate as a waiver of any requirement or provision of the Contract, nor of any remedy, power or right of or herein reserved to the Authority, nor of any right to damages for breach of contract. Any and all rights and/or remedies provided for in the Contract are intended and shall be construed to be cumulative; and, in addition to each and every other right and remedy provided for herein or by law, the Authority shall be entitled as of right to a writ of injunction against any breach or threatened breach of the Contract by the Contractor, by his subcontractors or by any other person or persons.

ARTICLE 40 - LIABILITY OF AUTHORITY.

40.1 No person, firm or corporation, other than the Contractor who signed this Contract as such, shall have any interest herein or right hereunder. No claim shall be made or be valid either against the Authority or any agent of the Authority and neither the Authority nor any agent of the Authority shall be liable for or be held to pay any money, except as herein provided. The acceptance by the Contractor of the payment as fixed in the final estimate shall operate as and shall be a full and complete release of the Authority and of every agent of the Authority of and from any and all claims, demands, damages and liabilities of, by or to the Contractor for anything done or furnished for or arising out of or relating to or by reason of the Work or for or on account of any act or neglect of the Authority or of an agent of the Authority or of any other person, arising out of, relating to or by reason of the Work, except the claim against the Authority for the unpaid balance, if any there be, of the amounts retained as herein provided.

ARTICLE 41 - GUARANTEE.

- 41.1 The Contractor guarantees that the Work and services to be performed under the Contract, and all workmanship, materials and equipment performed, furnished, used or installed in the construction of the same, shall be free from defects and flaws, and shall be performed and furnished in strict accordance with the Drawings, Specifications, and other Contract Documents, that the strength of all parts of all manufactured equipment shall be adequate and as specified and that the performance test requirements of the Contract shall be fulfilled. This guarantee shall be for a period of one year from and after the date of completion and acceptance of the Work as stated in the final estimate. If part of the Work is accepted the guarantee for that part of the Work shall be for a period of one year from the date fixed for such acceptance.
- 41.2 Furthermore, if at any time within the said period of guarantee any part of the Work requires repairing, correction or replacement, the Authority may notify the Contractor in writing to make the required repairs, correction, or replacements. If the Contractor neglects to commence making such repairs, correction, or replacements to the satisfaction of the Authority within three (3) days from the date of receipt of such notice, or having commenced fails to prosecute such Work with diligence, the Authority may employ other persons to make the same, and all direct and indirect costs of making said repairs, correction or replacements, including compensation for additional professional services, shall be paid by the Contractor.

ARTICLE 42 - RETAIN MONEY FOR REPAIRS.

- 42.1 The Authority may retain out of the moneys otherwise payable to the Contractor hereunder 1% of the amount thereof, and may expend the same, in the manner hereinafter provided, in making such repairs, corrections and replacements in the Work as the Authority, in its sole judgment, may deem necessary.
- 42.2 Furthermore, if at any time within the said period of guarantee any part of the Work requires repairing, correction or replacement, the Authority may notify the Contractor in writing to make the required repairs, correction or replacements. If the Contractor neglects to commence making such repairs, correction, or replacements to the satisfaction of the Authority within three (3) days from the date of receipt of such notice, or having commenced fails to prosecute such work with diligence, the Authority may employ other persons to make the same. The Authority shall pay the cost and expense of the same out of the amounts retained for that purpose. Upon the expiration of the said period of guarantee, provided that the Work at that time is in good order, the Contractor

00700-21

will be entitled to receive the whole or such part of the sum last aforesaid, if any, as may remain after the cost and expense of making said repairs, correction or replacements, in the manner aforesaid, have been paid therefrom.

ARTICLE 43 - RETURN OF DRAWINGS.

43.1 All Drawings furnished by the Authority or the Engineer to the Contractor may be used only in connection with the prosecution of the Work and shall be returned by the Contractor upon completion of the Work.

ARTICLE 44 - <u>CLEANING UP</u>.

44.1 The Contractor at all times shall keep the site of the Work free from rubbish and debris caused by his operations under the Contract. When the Work has been completed, the Contractor shall remove from the site of the Work all of his plant, machinery, tools, construction equipment, temporary work, and surplus materials so as to leave the Work and the site clean and ready for use.

ARTICLE 45 - LEGAL ADDRESS OF CONTRACTOR.

45.1 The 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 the Contractor, and the date of such service shall be the date of receipt. The first-named address may be charged at any time by an instrument in writing, executed and acknowledged by the Contractor delivered to the Engineer. Service of any notice, letter, or other communication upon the Contractor personally shall likewise be deemed sufficient service.

ARTICLE 46 - HEADINGS.

46.1 The headings or titles of any section, subsection, paragraph, provision, or part of the Contract Documents shall not be deemed to limit or restrict the content, meaning or effect of such section, subsection, paragraph, provision or part.

ARTICLE 47 - MODIFICATION OR TERMINATION.

47.1 Except as otherwise expressly provided herein, the Contract may not be modified or terminated except in writing signed by the parties hereto.

ARTICLE 48 - REMEDIES AND ARBITRATION.

- 48.1 The Contractor's attention is directed to the fact that this Contract is subject to the Public Works Arbitration Act of R.I. General Laws Section 37-16-1 et., seq.
 - A. Unless otherwise provided in this agreement, all claims, counterclaims, disputes and other matters in question between the Authority and the Contractor arising out of, or relating to, this Agreement or in performance interpretation or breach of it will be decided by arbitration

- at the election of either party, or in a court of competent jurisdiction within the State in which the Authority is located.
- B. Any dispute to be arbitrated shall be done so in accordance with the Construction Industry Arbitration Rules and Regulations of the American Arbitration Association, and judgment upon the award rendered by the Arbitrator(s) may be entered in any court having jurisdiction thereof.
- C. However, to the extend allowed by law, if neither party wishes to elect arbitration, and if both parties agree, such claim or controversy may be litigated in a court of competent jurisdiction, as provided in this Agreement. Furthermore, if either party elects to bring such claim or controversy to arbitration, it shall first notify the other party and allow that other party ten (10) calendar days (before filing) within which to have the claim mediated, and shall negotiate in good faith during any such mediation effort.
- D. In addition, the method of the appointment of an arbitrator shall vary from the method set forth in Article 13 (Appointment form Panel) of the American Arbitration Association (AAA) Construction Industry Arbitration Rules only so far as that: the AAA shall submit a second, but no further, set of lists should the parties fail to agree upon any of the persons names, or if acceptable arbitrators are unable to act, or if for any other reason the appointment cannot be made from the original submitted lists. If for any reason an appointment cannot be made from the second set of lists, the AAA shall have the power to make the appointment from other members of the Panel without the submission of any additional lists.

ARTICLE 49 - RIGHTS-OF-WAY and SUSPENSION OF WORK

- 49.1 Land and rights-of-way for the purposes of this Contract will be furnished by the Owner. The Owner will use due diligence in acquiring said land and rights-of-way as speedily as possible. However it is possible that all lands and rights-of-way may not be obtained as herein contemplated before construction begins, in which event the Contractor shall begin his work upon such land and rights-of-way as the Owner may have previously acquired.
- 49.2 No claim for damages whatsoever will be allowed by reason of the delay in obtaining the remaining lands and rights-of-way. Should the Owner be prevented or enjoined from proceeding with the work or from authorizing its prosecution, either before or after the commencement by reason of any litigation, or by reason of its inability to procure any lands or rights-of-way for the said work, the Contractor shall not be entitled either to make or assert claim for damage by reason of said delay, or to withdraw from the Contract except by consent of the Owner. Time for completion of the work will be extended to such time as the Owner determines will compensate for the time lost by such delay; such determination to be set forth in writing.

INSURANCE CERTIFICATE

SHEET 1 OF 2

Issued to

The City of Warwick, Rhode Island

This i	s to certify that this Com	pany,		,
		y) has enforced the f	ollowing policie	s covering all work and operations
of				
				ct with the City of Warwick, Rhode
Island	I, as the designated Own	er, dated		,
said (Contract entitled BAYSII	DE SEWER SYSTEM	, CONTRACT N	O. 86B.
	CY NUMBER			
	CTIVE AND			
KIND	S OF INSURANCE	LIMITS	EXPIRATIO	ON DATE
Work	er's Compensation		Number:	
	mployers Liability and		Effective:	
	or Workers Coverage *		Expires:	
Dubli	a Liability including	Podily \$ and		Number
	c Liability including actor's Protective	Bodily \$ eacl Injury	i occurrence	
				Effective:
	nal Injury, Completed	\$ agg	regate	Expires:
	tions, and Contractual	Duomontes		
Liabil	ity***	Property	1	
		Damage \$ eac	en occurrence	
		including		
ale ale ale 🖹 T		C.U.		
N		Coverage\$	_ aggregate	
•	sion Collapse			
	nderground coverage	Personal		
is pro	vided	Injury \$ agg	regate	
*	Longshoremen's and I contract.	Harbor Workers' Cover	rage may be dele	ted if not required by
**	Contractual Liability	covers the liability assu	med by the Con	tractor under the
	subsection entitled "O			
	required by subsection			
***	Blasting coverage is n		ugroomen.	

INSURANCE CERTIFICATE

SHEET 2 OF 2 Issued to

The City of Warwick, Rhode Island

Contract Reference: City of Warwick, Rhode Island,

BAYSIDE SEWER SYSTEM CONTRACT NO. 86B.

POLICY NUMBER EFFECTIVE AND KINDS OF INSURANCE	LIMITS	EXPIRATION DATE
Automobile Liability including Coverage for Injury hired or borrowed vehicles	Bodily \$ each person each occurrence	Number: Effective: Expires:
	Property Damage \$ each occurrence	ce
Owner's Protective Liability and Property Damage	Bodily \$ each occurrence Injury \$ aggregate	ee Number: Effective:
	Property\$ each occurrence Damage\$ aggregate	ce
Note: A copy of the Owner's completed certificates.	Protective Policy for the City is t	o be furnished with the

00700- 25

BAYSIDE SEWER SYSTEM Date: 11/2019 GENI

s shall be mailed to the Authority.	
INSURANCE COMPANY	-
INSURANCE AGENCY	-
By:AUTHORIZED AGENT OR OFFICER	
DATE:	

It is agreed that ten (10) days' notice of cancellation or restrictive amendment of said

SECTION 00800

SUPPLEMENTAL CONDITIONS

ARTICLE 1 – WORK TO BE ACCOMPLISHED IN ACCORDANCE WITH THE DRAWINGS AND SPECIFICATIONS

1.1 The Work, during its progress and at its completion, shall conform to: the Contract Documents and to the directions given by the Owner from time to time, subject to such modifications or additions as it shall determine to be necessary during the execution of the Work; and in no case will any Work be paid for in excess of such requirements.

ARTICLE 2 - CONTRACTOR TO CHECK DIMENSIONS AND SCHEDULES

2.1 The Contractor will be required to check all dimensions and quantities shown in the Contract Documents or schedules given to him by the Owner, and shall notify the Engineer and the Owner of all errors therein which it may discover by examining and checking the same. The Contractor shall not take advantage of any error or omission in the Contract Documents. The Owner will furnish all instructions should such error or omission be discovered, and the Contractor shall carry out such instructions as if originally specified.

ARTICLE 3 – HURRICANE PROTECTION

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

ARTICLE 4 - FIRST AID TO INJURED

4.1 The Contractor shall keep in its office on site ready for immediate use, all articles necessary for giving first aid to injured persons. It shall also make arrangements for the immediate removal and hospital treatment of any persons injured on the Project who may require the same.

ARTICLE 5 - CONFORMANCE WITH DIRECTIONS

5.1 The Engineer may make alterations in the lines, grade, plan, form dimensions or materials of the Work, or any part thereof, either before or after the commencement of construction by means of a Change Order. If such alterations diminish the quantity of work to be done, the deduction in the Contract Price will be determined by the Unit Price proposed by the Contractor, and the Contractor shall have no claim for damages or for anticipated profits on the Work that thus may be dispensed with. If the alterations increase the quantity, such increase shall be paid for at the stipulated Unit Price.

ARTICLE 6 -PROTECTION AGAINST HIGH WATER AND STORM

- 6.1 The Contractor shall take all precautions to prevent damage to the Work or equipment by high waters or by storms. The Engineer, with the approval of the Owner, may prohibit the carrying out of any Work at any time when in its judgment, high waters or storm conditions are unfavorable or not suitable, or at any time, regardless of the weather, when proper precautions are not being taken to safeguard previously constructed work or work in progress.
- 6.2 In case of damage caused by the failure of the Contractor to take adequate precautions, the Contractor shall repair or replace equipment damaged and shall make such repairs or rebuild such parts of the damaged Work, as the Owner may require, at no additional expense to the Owner.

ARTICLE 7 – COMPETENT HELP TO BE EMPLOYED

7.1 The Contractor shall employ experienced foremen, craftsmen and other workmen competent in the Work in which they are to be engaged. All Work shall be accomplished by able, skilled and competent personnel. If any person employed on the Work by the Contractor shall appear to be incompetent or unreliable in any way, he/she shall be discharged immediately upon the request of the Owner and shall not again be employed on the Work.

ARTICLE 8 - STREETS TO BE KEPT OPEN

8.1 The Contractor shall at all times keep the public streets, driveways in which it may be at work open for pedestrian and vehicular traffic. Under no circumstances shall traffic on this route be blocked, unless approved by the City of Warwick.

ARTICLE 9 – LIGHTS, BARRIERS, FENCES, WATCHMEN AND INDEMNITY

- 9.1 The Contractor shall put up and maintain such barriers, fences, lighting and warning lights, danger warning signals and signs as will prevent accidents during the construction work, and protect the Work and insure the safety of personnel and the public at all times and places; and the Contractor shall defend, indemnify and save harmless the Engineer, the Owner and its agents, in every respect from any injury or damage whatsoever caused by an act, omission or neglect of the Contractor or its agents, including any claims arising out of failure to erect and maintain sufficient railing or fencing. The fact that the Owner may retain control of the premises, or that it or its agent may take action to erect or maintain railings or fences, shall not relieve the Contractor's obligations hereunder.
- 9.2 The Contractor shall furnish, maintain and use all necessary safety devices and safe practices in prosecution of the Work and to adopt, follow and maintain such additional safety measures as in the opinion of the Engineer with the approval of the Owner are conducive to safe operation by the Contractor. The Owner shall have the right to order any or all work suspended where, in the Engineer's opinion, such work is not being carried on in a safe and proper manner, or where persons and property are not being properly protected or safeguarded and such work shall not be resumed until the Owner's requirements have been met and the Owner has directed that the Work be resumed. The Work required by the preceding paragraph shall be totally at the Contractor's expense.

9.3 In addition to the above, when and as necessary, or when required by the Engineer, with the approval of the Owner, the Contractor shall post signs and employ watchmen, flagmen, or police officers for the direction of traffic at the site and for excluding at all times unauthorized persons from the Work, for which the Contractor will not be paid additional compensation.

ARTICLE 10 - WORK OUTSIDE REGULAR HOURS

10.1 The Contractor will be permitted to work Monday through Friday 7:00 A.M. through 3:30 P.M., Monday through Friday. Work on weekends or holidays, and extended weekday hours will not be permitted without the approval of the Owner and the City of Warwick. The lighting, safety, and other facilities which are deemed necessary by the Owner for performing such night work shall be provided by the Contractor. For night work, work on Saturdays and Sundays or legal holidays, the Contractor will receive no extra payment, but compensation shall be considered as having been included in the prices stipulated for appropriate items of Work as listed in the Proposal.

ARTICLE 11 - WORK IN COLD AND INCLEMENT WEATHER

- 11.1 The Owner will determine when site conditions are unfavorable for work, and may order the Work or any portion of it suspended whenever, in its opinion, the conditions are not such as will insure first class work. In general, work shall be prosecuted throughout the Contract period; and the Contractor will be expected to keep going, and employ labor, as continuously as possible.
- All methods and materials used in the performance and for the protection of the Work in cold and inclement weather, shall be subject to the approval of OWNER. CONTRACTOR shall take necessary precautions for protecting the Work from damage. The materials necessary to comply with the above requirements shall be considered to be included in the prices stipulated for the appropriate items of work, as listed in the Bid.
- 11.3 Should OWNER stop the Work due to unfavorable conditions at the site, an appropriate adjustment in the Contract Time will be made. No adjustment in Contract Price will be made as a result of any temporary suspension of the Work due to unfavorable weather conditions at the site.

ARTICLE 12 - BLASTING AND EXPLOSIVES

12.1 All rock excavation requiring blasting must be performed with the consent of the Owner, City of Warwick, utility companies present in the area of the Work, and the State Fire Marshall.

ARTICLE 13 – TUNNELING NOT PERMITTED

13.1 Tunneling will not be permitted without the consent of the Owner and the City of Warwick.

ARTICLE 14 - RESERVED MATERIALS

14.1 Materials found in the Work site suitable for any special use shall be reserved for that purpose. Where specifically permitted by the Owner, the Contractor may use in the various parts of the Work, without charge therefore, any materials taken from the excavation.

ARTICLE 15 – LENGTH OF TRENCH TO BE OPENED, MAINTAINING PREMISES FREE FROM OBSTRUCTIONS, CROSSOVERS, DIRECTIONAL SIGNS AND LIGHTS

- 15.1 The length of trench opened at any time, from the point where ground is being broken to completed backfill, and also the amount of space in streets or public and private lands occupied by equipment, trench, and supplies, shall not exceed the length or space considered reasonably necessary and expedient by the Engineer. As to the length of open trench or spaces for equipment, materials, supplies and other necessities, the Engineer will consider: the nature of the lands or streets where work is being done; types and methods of construction and equipment being used; inconvenience to the public or to private parties; possible dangers; and other proper matters. All work must be constructed with a minimum of inconvenience and danger to the public and all other parties concerned.
- 15.2 Whenever any trench obstructs pedestrian and vehicular traffic in or to any public street, private driveway or property entrance, or on private property, the Contractor shall take such means as may be necessary to maintain pedestrian and vehicular traffic and access. Until such times as the Work may have attained sufficient strength to support backfill, or if for any other reason, it is not expedient to backfill the trench immediately, the Contractor shall construct and maintain suitable plank crossings and bridges to carry essential traffic in or to the street, driveway or property in question, as specified or directed.
- 15.3 Suitable signs, lights, and such items required by police authorities to direct traffic, shall be furnished and maintained by the Contractor.
- 15.4 The Contractor must keep streets and premises free from unnecessary obstructions, debris, and all other materials. The Engineer may, at any time, order all equipment, materials, surplus from excavations, debris and all other materials lying outside that length of working space, promptly removed. Should the Contractor fail to remove such material within 24 hours after notice to remove the same, the Owner may cause any part or all of such materials to be removed by such persons as it may employ, at the Contractor's expense, and may deduct the costs thereof from payments which may be, or may become, due to the Contractor under the Agreement. In special cases, where public safety urgently demands it, the Owner may cause such materials to be removed without prior notice, at the Contractor's expense.

ARTICLE 16 - EXISTING UTILITIES OR CONNECTIONS

- 16.1 The location of existing underground pipes, conduits, and structures, as shown, has been collected from the best available sources. The Owner, together with its agents, does not guarantee the completeness of the data and information showing underground pipes, conduits, structures and such other parts, nor their locations as indicated. The Contractor shall assume that there are existing water connections to each and every building enroute, whether they appear on the Drawings or not. Any expense and/or delay occasioned by utilities and structures, or damage thereto, including those items not shown, shall be the responsibility of the Contractor, at no additional expense to the Owner.
- Before proceeding with construction operations, the Contractor shall notify the State of Rhode Island Utilities Underground Plant Damage Prevention Systems (DIG SAFE at 811 or 1-888-344-7233), and shall make such supplemental investigations, including exploratory excavations, by hand digging, as it deems necessary to uncover and determine the exact locations of utilities and

00800 - 4

structures, and it shall have no claims for damages due to encountering subsurface structures or utilities in locations other than shown on the Drawings, or which are made known to the Contractor prior to construction operations. The Contractor shall be responsible and liable for all damages to the existing utilities and structures.

ARTICLE 17 – INTERFERENCE WITH EXISTING UTILITIES AND STRUCTURES

- Whenever it may be necessary to cross or interfere with existing culverts, drains, sewers, water pipes, overhead lines or fixtures, guardrails, fences, gas pipes or fixtures, or other structures and service connections needing special care, due notice shall be given to the Engineer and any affected utility or authority, and the Work shall be done according to the utility or authority's directions. Whenever required, all objects shall be strengthened to meet any additional stress that the Work herein specified may impose upon them, and any damage caused shall be thoroughly repaired. The entire Work shall be the responsibility of the Contractor, and the Work shall be performed at no additional expense to the Owner.
- 17.2 The Contractor shall be responsible for all broken mains or utilities encountered during the progress of the Work, and shall cause to be repaired and be responsible for correcting all damages to existing utilities and structures at no additional expense to the Owner. The Contractor shall contact the proper utility or authority to correct or make any changes due to utility or other obstructions during the Work, but the entire responsibility and expense shall be with the Contractor.
- 17.3 All damaged items of Work, or items required to be removed and replaced due to construction, shall be replaced or repaired by the Contractor to the complete satisfaction of the property owners, and/or the Engineer and the Owner, at no additional expense to the Owner.

ARTICLE 18 - RECORD DRAWINGS

- 18.1 The Contractor will be furnished with a complete set of prints of all Contract Drawings, which shall be used exclusively for incorporating thereon, the as-built record of all Contract Work as the construction progresses. The Contractor will be required to furnish, at no additional expense to WSA, the services of a Rhode Island registered surveyor and/or engineer under whose direction shall be obtained and recorded all surveys, measurements and such other data required for the determination of the as-built records of the construction of all Contract Work.
- 18.2 The complete set of prints shall be maintained at the site at all times, and the Contractor shall be responsible for having clearly, neatly, accurately and promptly recorded thereon, as the Work is performed, the as-built record of the Contract Work. Principal dimensions, elevations, and other data as required shall be recorded on all Work.
- 18.3 At the completion of the Project, the entire set of prints shall be submitted to the Engineer for final inspection and comment; the Contractor shall correct, amplify and do all other work as may be required by the Engineer to complete the as-built drawings in a manner satisfactory of WSA. As-built drawings shall be provided by the Contractor to the Owner not later than forty-five (45) Days after the deadline for completion of Work as delineated in Section 00300 Price Bid Form and Section 00500 Agreement. As-built drawings shall also be provided to the Engineer in digital file format.

ARTICLE 19 - MATERIALS

19.1 All materials furnished and used in the complete Work, shall be new, of best quality workmanship and design, and recognized as standard in good construction practices. Whenever a specification number of reference is given, the subsequent amendments (if any) shall be included. The standards set forth in the selection of materials and supplies are intended to conform with those standards adopted by the Owner. Preference in manufacture shall be given to adopted standards, and the Contractor shall further familiarize itself with the requirements of OWNER when the occasion or choice of materials or supplies so demands.

ARTICLE 20 - DEFECTIVE MATERIALS, INSPECTION AND TESTING OF MATERIALS FURNISHED, SAMPLES AND ORDERING LISTS

- 20.1 No materials shall be laid or used which are known or may be found to be in any way Defective or unfit. Notice shall be given to the Owner and the Engineer of any Defective or imperfect material. Defective or unfit material found to have been laid, shall be removed and replaced by the Contractor with sound and unobjectionable materials, without additional expense to the Owner.
- 20.2 All materials furnished by the Contractor are subject to thorough inspections and tests by the Owner and the Engineer.
- 20.3 The Contractor shall submit samples, as required by the Engineer, of the various materials used on the Project for testing purposes.
- All ordering lists shall be submitted by the Contractor to the Owner and Engineer for approval, and shall be approved before the ordering of materials.

ARTICLE 21 – SANITARY REGULATIONS

- 21.1 Adequate sanitary conveniences for use by workmen on the premises, properly secluded from public observation, shall be provided and maintained by the Contractor in accordance with the requirements of local and State Health authorities. Under no circumstances shall sanitary wastes be allowed to flow on the surface of the ground or be discharged directly or indirectly into any body of water.
- The Contractor shall rigorously prohibit the committing of nuisances upon the lanes or rights-ofway of the Owner, about the Work or upon adjacent public or private property.
- 21.3 The cost of the sanitary conveniences and maintaining same will not be paid for separately, but compensation will be considered to be included in the prices stipulated for the appropriate items of work as listed in the Bid.

ARTICLE 22 – SPIRITUOUS LIQUORS

22.1 Under the work embraced in this Contract, the Contractor shall neither permit, nor suffer the introduction or use of, spirituous liquors, or controlled substances of any kind or description, unless the use of same is ordered by a physician, and the use will not jeopardize the safety of personnel, property or equipment.

00800-6

ARTICLE 23 - FINISHING AND CLEANING UP

23.1 The Contractor shall replace all surface material to the satisfaction of the Owner, and shall then immediately remove surplus materials, and all tools and other property, leaving the site free and clean and in good order, at no additional expense to the Owner. The removal of materials shall follow closely upon the completion of the Work. The Contractor shall exercise special care in keeping right-of-way and private and public lands upon which the Work is to be performed, clean and free of debris at all times, and to remove tools and other property belonging to the Contractor when they are not being used. Before the Work will be considered complete, the Contractor shall thoroughly clean all structures and their appurtenances.

ARTICLE 24 - CLEAN-UP AT CONTRACTOR'S EXPENSE

24.1 In case the Contractor shall fail or neglect to promptly remove all surplus materials, tools and other incidentals, OWNER may, after 24 hours' notice, cause the work to be done, and the cost thereof shall be deducted from any monies then or thereafter due to the Contractor.

ARTICLE 25 – RIGHTS OF ACCESS

25.1 Nothing herein contained or provided in the Contract Documents shall be construed as giving the Contractor exclusive occupancy of the Work areas involved. The Owner or any other the Contractor employed by it, the various utility companies, contractors or subcontractors employed by federal, state or local governmental agencies, or other utility firms or agencies involved in the general Project or upon public rights-of-way, may enter upon, or cross the area of Work, or occupy portions of it, as directed or permitted. When the territory of one contract is the convenient means of access to the other, each contractor shall arrange its work in such manner as to permit such access to the other, and prevent unnecessary delay to the Work as a whole.

ARTICLE 26 - LOADING

26.1 No part of the structures involved in this Contract shall be loaded during construction with a load greater than that it can carry with safety. Should any accidents or damage occur through any violation of this requirement, the Contractor will be held responsible under its Contract and Bond.

ARTICLE 27 - CONTRACTOR TO LAY OUT HIS/HER OWN WORK

- 27.1 The Owner will establish such general reference points as in its judgment will enable the Contractor to proceed with the Work. The Contractor, at its own expense, shall provide all materials and equipment and such qualified helpers as the Owner may require for setting the general reference points, and shall protect and preserve all stakes, benches and other markers used to identify the reference points. The Contractor shall lay out all the Contract Work from the above, and shall be responsible for the accuracy of all lines, grades and measurements. The Contractor will be required to employ, at no additional expense to the Owner, a Rhode Island Registered Land Surveyor or Registered Professional Engineer who shall perform all layout work for the construction of this Contract Work, including all lines, grades and measurements.
- 27.2 The Contractor shall engage a Land Surveyor or Professional Engineer licensed in the State of Rhode Island, to perform those services specified within. At a minimum, a licensed surveyor will be required to furnish all surveys, measurements, and other data used to compute quantities and prepare final as-built drawings as specified in the Contract Documents.

00800 - 7

- 27.3 Survey Procedures: Before proceeding with the layout of actual work, verify the established control information shown on the Drawings. As the Work proceeds, locate and place all cut, range, line, final grade, or other stakes and points, as may be directed by the Engineer for the proper progress of the Work. Maintain a surveyor's log or record book of such checks; make this log or record book available for the Engineer's reference. Record deviations from required lines and levels, and advise the Engineer promptly upon detection of deviations that exceed indicated or recognized tolerances. Record deviations which are accepted, and not corrected, on as-built drawings.
- 27.4 The Engineer may check all or any portion of the stakeout survey work or notes made by the Contractor and have the Contractor make any necessary corrections to the Work immediately. Such checking by the Engineer will not relieve the Contractor of any responsibility for the accuracy or completeness of his/her work.

ARTICLE 28 - COMPLETENESS OF WORK

28.1 In addition to the specified or described portions, all other work, materials, equipment, and labor of whatever description which are necessary or required to complete the Work or carry out the full intent of the Contract Documents, as interpreted by the Owner, shall be provided by the Contractor. Payment therefore, shall be considered as having been included in the prices stipulated for the appropriate items of Work as listed in the Bid.

ARTICLE 29 - CLEANING FINISHED WORK

29.1 After the Work is completed, the site shall be carefully cleaned and left in first class condition, and ready for use by the Owner. All temporary or excess material shall be disposed of to the satisfaction of the Engineer and the Owner.

ARTICLE 30 - DUST CONTROL

30.1 The Contractor shall exercise every precaution and means to prevent and control dust arising out of his/her construction operations from becoming a nuisance to abutting property owners or surrounding neighborhoods. Continuous dust control using water shall be provided for all earth stockpiles, and surfaces of refilled trenches. No extra payment will be made for providing the control measures and conforming to the requirements specified above, but compensation therefor, shall be considered to be included in the prices stipulated for the appropriate items of work.

ARTICLE 31 - CARE OF THE WORK

31.1 The Contractor shall be responsible for all damages to persons or property that occur as a result of its fault or negligence in connection with the prosecution of the Work, and it shall be responsible for the proper care and protection of all materials delivered, and work performed, until completion and final acceptance, whether or not the same has been covered by partial payments made by the Owner.

ARTICLE 32 – WORK BY OTHERS

32.1 The Owner reserves the right to do any other work which may connect with, become a part of, or be adjacent to, the Work embraced by the Agreement, at any time, by contract or otherwise. The Contractor shall not interfere with or obstruct in any way the work of such other persons as the Owner may employ, and shall execute its own work in such a manner as to aid in the executing of work by others, as may be required.

ARTICLE 33 - FIRE PREVENTION AND PROTECTION

- 33.1 Federal laws (including but not limited to Occupational Safety and Health Act) and all state and municipal rules and regulations with respect to fire prevention, fire-resistant construction, and fire protection, shall be strictly adhered to, and all Work and facilities necessary therefore, shall be provided and maintained by the Contractor in an approved manner.
- All fire protection equipment, such as water tanks, hoses, pumps, extinguisher and other materials and apparatus, shall be provided for the protection of the Contract Work.
- 33.3 Open fires will not be permitted.

ARTICLE 34 - NOT USED

ARTICLE 35 – DAILY REPORTS

35.1 The Contractor shall submit to the Engineer and/or Owner, on an approved form, daily activity reports for the duration of the Project. The reports shall indicate: all personnel currently employed on the Work, including each trade and every Subcontractor; all equipment and whether such equipment was idle for the particular Day; a general description of all work accomplished; and any authorized extra work (time and materials reports shall be submitted on separate forms).

ARTICLE 36 - CERTIFICATES OF CONFORMANCE

36.1 In addition to other requirements specified herein, the Contractor shall furnish to the Owner, in the manner as directed, notarized certificates of conformance for all materials to be furnished under this Contract. The notarized certificates of conformance shall state that the materials to be furnished under this Contract meet the requirements of the Contract Documents. When directed, each shipment of materials shall be accompanied by the manufacturer's notarized certificates of conformance, certifying that the materials meet the requirements or Specifications. Unless otherwise specifically stated, all testing of materials shall be provided by the Contractor at no additional expense to the Owner.

ARTICLE 37 - TEMPORARY POWER AND LIGHT

37.1 The Contractor shall provide, where required and at no additional cost to the Owner, an electrical distribution system with sufficient circuits and receptacle outlets suitable for temporary power and lights during construction. The Contractor shall maintain the services until completion of the Project, at which time it shall remove the same.

00800-9

- 37.2 The Contractor shall provide all temporary wiring, extension cords, lighting, appurtenances and accessories for lights or power tools required in addition to outlets mentioned above. All equipment shall be in good condition and shall be of sufficient quality to meet all applicable codes and regulations.
- 37.3 The cost of electrical energy used for temporary power and lighting shall be borne by the Contractor, which shall make all necessary applications and arrangements and pay all fees and charges necessary for the proper completion of the Work.

ARTICLE 38 – ARCHAEOLOGICAL FINDS

- 38.1 During the life of this Contract, the Contractor is herewith required to immediately notify the following organizations in the event that any articles, such as "charcoal," "bone," "shell," "cultural objects," "fired-cracked stones," or "stone flaking materials," or any other such related items of historical significance are discovered:
 - A. OWNER.
 - B. ENGINEER.
 - C. Local Historical Society.
 - D. Rhode Island Historical Preservation Society.

ARTICLE 39 - CONSTRUCTION SCHEDULE

- 39.1 The requirements of Section 00700 General Conditions hereby supplemented as follows:
 - A. The construction schedule shall be based on the specified Contract Time, using adequate labor forces working extended hours, only as specified in the Contract Documents.
 - B. The construction schedule shall show the order of work including all significant tasks.
 - C. The construction schedule shall be submitted for the Owner's approval within 10 days after receipt of the Notice to Proceed and updated as required by the Engineer.

ARTICLE 40 – <u>TERMINATION FOR DEFAULT; DAMAGES FOR DELAY; TIME</u> EXTENSIONS

- 40.1 If the Contractor refuses or fails to prosecute the Work (other than for those reasons enumerated in Section 00700 General Conditions) or any separable part thereof, with such diligence as will insure (in the Owner's belief) its completion within the time frame specified in the Agreement, or any extensions thereof, or fails to complete said Work within such time, the Owner may, by written notice to the Contractor, terminate its right to proceed with the Work or such part of the Work as to which there has been a delay. Such termination shall be treated as a termination for default as described in Section 00700 General Conditions. Additionally, in the event that the Owner takes over the Work and prosecutes the same to completion, by contract or otherwise, it may take possession of and utilize in completing the Work such materials, appliances and plant as may be on the site of Work and necessary therefor. Whether or not the Contractor's right to proceed with the Work has been terminated, it and its Sureties shall be liable for any damage to the Owner resulting from the Contractor's refusal or failure to complete the Work within the Contract Time.
- 40.2 If the Owner terminates the Contractor's right to proceed, the resulting damage will consist of liquidated damages for the period from the completion date provided in the Agreement until such

00800-10

- reasonable time as is required for final completion of the Work, together with any increased costs occasioned by having the Owner complete the Work.
- 40.3 If the Owner does not terminate the Contractor's right to proceed, the resulting damage will consist of liquidated damages for the period until the Work is completed or accepted.
- 40.4 If, after a notice of termination of the Contractor's right to proceed under the provisions of this clause is provided, it is determined for any reason that the Contractor was not in default under the provisions of this Article, or that the delay was excusable under the provisions of this Article, the rights and obligations of the parties shall be the same as if the notice of termination had been issued for the convenience of the Owner, as otherwise provided herein.
- 40.5 The rights and remedies of the Owner provided in this Article are in addition to any other rights and remedies provided by law or under this Agreement.

ARTICLE 41 - CONTRACTOR QUALITY CONTROL

- 1.1 The Contractor shall provide and maintain an effective quality control program.
- 1.1.1 The Contractor shall establish a quality control system to perform sufficient inspection and tests of all items of work, including that of any Subcontractors, to ensure conformance to the Contract Documents with respect to the materials, workmanship, construction, finish, functional performance and identification.
- 1.1.2 The Contractor's quality control system shall be the means by which he/she assures himself/herself that his/her construction complies with the requirements of the Contract Documents. The controls shall be adequate to cover all construction operations and should be keyed to the proposed construction sequence.
- 1.1.3 The Contractor's job supervisory staff may be used for quality control, supplemented as necessary by additional personnel for surveillance, special technicians, or testing facilities to provide capability for the controls required by the technical provisions of the Specifications.
- 1.1.4 The Contractor shall furnish to the Engineer within fourteen (14) Days after receipt of the Notice to Proceed a quality control plan which shall include the procedures, instructions, and reports to be used. This document shall include as a minimum:
 - A. The quality control organization.
 - B. Number and qualifications of personnel to be used for this purpose.
 - C. Authority and responsibilities of quality control personnel.
 - D. Methods of quality control including that for the Subcontractor's work.
 - E. Method of documenting quality control operations, inspection, and testing.
 - F. Safety inspection procedures.
 - G. A copy of a letter of direction to the Contractor's representative responsible for quality control, outlining his/her duties and responsibilities, and signed by a responsible officer of the firm.
- 1.1.5 After the Contract is awarded and before construction operations are started, the Contractor shall meet with the Engineer and discuss quality control requirements. The meeting shall develop mutual understanding relative to details of the system, including the forms to be used for recording the

00800-11

- quality control operations, inspections, administration of the system, and the interrelationship of the Contractor, Owner and the Engineer.
- 1.1.6 Unless specifically authorized by the Owner, no construction will be started until the Contractor's quality control plan is approved in writing.
- 1.1.7 Failure of the Contractor to comply with the requirements of this paragraph shall be grounds for determination by the Engineer that the Contractor is not prosecuting the Work as required by the Specifications. Approval or progress payment estimates will be withheld until such time as the Contractor complies with the provisions of this paragraph, and an amount will be deducted from the Contract Price equal to the value of the services not furnished.

END OF SECTION

00800-12

Date: 11/2019

BAYSIDE SEWER SYSTEM

SUPPLEMENTAL CONDITIONS

SPECIAL CONDITIONS

The Contractor is alerted to the following special conditions and requirements of the Contract Work. Additional conditions and requirements are presented in the Contract Documents:

- 1. It shall be the responsibility of the Contractor to inspect, as needed, the site prior to submitting a Bid for this project. Failure of Contractor to visually inspect the Project site, or conduct such testing as it may deem necessary prior to submitting its Bid, shall not relieve the Contractor of completing the Project in accordance with the Contract Documents at the cost figures submitted by the Contractor.
- 2. The Contractor shall limit its activities on-site to the approximate limits of construction as shown on the plans, except where activities outside of the limits are expressly authorized in the Contract Documents.
- 3. It is the responsibility of the Contractor to confirm that all required local and state permits have been secured. It is the Contractor responsibility to secure and pay for all outstanding permits.
- 4. All work performed under this contract is subject to, and governed by, the Warwick Sewer Authority (WSA), The United States Environmental Protection Agency (U.S. EPA), the Rhode Island Department of Environmental Management (RIDEM), Rhode Island Department of Transportation (RIDOT), the Rhode Island Department of Environmental Management (RIDEM), Rhode Island Coastal Resource Management Council (RICRMC) and the City of Warwick. The Contractor shall conform to RIDEM regulations on behalf of the WSA, and take all required action to protect and assure WSA compliance with applicable regulations.
- 5. Reference is made to the Rhode Island Department of Transportation "Standard Specifications for Road and Bridge Construction" throughout the specifications. All references to measurement and payment are excluded from this contract. Also, the provisions of Part 100-General Requirements and Covenants are not to be considered a part of this contract.
- 6. The Contractor bidding this project is made aware that the actual conditions at the time of construction may somewhat vary from that presented in the Contract Documents.
- 7. The Contractor shall make best effort to coordinate work under this contract with other ongoing site activities including those projects described in Section 00120 Information for Bidders.
- 8. **Health and Safety Plan.** A Health and Safety Plan shall be prepared by the Contractor. The Contractor shall meet all applicable State and OSHA Health and Safety regulations required for this project. The Contractor shall visit site to verify existing conditions prior to bidding this project.
- 9. **Datum of Levels.** All of elevations shown on the Plans are referred to NAVD 88. Benchmarks are provided on construction drawings.
- 10. **Subsurface Borings.** have been made along the sewer route under the direction of the Engineer. All information obtained thereby regarding the character of the material to be encountered has been recorded in good faith on log sheets. These sheets are not Contract Drawings. There is no expressed

or implied agreement that the depths or the character of the material or any other information or data regarding the materials to be encountered in carrying out the work to be performed under this Contract as shown on the Contract Drawings have been indicated correctly; and it is understood that conditions affecting the cost or quantity of the work to be performed may differ from the conditions which may be indicated by the data obtained from the borings. It is agreed that the Contractor shall make for his own information all additional borings and tests necessary to enable him to fairly and accurately estimate the figures which he records in the Schedule of Prices. It is the intent of this Contract that the Contractor assume all risks re-grading the character of material to be encountered.

- 11. **Site Inspection.** The Contractor shall allow the Authority or its agent, and other contractors and public service corporations, or their agents, to enter upon the work for the purpose of inspecting ongoing work, constructing, maintaining, repairing, removing, altering, or replacing such pipes, sewers, conduits, manholes, wires, poles, or other structures as may be required or permitted at, or on, the work by the Engineer. The Contractor shall cooperate with all aforesaid parties and shall allow reasonable facilities for the prosecution of any other work of the City, or of public service corporations, to be done in connection with this work. Care shall be taken at all times to inconvenience abutters as little as possible.
- 12. Traffic Control. The Contractor shall conduct his work so as to interfere with traffic as little as possible, and shall safeguard all highways and traffic thereon. The construction equipment and materials shall be so placed as not to endanger the work or to obstruct traffic, except as permitted by the Engineer. Safe and reasonable means of ingress to and egress from abutting property, private ways and alleys shall be provided for the usual and ordinary traffic in and out of all such premises by the Contractor at his own expense and as directed by the Engineer. The use of private property shall not be interfered with, except in so far as necessary, and as determined by the Engineer, provided that practical construction methods are being used and reasonable precautions against unnecessary interference are being taken. Every reasonable effort shall be made to reduce to a minimum interference with and inconvenience to business concerns on account of the construction work. Excavated material shall be trucked away and returned if the Engineer deems it necessary and practicable as a means for avoiding serious interference with and inconvenience to a business concern, traffic operations or private residences. It is the intent of this Contract to maintain through traffic along local streets and state highways wherever possible. If, in certain instances, it is necessary that certain streets must be of necessity closed to through traffic, such closing must be worked out in advance with the Engineer. This is necessary to allow the Engineer ample time to consult with local departments having jurisdiction over or the need to travel through these roads. During non-working hours, the Contractor will be required to maintain a minimum of two 10-foot travel lanes, one in each direction, with proper traffic control including barricades, drums, traffic cones, signing, etc. The Contractor shall coordinate, as necessary, all traffic control with the Warwick Department of Public Works.
- 13. **Traffic Police.** The Contractor shall furnish traffic police if and when required by the Chief of Police or the Engineer. Traffic police shall be assigned to the project by the Warwick Police Department. The duty of traffic police shall be solely to direct traffic. Payment for Traffic Police shall be paid directly by the Warwick Sewer Authority (WSA). The Warwick Police Department shall invoice the WSA directly without charge to the Contractor. The Engineer shall review all related police invoices for approval.
- 14. **Erection of Shanties.** Shanties or other structures for housing or storage of materials, or storage of materials, or of an office, shall be built only if permission in writing is given by the Engineer, and will then be permitted only at such places as the Engineer shall approve. The sanitary conditions on the 00810- 2

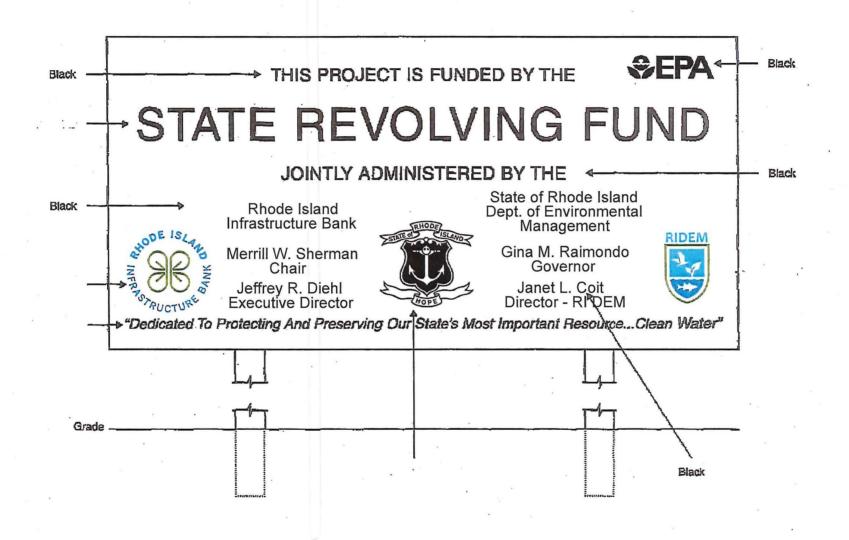
grounds in or about such shanties or other structures must at all times be maintained in a manner satisfactory to the Engineer.

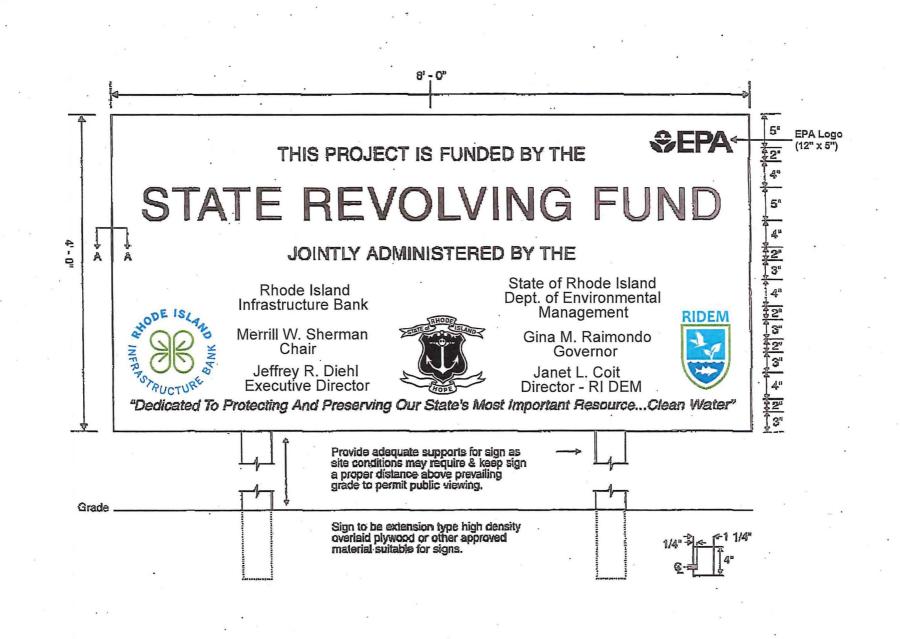
- 15. **National Grid Gas Company Conditions.** Contractor's Responsibility for Utility Property and Services. At points where the Contractor's operations are adjacent to properties of National Grid, and where damage at such point results in considerable expense, loss or inconvenience to the Gas Company, work on this Contract shall not commence until all arrangements necessary for the protection thereof have been made.
 - The Contractor shall cooperate with the Gas Company in their removal and rearrangement operations in order that these operations may progress in a reasonable manner, that duplication of rearrangement work may be reduced to a minimum, and that services rendered by those parties will not be unnecessarily interrupted.
 - In the event of contact with, or damage to, any gas facilities or its protective coating, or the interruption to gas service as a result of being exposed or unsupported, the Contractor shall promptly notify National Grid and shall cooperate fully with that Company in the restoration of service.
 - Upon receipt of said notice, National Grid shall immediately dispatch personnel to the subject location to effect temporary or permanent repair of the damage. Under no circumstance shall the excavator back-fill or conceal the damage area until National Grid arrives at the subject location. Upon the occurrence of the escape of gas from a broken line, the person or public agency responsible for the operations causing the damage shall evacuate the immediate area while awaiting the arrival of National Grid personnel.
 - The location and depth of existing gas lines as shown on the Plans are approximate and should not be relied upon by the Contractor. The Contractor shall check and verify the location of all underground gas lines before proceeding to commence work or to order materials. Excavation shall be in accordance with all statutes, ordinances, rules and regulations of any city, state or Federal Agency that may be applicable. Any damage to the existing utilities as marked by Dig Safe or as shown on the Plans arising out of said excavation, or by reason thereof, shall be the Contractor's sole responsibility.
 - It is understood and agreed that the Contractor has considered all of the permanent and temporary utility appurtenances in their approximate or relocated positions as shown on the Plans. It is also understood that no additional compensation will be allowed for any delays, inconvenience, or damage sustained by the Contractor due to any interference from said utility appurtenances or the operation of moving them.
 - Construction Methods. Backfilling around a gas main shall consist of suitable materials (gravel or padding sand) placed in layers of not more than 8 inches after compaction. Compaction shall be achieved by mechanical tampers, vibrators or rammers. Backfill under gas facilities shall be compacted to not less than 95% of maximum density. Unless otherwise directed, the backfill shall be brought to the surface of the surrounding ground and neatly graded.
 - Training. Prior to start of construction it is highly recommended that the Contractor's field personnel receive training on subjects relating to natural gas pipelines. This training will be provided by National Grid.

00810-3

- 16. **Project Identification Signs and Details.** The Contractor shall provide, erect, and maintain in good condition two (2) project identification signs at locations on the project site designated by the Authority. The signs shall be erected within twenty-one (21) days after the construction Contract is awarded and, in any event, prior to the start of construction operations. The design and construction standards of both signs are presented on the pages following these Special Conditions. The cost of providing the signs shall not be paid for separately but shall be included in the lump sum price for Item No. 1, Site Preparation, in the Schedule of Prices.
- 17. **Price Adjustment Liquid Asphalt and Diesel Fuel.** The intent of this provision is to insure adequate and fair compensation for unpredictable and fluctuating costs which, from time to time, occur in the prices of Liquid Asphalt and Diesel Fuel. The price adjustment provisions are made part of the Contract to assure more realistic bidding and encourage competition. The base price is the unit price of the material (FOB Terminal), as determined by the WSA through the RIDOT, just prior to the project bid date. The period price is the unit price of the material (FOB Terminal), as determined by the WSA through the RIDOT, for any one-month period following the bid date during which the price varies from the base price. Price adjustment will be determined by the difference between the Period Price and the Base Price. Price adjustments will only be made at the end of each month during which; a), work was accomplished on the project; and b), prices increase by 15% or more. Price adjustments will not be allowed beyond the completion date of the Contract or an approved extension thereof.
 - Liquid Asphalt Cement. The asphalt content will be the optimum amount used in every ton of bituminous concrete mixture, as determined by the RIDOT Standard Specifications. The Price Adjustment will be determined by multiplying the total weight of liquid asphalt, in tons, by the difference between the base price and period price.
 - Diesel Fuel. The fuel for operating the plant, and for hauling and placing bituminous concrete, will equal the total number of tons of bituminous concrete placed during the month in question times a fuel adjustment factor of 2.5 gallons of fuel per ton of bituminous concrete. Tonnage of bituminous concrete placed during the month in question will equal the sum of the weights indicated on the Daily Automated Recordation printout slips provided at the plant. The price adjustment will be determined by multiplying the total volume of fuel, in gallons, by the difference between the base price and the period price.
 - No price adjustment will be made for liquid asphalt or diesel fuel unless the amount of the adjustment exceeds \$500.00 and deviates more than 15% from the bid price for the month.
- 18. **Tree Trimming.** This work consists of removing tree limbs to facilitate sewer installation specifically for work not included in other bid items. Prior to the start of construction, the Contractor shall identify to the Authority locations throughout the entire project which require trimming to facilitate sewer installation. The Authority shall review the request and shall ultimately determine the extent of work to be performed. Tree trimming shall be authorized by the WSA and paid through the contract allowance.

END OF SECTION





CONSTRUCTION MANAGEMENT FORMS

PART 1 - CONSTRUCTION MANAGEMENT FORMS

1.1 DESCRIPTION

The following forms shall be utilized during the duration of the Work as required to meet procedures as established in the Contract Documents. Forms should be completed to fulfill the requirements of the Contract as stated herein and submitted in a timely fashion so as to allow sufficient time for required action to be completed without unnecessary delays in the Work.

- 1.2 Forms included in this Section
 - A. CERTIFICATE OF SUBSTANTIAL COMPLETION
 - B. WAIVER OF LIENS PRIME CONTRACTOR/SUBCONTRACTOR
 - C. CERTIFICATE OF FINAL PAYMENT AND COMPLETION OF WORK
 - D. APPLICATION FOR PAYMENT FORM
 - E. CHANGE ORDER FORM

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

(Forms attached)

CERTIFICATE OF SUBSTANTIAL COMPLETION

OWNER'S Project No	ENGINEER'S Project No
Project:	
CONTRACTOR:	
Contract for:	Contract Date:
This certificate of Substantial Confollowing specified parts thereof:	mpletion applies to all Work under the Contract Documents or to the
To: Warwick Sewer Authority	
And To:	
(CC	ONTRACTOR)
	applies has been inspected by authorized representatives of the Owner, Work is hereby declared to be substantially complete in accordance with
-	Date of Substantial Completion
and the failure to include an item in	pleted or corrected is attached hereto. This list may not be all inclusive, in it does not alter the responsibility of the Contractor to complete all the tract Documents. The items in the tentative list shall be completed or days of the above date of Substantial Completion.

The responsibilities between the Owner and Contractor for security, operation, safety, maintenance, heat, utilities, insurance, and warranties shall be as follows:

RESPONSIBILITIES:

OWNER:			
CONTRACTOR:			
The following documents are attached	ed to and made a part of the	is Certificate:	
nor is it a release of the Contractor Documents.		in accordance with the Contract Docum the Work in accordance with the Con	
Executed by Engineer on	, 20		
	By:	(ENGINEER)	
Contractor accepts this Certificate of	f Substantial Completion o	on, 20	
		(CONTRACTOR)	

00870-3

Owner accepts this Certificate of Substantial Completion on _	
By:	(OWNER)
WAIVER OF LIEN	NS
PRIME CONTRACT	<u>ror</u>
Project:	
OWNER:	
Contract No.: Contract Date:	
The undersigned Contractor hereby swears under penalty of pereceived from the Owner on account of work performed undersplied by the undersigned to discharge, in full, all obligation with work covered by prior Estimates for Partial Payment understrough inclusive; and (2) all labor, materials and equipm listed in or covered by these Estimates for Partial Payment are interests and encumbrances, except those listed below by obcovered by appropriate bond or bonds, as listed beside each of this certification.	er the Contract referred to above have been as of the undersigned incurred in connection der said contract, being Estimates number ment incorporated in said Project or otherwise re free and clear of all liens claims, security oligee, nature and amount of obligation and
Obligation	Bond
Dated:	(CONTRACTOR) (Name) (Title)
COUNTY OFSTAT	TE OF

00870-4

Before	me	on	unis	aay	01	personany	appeared
				known to me, who b	being duly sw	vorn, did depose and save th	at he/she is
the			o	f the Contractor above	mentioned;	-	
		Office	r)				
that he/sh	e execu	ted the	above sta	atement on behalf of sa	id Contractor	and that all of the statement	s contained
therein ar	re true,	correct	and com	plete.			
	,			1			
				NOTARY PU	BLIC		

PARTIAL RELEASE AND WAIVER OF LIEN $\underline{SUBCONTRACTOR}$

OWNER:	
PROJECT NAME:	
PROJECT LOCATION:	
SUBCONTRACT NUMBER: SUBCONTRACT AMOUNTS	Requisition Number: Requisition Date:
- payments to date:	
– current payment:	
– contract:	
- check date:	
the requisition described above for captioned Project. In considerat	it has submitted to (the "Contractor") or labor performed and/or materials supplied in connection with the above—tion of payment of the requisition, the undersigned hereby releases the ll claims of lien which the undersigned has regarding the Project as of the
it has paid, or will pay, from the provided materials to the all sums due to those parties who in connection with all previous reprovide written evidence of the d	to pay the requisition, the undersigned hereby represents and warrants that roceeds of the requisition all sums due to those parties who have performed a undersigned in connection with the Project, that it has made payment of have performed work or who have provided materials to the undersigned quisitions related to the Project, and that it will on request of the Contractor ischarge by such parties of any claims of lien against the Project and that becontractor under the subcontract, including all approved amendments above.
	(Name of Subcontractor)
Witness	(Officer of the Company)

FINAL RELEASE AND WAIVER OF LIEN $\underline{SUBCONTRACTOR}$

OWNER:		
PROJECT NAME:		
PROJECT LOCATION: _		
SUBCONTRACT NUMBER: _		
SUBCONTRACT AMOUNTS		
– payments to date:		
– final payment:		
- final contract amount:		
REQUISITION NUMBER: FINAL	L	
DATE:		
the Final requisition for labor performed. In consideration of payme and the Owner from all claims of labor to induce the Contractor warrants that it has paid, or will pay who have performed work or proving made payment of all sums distributed in conviction or request of the Contractor provided will on request of the Contractor provided with the contractor provi	has submitted to	n with the above—captioned reby releases the Contractor Project. ned hereby represents and all sums due to those parties ion with the Project, that it ork or who have provided to the Project, and that it uch parties of any claims of
	(Name of Subcontractor)	_
Witness	(Officer of the Company)	

CERTIFICATE OF FINAL PAYMENT AND COMPLETION OF WORK

Contract No.:	Agreement Date:
Contract Description:	
Completion Date per Agreement and	Change Orders:
FINAL CERTIFICATION OF CO	NTRACTOR
(Insert Name and Complete Address of	of CONTRACTOR)
	<u> </u>
	<u> </u>
	<u> </u>
	(Dollar Amount) as full and final payment for all Work completed (Date) with the Warwick Sewer Authority.
	a carried out in substantial compliance with the Contract Documents, als and Subcontractors have been or will be paid in accordance with of the State of Rhode Island.
Date	CONTRACTOR
	Signed by Officer of Corporation
	Title

END OF SECTION

00870-8

BAYSIDE SEWER SYSTEM Date: 11/2019 CONSTRUCTION MANAGEMENT

APPLICATION FOR PAYMENT NO._____

To:			_(OWNER)
	I:	•	TRACTOR)
	ract:		
-	ct:		
		NGINEER's Project No	998
For V	Vork accomplished through the date of:		
1.	Original Contract Price:	\$	
2.	Net change by Change Orders and Written Amendments	(+ or -): \$	
3.	Current Contract Price (1 plus 2):	\$	
4.	Total completed and stored to date:	\$	
5.	Retainage (per Agreement):	T	
	Total Retainage:	\$	
6.	Total completed and stored to date less retainage (4 minu		
7.	Less previous Application for Payments:	\$	
8.	DUE THIS APPLICATION (6 MINUS 7):	\$	
	,		
Acco	empanying Documentation:		
	CONTRACTOR'S Certification	tion:	
for I incor OWN as are interest	TRACTOR's legitimate obligations incurred in connection of Payment numbered 1 through inclusive; (2) title prorated in said Work or otherwise listed in or covered by the NER at time of payment free and clear of all Liens, security the covered by a Bond acceptable to OWNER indemnifying the est or encumbrance); and (3) all Work covered by this Applia Contract Documents and not defective.	of all Work, materials and his Application for Payment interests and encumbrances OWNER against any such L	d equipment will pass to (except such ien, security
Date	d	CONTRACTO	
State	of	CONTRACTO	X
Coun			
	cribed and sworn to before me this		
	of,		
any c	^ ,		
Nota	ry Public		
	Commission expires:		
•	•		
Paym	nent of the above AMOUNT DUE THIS APPLICATION is	recommended.	
Date	d		
		ENGINEER	
	22252		

00870-9

BAYSIDE SEWER SYSTEM Date: 11/2019 CONSTRUCTION MANAGEMENT

APPLICATION FOR PAYMENT

INSTRUCTIONS

A. GENERAL INFORMATION

The sample form of Schedule of Values is intended as a guide only. Many projects require a more extensive form with space for numerous items, descriptions of Change Orders, identification of variable quantity adjustments, summary of materials and equipment stored at the site and other information. It is expected that a separate form will be developed by Engineer and Contractor at the time Contractor's Schedule of Values is finalized. Note also that the format for retainage must be changed if the Contract permits (or the law provides), and Contractor elects to deposit securities in lieu of retainage. Refer to the General Conditions for provisions concerning payments to Contractor.

B. COMPLETING THE FORM

The Schedule of Values, submitted and approved as provided in the General Conditions, should be reproduced as appropriate in the space indicated on the Application for Payment form. Note that the cost of materials and equipment is often listed separately from the cost of installation. Also, note that each Unit Price is deemed to include Contractor's overhead and profit.

All Change Orders affecting the Contract Price should be identified and included in the Schedule of Values as required for progress payments.

The form is suitable for use in the Final Application for Payment as well as for Progress Payments; however, the required accompanying documentation is usually more extensive for final payment. All accompanying documentation should be identified in the space provided on the form.

C. LEGAL REVIEW

All accompanying documentation of a legal nature, such as Lien waivers, should be reviewed by an attorney, and Engineer should so advise Owner.

00870-10

Application No. Date: TOTAL ITEM **ESTIMATED** BID **PREVIOUS PREVIOUS** PERIOD PERIOD QUANTITY COST ITEM UNIT PERCENT UNIT NO. DESCRIPTION QUANTITY PRICE AMOUNT QUANTITY COST QUANTITY COST TO DATE TO COMPLETE DATE \$ 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29

Note: Total Schedule of Values should equal the Current Contract Price.

CHANGE ORDER		Distribu Owner Enginee Contrac Consulta Field Other	[] r [] tor []	
Owner:	Warwick Sewer Autho	rity Change Order	Number:	
Project:	Bayside Sewer System	Initia	tion Date:	
To:		Owner's Contract	Number:	
		Cont	ract Date:	
Furnish and install all necessary labor and materials to modify the Contract Requirements as follows: Not valid until signed by Owner. Signature of the Contractor indicates his agreement herewith, including any adjustment in the Contract sum or Contract Time.				
The original (Contract Sum) was Net change by previously authorized Change Orders The (Contract Sum) prior to this Change Order was The (Contract Sum) will be (increased) (decreased) (unchanged) by this Change Order The new (Contract Sum) including this Change Order will be The Contract Time will be (increased) (decreased) (unchanged) by (0) Calendar Days. The Date of Substantial Completion as of the date of this Change Order therefore				
Authorized				
CONTRAC	CTOR	Warwick Sewer Authority OWNER	Gordon R. Archibald, Inc. ENGINEER	
			By: Project Manager Date:	

00870-12

BAYSIDE SEWER SYSTEM Date: 11/2019 CONSTRUCTION MANAGEMENT

RHODE ISLAND DEPARTMENT OF LABOR AND TRAINING PREVAILING WAGE REQUIREMENTS

Reference (www.dlt.ri.gov/pw/)

00900-1

R.I. DEPT. OF LABOR AND TRAINING
Date: 11/2019 PREVAILING WAGE REQUIREMENTS



SUMMARY OF WORK

PART 1 - GENERAL

1.01 PROJECT/WORK IDENTIFICATION

- A. General: The Project name of Contract No. 86B issued by the Owner (Warwick Sewer Authority), is the "Bayside Sewer System Pressure Sewers". The Contract Documents are dated November 2019.
- B. Contract Documents: Related requirements and conditions that have an impact on the Project and that are indicated in the Contract Documents include, but are not necessarily limited to, the following:
 - 1. Maintenance and protection of subsurface and underground utilities
 - 2. Archaeological requirements and restrictions
 - 3. Maintenance and protection of traffic
 - 4. Construction methods for pipe installation
 - 5. Regulatory permit requirements
- C. The Project is being implemented to expand sanitary sewer service to the Bayside area located within the City of Warwick. The essential features of the work are:
 - 1. Mobilization of equipment, temporary facilities and supplies.
 - 2. Soil and erosion control.
 - 3. Installation of pressure sewer pipe utilizing trenchless technologies and open cut excavation.
 - 4. Payement restoration
 - 5. Final cleanup and demobilization.
- D. Additional details of the construction are provided in this document as well as the Contract Drawings.
- E. There are several types of materials necessary for the construction of this project, which are included in the itemized pricing. The intent of the project is that required materials are supplied and placed by the Contractor as part of the respective lump sum or unit price bid items as indicated in Section 00300 Bid Form and Section 01025 Measurement and Payment.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

WORK SEQUENCE

PART 1 - GENERAL

1.1 VERIFICATION OF EXISITNG UTILITIES PRIOR TO ANY WORK

A. SUMMARY:

- 1. Contractor shall install sediment and erosion controls.
- 2. Contractor shall verify locations and elevations of the existing gas, sewer, water main and storm drain prior to any work.
- 3. Contractor shall construct pressure sewer system.
- 4. Contractor shall perform pavement restoration.
- 5. Contractor shall loam and seed disturbed areas

1.2 SEQUENCE OF CONSTRUCTION

A. GENERAL:

- 1. The construction of sewer shall be performed in a manner to activate sanitary sewer service as the project progresses.
- 2. The Contractor shall fully cooperate with the Owner, coordinate the construction schedule with the Owner and Engineer, and provide the labor, equipment and materials to prevent interruption of influent to the wastewater treatment facility. The Owner and Engineer reserve the right to modify or expand the schedule during construction to meet prevailing conditions.

B. SEQUENCE OF CONSTRUCTION WORK:

1. The contractor shall proceed with construction work in accordance with Contract Plan Document entitle Sequence of Construction. The Contractor shall proceed in order from Area 1 through Area 6. The areas shall be completed and activated in accordance with the schedule below. Completion of work does not include final pavement restoration.

Area	Sewer System
	Activated and In Service
	(Months from Notice to
	Proceed)
1	12
2	14
3	16
4	18
5	20
6	22

C. SUBMITTAL:

1. The Contractor shall submit a detailed plan and time schedule for operations. The detailed plan shall describe the length of time required to complete operation and address all submittal requirements in these sections.

PART 2 - PRODUCTS

(Not Used)

PART 3 - EXECUTION

(Not Used)

END OF SECTION

CONTRACTOR'S USE OF PREMISES

PART 1 - GENERAL

- A. The Contractor shall be responsible for securing material and equipment storage areas. Proposed storage areas shall be submitted to the WSA for approval.
- B. City right-of-way shall not be used for long-term storage of materials or equipment.
- C. Material and equipment storage areas shall be secured after hours.
- D. All work shall be performed during WSA regular work hours, unless approved in writing by the Engineer.
- E. All roadways and access drives shall remain accessible to emergency vehicles at all times.
- F. The Contractor shall not occupy private property without permission.

PART 2 - PRODUCTS

(Not Used)

PART 3 - EXECUTION

(Not Used)

END OF SECTION

MEASUREMENT AND PAYMENT

PART 1 – GENERAL

1.1 MEASUREMENT AND PAYMENT

- A. All Work performed as described in these Contract Documents will be paid for under one or more of the items listed in the Schedule of Bid Items. All other activities required in connection with performance of the Work, including all Work required under Division 1 General Requirements, whether described in the Contract Documents or mandated by applicable codes, permits and laws, will not be separately paid for unless specifically provided for in the form of general bid, but will be considered incidental to performance of the overall Project and deemed to be included in the various bid items listed in the Schedule of Bid Items.
- B. Each unit or lump sum price stated in the Schedule of Bid Items shall constitute full compensation as herein specified for each item of Work completed in accordance with the Drawings and Specifications.
- C. Contractor shall make its own estimate of the quantities necessary to complete the Work.
- D. The payment items listed herein and in the Schedule of Bid Items are intended to provide full payment for the Work shown on the Drawings and specified herein. Any Work called for or inferred in the documents but not listed as a payment item shall be considered incidental to the overall Project.
- E. It is the intent of these Specifications to provide all labor, equipment, materials, supplies, temporary facilities, incidentals, and appurtenances to satisfactorily complete the Work of this Contract.
- F. Partial payment for lump sum items will be made based upon the percentage of Work complete in accordance with the schedule of values as estimated by Contractor and verified and approved by Engineer under each individual item to date. Partial payment for unit price items will be made based upon the Contractor's estimated quantity completed to date, and verified by Engineer, for items listed in the schedule of values.
- G. Contractor shall coordinate all quantity surveys with the Engineer, so that Engineer may conduct its own quantity survey for verification purposes. Discrepancies in the quantities estimated by Contractor and Engineer shall be resolved prior to modifying the site surface.
- H. Allowances have been included on the Bid Price Form for work that cannot be sufficiently quantified and must be completed by a specific third party, the services of which are arranged and provided by the Contractor. Measurement for these services will be the invoice amounts paid by the Contractor for work authorized and directed by the Engineer. No Contractor markup will be

applied to these costs. Payment will constitute full compensation for work and costs associated with reimbursable payments to third parties.

1.2 METHOD OF MEASUREMENT AND BASIS OF PAYMENT

A. The methods of measurement and basis of payment for the Payment Items listed above are specified in the following section.

BID ITEM	DESCRIPTION	PAY UNIT
1	Site Preparation and Mobilization	Lump Sum

<u>Measurement</u>: The work of this section shall be measured on a lump sum basis. The work consists of the performance of actions that are required to clear and prepare the site for subsequent construction operations and those efforts necessary for the movement of Contractor's personnel and equipment to the project site and for the establishment of all the Contractor's field offices, buildings, and facilities required for the performance of the Contract, and other incidentals not paid elsewhere in the contact.

<u>Payment</u>: Site Preparation and Mobilization will be paid for at the contract lump sum price listed in the Proposal. The price so-stated constitutes full and complete compensation for all labor, materials and equipment and other incidentals required to establish site preparation, Contractor's facilities at the site and at the conclusion of the contract, for complete removal thereof.

BID ITEM	DESCRIPTION	PAY UNIT
2	Rock Excavation (Open Cut Excavation)	Cubic Yard (CY)

<u>Measurement:</u> Rock excavation for open cut trench installation will be measured on a volume basis as computed from the area in its original position. The volume will be determined by differencing the area to be excavated from its original position before excavation is begun to the design subgrade after excavation is completed. Rock excavation for open cut excavations will consist of the removal of intact bedrock and boulders or detached bedrock fragments which have a minimum volume of 1 cubic yard.

<u>Payment:</u> The accepted quantity of Rock excavation for open cut trench removal will be paid for at the contract unit price per cubic yard as listed in the Proposal. The payable quantity will be the number of cubic yards of ledge rock or boulders drilled and mechanically split, or split by hand, as measured before excavation, that would have been removed if the excavation had been made everywhere to a depth of 6 inches below the underside of the pipe or masonry and to a width of 27 inches greater than the outside dimensions of said pipe or masonry on each side. The price so-stated constitutes full and complete compensation for all labor, materials and equipment, including excavation within the prescribe limits of the work, formation of embankments, grading, compaction, disposal of surplus materials, preparation of subgrade, and all other incidentals required to finish the work complete and accepted by the Engineer.

3 Rock Excavation (Trenchless - Open Cut Excavation) C

Cubic Yard (CY)

<u>Measurement:</u> Rock excavation to facilitate trenchless technologies will be measured on a volume basis as computed from the area in its original position. Trenchless technology rock excavation will include excavations for operation and reception pits, and for rock removal required to retrieve or facilitate directional drilling runs using open cut excavation. Rock excavation for trenchless open cut excavations will consist of the removal of intact bedrock and boulders or detached bedrock fragments which have a minimum volume of 1 cubic yard.

<u>Payment:</u> The accepted quantity of Rock Excavation for trenchless open cut removal will be paid for at the contract unit price per cubic yard as listed in the Proposal. The payable quantity will be the number of cubic yards of ledge rock or boulders drilled and mechanically split, or split by hand, as measured before excavation, that would have been removed if the excavation had been made everywhere. The price so-stated constitutes full and complete compensation for all labor, materials and equipment, including excavation within the prescribed limits of the work, formation of embankments, grading, removal of bituminous pavement, compaction, disposal of surplus materials, preparation of subgrade, and all other incidentals required to finish the work complete and accepted by the Engineer.

BID ITEM DESCRIPTION PAY UNIT

4 Rock Excavation (Trenchless – Drilling – All Diameters) Linear Foot (LF) <u>Measurement:</u> Rock excavation to facilitate directional drilling through boulders or ledge rock encountered during operations will be measured in linear feet of continuous run.

<u>Payment:</u> The accepted quantity for rock drilling via trenchless technologies will be paid for at the contract unit price per linear foot for all pipe size diameters as listed in the Proposal. The linear foot price shall be the additional premium cost to facilitate directional drill through boulders or ledge rock. The price so-stated constitutes full and complete compensation for all labor, materials and equipment, including all other incidentals required to finish the work complete and accepted by the Engineer.

BID ITEM DESCRIPTION PAY UNIT 5 Earth Excavation (Test Pits - Utilities) Cubic Yard (CY)

<u>Measurement:</u> Earth excavation performed to locate existing utilities or to determine subsurface soil conditions will be measured on a volume basis as computed from the area in its original position. The volume will be determined by differencing the area to be excavated from its original position before excavation is begun to the design subgrade after excavation is completed.

<u>Payment:</u> The accepted quantity of Earth Excavation for test pits for utility exploration will be paid for at the contract unit price per cubic yard as listed in the Proposal. The payable quantity will be the number of cubic yards of material excavated. The price so-stated constitutes full and complete compensation for all labor, materials and equipment, including excavation within the prescribe limits of the work, backfill of material, grading, compaction, disposal of surplus materials, preparation of subgrade, and all other incidentals required to finish the work complete and accepted by the Engineer.

01025-3

BID ITEM DESCRIPTION PAY UNIT

6 Earth Excavation (Unsuitable Materials)

Cubic Yard (CY)

Cubic Yard (CY)

<u>Measurement:</u> Earth excavation performed to remove unsuitable soils which due to their consolidation properties, degree of saturation, gradation, organic content or other deleterious characteristics will not provide a stable subgrade or foundation or cannot be placed and compacted as backfill will be measured on a volume basis as computed from the area in its original position. The volume will be determined by differencing the area to be excavated from its original position before excavation is begun to the design subgrade after excavation is completed.

<u>Payment:</u> The accepted quantity of Earth Excavation to remove unsuitable soil will be paid for at the contract unit price per cubic yard as listed in the Proposal. The payable quantity will be the number of cubic yards of material excavated. The price so-stated constitutes full and complete compensation for all labor, materials and equipment, including excavation within the prescribe limits of the work, dewatering, disposal of materials, preparation of subgrade, and all other incidentals required to finish the work complete and accepted by the Engineer. Backfill to replace unsuitable materials will be paid for separately.

BID ITEM DESCRIPTION PAY UNIT

7 Earth Excavation (Archeological Investigations)

<u>Measurement:</u> Earth excavation for archeological investigations will be measured on a volume basis as computed from the area in its original position. The volume will be determined by differencing the area to be excavated from its original position before excavation is begun to the design subgrade after excavation is completed. Earth excavations for archeological investigation will be performed as required to facilitate the placement of additional operation or reception pits, to support additional excavation within areas not previously approved by archeological investigations.

<u>Payment:</u> The accepted quantity of Earth Excavation for archeological investigations will be paid for at the contract unit price per cubic yard as listed in the Proposal. The payable quantity will be the number of cubic yards of material excavated. The price so-stated constitutes full and complete compensation for all labor, materials and equipment, saw-cutting bituminous pavement, including excavation within the prescribe limits of the work, disposal of bituminous pavement and materials, preparation of subgrade, and all other incidentals required to finish the work complete and accepted by the Engineer.

BID ITEM DESCRIPTION PAY UNIT 8 Additional Select Material Cubic Yard (CY)

<u>Measurement:</u> Additional select material will be measured by the number of cubic yards actually placed. Additional select material shall be placed as directed by the Engineer as needed to facilitate construction operations. The material will be commercial grade crushed stone or filter stone in accordance the Rhode Island Department of Transportation Standard Specifications for Road and Bridge Construction. All stone shall be suitably graded from the smallest to the largest particles; it shall be clean, hard, durable and free from dust, loam, clay or organic matter.

<u>Payment:</u> The accepted quantity of additional select material will be paid for at the contract unit price per cubic yard as listed in the Proposal. The price so-stated constitutes full and complete compensation for all labor, materials and equipment, and all other incidentals, including trimming and fine grading required to finish the work, and complete and accepted by the Owner. Selected material required to fill unauthorized excavations will not be paid for separately, but will be provided at the Contractor's expense.

BID ITEM	DESCRIPTION	PAY UNIT
9	Calcium Chloride Dust Control	Tons (TON)

<u>Measurement:</u> Calcium Chloride for Dust Control will be measured by the number of tons actually applied as directed by the Owner and as needed to conform to the soil erosion and sediment control plan. The material shall conform to the latest ASTM Specifications. The Owner may allow the weights as printed on the shipping contained to constitute the official measure, otherwise the contractor shall provide scales to weight the material at no additional cost to the Owner.

<u>Payment:</u> The accepted quantity of calcium chloride for dust control will be paid for at the contract unit price per ton as listed in the Proposal. The price so-stated constitutes full and complete compensation for all labor, materials, and equipment, and all other incidentals, required to finish the work, complete and accepted by the Owner.

BID ITEM	DESCRIPTION	PAY UNIT
10	Additional Gravel Borrow	Cubic Yard (CY)

<u>Measurement:</u> Additional gravel borrow material will be measured by the number of cubic yards actually placed. Additional gravel borrow material shall be placed as directed by the Engineer as needed to facilitate construction operations.

<u>Payment:</u> The accepted quantity of additional select material will be paid for at the contract unit price per cubic yard as listed in the Proposal. The price so-stated constitutes full and complete compensation for all labor, materials and equipment, and all other incidentals, including trimming and fine grading required to finish the work, and complete and accepted by the Owner. Gravel borrow used as a subbase course for temporary and permanent pavement patch and for pipe bedding will not be paid for separately, but is included for payment under the appropriate pipe and pavement items.

BID ITEM	DESCRIPTION	PAY UNIT
11, 12, 13, 14, 15	Pressure Sewer Pipe (All Sizes)	Linear Foot (LF)
	Laterals – Open Cut Excavation	

<u>Measurement:</u> Pressure sewer pipe installed by open cut excavations of the various types and sizes indicated on the Plans will be measured in linear feet of continuous runs of such sewers actually installed in accordance with the Plans and/or as directed by the Owner. Deductions will not be made for the pipe length, inside diameter, of manholes.

Payment: The accepted quantity for pressure sewer pipe, laterals and services, installed by open cut excavation will be paid for at the contract unit price per linear foot for the various pipe sizes as listed in the Proposal. The price so-stated constitutes full and complete compensation for all labor, materials and equipment to install the pipe complete and in place. The work will include furnishing all pipes, plugs, excavation, dewatering, compaction, saw-cut of bituminous and concrete pavements, furnishing and placing a bedding materials, geo-textile filter fabric; laying, setting and jointing all pipes and fittings, making all connections to existing pipes and manholes, for rebuilding inverts of existing manholes as may be required, including adapters for all leakage testing, for backfilling and compacting backfill material, for disposal of all excess excavated materials, for replacing or rebuilding driveways, walks, sidewalks, curbs, walls, and any other impacted structures, including shrubs, fences, sprinkler systems, existing grassed areas and other surface material; for furnishing, placing, and removing all temporary timber sheeting and bracing, trench boxes and or steel plates; for providing temporary bracing at existing utility poles, for removing and resetting existing mailboxes; for removing abandoned water and gas main pipe, and all other incidentals.

BID ITEM	DESCRIPTION	PAY UNIT
16, 17, 18, 19, 20 & 21	Pressure Sewer Pipe (All Sizes)	Linear Foot (LF)
	Laterals and Services – Trenchless	

<u>Measurement:</u> Pressure sewer pipe installed by trenchless technologies, horizontal directional drilling, of the various types and sizes indicated on the Plans will be measured in linear feet of continuous runs of such sewers actually installed in accordance with the Plans and/or as directed by the Owner.

<u>Payment:</u> The accepted quantity for pressure sewer pipe, laterals and services, installed by directional drilling will be paid for at the contract unit price per linear foot for the various pipe sizes as listed in the Proposal. The price so-stated constitutes full and complete compensation for all labor, materials and equipment to install the pipe complete and in place. The work will include furnishing all pipes, plugs, installing and jointing all pipes and fittings, making all connections to existing pipes and manholes, disposal of all excess excavated materials, for replacing or rebuilding driveways, walks, sidewalks, curbs, walls, and any other impacted structures, including shrubs, fences, sprinkler systems, existing grassed areas and other surface material; for providing temporary bracing at existing utility poles, and all other incidentals.

BID ITEM	DESCRIPTION	PAY UNIT
22	16-Inch Ductile Iron Gravity Sewer Pipe	Linear Foot (LF)
	Laterals - Open Cut Excavation	

<u>Measurement:</u> Gravity sewer pipe installed by open cut excavation as indicated on the Plans will be measured in linear feet of continuous runs of such sewers actually installed in accordance with the Plans and/or as directed by the Owner. Deductions will not be made for the pipe length, inside diameter, of manholes.

<u>Payment:</u> The accepted quantity for gravity sewer pipe installed by open cut excavation will be paid for at the contract unit price per linear foot for the various pipe sizes as listed in the Proposal. The price so-stated constitutes full and complete compensation for all labor, materials and equipment to install the pipe complete and in place. The work will include furnishing all pipes, plugs,

01025-6

excavation, dewatering, compaction, saw-cut of bituminous and concrete pavements, furnishing and placing a bedding materials, geo-textile filter fabric; laying, setting and jointing all pipes and fittings, making all connections to existing pipes and manholes, for rebuilding inverts of existing manholes as may be required, including adapters for all leakage testing, for backfilling and compacting backfill material, for disposal of all excess excavated materials, for replacing or rebuilding driveways, walks, sidewalks, curbs, walls, and any other impacted structures, including shrubs, fences, sprinkler systems, existing grassed areas and other surface material; for furnishing, placing, and removing all temporary timber sheeting and bracing, trench boxes and or steel plates; for providing temporary bracing at existing utility poles, for removing and resetting existing mailboxes; for removing abandoned water and gas main pipe, and all other incidentals.

<u>Measurement:</u> Sewer Manholes installed by open cut excavation of the various types and sizes all indicated on the Plans will be measured by the number of such structures actually installed in accordance with the Plans and/or as directed by the Owner.

<u>Payment:</u> The accepted quantities of sewer manholes installed by open cut excavation will be paid for at the contract unit price per each such structure as listed in the Proposal. The price so-stated constitutes full and complete compensation for all labor, materials and equipment to install the manholes complete and in place. The work will include furnishing all excavation, dewatering, earth supports systems, compaction, saw-cut of bituminous and concrete pavements, furnishing and placing bedding materials, geo-textile filter fabric; making all connections to existing pipes, constructing brick inverts, manholes frames and covers (all types), valves, fittings, adapters, leakage tests, temporary bracing at existing utility poles, removing abandoned water and gas main pipe, joint sealant, non-shrink grout, concrete, manhole steps, rubber boots, waterproofing, and all other incidentals. No extra payment will be made for the various type of manhole frames and covers.

BID ITEM	DESCRIPTION	PAY UNIT
28, 29, 30 & 31	Valve, Cleanout, & Junctions Connections	Each (EA)
	(Trenchless Technologies, Types A, B, C, & D)	

<u>Measurement:</u> The various types of valve, cleanout and junction connection types installed by open cut excavation within the designated operation and reception pits all indicated on the Plans will be measured by the number of each such configurations actually installed in accordance with the Plans and/or as directed by the Owner.

<u>Payment:</u> The accepted quantities of each type of valve, cleanout and junction connection installed by open cut excavation within the designated operation and reception pits will be paid for at the contract unit price per each such type as listed in the Proposal. The price so-stated constitutes full and complete compensation for all labor, materials and equipment to install the manholes complete and in place. The work will include furnishing all excavation, dewatering, earth supports systems, compaction, saw-cut of bituminous and concrete pavements, furnishing and placing bedding materials, making all connections to existing pipes, concrete, frames and covers, curb boxes, covers, risers, valves, fittings, caps, adapters, temporary bracing at existing utility poles, joint sealant, and all other incidentals.

01025-7

BID ITEM	DESCRIPTION	PAY UNIT
32	Air Release Manhole and Valve	Each (EA)
	(On an Cut Even susting)	

(Open Cut Excavation)

<u>Measurement:</u> Air Release Manholes and Valves installed by open cut excavation with a trench or designated operation or reception pits of the various types and sizes all indicated on the Plans will be measured by the number of such structures actually installed in accordance with the Plans and/or as directed by the Owner.

<u>Payment:</u> The accepted quantities of air release manholes and valves installed by open cut excavation will be paid for at the contract unit price per each such structure as listed in the Proposal. The price so-stated constitutes full and complete compensation for all labor, materials and equipment to install the manholes complete and in place. The work will include furnishing all excavation, dewatering, earth supports systems, compaction, saw-cut of bituminous and concrete pavements, furnishing and placing bedding materials, geo-textile filter fabric; making all connections to existing pipes, constructing brick inverts, manholes frames and covers (all types), air release valves, fittings, adapters, leakage tests, temporary bracing at existing utility poles, removing abandoned water and gas main pipe, joint sealant, non-shrink grout, concrete, manhole steps, rubber boots, waterproofing, and all other incidentals. No extra payment will be made for the various type of manhole frames and covers.

BID ITEM	DESCRIPTION	PAY UNIT
33	Remove Bituminous Pavement Surface	Square Yard (SY)
	Gutters by Cold Planing / Milling	

<u>Measurement:</u> Removing bituminous pavement within the roadway gutters by cold planning will be measured by the number of square yards of said pavement actually removed in accordance with the Plans and/or as directed by the Owner.

<u>Payment:</u> The accepted quantities of removing bituminous pavement surface from roadway gutters by cold planning will be paid for at the contract unit price per square yard as listed in the Proposal. The price so-stated constitutes full and complete compensation for all labor, materials, and equipment, removal and disposal of millings, sweep pavement immediately following operations, all other incidentals required to finish the work complete and accepted by the Owner.

BID ITEM	DESCRIPTION	PAY UNIT
34	2-Inch Depth Bituminous Pavement Patch Linear	Linear Foot (LF)
	HMA CL 9.5 - Open Cut Excavation Trenches	

<u>Measurement:</u> Bituminous pavement patch for sewer pipe installed by open cut trench excavations as indicated on the Plans will be measured in linear feet of continuous runs of such 2-inch depth installed in accordance with the Plans and/or as directed by the Owner.

<u>Payment:</u> The accepted quantities of bituminous pavement patch will be paid for at the contract unit price per linear foot as listed in the Proposal. The price so-stated constitutes full and complete compensation for all labor, materials, and equipment and includes sawcut and tack coating the pavement edge, 12-inches of compacted gravel borrow base, 2-inch of bituminous pavement (HMA CL 9.5), temporary stripping, all other incidentals required to finish the work complete and accepted by the Owner.

01025-8

BID ITEM	DESCRIPTION	PAY UNIT
35	2-Inch Depth Bituminous Pavement Patch	Square Yard (SY)
	HMA CL 9.5 – Operating and Reception Pits	

<u>Measurement:</u> Bituminous pavement patch open cut operation and reception pits for trenchless technologies as indicated on the Plans will be measured in square yard of such 2-inch depth installed in accordance with the Plans and/or as directed by the Owner.

<u>Payment:</u> The accepted quantities of bituminous pavement patch will be paid for at the contract unit price per square yard as listed in the Proposal. The price so-stated constitutes full and complete compensation for all labor, materials, and equipment and includes sawcut and tack coating the pavement edge, 12-inches of compacted gravel borrow base, 2-inch of bituminous pavement (HMA CL 9.5), temporary stripping, all other incidentals required to finish the work complete and accepted by the Owner.

BID ITEM	DESCRIPTION	PAY UNIT
36, 37 & 38	Bituminous Pavement Surface Course HMA CL 9.5	Ton (TON)
	1-1/2" Permanent Pavement Overlay	
	2" Permanent Pavement Overlay - Tidewater Drive	
	2-1/2" Driveways and Sidewalks Surface Course	

<u>Measurement:</u> Bituminous pavement for permanent surface course overlay will be measured by the number of tons based on certified delivery slips actually placed in accordance with the Plans and/or as directed by the Owner.

<u>Payment:</u> The accepted quantities of bituminous pavement for permanent surface course will be paid for at the contract unit price per ton as listed in the Proposal. The price so-stated constitutes full and complete compensation for all labor, materials, and equipment including sweeping and cleaning, tack coat, removal and disposal of broken or loose pavement, saw-cutting of street pavements, saw-cutting side streets, cut and match areas existing roadways, filling of potholes or depressions, adjusting of all utility frames, covers, and roadway boxes, temporary bituminous wedges, hauling, spreading, shaping, rolling and compaction of bituminous concrete material for leveling courses and new pavement, pavement markings; and for furnishing all labor, materials, and equipment and for all other incidental required to finish the work complete and accepted by the Owner.

BID ITEM	DESCRIPTION	PAY UNIT
39	Bituminous Berm	Linear Foot (LF)
	Rhode Island Standard No. 7.5.1	

<u>Measurement:</u> Bituminous berm will be measured in linear feet of continuous runs installed in accordance with the Plans and/or as directed by the Owner.

<u>Payment:</u> The accepted quantities of bituminous berm will be paid for at the contract unit price per linear foot as listed in the Proposal. The price so-stated constitutes full and complete compensation for all labor, materials, and equipment including forming, shaping, rolling and compaction of

bituminous berm and for all other incidentals required to finish the work complete and accepted by the Owner.

BID ITEM DESCRIPTION PAY UNIT

40 Saw-cutting Bituminous Driveways

Linear Foot (LF)

<u>Measurement:</u> Saw-cutting operation and bituminous driveways will be measured in linear feet of continuous runs completed in accordance with the Plans and/or as directed by the Owner.

<u>Payment:</u> The accepted quantities of saw-cutting bituminous driveways will be paid for at the contract unit price per linear foot as listed in the Proposal. The price so-stated constitutes full and complete compensation for all labor, materials, and equipment and for all other incidentals required to finish the work complete and accepted by the Owner.

BID ITEM DESCRIPTION PAY UNIT

41 Saw-cutting Operation / Reception Pits

Each (EA)

<u>Measurement:</u> Saw-cutting bituminous at operation and reception pits will be measured per each operation/reception pit sawcut completed in accordance with the Plans and/or as directed by the Owner.

<u>Payment:</u> The accepted quantities of saw-cutting operation / reception pits will be paid for at the contract unit price per each as listed in the Proposal. The price so-stated constitutes full and complete compensation for saw-cutting all four sides of each pit and for all labor, materials, and equipment and for all other incidentals required to finish the work complete and accepted by the Owner.

BID ITEM DESCRIPTION PAY UNIT

42 Controlled Low Strength Material Cubic Yard (CY)

<u>Measurement:</u> Controlled low strength material, flowable fill, will be measured by the number of cubic yards actually placed. Controlled low strength material shall be placed as directed by the Engineer as needed to facilitate construction operations.

<u>Payment:</u> The accepted quantity of controlled low strength material will be paid for at the contract unit price per cubic yard as listed in the Proposal. The price so-stated constitutes full and complete compensation for all labor, materials and equipment, and all other incidentals required to finish the work complete and accepted by the Owner.

BID ITEM DESCRIPTION PAY UNIT

43 Miscellaneous Concrete Cubic Yard (CY)

<u>Measurement:</u> Concrete will be measured by the number of cubic yards actually placed. Concrete shall be placed as directed by the Engineer as needed to facilitate construction operations.

<u>Payment:</u> The accepted quantity of concrete will be paid for at the contract unit price per cubic yard as listed in the Proposal. The price so-stated constitutes full and complete compensation for all labor, materials and equipment, and all other incidentals complete and accepted by the Owner.

01025-10

BID ITEM	DESCRIPTION	PAY UNIT
44	8" Compost Filter Sock	Linear Foot (LF)

<u>Measurement:</u> Compost Filter Sock will be measured in linear feet of continuous runs completed in accordance with the Plans and/or as directed by the Owner.

<u>Payment:</u> The accepted quantities of compost filter sock will be paid for at the contract unit price per linear foot as listed in the Proposal. The price so-stated constitutes full and complete compensation for all labor, materials, and equipment including continuous maintenance throughout construction and removal upon completion of work, and for all other incidentals required to finish the work complete and accepted by the Owner.

BID ITEM	DESCRIPTION	PAY UNIT
45	Silt Sack Inlet Protection	Each (EA)

<u>Measurement:</u> Silt Sack Inlet Protection will be measured per each unit installed in accordance with the Plans and/or as directed by the Owner.

<u>Payment:</u> The accepted quantities of silt sacks will be paid for at the contract unit price per each as listed in the Proposal. The price so-stated constitutes full and complete compensation for all labor, materials, and equipment including continuous maintenance throughout construction, cleaning and removal upon completion of work, and for all other incidentals required to finish the work complete and accepted by the Owner.

BID ITEM	DESCRIPTION	PAY UNIT
46	4-Inch Loam and Seed	Square Yard (SY)

<u>Measurement:</u> 4-Inch Loam and seed will be measured in square yards installed in accordance with the Plans and/or as directed by the Owner.

<u>Payment:</u> The accepted quantities of loam and seed will be paid for at the contract unit price per square yard as listed in the Proposal. The price so-stated constitutes full and complete compensation for all labor, materials, and equipment including placing of loam, seed, and fertilizer, for watering all newly seeded and all other incidentals required to finish the work complete and accepted by the Owner. Payment for loam and seed for areas disturbed by the Contractor, outside of normal work limits during construction of this project will paid by the Contractor.

BID ITEM	DESCRIPTION	PAY UNIT
47	Precast Drainage Structure	Each (EA)

<u>Measurement:</u> Precast Drainage Structures of the various types and sizes all indicated on the Plans will be measured by the number of such structures actually installed in accordance with the Plans and/or as directed by the Owner.

<u>Payment:</u> The accepted quantities of drainage manholes installed by will be paid for at the contract unit price per each such structure as listed in the Proposal. The price so-stated constitutes full and complete compensation for all labor, materials and equipment to install the structures complete and in place. The work will include furnishing all excavation, dewatering, earth supports systems, compaction, saw-cut of bituminous and concrete pavements, furnishing and placing bedding materials, geo-textile filter fabric; making all connections to existing pipes, constructing brick inverts, manholes frames and covers (all types), temporary bracing at existing utility poles, removing abandoned water and gas main pipe, joint sealant, non-shrink grout, concrete, manhole steps, waterproofing, and all other incidentals.

BID ITEM DESCRIPTION PAY UNIT

48 Remove and Dispose Drainage Pipe – All Sizes Linear Foot (LF)

Measurement: Removal of drainage pipe will be measured in linear feet of continuous runs completed in accordance with the Plans and/or as directed by the Owner.

<u>Payment:</u> The accepted quantity removal and dispose drainage pipe will be paid for at the contract unit price per linear foot as listed in the Proposal. The price so-stated constitutes full and complete compensation for all labor, materials, and equipment including legal disposal of all pipe and excess materials and for all other incidentals required to finish the work complete and accepted by the Owner.

BID ITEM DESCRIPTION PAY UNIT

49 Remove and Dispose Existing Drainage Structures – All Sizes Each (EA)

Measurement: Remove and dispose existing drainage structures of the various types and sizes will

Measurement: Remove and dispose existing drainage structures of the various types and sizes will be measured by the number of such structures actually removed and disposed in accordance with the Plans and/or as directed by the Owner.

<u>Payment:</u> The accepted quantities of remove and dispose drainage structures will be paid for at the contract unit price per each such structure as listed in the Proposal. The price so-stated constitutes full and complete compensation for all labor, materials and equipment to install the structures complete and in place. The work will include all excavation, dewatering, earth supports systems, compaction, saw-cut of bituminous and concrete payments, and all other incidentals.

BID ITEM DESCRIPTION PAY UNIT

50, 51, 52 & 53 Storm Drainage Pipe Linear Foot (LF)

12" Reinforced Concrete Pipe

12" Ductile Iron Pipe

18" Reinforced Drainage Pipe

18" Ductile Iron Pipe

<u>Measurement:</u> Drainage pipe will be measured in linear feet of continuous runs of such pipe actually installed in accordance with the Plans and/or as directed by the Owner.

<u>Payment:</u> The accepted quantity for drainage pipe will be paid for at the contract unit price per linear foot for the various pipe type and sizes as listed in the Proposal. The price so-stated constitutes full and complete compensation for all labor, materials and equipment to install the pipe

complete and in place. The work will include furnishing all pipes, plugs, excavation, dewatering, compaction, saw-cut of bituminous and concrete pavements, furnishing and placing of bedding materials; laying, setting and jointing all pipes and fittings, making all connections to existing pipes and manholes, for rebuilding inverts of existing manholes as may be required, for backfilling and compacting backfill material, for disposal of all excess excavated materials, and all other incidentals.

BID ITEM DESCRIPTION PAY UNIT

54, 55 & 56 Remove and Reset Storm Drainage Pipe (All Types) Linear Foot (LF)

12" Pipe or Less, 18" and 24"

<u>Measurement:</u> Remove and reset storm drainage pipe will be measured in linear feet of continuous runs of such pipe actually removed and reset in accordance with the Plans and/or as directed by the Owner.

<u>Payment:</u> The accepted quantity for remove and reset storm drainage pipe (all types) will be paid for at the contract unit price per linear foot for the various pipe types and sizes as listed in the Proposal. The price so-stated constitutes full and complete compensation for all labor, materials and equipment to remove and reset pipe complete and in place. The work will include furnishing all pipes, plugs, excavation, dewatering, compaction, saw-cut of bituminous and concrete pavements, furnishing and placing of bedding materials; laying, setting and jointing all pipes and fittings, making all connections to existing pipes and manholes, for backfilling and compacting backfill material, for disposal of all excess excavated materials, and all other incidentals.

BID ITEM DESCRIPTION PAY UNIT

57 & 58 Isolate, Remove, Replace & Reactivate Water Mains Each (EA)

Less than 40 Feet of Water Pipe (6" and 8" Ductile Iron and PVC)

40 to 80 Feet of Water Pipe (6" and 8" Ductile Iron and PVC)

<u>Measurement:</u> Isolate, remove, replace and reactivate water mains of the various types and sizes will be measured by the number of such operations made to facilitate sewer pipe installation in accordance with the Plans and/or as directed by the Owner.

<u>Payment:</u> The accepted quantities of remove, replace, and reactivate water mains will be paid for at the contract unit price per each such structure as listed in the Proposal. The price so-stated constitutes full and complete compensation for all labor, materials and equipment include furnishing all pipes, fittings, restraints, earth support, dewatering, excavation, backfill, compaction, saw-cut of bituminous pavements, bedding materials; laying, setting and jointing all pipes and fittings, disinfection, re-activation of the water system and all other incidentals.

BID ITEM DESCRIPTION PAY UNIT

59 Overhead Utility House Services (Disconnect & Re-activate) Each (EA)

Measurement: overhead utility service requiring temporary disconnect to facilitate trenchless technologies and subsequent reactivation will be measured by the number of such disconnects

performed in accordance with the Plans and/or as directed by the Owner.

01025-13

<u>Payment:</u> The accepted quantities of overhead utility house services, disconnect and reactivate, will be paid for at the contract unit price per each as listed in the Proposal. The price so-stated constitutes full and complete compensation for all labor, materials and equipment and full coordination with National Grid and other communication providers to temporarily disconnect and reactivate service to facilitate the install of sewer pipe.

BID ITEM	DESCRIPTION	PAY UNIT
60 & 61	6" PVC Water Pipe (Sewer Conflicts)	Linear Foot (LF)
	8" PVC Water Pipe (Sewer Conflicts)	

<u>Measurement:</u> Water main installed will be measured in linear feet of continuous runs of such pipe actually installed in accordance with the Plans and/or as directed by the Owner.

<u>Payment:</u> The accepted quantity for water pipe installed will be paid for at the contract unit price per linear foot for the various pipe sizes as listed in the Proposal. The price so-stated constitutes full and complete compensation for all labor, materials and equipment to install the pipe complete and in place. The work will include furnishing all pipes, fitting, restraints, excavation, backfill, dewatering, compaction, earth support systems, saw-cut of bituminous pavements, bedding materials; laying, setting and jointing all pipes and fittings, making all connections to existing pipes, leakage testing, for backfilling and compacting backfill material, for disposal of all excess excavated materials, for replacing or rebuilding driveways, walks, sidewalks, curbs, walls, and any other impacted structures, including shrubs, fences, sprinkler systems, existing grassed areas and other surface material; for furnishing, placing, and removing all temporary timber sheeting and bracing, trench boxes and or steel plates; for providing temporary bracing at existing utility poles, for removing and resetting existing mailboxes; for removing abandoned water and gas main pipe, and all other incidentals.

BID ITEM	DESCRIPTION	PAY UNIT
62	Water Service Connections (House Services)	Each (EA)

<u>Measurement:</u> Water service connections will be measured by the number of service connections installed from the water main to the property line in accordance with the Plans and/or as directed by the Owner.

<u>Payment:</u> The accepted quantities of water service connections will be paid for at the contract unit price per each service installed as listed in the Proposal. The price so-stated constitutes full and complete compensation for all labor, materials and equipment include furnishing all pipes, fittings, tapping new mains, saddles, corporation stops, curb stops, cast iron curb boxes and extension rods, removal and disposal of existing curb stops and boxes; reconnecting the new service pipe to the existing service; providing miscellaneous fittings and unions; and other materials required for installing the services complete, earth support systems, dewatering, excavation, backfill, compaction, saw-cut of bituminous pavements, bedding materials; laying, setting and jointing all pipes and fittings, disinfection, re-activation of the water service and all other incidentals.

BID ITEM	DESCRIPTION	PAY UNIT
63 & 64	6" and 8" Water - Gate Valves	Each (EA)

<u>Measurement:</u> Gate Valves will be measured by the number of gate valve of various sizes installed on the water main in accordance with the Plans and/or as directed by the Owner.

<u>Payment:</u> The accepted quantities of gate valves will be paid for at the contract unit price per each installed as listed in the Proposal. The price so-stated constitutes full and complete compensation for all labor, materials and equipment include furnishing all valves, fittings, cast iron curb boxes and extension rods, restraints, removal and disposal of existing valves and other materials, earth support systems, dewatering, excavation, backfill, compaction, saw-cut of bituminous pavements, bedding materials; laying, setting and jointing all connections and fittings, disinfection, reactivation of the water service and all other incidentals.

BID ITEM	DESCRIPTION	PAY UNIT
65	Tapping Sleeve and Valve – All Sizes	Each (EA)

<u>Measurement:</u> Tapping Sleeves and Valves will be measured by the number of various types and sizes installed on the water main in accordance with the Plans and/or as directed by the Owner.

<u>Payment:</u> The accepted quantities of tapping sleeves and valves will be paid for at the contract unit price per each installed as listed in the Proposal. The price so-stated constitutes full and complete compensation for all labor, materials and equipment include furnishing all valves, fittings, cast iron curb boxes and extension rods, restraints, removal and disposal of existing valves and other materials, earth support systems, dewatering, excavation, backfill, compaction, saw-cut of bituminous pavements, bedding materials; laying, setting and jointing all connections and fittings, disinfection, re-activation of the water service and all other incidentals.

BID ITEM	DESCRIPTION	PAY UNIT
66	Fire Hydrants	Each (EA)

<u>Measurement:</u> Hydrants will be measured by the number installed on the water main in accordance with the Plans and/or as directed by the Owner.

<u>Payment:</u> The accepted quantities of hydrants will be paid for at the contract unit price per each installed as listed in the Proposal. The price so-stated constitutes full and complete compensation for all labor, materials and equipment include furnishing all valves, fittings, cast iron curb boxes and extension rods, restraints, removal and disposal of existing valves, hydrants, and other materials, concrete, earth support systems, dewatering, excavation, backfill, compaction, saw-cut of bituminous pavements, bedding materials; laying, setting and jointing all connections and fittings, disinfection, re-activation of the water service and all other incidentals.

BID ITEM	DESCRIPTION	PAY UNIT
67, 68 & 69	Traffic Control Devices	Lump Sum (LS)
	Construction Road Signs	
	Traffic Barrels w/Type A or Type C Light	
	Traffic Barricades	
	01025-15	

<u>Measurement</u>: The work of this section shall be measured on a lump sum basis. The payable quantity will be for devices in place including but not limited to construction road signs, traffic barrels w/ type A or type C lights, and traffic barricades.

<u>Payment</u>: Traffic control devices including construction road signs, traffic barrels w/Type A or Type C lights, and traffic barricades will be paid for at the contract lump sum price listed in the Proposal. The price so-stated constitutes full and complete compensation for all labor, materials and equipment including daily maintenance, moving, and resetting of all traffic control equipment and devices and all other incidentals.

BID ITEM	DESCRIPTION	PAY UNIT
70	Vibration Monitoring	Lump Sum (LS)

<u>Measurement</u>: The work of this section shall be measured on a lump sum basis. The payable quantity will be for providing vibration monitoring throughout construction of the project as defined by the Contract Documents.

<u>Payment</u>: Vibration monitoring will be paid for at the contract lump sum price listed in the Proposal. The price so-stated constitutes full and complete compensation for all labor, materials, equipment, and reports and all other incidentals.

BID ITEM	DESCRIPTION	PAY UNIT
71 & 72	Miscellaneous Utility Work	Allowances
	Asbestos Containing Materials	

The Contractor shall include in the Contract Sum all allowances stated as listed in the Proposal. The items covered by allowances shall be supplied for such amounts and by such persons or entities as the Owner may direct, but the Contractor shall not be required to employ persons or entities to whom the Contractor has reasonable objection. Unless otherwise provided in the Contract Documents, allowances shall cover the cost to the Contractor's materials and equipment, delivery, unloading and handling, labor, installation costs, overhead, profit and other expenses.

BID ITEM	DESCRIPTION	PAY UNIT
73, 74 & 75	Gas Main Relocation	Allowances
	Soil Compaction Testing	
	Tree Trimming	

The Contractor shall include in the Contract Sum all allowances stated as listed in the Proposal. The items covered by allowances shall be supplied for such amounts and by such persons or entities as the Owner may direct, but the Contractor shall not be required to employ persons or entities to whom the Contractor has reasonable objection. Unless otherwise provided in the Contract Documents, allowances shall cover the cost to the Contractor's materials and equipment delivered at the site and all required taxes, less applicable trade discounts. Contractor's costs for unloading and handling at the site, labor, installation costs, overhead, profit and other expenses contemplated for stated allowance amounts shall be included in the Contract Sum but not in the allowances.

BID ITEM	DESCRIPTION	PAY UNIT
76	Police Protection	Lump Sum

Measurement: None.

<u>Payment</u>: Payment for police protection will be paid directly by the Warwick Sewer Authority. The Contractor will be responsible for coordinating police protection with the Police Department and the Owner. The Warwick Police Department will invoice the WSA directly without charge to the Contractor. The Owner's representative will review and approve all related police invoices.

REFERENCE STANDARDS

PART 1 - GENERAL

1.1 GENERAL

- A. Wherever reference is made to any published standards, codes, or standard specifications, it shall mean the latest standards code, specification, or tentative specification of the technical society, organization, or body referred to which is in effect at the date of this Invitation for Bids.
- B. The following is a partial list of typical abbreviations which may be used in the specifications and the organizations to which they refer:

AASHTO	American Association of State Highway and Transportation Officials
ACI	American Concrete Institute
AISC	American Institute of Steel Construction
ANSI	American National Standards Institute
ASCE	American Society of Civil Engineers
ASTM	American Society for Testing and Materials
AWWA	American Waterworks Association
CORPS	Army Corps of Engineers
NASSCO	National Association of Sewer Service Companies
OSHA	Occupational Safety and Health Act
PACP	Pipeline Assessment and Certification Program
RIDOT	Rhode Island Department of Transportation
RIDEM	Rhode Island Department of Environmental Management
UBC	Uniform Building Code
UL	Underwriters' Laboratory
USCG	United States Coast Guard

C. Contractor shall, when required, furnish evidence satisfactory to Engineer that materials and methods are in accordance with such standards where so specified.

United States Environmental Protection Agency

D. In the event any questions arise as to the application of these standards or codes, copies shall be supplied on site by Contractor.

END OF SECTION

Date: 11/2019

USEPA

PROJECT MEETINGS

PART 1 - GENERAL

1.1 PRECONSTRUCTION CONFERENCE

A. The Engineer will schedule and conduct one preconstruction conference prior to the commencement of any work at the site, to which all interested agencies and utility companies will be invited to discuss their interests and requirements relating to the project. Contractor and all subcontractor representatives shall attend.

1.02 CONSTRUCTION PERIOD MEETINGS

- A. Construction period meetings will be conducted at biweekly intervals or at some other frequency if approved by the Engineer. These meetings shall be attended by the Engineer and the Contractor's Project Manager and any others that are invited by these people.
- B. Engineer will prepare the agenda of these project meetings, which will include reports on construction progress, the status of submittal reviews, the status of information requests, and any general business. The meetings will be conducted by the Engineer. Engineer shall keep minutes of the proceedings. The minutes shall be typed and distributed to all attendees prior within 48 hours of each meeting to the extent possible, but in no event later than the date of the next scheduled meeting.

PART 2 - PRODUCTS

(Not Used)

PART 3 - EXECUTION

(Not Used)

END OF SECTION

CONSTRUCTION SCHEDULE

PART 1 - GENERAL

1.1 SUMMARY

A. This Section specifies reports and schedules for planning and monitoring the progress of the project work.

1.2 DESCRIPTION

A. The Contractor shall provide a graphic construction schedule indicating the various subdivisions of the work and the dates of commencing and finishing each. The schedule shall follow the Critical Path Method (CPM) of depicting critical and non-critical tasks. The schedule shall show the time allowed for testing and for other procedures which must be completed prior to the work being put into operation. The schedule will take into account the time of completion and the specific dates as specified in the Contract Documents.

1.3 SUBMITTAL PROCEDURES

- A. Within 10 days after the Bid Opening, the Contractor shall submit in accordance with Section 01340, a construction schedule conforming to this specification. The submittal shall consist of a reproducible original and two copies.
- B. Within 7 calendar days after receipt of the submittal, the Engineer shall review the submitted schedule and return one copy of the marked up original to the Contractor. If the Engineer finds that the submitted schedule does not comply with specified requirements, the corrective revisions will be noted on the submittal copy returned to the Contractor.

1.4 SCHEDULE REVISIONS

A. Revisions to the accepted construction schedule may be made only with the written approval of the Contractor and Owner. A change affecting the contract value of any activity, the completion time, and specific dates and sequencing may be made only in accordance with applicable provisions of Special Conditions.

1.5 PROJECT STATUS UPDATE

A. Project status review narrative and updated CPM schedule shall be provided monthly with each payment requisition.

END OF SECTION

SHOP DRAWINGS

PART 1 - GENERAL

1. 1 GENERAL

- A. Contractor shall submit for review, shop drawings and descriptions of methods and equipment to be utilized and of all materials and equipment to furnish in accordance with the applicable Sections of the Contract Documents.
- B. Contractor is required to submit details of all materials and equipment, even though a particular item is the one specified.
- C. Contractor, on review from Engineer, may submit manufacturer's literature as a substitute for, or supplement to, the shop drawings. The minimum size for any submission shall be 8 1/2 inches by 11 inches, and the maximum size shall not exceed 36 inches by 24 inches. All shop drawings and printed matter submitted shall clearly indicate the Section of the Contract Documents to which they correspond (e.g. Section 03200).
- D. Shop drawings or printed matter shall give all dimensions and sizes to enable Engineer to pass on the suitability of the material or layout for the purpose intended. The shop drawings shall, where needed for clarity, include outline and Sectional views, and detailed shop dimensions and designations of the kind of materials and kinds of machine work and finishes required. Shop drawings for submission shall be coordinated by Contractor with shop drawings previously submitted, with shop drawings being prepared, and with the design and function of any equipment or structure.
- E. If the shop drawings show variances from the requirements of the Contract because of standard shop practice or other reason, Contractor shall make specific mention of such variation in his letter of transmittal in order that, if acceptable, suitable action to be taken for proper adjustment; otherwise Contractor will not be relieved of the responsibility for executing the Work in accordance with the Contract even though such shop drawings have been "Reviewed" by Engineer.
- F. Material shall not be purchased or fabricated for equipment or structures until Engineer has reviewed and "Approved" the shop drawings, which shall represent all materials and work involved in the construction. No materials or equipment for which a submittal of a shop drawing is required shall be delivered to the site unless they are in conformance with the shop drawings which have been "Approved".
- G. Work shall not be done upon any part of a structure, the design or construction of which acceptance is required, until such acceptance has been received from which is dependent upon the design of equipment or other features, for Engineer.

1.2 PROCEDURE FOR REVIEW

- A. A minimum of six (6) copies of shop drawings and printed matter shall be submitted by Contractor to Engineer for review. By submitting the shop drawings, Contractor thereby represents that he/she has determined and verified all field measurements, field construction criteria, materials, made log numbers and similar data or will do so, and that he/she has checked and coordinated each shop drawing with the requirements of the Work and of the Contract Documents.
- B. Contractor shall review all drawings or literature submitted to him by Subcontractors and Suppliers for correctness and adequacy of data, and shall stamp the drawings or literature "Approved for Submission" and sign them prior to submitting such shop drawings, and literature to Engineer for review. Contractor shall be responsible for the prompt submission of all shop drawings, so that there shall be no delay to the Work due to the absence of such drawings.
- C. Engineer will review the shop drawing, but only for conformance with the design concept of the Project and with the information given in the Contract Documents.
- D. Three (3) copies of the shop drawings or printed matter will be retained by Engineer. The remaining three (3) copies will be returned to Contractor marked in one of the following ways, all subject to Contract requirements:

<u>NO EXCEPTION TAKEN</u> - The content of this submittal was reviewed by the Engineer and was found to be in general compliance with the Contract Documents. No further submission of this submittal is required and the information contained in the submittal may be built into the Work in accordance with the terms and conditions of the Contract Documents.

<u>MAKE CORRECTIONS NOTED</u> - The content of this submittal was reviewed by Engineer and was found in general to be in compliance with the Contract Documents. The notations made on the submittal, by Engineer, shall be incorporated into the Work in accordance with the terms and conditions of the Contract Documents. Resubmission may be required.

<u>SUBMIT SPECIFIED ITEM</u> - The content of this submittal was reviewed by Engineer and was found in general to be in compliance with the Contract Documents but incomplete. Contractor shall address the items specified in the Engineer's comments and resubmit these items for review. In general, if the specified item is an omission, the Contractor may submit that item for review. However, the Engineer may require the resubmittal to contain all elements found to be in compliance with the Contract Documents in addition to the items specified in Engineer's review comments to produce a complete resubmittal.

REVISE and RESUBMIT - The content of this submittal was reviewed by Engineer and this review has indicated that additional data and/or modifications to the submitted data or other changes are required to bring the work represented in this submittal into compliance with the Contract Documents. This submittal shall be reviewed and remarked in accordance with Engineer's comments, by Contractor, and resubmitted to Engineer for another review. The information contained on the resubmittal shall not be incorporated into the Work until it is returned to Contractor with an "Approved" or "Approved as Noted" stamp.

01340 - 2

<u>REJECTED</u> - The content of this submittal was reviewed by Engineer and this review has indicated that the work displayed in the submittal is not in compliance with the Contract Documents. Contractor shall forward another submittal for this portion of the Work, which complies with the Contract Documents.

- E. Prior to the end of the Contract Work, Contractor shall furnish Engineer with three (3) prints of each "Approved" drawing, and all approved field changes shown. Contractor shall also furnish three (3) copies of accepted Supplier printed literature. Only drawings which were checked and corrected shall be submitted. Contractor shall review all drawings or literature submitted to him/her by Subcontractors and Suppliers for correctness and adequacy of data prior to submitting such drawings and literature to Engineer.
- F. Any action by Engineer shall not be construed in any way as relieving Contractor from his full responsibilities under the terms of the Contract requirements. Review of a separate item shall not indicate approval of an assembly in which the item functions. Review is for general conformance with the design concept of the Project and compliance with the information given in the Contract Documents. Contractor is responsible for all dimensions, quantities, and performance requirements for all confirmation and correlation at the job site; for all information that pertains solely to the fabrication processes or to the techniques of construction; and for all coordination of the Work of all trades; and for assuring consistency with the Contract Documents.

1.3 CERTIFIED SHOP TEST REPORTS

- A. Each piece of equipment for which pressure, duty, capacity, rating, efficiency, performance, function, or special requirements are specified shall be tested in the shop of the manufacturer in a manner that shall conclusively prove that its characteristics comply fully with the requirements of the Contract Documents. Tests shall be conducted in accordance with the test codes of the ASME, NEMA, and other applicable standards.
- B. Equipment shall not be shipped to the site until Engineer notifies Contractor in writing that the results of the shop tests are acceptable.
- C. When the Specifications require witness shop tests at the point of manufacture, the only tests that will be accepted are those made in the presence of Engineer or his representative. Contractor shall give Engineer written notice ten (10) days in advance of the time when the equipment will be ready for the witness shop test, or as required by the Specifications. This notification shall include a diagram of the testing setup and a list of the instruments the manufacturer proposes to use for the tests. All instruments shall have ranges suitable for the quantities to be measured, with approved laboratory calibration. Five (5) copies of the witness shop test data and interpreted results thereof, accompanied by a certificate of authenticity sworn to by a responsible official of the manufacturing company, shall be forwarded to Engineer.

1.4 SAMPLES

A. Contractor shall furnish for review all samples as required by the Contract Documents or requested by Engineer.

- B. Samples shall be of sufficient size or quantity to clearly illustrate the quality, type, range of color, finish, or texture and shall be properly labeled to show the nature of the material, trade name of manufacturer, and location of the work where the material represented by the sample will be used.
- C. Samples shall be checked by Contractor for conformance to the Contract Documents before being submitted to Engineer, and shall bear Contractor's stamp of approval certifying that they have been so checked. Transportation charges on samples submitted to Engineer shall be prepaid by Contractor.
- D. Engineer's review will be for compliance with the Contract Documents and his/her comments will be transmitted to Contractor with reasonable promptness.
- E. Accepted samples will establish the standards by which the completed Work will be judged.

PART 2 - PRODUCTS

2.1 GENERAL

Contractor shall submit for review the following shop drawings.

- A. Detailed description of the construction means and methods to be utilized to perform trenchless technologies for service and main line pipe installation.
- B. List of specifications of equipment to be utilized to perform trenchless technologies.
- C. Resumes of trenchless technology superintendent and machine operator.
- D. Excavation support methods
- E. Pipe and fittings for trenchless technologies
- F. Pipe and fittings for open trench excavations
- G. Precast manholes and appurtenances
- H. Frames and grates
- I. Brick and mortar materials
- J. Curb boxes and valves
- K. Air release valves
- L. Concrete
- M. Load and seed materials
- N. Borrow materials (gravel, sand, etc.)
- O. Bituminous pavement
- P. Water pipe and appurtenances
- Q. Health and Safety Plan

END OF SECTION

HEALTH AND SAFETY PROVISIONS

PART 1 - GENERAL

1.1 REQUIREMENTS

- A. Contractor's attention is directed to the fact that the project's objective is to connect residences to the municipal sewer system, owned by the WSA and work will be conducted in area's utilized for wastewater/septage collection, and that unsafe conditions may occur. Contractor is advised that methane, hydrogen sulfide, and other toxic gases may be encountered in the execution of this Project. Low levels of oxygen and other hazards may occur.
- B. Contractor is responsible to monitor working conditions at all times during construction and to provide appropriate OSHA protective clothing, equipment, and facilities for its personnel, and to establish work place procedures to ensure their safety, and to enforce the use of these procedures, equipment, and facilities in accordance with the following guidelines:
 - 1. Safety and Health Regulations Promulgated by the U.S. Department of Labor, OSHA, 29 CFR 1910 Occupational Safety and Health Standards, and 29 CFR 1920 Safety and Health Regulations for Construction.
 - 2. U.S. Environmental Protection Agency, Interim Standard Operating Safety Guides, Office of Emergency and Remedial Response, Hazardous Response Support Division, Rev. September 1982.
 - 3. U.S. Environmental Protection Agency, Medical Monitoring Program Guidelines.
- C. Contractor shall implement a Health and Safety protection program. The program procedures shall include provisions for stations allowing workers to wash and to put on and remove protective clothing, and stations for vehicles to be cleaned, if necessary, before leaving the site. It shall also include a plan for maintaining proper ventilation of Work areas, provision of required breathing apparatus for workers, and contingency plans for emergencies, at a minimum.
- D. Contractor shall engage an independent, qualified Health and Safety expert having experience on similar projects, to prepare the program, to monitor site conditions, and to recommend all necessary Health and Safety protection. The Contractor shall follow such recommendations and shall provide such protection to his personnel, and personnel of Owner and Engineer, as may be affected.
- E. Contractor shall comply with all federal, State, and local safety requirements related to the presence of combustible and nausea inducing gases.
- F. If, at any time, the Owner or Engineer is apprised of a safety hazard which demands immediate attention because of its high potential for harm to public travel, persons on or about the Work, or public or private property, the Owner or Engineer shall have the right to order such safeguards to be erected and such precautions to be taken as necessary and Contractor shall comply with such orders. If, under such circumstances, Contractor does not or cannot immediately put the Work into proper condition, or if Contractor or his representative is not upon the site so that he can be notified immediately of the insufficiency of safety precautions, then the Owner may put the Work into such

01370 - 1

a condition that it shall be, in his opinion, in all respects safe, and Contractor shall pay all expenses of such labor and materials as may have been used for this purpose by him or by the Owner. The fact that the Owner or Engineer does not observe a safety hazard or does not order the Contractor to take remedial measures shall in no way relieve Contractor of the entire responsibility for any costs, loss, or damage by any party sustained on account of the insufficiency of the safety precautions taken by him or by the Owner acting under authority of this Section.

- G. Contractor is alerted to the fact that conditions of high hazard are present or can be present at the site during performance of the Work. It is the responsibility of Contractor to take appropriate safety precautions to meet whatever conditions of hazard may be present during the performance of the Work, whether reasonably foreseeable or not. The safety conditions enumerated within the Specifications are the minimum permissible and neither the Owner nor Engineer make any representation that the safety standards provided herein will be adequate to meet all eventualities. Contractor is therefore alerted to the fact that it shall be Contractor's responsibility to anticipate and provide such additional facilities, personnel, and equipment as shall be necessary to protect life and property from whatsoever conditions of hazard are present or may be present.
- H. Contractor shall supply and erect highly visible safety fencing a minimum of three feet in height around all construction areas that pose a threat to safety. Contractor shall erect safety fencing at his own discretion or as directed by the Owner or Engineer and shall maintain such fencing until such a time that the potential safety hazard has been rectified. Upon final completion of construction, all safety fencing shall be removed off site by Contractor. Safety fencing requirement of OSHA shall be enforced by Contractor.

END OF SECTION

01370 - 2

Date: 11/2019

HEALTH AND SAFETY PROVISIONS

ENVIRONMENTAL PROTECTION

PART 1 - GENERAL

1.1 SUMMARY

A. Contractor shall furnish all labor, equipment, and materials required for environmental protection during and as the result of construction operations under this Contract except for those measures set forth in other provisions of these Specifications. Environmental protection requires consideration of air, water and land, and involves noise and solid waste management as well as other pollutants. Contractor shall implement environmental protection measures to ensure all requirements or regulations set forth in site-wide or project-specific permits are met.

B. Related Sections:

- 1. Section 03100 Site Clearing
- 2. Section 03200 Earth Moving
- 3. Section 03350 Excavation and Backfill
- 4. Section 03750 Dewatering
- 5. Section 03800 Erosion and Sedimentation Control

C. Applicable Regulations

In order to prevent environmental pollution and to provide for environmental protection arising from construction activities related to the performance of this Contract, Contractor and all Subcontractors shall comply with all applicable Federal, State and local Laws and Regulations concerning environmental protection, as well as the specific requirements stated in this Section and elsewhere in the Specifications.

D. Submittals:

- 1. <u>Implementation Plan.</u> Prior to commencement of the Work, Contractor shall:
 - a. Meet with Engineer to develop a mutual understanding relative to compliance with the provisions of this Section and administration of the environmental protection program.

PART 2 - PRODUCTS

(Not used)

PART 3 - EXECUTION

3.1 GENERAL

A. It is intended that the resources within the Project boundaries and outside the limits of permanent Work performed under this Contract be preserved in their present condition, or be restored to a condition after completion of construction, that will appear to be natural and not detract from the appearance of the Project. Contractor shall confine his construction activities to areas defined on the Drawings or in the Specifications except with written approval of the Owner and/or Engineer.

- 1. <u>Prevention of Landscape Defacement.</u> Limits of working areas include areas for storage of construction material, and shall be cleared in a manner which will enable satisfactory restoration and which will not affect the environment during or after the construction period. Contractor shall not enter beyond the working limits of the working area except with written approval of Engineer and the Owner.
- Location of Storage. The location of areas for storage of Contractor's materials required temporarily in the performance of the Work, shall be within the limits of the working area as provided for by OWNER and shall require written approval of Engineer prior to use. The preservation of the landscape shall be an imperative consideration in the selection of the sites.
- 3. <u>Post Construction Cleanup or Obliteration</u>. Contractor shall obliterate all signs of temporary construction facilities such as work areas, stockpiles of excess or waste materials, temporary erosion and sediment controls, or any other vestiges of construction. The disturbed areas shall be graded and repaired in accordance with the Drawings and to a condition equal or better than prior to construction as required.

3.2 PROTECTION OF WATER RESOURCES

- A. Contractor shall not pollute streams, lakes or reservoirs with fuels, oils, bitumens, calcium chloride, acids or harmful materials. It is the responsibility of Contractor to investigate and comply with all applicable federal, state, county and municipal laws concerning pollution of rivers, streams and impounded water. All Work under this Contract shall be performed in such a manner that objectionable conditions will not be created in streams, lakes, reservoirs, or bodies of water adjacent to, or within, the Project area.
- B. <u>Erosion</u>. Temporary erosion and sediment control measures shall be provided and maintained until permanent vegetation is established.
- C. <u>Spillage</u>. At all times of the year, special measures shall be taken to prevent chemicals, fuels, oils, greases, bituminous materials, waste washing, herbicides and insecticides, and cement and surface drainage from entering public or private waters.
- D. <u>Disposal.</u> Disposal of any materials, wastes, effluent, trash, garbage, oil, grease, chemicals, etc., in or adjacent to reservoirs, streams or other waterways shall be disposed by the Contractor as specified in these Contract Documents. If any waste material is dumped in unauthorized area, Contractor shall remove the material and restore the area to the condition of the adjacent undisturbed area. If necessary, contaminated soil shall be excavated, disposed of as specified herein before, and replaced with suitable fill material, compacted and finished with topsoil, all at the expense of Contractor.
- E. <u>Disturbed Area.</u> Contractor shall limit disturbed area to less than 1 acre at any given time. Obtain, pay all permit fees and comply with all provisions of the General Permit Rhode Island Pollutant Discharge Elimination System Storm Water Discharge Associated with Construction Activity if required at no additional cost to the Owner. Comply with all provisions of the Soil Erosion and Sediment Control Plan maintained by Contractor a no additional cost to the Owner.

3.3 MAINTENANCE

- A. Contractor shall dispose of all discarded debris and waste materials in a manner approved by Engineer. Toilet facilities shall be kept clean and sanitary at all times. Services shall be performed at such a time and in such a manner to least interfere with the operations. Services shall be accomplished to the satisfaction of Engineer.
- B. Contractor shall frequently remove materials no longer required on the site so that, at all times the site, access routes to the site and any other areas disturbed by his operations shall present a neat, orderly, workmanlike appearance.
- C. Before final payment, Contractor shall remove all surplus material, false work, and debris of every nature resulting from his operations, and put the site in a neat, orderly condition; and restore all areas which have been used for or disturbed by his operations, to their original condition or to a condition satisfactory to and approved by Engineer.

3.4 NOISE CONTROL

A. Contractor shall use every effort and means possible to minimize or eliminate noise caused by his operation that Engineer may consider objectionable. Contractor shall provide working machinery, designed to operate with the least possible noise, pumps and compressors to be operated at times other than between 7:00 A.M. to 3:30 PM, Mondays through Fridays, should they be required. The air intakes of compressors shall be equipped with silencers; engine driven machinery, where permitted, shall be equipped with mufflers; and sound insulating enclosures and baffles shall be provided where directed.

3.5 PESTICIDES AND HERBICIDES

A. Pesticides and herbicides shall be utilized only when specifically approved by the Owner and Engineer. Where pesticides or herbicides are to be used in construction operations, data relative to restrictions on the type or types of material available and approved for application to control or eradicate vegetation, insects or organisms shall be obtained from the Department of Environmental Management. The amount of pesticide applied shall be limited to the recommended dosage. Application equipment shall provide an even distribution of the materials in accordance with the approved rate in terms of pounds per acre. Materials delivered to the site shall be covered and protected from the elements. Contents of the containers shall not be exposed. Application equipment or empty containers shall not be rinsed. Empty containers shall be disposed of legally, off-site, in a manner that would not cause pollution of surface or groundwater.

3.6 PROHIBITED CONSTRUCTION PROCEDURES

A. Contractor is advised that the disposal of excess material in wetlands, stream corridors, and floodplain is strictly prohibited. Any violation of this restriction by 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 material at his own expense and restore the area impacted.

- 1. At a minimum, Contractor shall comply with the following requirements regarding prohibited construction procedures as follows:
 - a. Dumping or discharge of spoil material or excessively turbid water into any stream corridor, any wetlands, any surface waters, or at unspecified locations.
 - b. Indiscriminate, arbitrary or capricious operations of equipment in any stream corridors, any wetlands or surface waters.
 - c. Disposal of trees, brush and other debris in any stream corridors, any wetlands, any surface waters, or at unspecified location.
 - d. Disposal of excess or unsuitable excavation material in wetlands or floodplain even with permission of the property owner.
 - e. Open burning of project debris.
 - f. Location of storage stockpile areas in environmentally sensitive areas.

END OF SECTION

QUALITY CONTROL

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

- 1. Quality Assurance and Control of Installation
- 2. References
- 3. Field samples
- 4. Inspection and testing laboratory services
- 5. Manufacturers' field services and reports
- B. Related Documents: The Contract Documents, as defined in Section 01010 Summary of Work, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other Documents.

C. Submittals:

1. Contractor shall submit a Quality Control Plan to Engineer for review and approval a minimum 10 days prior to initiating work.

D. Quality Assurance and Control of Installation

- 1. Monitor quality control over suppliers, manufacturers, products, services, site conditions, and workmanship to produce work of specified quality.
- 2. Comply fully with manufacturers' instructions, including each step-in sequence.
- 3. Should manufacturers' instructions conflict with Contract Documents, request clarification from Engineer before proceeding.
- 4. Comply with specified standards as a minimum quality for the work except when more stringent tolerances, codes or specified requirements indicate higher standards or more precise workmanship.
- 5. Perform work by persons qualified to produce workmanship of specified quality.
- 6. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion or disfigurement.

1.2 REFERENCES

- A. Conform to reference standard by date of issue current on date of Contract Documents.
- B. Obtain copies of standards when required by Contract Documents.
- C. Should specified reference standards conflict with Contract Documents, request clarification from Engineer before proceeding.

- D. The contractual relationship of the parties to the Contract shall not be altered from the Contract Documents by mention of inference otherwise in any reference document.
- 1.3 FIELD SAMPLES
 - A. Install field samples at the site for review, as required by individual specification Sections.
 - B. Acceptable samples represent a quality level for the work.
 - C. Where field sample is specified in individual Sections to be removed, clear area after field sample has been accepted by Engineer.
- 1.4 MANUFACTURER'S FIELD SERVICES AND REPORTS
 - A. Submit qualifications of observer to Engineer 30 days in advance of required observations. Observer subject to approval of Engineer.
 - B. When specified in individual specification Sections, require material or product suppliers or manufacturers to provide qualified staff personnel to observe site conditions, conditions of surfaces and installation, quality of workmanship, start-up of equipment, testing, adjusting and balance of equipment as applicable, and to initiate instructions when necessary.
 - C. Individuals to report observations and site decisions or instructions given to applicators or installers that are supplemental or contrary to manufacturers' written instructions.
 - D. Submit report in duplicate to Engineer for review, within 30 days of observation.

PART 2 - PRODUCTS

(Not Used)

PART 3 – EXECUTION

(Not Used)

END OF SECTION

TESTING LABORATORY SERVICES

PART 1 - GENERAL

1.1 SUMMARY:

A. This Section specifies Quality Control testing and reporting performed by a Testing Laboratory. The Contractor shall retain the services of a qualified Testing Laboratory and contract for the services specified herein. The Testing Laboratory shall be approved by the Engineer and/or the Owner.

1.2 REFERENCES:

- A. This Section contains references to the following documents. They are a part of this Section as specified and modified. Where a referenced document contains references to other standards, those documents are included as references under this Section as if referenced directly. In the event of conflict between the requirements of this Section and those of the listed documents, the requirements of this Section shall prevail.
- B. Unless otherwise specified, references to documents shall mean the documents in effect at the time of Advertisement for Bids or Invitation to Bid. If referenced documents have been discontinued by the issuing organization, references to those documents shall mean the replacement documents issued or otherwise identified by that organization or, if there are no replacement documents, the last version of the document before it was discontinued. Where document dates are given in the following listing, references to those documents shall mean the specific document version associated with that date, regardless of whether the document has been superseded by a version with a later date, discontinued or replaced.

ASTM A880	Criteria for Use in Evaluation of Testing Laboratories and Organizations for Examination and Inspection of Steel, Stainless Steel, and Related Alloys
ASTM C802	Conducting an Inter-laboratory Test Program to Determine the Precision of Test Methods for Construction Materials
ASTM C1021	Laboratories Engaged in the Testing of Building Sealants
ASTM Cl077	Laboratories Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Laboratory Evaluation
ASTM C1093	Accreditation of Testing Agencies for Unit Masonry
ASTM D3666	Specification for Minimum Requirements for Agencies Testing and Inspecting Road and Paving Materials
ASTM D3740	Minimum Requirements for Agencies Engaged in the Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction
ASTM D4561	Quality Control Systems for Organizations Producing and Applying Bituminous Paving Materials

ASTM E4	Force Verification of Testing Machines
ASTM E329	Agencies Engaged in the Testing and/or Inspection of Materials Used in Construction
ASTM E543	Agencies Performing Nondestructive Testing
ASTM E994	Calibration and Testing Laboratory Accreditation Systems General Requirements for Operation and Recognition.
IBC	International Building Code
ICC	International Code Council

1.3 TESTING LABORATORY QUALIFICATIONS:

- A. Testing Laboratory shall satisfy the following qualifications:
 - 1. Recommended Requirements for Independent Laboratory Qualification, published by American Council of Independent Laboratories.
 - 2. Conform to the requirements of ASTM E329 in particular, and other reference standards as generally pertain to this project.
 - 3. Authorized to operate in the Rhode Island with personnel and equipment based sufficiently close to the project to allow short-notice site access for sampling and testing.
 - 4. Acceptable to Owner and local building authorities.

1.4 TESTING LABORATORY RESPONSIBILITIES:

- A. Testing Laboratory shall provide qualified personnel at the site and cooperate with Engineer and Contractor in performance of the following services:
 - 1. Perform specified independent inspection, sampling, and testing of products in accordance with specified standards, to determine compliance with requirements of Contract Documents.
 - 2. Provide sampling equipment and personnel, deliver samples to the testing laboratory, record field measurements, and cure samples as required by Contract Documents.
 - 3. Timely prepare and deliver reports summarizing results of tests and inspections.
 - 4. Attend pre-construction conferences and, if requested, a limited number of progress meetings where Quality Control, testing, and inspection issues require discussion.
 - 5. When directed by the Engineer or Owner or requested by the Contractor, provide special and additional tests and inspections to verify material compliance with requirements of Contract Documents.
 - a. Owner shall pay for special tests and inspections where work conforms to the Contract Document requirements.
 - b. Contractor shall pay for additional tests and inspections where work fails to comply with Contract Document requirements (re-inspection) and for costs associated with cancelled or short-notice re-scheduling of requested sampling, testing, and inspection. Testing Laboratory work requested by Contractor to fulfill submittal requirements shall also be considered additional tests and costs shall be paid by the Contractor, at no additional expenses to the Owner.

1.5 CONTRACTOR RESPONSIBILITIES:

- A. Contractor shall deliver adequate samples of materials proposed to be used and which require testing to the Testing Laboratory. Contractor shall cooperate with Testing Laboratory personnel, and provide access to the work and to manufacturer's facilities. Contractor shall provide incidental labor and facilities to provide access to work to be tested, to obtain and handle samples at the site or at source of products to be tested, to facilitate tests and inspections, storage and curing of test samples.
- B. Contractor shall notify Testing Laboratory and Engineer 72 hours prior to expected time for operations requiring inspection, sampling and testing services.

1.6 TEST AND INSPECTION REPORTS:

A. Report Contents:

- 1. At a minimum, Test and Inspection Reports shall include the following:
 - a. Project name and date of report.
 - b. Testing Laboratory name, address, telephone number, name of laboratory field sampling personnel, lab testing personnel, or QCS Inspector as applicable.
 - c. Date, time, and location of sampling, testing, and inspecting.
 - d. Ambient temperature and weather conditions at the site or shop and curing conditions of samples.
 - e. Product identification and referenced specification Section number.
 - f. Type of sample, test, and inspection and industry standard for sampling and testing.
 - g. Results of sample, test, and inspection.
 - h. Evaluation of compliance with requirements in Contract Documents.
 - i. Certified Inspection Reports shall specifically indicate the qualification of the inspector to render judgment and certify said inspection.
 - j. When requested by Owner or Engineer, interpretation of test results.
- 2. Distribution of Test and Inspection Reports:
 - a. Test and Inspection reports shall be submitted to the Engineer for distribution as Product Data described in Section 01340 Shop Drawings. Test reports shall be submitted not more than two days after completion of required tests. Inspection reports shall be submitted immediately if deficiencies or significant irregularities are noted, and in no case less than two working days after said inspection. Provide six (6) copies of all reports.

1.7 SUBMITTALS:

- A. The following information shall be provided in accordance with Section 01340 Shop Drawings:
 - 1. A copy of this specification Section, with addendum updates included, and all referenced and applicable Sections, with addendum updates included, with each Paragraph check-marked to indicate specification compliance or marked to indicate requested deviations from specification requirements. Check marks (✓) shall denote full compliance with a Paragraph as a whole. If deviations from the specifications are indicated, and therefore requested by the Contractor, each deviation shall be underlined and denoted by a number in the margin to the right of the identified Paragraph, referenced to a detailed written explanation of the reasons

for requesting the deviation. The Engineer shall be the final authority for determining acceptability of requested deviations. The remaining portions of the Paragraph not underlined will signify compliance on the part of the Contractor with the specifications. Failure to include a copy of the marked-up specification Sections, along with justification(s) for any requested deviations to the specification requirements, with the submittal shall be sufficient cause for rejection of the entire submittal with no further consideration.

- 2. Documentation of conformance with Testing Laboratory Qualifications as specified.
- 3. Form completed by both the Testing Laboratory and the Contractor, as described in the Contract Documents.

1.8 LIMITS ON TESTING LABORATORY AUTHORITY:

A. Testing Laboratory may not release, revoke, alter, or enlarge on requirements of Contract Documents. Testing Laboratory may not approve or accept any portion of the work, nor assume any duties of Contractor. Testing Laboratory has no authority to stop the work

PART 2 - PRODUCTS

2.1 SOURCE QUALITY CONTROL

A. General:

1. Source quality control is defined in Section 01400 – Quality Control. This Section provides general guidelines as to the sampling, tests, and inspections required of products and manufactures prior to delivery to the project site, and should be considered a minimum. Additional information and requirements are provided in each technical specification Section and those requirements shall control over this Section when in conflict. Absence of a test, inspection or requirement listed herein from a subsequent specification Section does not relieve the Testing Laboratory or the Contractor from their respective responsibilities specified in this Section.

B. Reference Standards in Other Sections:

1. Codes, standards, and other references called out below, but which are not listed are described in other specification Sections and not repeated herein.

C. Fill Materials:

- 1. Imported Fill Materials: Testing Laboratory may conduct additional testing on behalf of Contractor to prepare required submittals specified in Section 03200 Earth Excavation.
- 2. On-Site Fill Material: Testing Laboratory shall conduct required testing to verify on-site materials proposed for fill conforms to specification Section 03200 Earth Excavation. Contractor shall pay Testing Laboratory for such sampling and testing. Sampling and testing shall determine Liquid Limit, Plasticity Index, optimum moisture content and density relationship, and other data as required for proper use of this material.

D. Imported Loam and On-Site Loam:

1. Provide sampling and testing as specified in the Contract Documents.

E. Paving Materials:

1. Provide sampling and testing requested by Engineer or additional testing as requested by Contractor to verify materials proposed for use conform to specification Section 04010 – Bituminous Concrete Pavement.

F. Concrete Reinforcing:

1. Provide sampling and testing requested by Engineer or additional testing as requested by Contractor to verify materials proposed for use conform to specification Section 03300 and 03400.

G. Cast-In-Place Concrete:

1. Provide sampling and testing requested by Engineer or additional testing as requested by Contractor to verify materials proposed for use conform to specification Section 03300. At Contractor's expense, Testing Laboratory may assist Contractor in formulating concrete mix designs, testing and reporting same, and providing the services of a Professional Engineer to review and seal the mix design.

H. Precast Concrete:

- 1. Precast Yard Inspection: Source quality inspection is not required for PCI Certified facilities unless otherwise directed by the Building Official.
- 2. Non-PCI Certified Facilities: Provide Special Inspection conforming to PCI recommendations for all facets of operation including reinforcing, prestressing, concrete placing, finishing, and curing, form release and handling.
- 3. Vaults, Manholes, And Non-Structural Precast Concrete Items: Precast yard inspection is not required unless so directed by the Owner or Engineer due to quality concerns. Such inspection and testing shall be paid for by the Contractor.

PART 3 - EXECUTION

3.01 FIELD QUALITY CONTROL

A. General: Field quality control is defined in Section 01400. This Section provides general guidelines as to the sampling, tests, and inspections required of work in progress or completed in the field, and should be considered a minimum. Additional information and requirements are provided in each technical specification

3.02 SCHEDULE OF INSPECTIONS AND TESTS:

A. Form 01410-1 below shall be used to coordinate sampling and testing provided by Testing Laboratory, Engineer, Contractor, and other parties, if any. Testing Laboratory shall fill out Form 01410-1 with anticipated inspections, sampling, and testing, submit for review by Engineer and for information to Contractor, and revise as directed. After receipt of Testing Laboratory's Form 01410-1 submittal, Contractor shall submit Form 01410-1 to identify sampling and testing requested for submittal preparation, and with an allowance for additional inspections. Such allowance shall not be less than five percent (5%) of the anticipated Field Quality Control budget for the Testing Laboratory, but shall not contractually commit Contractor to such expenditure, unless additional inspections are requested and then only to their extent.

FORM 01410-1 ANTICIPATED SAMPLING, TESTING, AND INSPECTIONS BY TESTING LABORATORY AND CONTRACTOR

LADORATORT AND CONTRACTOR					
Prepared by : Testing I	Laboratory Contractor (c	heck one).			
Electronic version available upon request. Expand each cell as necessary to provide a complete scope description.					
Specification Section	Source Quality Control	Field Quality Control			
02200 – Earthwork					
02510 – Bituminous Concrete Paving					
02938 – Loam and Seed and Sodding					
03300 – Cast-in-Place Concrete					
03400 – Precast Concrete					

END OF SECTION

Date: 11/2019

03600 - Grout

TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General, Special, and Supplemental Conditions and other Division 1 Specification Sections, apply to the Work of this Section.

1.2 DESCRIPTION OF REQUIREMENTS

- A. This Section specifies administrative and procedural requirements for temporary services and facilities, including such items as temporary utility services, temporary construction and support facilities / office, and project security and protection.
 - Use Charges No cost or usage charges for temporary services or facilities are chargeable to
 Owner or Engineer. Cost or use charges for temporary services or facilities will not be
 accepted as a basis of claims for a Change Order.
 - 2. Temporary utility services which shall be provided by the Contractor at the Project site includes, but are not limited to, the following:
 - a. Temporary electric power and light
 - b. Telephone service
 - c. Internet service
 - d. Water service
 - e. Provision of adequate utility capacity at each stage of construction
 - f. Obtaining and paying for temporary easements required to bring temporary utilities to the Project site, where Owner's permanent easement cannot be utilized for that purpose.
 - 3. Temporary construction and support facilities or field office shall be made available a minimum of seven (7) days prior to the start of work. The field office shall be located at a site satisfactory to the Engineer and be for exclusive use of the Authority, the Resident Engineer and the inspection staff. The field office shall not be shared with the Contractor regardless of size or internal partition arrangements. The field office shall have a minimum of three hundred (300) square feet of floor space, approximately seven (7) feet headroom and suitably located windows permitting a minimum of twenty-seven (27) square feet of natural light. Existing building structures meeting the above minimum requirements are considered acceptable. If commercial office trailers are used, they shall be enclosed with a 6' (minimum) high chain link fence with the necessary gates, locks and keys, and automated outside area flood lighting. The field office shall be equipped with a sign for the purposes of identifying the use of the trailer or building and providing notice against trespassing. In addition, the office shall provide the following.
 - a. A 5-pound C0₂ fire extinguisher for each 200 square feet of floor space.
 - b. A worktable with a minimum of 24 square feet work area being approximately 30 inches in height, on drafting stool.

01500 - 1

- c. A minimum of one (1) approved 4-drawer fire resistant safe, legal size, with combination or key lock, and a minimum of one (1) four drawer legal size metal file cabinet with lock, in like-new condition.
- d. Telephone and internet service.
- e. New First Aid Kit 20 Person Size.
- f. Electric sanitary water cooler with bottled drinking water and cups, including replenishing the bottled water as required throughout the duration of the Contract.
- g. Two (2) two drawer (14 1/2" x 16") metal filing cabinets, in like-new condition.
- h. One (1) office copying machine with supplies.
- i. One (1) new electric pencil sharpeners.
- j. Two (2) office desks and swivel chairs.
- k. One (1) telephone message recording device.
- 1. One (1) HP Laser Jet Printer with all connecting cables.
- m. One (1) Window 10 Professional based Laptop PC compatible computer. Installed software shall include: Microsoft Windows 10, Microsoft Office 2016 Professional or greater, and Adobe Acrobat Professional. The computer shall become the property of the Warwick Sewer Authority.
- n. Field Office with microwave, refrigerator, coffee maker, office supplies, chair tables, lamps, etc.
- 4. Security and protection facilities and services which shall be used for the Project include, but are not limited to, the following:
 - a. Temporary fire protection
 - b. Barricades, warning signs, lights
 - c. Environmental protection
 - d. Physical security, fencing, etc.
 - e. Additional security and protection methods or facilities required by the Contractor.

1.3 QUALITY ASSURANCE

- A. Regulations Comply with requirements of local laws and regulations governing construction and local industry standards, in the installation and maintenance of temporary services and facilities including, but not limited to, the following:
 - 1. Building Codes, including local requirements for permits, testing, and inspection.

- 2. Health and safety regulations.
- 3. Utility company regulations and recommendations governing temporary utility services.
- 4. Police and Fire Department rules and recommendations.
- 5. Police and Rescue Squad recommendations.
- 6. Environmental protection regulations governing use of water and energy, and the control of dust, noise, and other nuisances.
- B. Inspections Inspect and test each service before placing temporary utilities in use. Arrange for required inspections and tests by governing authorities, and obtain required certifications and permits for use.

1.4 SUBMITTALS

- A. Reports and Permits During progress of the Work, submit copies of reports and permits required by governing authorities, including necessary traffic control plans as necessary for execution of the work and efficient operation of temporary facilities.
- B. Submit copies of reports of tests, inspections, meter readings, and similar procedures performed on temporary utilities before, during, and after performance of the documentation necessary for the installation, use, and operation of temporary utility services. Reports and permits required for the use of temporary utility services and their use include, but are not limited to, temporary electric power and light.

1.5 JOB CONDITIONS

- A. General Provide each temporary service and facility ready for use at each location when the service or facility is first needed to avoid delay in performance of the Work. Maintain, expand as required, and modify temporary services and facilities as needed throughout the progress of the Work. Do not remove until services or facilities are no longer needed, or are replaced by the authorized use of completed permanent facilities.
- B. With the establishment of the job progress schedule, establish a schedule for the implementation and termination of service for each temporary utility. At the earliest feasible time, and when acceptable to the Owner and Engineer, change over from the use of temporary utility service to the use of the permanent service, to enable removal of the temporary utility and to eliminate possible interference with completion of the Work.
- C. Conditions of Use Operate temporary services and facilities in a safe and efficient manner. Do not overload temporary services or facilities, and do not allow unsanitary conditions, public nuisances or hazardous conditions to develop or persist on the site.
- D. Temporary Utilities Do not permit the freezing of pipes, flooding, or the contamination of water sources.
- E. Temporary Construction and Support Facilities Maintain temporary facilities in such a manner as to prevent discomfort to users. Take necessary fire prevention measures. Maintain temporary support facilities in a sanitary manner so as to avoid health problems and other deleterious effects.

01500-3

F. Security and Protection - Maintain site security and protection facilities in a safe, lawful, and publicly acceptable manner. Take necessary measures to prevent erosion of the site and to prevent sediment from leaving the site.

PART 2 - PRODUCTS

2.1 MATERIALS AND EQUIPMENT

- A. General Provide new materials and equipment for temporary services and facilities, used materials and equipment that are undamaged and in serviceable condition may be used, if acceptable to Engineer. Provide only materials and equipment that are recognized as being suitable for the intended use, by compliance with appropriate standards.
- B. Temporary Utilities Where the utility company provides only a portion of the temporary utility, provide the remainder with matching, compatible materials, and equipment. Comply with the utility company's recommendations.
- C. Electrical Service Comply with applicable NEMA, NECA, and UL standards and governing regulations for materials and layout of temporary electric service.
- D. Temporary Construction and Support Facilities Provide facilities that can be maintained properly throughout their use at the Project site.
- E. Heating Units Provide temporary heating units that have been tested and labeled by UL, FM, or another recognized trade association related to the fuel being consumed.
- F. Temporary Offices and Similar Construction For temporary offices, storage sheds, and similar construction, provide either standard prefabricated, mobile units, or nearby office space. Provide insulated, weather tight units, heated units, air-conditioned where required, lighted entrances, operable window, roofing, foundations adequate for normal loading, including wind loads, serviceable finishes, and mechanical and electrical equipment necessary to achieve ambient conditions required.
- G. Self-Contained Toilet Unit Provide single-occupant, self-contained toilet units of the chemical, aerated recirculation, or combustion type, properly vented and fully enclosed with a glass fiber, reinforced polyester shell or similar non-absorbent material.
- H. First Aid Supplies Comply with governing regulations and recognized recommendations within the construction industry.
- I. Security and Protection Facilities
 - 1. Fire Extinguisher: Type "ABC" dry chemical extinguisher, or a combination of several extinguishers of NFPA recommended types of sufficient size for the structures and equipment to be utilized.
 - 2. Plywood for fences and vision barriers; provide exterior type, minimum 3/8" thick plywood, prime and finish painted. For safety barriers, sidewall bridges and similar direct-contact uses provide minimum 5/8" thick exterior plywood, prime and finish painted.

01500 - 4

- 3. Open Mesh Fencing: Provide No. 11 gage, galvanized chain-link fabric fencing, minimum 8 feet high, with galvanized barbed wire top strand and galvanized steel pipe posts, 1 1/2" I.D. for line posts, and minimum 2 1/2" I.D. for corner posts.
- J. Orange Warning Barrier Fence Provide 4' minimum height fence at perimeter of work site in addition to OHSA requirements.

PART 3 - EXECUTION

3.1 INSTALLATION GENERAL

- A. Use qualified tradesmen for installation of temporary services and facilities. Locate temporary services and facilities where they will serve the entire project adequately and result in minimum interference with the performance of the Work.
- B. Relocate, modify, and extend services and facilities as required during the course of work so as to accommodate the entire work of the Project.

3.2 TEMPORARY UTILITY INSTALLATION

- A. General Engage the local utility company to install temporary service to the Project or to make connections to existing service. Arrange with the companies and existing users for an acceptable time when service can be interrupted, where necessary, to make connections for temporary services.
- B. Temporary Electric Power Service
 - 1. General Provide a weatherproof, grounded, temporary electric power service and distribution system of sufficient size, capacity, and characteristics to accommodate performance of work during the construction period.
 - 2. Temporary Service Install service and grounding in compliance with the National Electric Code (NFPA 70). Include necessary meters, transformers, overload protected disconnect and main distribution switchgear:
 - a. Install electric power service underground except where overhead service must be used to avoid construction conflicts or to comply with governing regulations.
 - b. Connect temporary service to the local electric power company main in the manner directed by company officials. Pay usage charges, whether metered or otherwise, for electricity used by all entities authorized to be at or to perform usage at the site.
 - c. Provide temporary service with an automatic ground-fault interrupter activated from the circuits of the systems.
 - 3. Power Distributions System Provide circuits of adequate size and proper characteristics for each use. In general, run wiring underground, and rise vertically where wiring will be least exposed to damage from construction operations. Provide rigid steel conduit or equivalent raceways for wiring, which must be exposed on grade, floors, decks or other areas of possible damage or abuse:
 - a. Provide metal conduit, tubing or armored cable for protection of temporary power wiring where exposed to possible damage during construction operations. Where permitted by code, wiring of circuits not exceeding 110-120 volts 20 amp rating, and wiring of lighting circuits may be non-metallic sheathed cable in areas where located overhead and exposed for surveillance. Do not wire temporary lighting with plain,

01500 - 5

- exposed (insulated) electrical conductors. Provide metal enclosures or boxes for wiring devices.
- b. Provide overload protected disconnect switch for each temporary circuit and each temporary lighting circuit, located at the power distribution center.

C. Temporary Telephones

1. General - Arrange for the local telephone company to install temporary telephone service in the field office.

3.3 TEMPORARY CONSTRUCTION AND SUPPORT FACILITIES INSTALLATION

- A. Provide a reasonable neat and uniform appearance in temporary construction and support facilities acceptable to Engineer and Owner.
 - 1. Locate field offices, storage and fabrication sheds, and other support facilities for easy access to the Work. Position offices so that windows give the best possible view of construction activities.
 - 2. Except as otherwise indicated, make the change-over from use of temporary services and facilities to use of permanent service and facilities at the earliest feasible date, to minimize hazards and interferences with performance of the Work.
 - 3. Maintain field offices, storage and fabrication sheds, temporary sanitary facilities, waste collection and disposal systems, and project identification and temporary signs until near substantial completion. Immediately prior to substantial completion remove these facilities. Personnel remaining at the site beyond this time may use certain permanent facilities, under restricted use conditions acceptable to Owner.

B. Collection and Disposal of Waste

1. General - Establish a system for daily collection and disposal of waste materials from construction areas and elsewhere on the site. Enforce requirements strictly. Do not hold collected materials at the site longer than 7 days during normal weather or 3 days when the daily temperature is expected to rise above 80 degrees Fahrenheit (27 degrees Celsius). Handle waste materials that are hazardous, dangerous, or unsanitary separately from other inert waste by containerizing appropriately. Dispose of waste material in a lawful manner.

3.4 SECURITY AND PROTECTION OF FACILITIES AND INSTALLATIONS

A. Barricades, Warning Signs and Lights

- 1. Comply with recognized standards and code requirements for the erection of substantial, structurally adequate barricades where needed to prevent accidents and losses. Paint with appropriate colors, graphics, and warning signs to inform personnel at the site and the public, of the hazard being protected against. Provide lighting where appropriate and needed, including flashing red light where appropriate.
- 2. Environmental Protection Provide general protection facilities, operate temporary facilities, conduct construction activities, and enforce strict discipline for personnel on the site in a way and by methods that comply with environmental regulations, and that minimize the possibility that air, water, and soil might be contaminated or polluted, or that other undesirable effects might result from the performance of work at the site. Use tools, methods, and equipment that will minimize noise complaints from persons or firms near the project site.

01500-6

3.5 OPERATION, TERMINATION, AND REMOVAL

- A. Supervision Enforce strict discipline in use of temporary services and facilities to essential and intended use to minimize waste and abuse. Do not permit temporary installations to be abused or endangered. Do not allow hazardous, dangerous, or unsanitary conditions to develop or persist on the Project site.
- B. Maintenance Operate and maintain temporary services and facilities in good operating condition throughout the time of use and until removal is authorized. Protect from damage by freezing temperatures and similar elements.
 - 1. Maintain the operation of outlet structures, piping, temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24-hour day basis where required, to achieve indicated results in the Work and to avoid the possibility of damage to the Work or to temporary facilities.
- C. Protection Prevent water filled piping from freezing, by use of ground covers, insulation, by keeping drained or by temporary heating. Maintain distinct markers for underground lines. Protect from damage during excavation operations.
- D. Termination and Removal Unless Engineer requests that it be maintained for a longer period of time, remove each temporary service and facility promptly when the need for it or a substantial portion of it has ended, or when it has been replaced by the authorized use of a permanent facility, or no later than Substantial Completion. Complete, or if necessary, restore permanent work, which may have been delayed because of interference with the temporary service of facility. Repair damaged Work, clean exposed surfaces and replace Work, which cannot be satisfactorily repaired.
 - 1. Materials and facilities that constitute temporary services and facilities are and remain the property of Contractor.
 - 2. Remove temporary roads and paving materials, which are not intended for or acceptable for integration into permanent paving. Where the area shown is intended for landscape development, remove soil and aggregate fill that does not comply with requirements for fill or subsoil in the landscape area. Remove materials contaminated with road oil, asphalt, and other petro-chemical compounds and other substances, which might impair growth of plant materials or lawns. Repair or replace street paving, curbs, and sidewalks at the temporary entrances, as required by the governing authority.
 - 3. At Substantial Completion, clean and renovate permanent surfaces and facilities that have been used to provide temporary services and facilities during the construction period.

END OF SECTION

01500-7

TRAFFIC CONTROL

PART 1 - GENERAL

1.1 SUMMARY

- A. Work specified in this section includes providing for the safe and expeditious movement of vehicular and pedestrian traffic on the project site, internal roadways, and external roads and highways affected by the Contractor's construction operation.
- B. Coordinate work specified in this section with requirements specified in Section 01014 Work Sequence.
- C. Comply with City Ordinances and Police and Fire Department requirements for vehicular access and traffic control.

1.2 REFERENCES

- A. This section contains references to the following documents. They are a part of this section insofar as specified and modified herein. In case of conflict between the requirements of this section and the listed documents, the requirements of this section shall prevail.
- B. Unless otherwise specified, references to documents shall mean the documents in effect at the time of Advertisements for Bids or Invitation to Bid (or on the effective date of the Agreement if there were no Bids). If referenced documents have been discontinued by the issuing organization, references to those documents shall mean the replacement documents issued or otherwise identified by that organization or, if there are no replacement documents, the last version of the document before it was discontinued. Where document dates are given in the following listing, references to those documents shall mean the specific document version associated with that date, whether or not the document has been superseded by a version with a later date, discontinued, or replaced.
- C. The following standards and specification are considered to be part of the Traffic Control Plan:
 - 1. Manual on Uniform Traffic Control Devices for Streets and Highways (MUTCD), 2003 Edition, with all current updates and official interpretations.

1.3 SUBMITTALS

A. GENERAL:

- 1. Submittals shall be in accordance with Section 01340 Shop Drawings.
- 2. Traffic Control Plans shall be updated and submitted to the Engineer whenever significant changes in traffic control measures are necessary.

01570-1

BAYSIDE SEWER SYSTEM Date: 11/2019 TRAFFIC CONTROL

B. TRAFFIC CONTROL PLAN:

- 1. Submit a Vehicular Traffic Control Plan, as described herein. No vehicular traffic disruptions or revisions shall be made before receiving approval of the Vehicular Traffic Control Plan from the Engineer, in accordance with Section 01340 Shop Drawings.
- 2. The Vehicular Traffic Control Plan shall consist of drawings and narrative sufficient to describe the methods to be used for control of vehicular traffic on all roads on or adjacent to the construction site. The plan shall include:
 - a. Drawings showing vehicular routing during each phase of the work, including permanent and temporary routing of all roadways.
 - b. Drawings showing the location of barricades, lighting, signing, and any other vehicular traffic control devices anticipated to be used during each phase of the work.
 - c. Arrangements for vehicular access to buildings on the site and vehicular access to various plant gates.
 - d. Arrangements for emergency access to buildings on the site.
 - e. Arrangements for winter storm response and provisions for access.
 - f. Anticipated traffic blockages resulting from construction activities.
 - g. Anticipated locations where temporary pipes, cables, or hoses will be placed across or parallel to roadways. Drawing details of ramps over utilities or shallow burial placement and protection cover.
 - h. Areas within Contractor's staging area designated for parking shall be identified on submitted drawings.
 - i. Include pedestrian detour and safety controls to ensure safe passage around and through work zones including along city streets.
- 3. The plan drawings in the Vehicular Traffic Control Plan shall be drawn to a scale of 1 inch equals 50 feet, with details at a larger scale as necessary for clear understanding.

1.4 GENERAL MAINTENANCE OF TRAFFIC REQUIREMENTS

- A. Maintain vehicular traffic within public rights-of-way in accordance with the current edition of the Manual of Uniform Traffic Control Devices and as supplemented by these specifications.
- B. Maintain emergency access to and from buildings within the construction site.
- C. Maintain vehicular traffic access for school buses and trash removal at all times.
- D. Maintain vehicular traffic at all locations to the greatest extent possible and reduce and reroute traffic only for the shortest time possible, consistent with effective construction operations. Material deliveries and other related trucking activities shall occur in the Contractor's protected work area.
- E. Provide signs and other devices, and erect and maintain barricades, standard construction signs, warning signs, and detour signs necessary to alert and forewarn the public at all times. Do no work on or adjacent to roads or trails until all necessary signs and traffic control devices are in place. Standard roadway warning construction signage used on this project shall be a minimum 30 inches by 30 inches.

01570-2

BAYSIDE SEWER SYSTEM Date: 11/2019 TRAFFIC CONTROL

F. The legal speed limits in the vicinity of the project site are posted. The maximum allowable speed limit is 10 miles per hour. The Contractor shall inform its subcontractors of these limits and the importance of strict adherence to all traffic regulations and shall repeat this information at regular safety and subcontractor coordination meetings throughout the life of the Contract.

1.5 REGULATION OF TRUCK TRAFFIC

- A. For the purposes of this section, a truck shall be a motor vehicle used for transporting materials, equipment, or other property, and having a gross vehicle weight of 10,000 pounds or more.
- B. The Contractor shall restrict truck traffic to and from the construction site to the hours between 7:00 a.m. and 3:30 p.m. on weekdays. No truck traffic shall be allowed at other times or during weekends or holidays, except with the written authorization of the Engineer. In the event that construction activities require truck traffic outside the hours listed in this Paragraph, the Contractor shall request approval from the Engineer at least seven (7) calendar days prior to the date of such construction activities. This request shall include the anticipated time and duration of the activities and the reasons why the activities cannot be undertaken within the hours listed in this Paragraph.

PART 2 - PRODUCTS

(Not Used)

PART 3 - EXECUTION

(Not Used)

END OF SECTION

01570-3

BAYSIDE SEWER SYSTEM Date: 11/2019 TRAFFIC CONTROL

SHIPMENT, PROTECTION AND STORAGE

PART 1 – GENERAL

1.01 GENERAL

A. Equipment, products and materials shall be shipped, handled, stored, and installed in ways which will prevent damage to the items. Damaged items will not be permitted as part of the work except in cases of minor damage can be satisfactorily repaired, at no additional expense to Owner, and is acceptable to the Owner.

1.02 PIPE, VALVE, PRECAST CONCRETE

A. Pipe, valves, and precast concrete units and appurtenances shall be handled, stored, and installed as recommended by the manufacturer. Materials shall be stored to protect the coating or lining from physical damage or other deterioration. Materials shipped with interior bracing shall have the bracing removed only when recommended by the manufacturer.

1.03 EQUIPMENT

A. PACKAGE AND MARKING:

- 1. All equipment shall be protected against damage from moisture, dust, handling, or other cause during transport from manufacturer's premises to site. Each item or package shall be marked with the number unique to the specification reference covering the item.
- 2. Stiffeners shall be used where necessary to maintain shapes and to give rigidity. Parts of equipment shall be delivered in assembled or sub assembled units where possible.
- B. IDENTIFICATION: Each item of equipment, product and material shall be labelled or tagged to identify it or its contents.
- C. SHIPPING: Damage shall be corrected to conform to the requirements of the contract before the material is incorporated into the work. The Contractor shall bear the costs arising out of dismantling, inspection, repair and reassembly.
- D. STORAGE: During the interval between the delivery of equipment to the site and installation, all materials, unless otherwise specified, shall be stored in a manner to prevent against deterioration. Manufacturer's recommendations shall be adhered to in addition to these requirements.

END OF SECTION

01605-1

FINAL CLEANUP

PART 1- GENERAL

1.01 GENERAL

- A. For all roadway work, the Contractor shall conform the work to acceptable line and grade, as determined by the Engineer. In addition, the Contractor shall have the sidewalks and streets affected by the work swept by a street or sidewalk cleaner as determined by the Engineer. Other surfaces of the grounds shall be rake cleaned. The Owner will not authorize final payment until the Contractor has removed all rubble and debris from the street and adjoining work areas, including all temporary storage and parking areas used by the Contractor.
- B. For pipelines, storm sewers, catch basins, and manholes, prior to their activation or at the conclusion of the project, the Contractor shall thoroughly clean all of the new pipes by flushing with water for fluid lines, or compressed air for gas lines. Debris cleaned from the lines shall be removed from the lowest access point.
- C. All temporary utility drops, fencing, and water supply outlets shall be removed.
- D. All signs, barricades, tools, rubbish collection receptacles and other such items shall be removed by the Contractor.
- E. All remaining earthen stockpiles of excess excavated material shall be graded to provide gentle slopes to prevent erosion as directed by the Engineer.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

AS-BUILT DRAWINGS

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. The work under this Section shall include the transmittal to the Owner and Engineer of all applicable data relative to as-built conditions as may be required in the Contract Documents.
- B. The specific required items listed within this Section are not inclusive of all the as-built requirements that the Contractor must provide as specified throughout the technical specifications and the drawings.

PART 2 - PRODUCTS

2.01 As-Built information as specified.

PART 3 - EXECUTION

3.01 MARKED-UP PRINTS

- A. The Contractor will be provided with an extra copy of the drawings to be used for indicating the locations, elevations, and other conditions of installed pipes, structures, and appurtenances.
- B. The Contractor shall also indicate on the prints the locations and elevations of all existing utilities, structures, and appurtenances encountered during the work which are different from those specified on the drawings, or in these specifications.
- C. The marked-up prints shall be kept up to date on a daily basis and shall be available for inspection by Engineer at all times.
- D. Marked-up prints shall, as a rule, be kept in a safe location by the Contractor.
- E. All markings on the prints shall be done neatly with a sharp red pencil.
- F. The marked-up prints shall become the property of the Owner upon completion of the Work.

3.02 AS-BUILT DRAWINGS

A. Contractor will be required to transfer all as-built information to a set of drawings supplied to the Contractor by the Engineer. The Contractor shall provide additional sheets as necessary of increased scale in order to provide the as-built information with clarity. The Contractor shall also provide all as-built information in electronic media format developed in CAD.

END OF SECTION

01780-1

BAYSIDE SEWER SYSTEM Date: 11/2019 AS-BUILT DRAWINGS

ARCHAEOLOGICAL PROVISIONS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Unanticipated discovery of archeological materials
 - 2. Notification procedures
 - 3. Public outreach
- B. Related Documents: The Contract Documents, as defined in Section 01010 Summary of Work, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other Documents.

PART 2 - EXECUTION

2.1 PROCEDURE

- A. This protocol is specifically designed for circumstances where human remains are encountered during the construction of this project.
 - 1. The Contractor will immediately notify the WSA Executive Director of an unanticipated discovery.
 - 2. The WSA Executive Director will direct a *Stop Work* order to the Contractor's Site Foreman to flag or fence off the archaeological discovery location and direct the Contractor to take measures to ensure site security. Any discovery made on a weekend or overnight hours will be protected until all appropriate parties are notified of the discovery. The Contractor will not restart work in the area of the find until the Executive Director has granted clearance.
 - 3. At all times human remains will be treated with dignity and respect. Human remains and/or associated artifacts will be left in place and not disturbed. No skeletal remains or materials associated with the remains will be collected or removed until appropriate consultation has taken place and a plan of action has been developed.
 - 4. WSA will immediately notify EPA, NITHPO, and SHPO of the find, as well as the Archaeologist, the local police, and the Rhode Island State Medical Examiner's Office.
 - 5. WSA will provide an opportunity for local law enforcement and, if necessary, a representative of the chief Medical Examiner's Office, to visit and inspect the site to determine whether the site constitutes a crime scene.
 - 6. If it is declared a criminal matter, the Archaeologist will have no further involvement and the decision to declare it a *Cleared Site* for construction will be made by the appropriate legal authorities.
 - 7. If the find is determined not to be a criminal matter, WSA will comprehensively evaluate the potential to avoid and/or minimize the Project's effects on the human remains.
 - a. If human remains are determined to be Native American, the remains will be left in place and protected from further disturbance until a site-specific work plan

for their avoidance or removal can be generated. The Archaeologist will contact the SHPO and NITHPO to develop a plan of action that is consistent with the Native American Graves Protection and Repatriation Act (NAGPRA) guidance, NAGPRA guidance, the ACHP Policy Statement, and applicable Rhode Island laws

b. If human remains are determined to be non-Native American, the remains will be left in place and protected from further disturbance until a site-specific work plan for their avoidance or removal can be generated. Avoidance is the preferred choice of the SHPO. Consultation with the SHPO and other appropriate parties will be required to determine a plan of action.

2.2 PREPARATION

A. Prior to work, all contractor personnel will receive basic training in cultural resource site recognition. The purpose of the training will be to make aware any kind of archeological resources that may be encountered by any contractor personnel. Training will ensure that contractors are fully aware of the distinction between sites that have been previously located and marked safe, areas to avoid, and new discoveries.

2.3 REMOVAL

A. Removal of human remains or funerary objects should occur only when other alternatives have been considered and rejected.

2.4 PROTECTION

- A. Provisions must be made to secure any area containing, or suspected of containing human remains. If field assessment of human remains or related excavations cannot be completed before the end of a work day, WSA will provide a security guard to provide constant monitoring of the burial location to prevent unauthorized entry during off-work hours.
- B. If relocation is necessary, temporary work shelters will be erected over individual (or small groups of) graves while they are in the process of being excavated and their remains removed. The shelters will permit adequate interior work space, but will prevent any outside persons from viewing the remains or the relocation process. The shelters will also permit the relocation team to work in most if not all-weather conditions.

END OF SECTION





Rhode Island Department of Environmental ManagementOffice of Water Resources

Clean Water State Revolving Fund Program Contract Specifications Package

A. Federal

- 1) Equal Employment Opportunity and Affirmative Action (Executive Order 11246)
 - i) OFCCP fact sheet.
 - ii) Equal Opportunity Clause and the Standard Federal Equal Employment Specifications.
 - iii) Notice of Non-Discrimination in Employment.
- 2) Non-discrimination in employment notice.
- 3) Assurance of compliance with Title VI of the Civil Rights Act of 1964 and Section 13 of the FWPCA Amendments of 1972 (EPA form 4700-1).
- 4) Affirmative steps for soliciting MBE/WBE (40 CFR 31.36(e))
- 5) Preservation of Open Competition and Government Neutrality Towards Government Contractors' Labor Relations on Federal and Federally Funded Construction Projects (Executive Order 13202)

Applicable cross-cutting Federal authorities for projects funded through SRF programs are made available at http://water.epa.gov/grants_funding/dwsrf/xcuts.cfm. Additional information is provided in the United States Environmental Protection Agency's cross-cutting handbook available at http://www.epa.gov/owm/cwfinance/cwsrf/enhance/DocFiles/Other%20Docs/CrosscutterHandbook.pdf.

B. State of Rhode Island

- 1) RIGL 37-2.1, Domestic Steel
- 2) RIGL 37-12, Contractors Bonds
- 3) RIGL 37-12.1, Substitution of Security for Retained Earnings of Architects and Engineers.
- 4) RIGL 37-13, Labor and Payment of Debts by Contractors
 - i) Prevailing Wage Rates
- 5) RIGL 37-14.1, Minority Business Enterprise
 - Regulations Governing Participation by Minority Business Enterprises in State Funded and Directed Public Construction Projects, Construction Contracts and Procurement Contracts Goods and Services.
- 6) RIGL 37-16, Public Works Arbitration
- 7) RIGL 45-55, Award of Municipal Contracts

NOTE: This package is prepared by RIDEM as a service of the CWSRF program. While every attempt at accuracy has been made, these are not certified true copies of the laws presented. **The responsibility for compliance with all applicable provisions of Federal and State laws and regulations relating to the bidding, award, and performance of contracts is the applicant's and the bidder's.** Certified true and complete copies of any Rhode Island laws and regulations may be obtained form the Office of the Secretary of State.

Employment Standards Administration Office of Federal Contract Compliance Programs

Fact Sheet **EXECUTIVE ORDER 11246**

EEO and Affirmative Action Guidelines for Federal Contractors Regarding Race, Color, Gender, Religion, and National Origin.

BASIC PROVISIONS

Since 1965, the U.S. Department of Labor's Office of Federal Contract Compliance Programs (OFCCP) has been committed to ensuring that Government contractors comply with the equal employment opportunity (EEO) and the affirmative action provisions of their contracts.

OFCCP administers and enforces Executive Order 11246, as amended, which prohibits federal contractors and federally-assisted construction contractors and subcontractors, who do over \$10,000 in Government business in one year from discriminating in employment decisions on the basis of race, color, religion, sex, or national origin.

The Executive Order also requires Government contractors to take affirmative action to insure that equal opportunity is provided in all aspects of their employment.

AFFIRMATIVE ACTION REQUIREMENTS

Each Government contractor with 50 or more employees and \$50,000 or more in government contracts is required to develop a written affirmative action program (AAP) for each of its establishments.

A written affirmative action program helps the contractor identify and analyze potential problems in the participation and utilization of women and minorities in the contractor's workforce.

If there are problems, the contractor will specify in its AAP the specific procedures it will follow and the good faith efforts it will make to provide equal employment opportunity.

Expanded efforts in outreach, recruitment, training and other areas are some of the affirmative steps contractors can take to help members of the protected groups compete for jobs on equal footing with other applicants and employees.

Affirmative action is not preferential treatment. It does not mean that unqualified persons should be hired or promoted over other people. What affirmative action does mean is that positive steps must be taken to ensure equal employment opportunity for traditionally disadvantaged groups.

ENFORCEMENT AND COMPLIANCE

Compliance Reviews

OFCCP conducts compliance reviews to investigate the employment practices of Government contractors. During a compliance review, a compliance officer examines the contractor's affirmative action program; checks personnel, payroll, and other employment records; interviews employees and company officials; and investigates virtually all aspects of employment in the company. The investigator also checks to see whether the contractor is making special efforts to achieve equal opportunity through affirmative action. If problems are discovered, OFCCP will recommend corrective action and suggest ways to achieve equal employment opportunity.

Complaint Investigations

Individuals may file complaints if they believe they have been discriminated against by federal contractors or subcontractors. Complaints also may be filed by organizations on behalf of the person or persons affected.

Complaints must be filed within 180 days from the date of the alleged discrimination, although filing time can be extended for a good reason.

If a complaint filed under Executive Order 11246 involves discrimination against only one person, OFCCP will normally refer it to the EEOC. Cases involving groups of people or indicating patterns of discrimination are generally investigated and resolved by OFCCP. Complaints may be filed directly with any of OFCCP's regional or district offices throughout the country, or with OFCCP in Washington, D.C.

Compliance Assistance

To help contractors understand their contractual obligations for EEO and affirmative action, OFCCP provides technical assistance. District office staff offers guidance to contractors on how to develop an affirmative program through company seminars, training programs held in conjunction with industry liaison groups, and one-on-one consultations on affirmative action practices and procedures.

Enforcing Contract Compliance

When a compliance review discloses problems, OFCCP attempts to work with the contractor, often entering into a conciliation agreement. A conciliation agreement may include back pay, job offers, seniority credit, promotions or other forms of relief for victims of discrimination. It may also involve new training programs, special recruitment efforts, or other affirmative action measures.

When conciliation efforts are unsuccessful, OFCCP refers the case to the Office of the Solicitor for enforcement through administrative enforcement proceedings. A contractor cited for violating EEO and affirmative action requirements may have a formal hearing before an administrative law judge.

If conciliation is not reached before or after the hearing, sanctions may be imposed. For example, a contractor could lose its government contracts or subcontracts or be debarred, i.e., declared ineligible for any future government contracts.

Further Information

For more information about contact compliance, filing complaints, or compliance assistance, contact any of OFCCP's regional or district offices. All offices are listed in telephone directories under U.S. Department of Labor, Employment Standards Administration, Office of Federal Contract Compliance Programs.

EQUAL EMPLOYMENT OPPORTUNITY AND AFFIRMATIVE ACTION

Executive Order 11246 (Excerpts from 41 CFR 60 Parts 1 and 4)

41 CFR 60-1.4 - Equal opportunity clause

(b) Federally assisted construction contracts. Except as otherwise provided, each administering agency shall require the inclusion of the following language as a condition of any grant, contract, loan, insurance, or guarantee involving federally assisted construction which is not exempt from the requirements of the equal opportunity clause:

The applicant hereby agrees that it will incorporate or cause to be incorporated into any contract for construction work, or modification thereof, as defined in the regulations of the Secretary of Labor at 41 CFR Chapter 60, which is paid for in whole or in part with funds obtained from the Federal Government or borrowed on the credit of the Federal Government pursuant to a grant, contract, loan insurance, or guarantee, or undertaken pursuant to any Federal program involving such grant, contract, loan, insurance, or guarantee, the following *equal opportunity clause*:

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

- (1) The contractor will not discriminate against any employee or applicant for employment because of race, color, religion, sex, or national origin. The contractor will take affirmative action to ensure that applicants are employed, and that employees are treated during employment without regard to their race, color, religion, sex, or national origin. such action shall include, but not be limited to the following: Employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. The contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices to be provided setting forth the provisions of this nondiscrimination clause.
- (2) The contractor will, in all solicitations or advertisements for employees placed by or on behalf of the contractor, state that all qualified applicants will receive considerations for employment without regard to race, color, religion, sex, or national origin.
- (3) The contractor will send to each labor union or representative of workers with which he has a collective bargaining agreement or other contract or understanding, a notice to be provided advising the said labor union or workers' representatives of the contractor's commitments under this section, and shall post copies of the notice in conspicuous places available to employees and applicants for employment.
- (4) The contractor will comply with all provisions of Executive Order 11246 of September 24, 1965, and of the rules, regulations, and relevant orders of the Secretary of Labor.
- (5) The contractor will furnish all information and reports required by Executive Order 11246 of September 24, 1965, and by rules, regulations, and orders of the Secretary of Labor, or pursuant thereto, and will permit access to his books, records, and accounts by the administering agency and the Secretary of Labor for purposes of investigation to ascertain compliance with such rules, regulations, and orders.
- (6) In the event of the contractor's noncompliance with the nondiscrimination clauses of this contract or with any of the said rules, regulations, or orders, this contract may be canceled, terminated, or suspended in whole or in part and the contractor may be declared ineligible for further Government contracts or federally assisted construction contracts in accordance with procedures authorized in Executive Order 11246 of September 24, 1965, and such other sanctions may be imposed and remedies invoked as provided in Executive Order 11246 of September 24, 1965, or by rule, regulation, or order of the Secretary of Labor, or as otherwise provided by law.
- (7) The contractor will include the portion of the sentence immediately preceding paragraph (1) and the provisions of paragraphs (1) through (7) in every subcontract or purchase order unless exempted by rules, regulations, or orders of the Secretary of Labor issued pursuant to section 204 of Executive Order 11246 of September 24, 1965, so that such provisions will be binding upon each subcontractor or vendor. The contractor will take such action with respect to any subcontract or purchase order as the administering agency may direct as a means of enforcing

such provisions, including sanctions for noncompliance: Provided, however, That in the event a contractor becomes involved in, or is threatened with, litigation with a subcontractor or vendor as a result of such direction by the administering agency the contractor may request the United States to enter into such litigation to protect the interests of the United States.

The applicant further agrees that it will be bound by the above equal opportunity clause with respect to its own employment practices when it participates in federally assisted construction work: Provided, That if the applicant so participating is a State or local government, the above equal opportunity clause is not applicable to any agency, instrumentality or subdivision of such government which does not participate in work on or under the contract.

The applicant agrees that it will assist and cooperate actively with the administering agency and the Secretary of Labor in obtaining the compliance of contractors and subcontractors with the equal opportunity clause and the rules, regulations, and relevant orders of the Secretary of Labor, that it will furnish the administering agency and the Secretary of Labor such information as they may require for the supervision of such compliance, and that it will otherwise assist the administering agency in the discharge of the agency's primary responsibility for securing compliance.

The applicant further agrees that it will refrain from entering into any contract or contract modification subject to Executive Order 11246 of September 24, 1965, with a contractor debarred from, or who has not demonstrated eligibility for, Government contracts and federally assisted construction contracts pursuant to the Executive order and will carry out such sanctions and penalties for violation of the equal opportunity clause as may be imposed upon contractors and subcontractors by the administering agency or the Secretary of Labor pursuant to Part II, Subpart D of the Executive order. In addition, the applicant agrees that if it fails or refuses to comply with these undertakings, the administering agency may take any or all of the following actions: Cancel, terminate, or suspend in whole or in part this grant (contract, loan, insurance, guarantee); refrain from extending any further assistance to the applicant under the program with respect to which the failure or refund occurred until satisfactory assurance of future compliance has been received from such applicant; and refer the case to the Department of Justice for appropriate legal proceedings.

- (c) Subcontracts. Each nonexempt prime contractor or subcontractor shall include the equal opportunity clause in each of its nonexempt subcontracts.
- (d) Incorporation by reference. The equal opportunity clause may be incorporated by reference in all Government contracts and subcontracts, including Government bills of lading, transportation requests, contracts for deposit of Government funds, and contracts for issuing and paying U.S. savings bonds and notes, and such other contracts and subcontracts as the Director may designate.
- (e) Incorporation by operation of the order. By operation of the order, the equal opportunity clause shall be considered to be a part of every contract and subcontract required by the order and the regulations in this part to include such a clause whether or not it is physically incorporated in such contracts and whether or not the contract between the agency and the contractor is written.
- (f) Adaptation of language. Such necessary changes in language may be made in the equal opportunity clause as shall be appropriate to identify properly the parties and their undertakings.

41 CFR 60-4.3 - Equal opportunity clauses

(a) The equal opportunity clause published at 41 CFR 60-1.4(a) of this chapter is required to be included in, and is part of, all nonexempt Federal contracts and subcontracts, including construction contracts and subcontracts. The equal opportunity clause published at 41 CFR 60-1.4(b) is required to be included in, and is a part of, all nonexempt federally assisted construction contracts and subcontracts. In addition to the clauses described above, all Federal contracting officers, all applicants and all non-construction contractors, as applicable, shall include the specifications set forth in this section in all Federal and federally assisted construction contracts in excess of \$10,000 to be performed in geographical areas designated by the Director pursuant to 60-4.6 of this part and in construction subcontracts in excess of \$10,000 necessary in whole or in part to the performance of non-construction Federal contracts and subcontracts covered under the Executive order.

Standard Federal Equal Employment Opportunity Construction Contract Specifications (Executive Order 11246)

- 1. As used in these specifications:
 - a. "Covered area" means the geographical area described in the solicitation from which this contract resulted;
 - b. "Director" means Director, Office of Federal Contract Compliance Programs, United States Department of Labor, or any person to whom the Director delegates authority;
 - c. "Employer identification number" means the Federal Social Security number used on the Employer's Quarterly Federal Tax Return, U.S. Treasury Department Form 941.
 - d. ``Minority" includes:
 - (i) Black (all persons having origins in any of the Black African racial groups not of Hispanic origin);
 - (ii) Hispanic (all persons of Mexican, Puerto Rican, Cuban, Central or South American or other Spanish Culture or origin, regardless of race);
 - (iii) Asian and Pacific Islander (all persons having origins in any of the original peoples of the Far East, Southeast Asia, the Indian Subcontinent, or the Pacific Islands); and
 - (iv) American Indian or Alaskan Native (all persons having origins in any of the original peoples of North America and maintaining identifiable tribal affiliations through membership and participation or community identification).
- 2. Whenever the Contractor, or any Subcontractor at any tier, subcontracts a portion of the work involving any construction trade, it shall physically include in each subcontract in excess of \$10,000 the provisions of these specifications and the Notice which contains the applicable goals for minority and female participation and which is set forth in the solicitations from which this contract resulted.
- 3. If the Contractor is participating (pursuant to 41 CFR 60-4.5) in a Hometown Plan approved by the U.S. Department of Labor in the covered area either individually or through an association, its affirmative action obligations on all work in the Plan area (including goals and timetables) shall be in accordance with that Plan for those trades which have unions participating in the Plan. Contractors must be able to demonstrate their participation in and compliance with the provisions of any such Hometown Plan. Each Contractor or Subcontractor participating in an approved Plan is individually required to comply with its obligations under the EEO clause, and to make a good faith effort to achieve each goal under the Plan in each trade in which it has employees. The overall good faith performance by other Contractors or Subcontractors toward a goal in an approved Plan does not excuse any covered Contractor's or Subcontractor's failure to take good faith efforts to achieve the Plan goals and timetables.
- 4. The Contractor shall implement the specific affirmative action standards provided in paragraphs 7 a through p of these specifications. The goals set forth in the solicitation from which this contract resulted are expressed as percentages of the total hours of employment and training of minority and female utilization the Contractor should reasonably be able to achieve in each construction trade in which it has employees in the covered area. Covered Construction contractors performing construction work in geographical areas where they do not have a Federal or federally assisted construction contract shall apply the minority and female goals established for the geographical area where the work is being performed. Goals are published periodically in the Federal Register in notice form, and such notices may be obtained from any Office of Federal Contract Compliance Programs office or from Federal procurement contracting officers. The Contractor is expected to make substantially uniform progress in meeting its goals in each craft during the period specified.

- 5. Neither the provisions of any collective bargaining agreement, nor the failure by a union with whom the Contractor has a collective bargaining agreement, to refer either minorities or women shall excuse the Contractor's obligations under these specifications, Executive Order 11246, or the regulations promulgated pursuant thereto.
- 6. In order for the non-working training hours of apprentices and trainees to be counted in meeting the goals, such apprentices and trainees must be employed by the Contractor during the training period, and the Contractor must have made a commitment to employ the apprentices and trainees at the completion of their training, subject to the availability of employment opportunities. Trainees must be trained pursuant to training programs approved by the U.S. Department of Labor.
- 7. The Contractor shall take specific affirmative actions to ensure equal employment opportunity. The evaluation of the Contractor's compliance with these specifications shall be based upon its effort to achieve maximum results from its actions. The Contractor shall document these efforts fully, and shall implement affirmative action steps at least as extensive as the following:
 - a. Ensure and maintain a working environment free of harassment, intimidation, and coercion at all sites, and in all facilities at which the Contractor's employees are assigned to work. The Contractor, where possible, will assign two or more women to each construction project. The Contractor shall specifically ensure that all foremen, superintendents, and other on-site supervisory personnel are aware of and carry out the Contractor's obligation to maintain such a working environment, with specific attention to minority or female individuals working at such sites or in such facilities.
 - b. Establish and maintain a current list of minority and female recruitment sources, provide written notification to minority and female recruitment sources and to community organizations when the Contractor or its unions have employment opportunities available, and maintain a record of the organizations' responses.
 - c. Maintain a current file of the names, addresses and telephone numbers of each minority and female off-the-street applicant and minority or female referral from a union, a recruitment source or community organization and of what action was taken with respect to each such individual. If such individual was sent to the union hiring hall for referral and was not referred back to the Contractor by the union or, if referred, not employed by the Contractor, this shall be documented in the file with the reason therefor, along with whatever additional actions the Contractor may have taken.
 - d. Provide immediate written notification to the Director when the union or unions with which the Contractor has a collective bargaining agreement has not referred to the Contractor a minority person or woman sent by the Contractor, or when the Contractor has other information that the union referral process has impeded the Contractor's efforts to meet its obligations.
 - e. Develop on-the-job training opportunities and/or participate in training programs for the area which expressly include minorities and women, including upgrading programs and apprenticeship and trainee programs relevant to the Contractor's employment needs, especially those programs funded or approved by the Department of Labor. The Contractor shall provide notice of these programs to the sources compiled under 7b above.
 - f. Disseminate the Contractor's EEO policy by providing notice of the policy to unions and training programs and requesting their cooperation in assisting the Contractor in meeting its EEO obligations; by including it in any policy manual and collective bargaining agreement; by publicizing it in the company newspaper, annual report, etc.; by specific review of the policy with all management personnel and with all minority and female employees at least once a year; and by posting the company EEO policy on bulletin boards accessible to all employees at each location where construction work is performed.
 - g. Review, at least annually, the company's EEO policy and affirmative action obligations under these specifications with all employees having any responsibility for hiring, assignment, layoff, termination or other employment decisions including specific review of these items with onsite supervisory personnel such as Superintendents, General Foremen, etc., prior to the initiation of construction work at any job site. A written record shall be made and maintained identifying the time and place of these meetings, persons attending, subject matter discussed, and disposition of the subject matter.
 - h. Disseminate the Contractor's EEO policy externally by including it in any advertising in the news media, specifically including minority and female news media, and providing written notification to and discussing the Contractor's EEO policy with other Contractors and Subcontractors with whom the Contractor does or anticipates doing business.

- i. Direct its recruitment efforts, both oral and written, to minority, female and community organizations, to schools with minority and female students and to minority and female recruitment and training organizations serving the Contractor's recruitment area and employment needs. Not later than one month prior to the date for the acceptance of applications for apprenticeship or other training by any recruitment source, the Contractor shall send written notification to organizations such as the above, describing the openings, screening procedures, and tests to be used in the selection process.
- j. Encourage present minority and female employees to recruit other minority persons and women and, where reasonable, provide after school, summer and vacation employment to minority and female youth both on the site and in other areas of a Contractor's work force.
- k. Validate all tests and other selection requirements where there is an obligation to do so under 41 CFR Part 60-3
- 1. Conduct, at least annually, an inventory and evaluation at least of all minority and female personnel for promotional opportunities and encourage these employees to seek or to prepare for, through appropriate training, etc., such opportunities.
- m. Ensure that seniority practices, job classifications, work assignments and other personnel practices, do not have a discriminatory effect by continually monitoring all personnel and employment related activities to ensure that the EEO policy and the Contractor's obligations under these specifications are being carried out.
- n. Ensure that all facilities and company activities are nonsegregated except that separate or single-user toilet and necessary changing facilities shall be provided to assure privacy between the sexes.
- o. Document and maintain a record of all solicitations of offers for subcontracts from minority and female construction contractors and suppliers, including circulation of solicitations to minority and female contractor associations and other business associations.
- p. Conduct a review, at least annually, of all supervisors' adherence to and performance under the Contractor's EEO policies and affirmative action obligations.
- 8. Contractors are encouraged to participate in voluntary associations which assist in fulfilling one or more of their affirmative action obligations (7a through p). The efforts of a contractor association, joint contractor-union, contractor-community, or other similar group of which the contractor is a member and participant, may be asserted as fulfilling any one or more of its obligations under 7a through p of these Specifications provided that the contractor actively participates in the group, makes every effort to assure that the group has a positive impact on the employment of minorities and women in the industry, ensures that the concrete benefits of the program are reflected in the Contractor's minority and female workforce participation, makes a good faith effort to meet its individual goals and timetables, and can provide access to documentation which demonstrates the effectiveness of actions taken on behalf of the Contractor. The obligation to comply, however, is the Contractor's and failure of such a group to fulfill an obligation shall not be a defense for the Contractor's noncompliance
- 9. A single goal for minorities and a separate single goal for women have been established. The Contractor, however, is required to provide equal employment opportunity and to take affirmative action for all minority groups, both male and female, and all women, both minority and non-minority. Consequently, the Contractor may be in violation of the Executive Order if a particular group is employed in a substantially disparate manner (for example, even though the Contractor has achieved its goals for women generally, the Contractor may be in violation of the Executive Order if a specific minority group of women is underutilized).
- 10. The Contractor shall not use the goals and timetables or affirmative action standards to discriminate against any person because of race, color, religion, sex, or national origin.
- 11. The Contractor shall not enter into any Subcontract with any person or firm debarred from Government contracts pursuant to Executive Order 11246.
- 12. The Contractor shall carry out such sanctions and penalties for violation of these specifications and of the Equal Opportunity Clause, including suspension, termination and cancellation of existing subcontracts as may be imposed or ordered pursuant to Executive Order 11246, as amended, and its implementing regulations, by the Office of Federal Contract Compliance Programs. Any Contractor who fails to carry out such sanctions and penalties shall be in violation of these specifications and Executive Order 11246, as amended.
- 13. The Contractor, in fulfilling its obligations under these specifications, shall implement specific affirmative action steps, at least as extensive as those standards prescribed in paragraph 7 of these specifications, so as to

- achieve maximum results from its efforts to ensure equal employment opportunity. If the Contractor fails to comply with the requirements of the Executive Order, the implementing regulations, or these specifications, the Director shall proceed in accordance with 41 CFR 60-4.8.
- 14. The Contractor shall designate a responsible official to monitor all employment related activity to ensure that the company EEO policy is being carried out, to submit reports relating to the provisions hereof as may be required by the Government and to keep records. Records shall at least include for each employee the name, address, telephone numbers, construction trade, union affiliation if any, employee identification number when assigned, social security number, race, sex, status (e.g., mechanic, apprentice trainee, helper, or laborer), dates of changes in status, hours worked per week in the indicated trade, rate of pay, and locations at which the work was performed. Records shall be maintained in an easily understandable and retrievable form; however, to the degree that existing records satisfy this requirement, contractors shall not be required to maintain separate records.
- 15. Nothing herein provided shall be construed as a limitation upon the application of other laws which establish different standards of compliance or upon the application of requirements for the hiring of local or other area residents (e.g., those under the Public Works Employment Act of 1977 and the Community Development Block Grant Program).
- (b) The notice set forth in 41 CFR 60-4.2 and the specifications set forth in 41 CFR 60-4.3 replace the New Form for Federal Equal Employment Opportunity Bid Conditions for Federal and Federally Assisted Construction published at 41 FR 32482 and commonly known as the Model Federal EEO Bid Conditions, and the New Form shall not be used after the regulations in 41 CFR Part 60-4 become effective.

[43 FR 49254, Oct. 20, 1978; 43 FR 51401, Nov. 3, 1978, as amended at 45 FR 65978, Oct. 3, 1980]

NOTICE TO LABOR UNIONS OR OTHER ORGANIZATIONS OF WORKERS

NON-DISCRIMINATION IN EMPLOYMENT

TO:	
(Name of Union or Organization of Wo	orkers)
The undersigned currently holds contract(s) with	
involving funds or credit of the U.S. Governmer holding such contract(s).	(Name of Applicant) nt of (a) subcontract(s) with a prime contractor
accordance with Executive Order 11246, dated S to discriminate against any employee or applicar	the above contract(s) or subcontract(s) and in eptember 24, 1965, the undersigned is obliged not for employment because of race, age, handicap, This obligation not to discriminate in employment
HIRING, PLACEMENT, UPGRADIN	G, TRANSFER, OR DEMOTION,
RECRUITMENT, ADVERTISING, O	R SOLICITATION FOR
EMPLOYMENT TRAINING DURING	G EMPLOYMENT, RATES OF PAY
OR OTHER FORMS OF COMPENSA	ATION, SELECTION FOR TRAINING
INCLUDING APPRENTICESHIP, LA	YOFF, OR TERMINATION.
This notice is furnished you pursuant to the provise Executive Order 11246.	sions of the above contract(s) or subcontract(s) and
	BY THE UNDERSIGNED IN CONSPICUOUS
PLACES AVAILABLE TO EMPLOYEES OR A	APPLICANTS FOR EMPLOYMENT.
	Contractor or Subcontractor)
	(Date)

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

ASSURANCE OF COMPLIANCE FOR TITLE VI OF THE CIVIL RIGHTS ACT OF 1964 AND SECTION 13 OF THE FWPCA AMENDMENTS OF 1972

NAME AND ADDRESS OF APPLICANT/RECIPIENT (Hereinafter called ASSUROR)	GRANT IDENTIFICATION NUMBER (To be completed by EPA)	GRANT AMOUNT REQUESTED \$	
	TYPE OF GRANT ΓDEMONSTRATION ΓRESEARCH ΓTRAINING ΓΟΤΗΕR (Specify):		
	CHECK ONE: FINEW FCONTINUAT	TION	

HEREBY AGREES THAT IT will comply with Title VI of the Civil Rights Act of 1964 (P.L. 88-352) and all requirements of the U.S. Environmental Protection Agency (*hereinafter called "EPA"*) issued pursuant to that title, to the end that in accordance with Title VI of that Act, no person in the United States shall, on the ground of race, color, or national origin be excluded from participation in, be denied the benefits of, or be otherwise subjected to discrimination under any program or activity for which the Assuror receives financial assistance from EPA and hereby gives assurance that it will now and hereafter take all necessary measures to effectuate this agreement.

HEREBY AGREES THAT IT will comply with all applicable requirements of Section 13 of the Federal Water Pollution Control Act Amendments of 1972 (P.L. 92-500) and all requirements of EPA issued pursuant to that section, to the end that in accordance with that section of that Act, no person in the United States shall, on the ground of sex be excluded from participation in, be denied the benefits of, or be otherwise subjected to discrimination under any program or activity under the said Federal Water Pollution Control Act Amendments for which the Assuror receives assistance from EPA and hereby gives assurance that it will now and hereafter take all necessary measures to effectuate this agreement.

If any real property or structure thereon is provided or improved with the aid of financial assistance extended to the Assuror by EPA, this Assurance obligates the Assuror, or, in the case of any transfer of such property, any transferee for the period during which the real property or structure is used for a purpose involving the provisions of similar services or benefits. If any personal property is so provided, this Assurance obligates the Assuror for the period during which it retains ownership or possession of the property. In all other cases, this Assurance obligates the Assuror for the period during which the financial assistance is extended to it by EPA.

THE ASSURANCE is given in consideration of and for the purpose of obtained any and all Federal grants, loans, contracts, property discounts or other financial assistance extended after the date hereof to the Assuror by EPA including installment payments after such date on account of arrangements for Federal financial assistance which were approved before such date. The Assuror recognizes and agrees that such Federal financial assistance will be extended in reliance on the representations and agreements made in this Assurance and that the United States shall reserve the right to seek judicial enforcement of this Assurance. The Assurance is binding on the Assuror, its successors, transferees, and assignees, and the person or persons whose signature appear below are authorized to sign this Assurance on behalf of the Assuror.

The obligations assumed by the Assuror hereunder are in addition to any obligations which may be imposed to the Assuror by any applicable regulation now outstanding or which may hereafter be adopted by EPA to effectuate any provision or goal of the said Title VI and all applicable requirements of the said Section 13, and no part of this Assurance shall be read so as to in any way detract from or modify any obligation which may be imposed on the Assuror by any such regulation standing alone.

SIGNATURE OF ASSUROR BY PRESIDENT,	CHAIRMAN OF BOARD	OR COMPARABLE AUTHORIZED
OFFICIAL		

DATE

CONTRACTING WITH SMALL AND MINORITY FIRMS, WOMEN'S BUSINESS ENTERPRISE

40 CFR 31.36(e)

- 40 CFR 31.36(e) Contracting with small and minority firms, women's business enterprise and labor surplus area firms.
- (1) The grantee and sub-grantee will take all necessary affirmative steps to assure that minority firms, women's business enterprises, and labor surplus area firms are used when possible.
- (2) Affirmative steps shall include:
 - (i) Placing qualified small and minority businesses and women's business enterprises on solicitation lists:
 - (ii) Assuring that small and minority businesses and women's business enterprises are solicited whenever they are potential sources;
 - (iii) Dividing the total requirements, when economically feasible, into smaller tasks or quantities to permit maximum participation by small and minority businesses, and women's business enterprises;
 - (iv) Establishing delivery schedules, where the requirement permits, which encourage participation by small and minority businesses, and women's business enterprises;
 - (v) Using the services and assistance of the Small Business Administration, and the Minority Business Development Agency of the Department of Commerce; and
 - (vi) Requiring the prime contractor, if subcontracts are to be let, to take affirmative steps listed in paragraphs (e)(2)(i) through (v) of this section.

EXECUTIVE ORDER

PRESERVATION OF OPEN COMPETITION AND GOVERNMENT NEUTRALITY TOWARDS GOVERNMENT CONTRACTORS' LABOR RELATIONS ON FEDERAL AND FEDERALLY FUNDED CONSTRUCTION PROJECTS

By the authority vested in me as President by the Constitution and laws of the United States of America, including the Federal Property and Administrative Services Act, 40 U.S.C. 471 et seq., and in order to (1) promote and ensure open competition on Federal and federally funded or assisted construction projects; (2) maintain Government neutrality towards Government contractors' labor relations on Federal and federally funded or assisted construction projects; (3) reduce construction costs to the Federal Government and to the taxpayers; (4) expand job opportunities, especially for small and disadvantaged businesses; and (5) prevent discrimination against Government contractors or their employees based upon labor affiliation or lack thereof; thereby promoting the economical, nondiscriminatory, and efficient administration and completion of Federal and federally funded or assisted construction projects, it is hereby ordered that:

- Section 1. To the extent permitted by law, any executive agency awarding any construction contract after the date of this order, or obligating funds pursuant to such a contract, shall ensure that neither the awarding Government authority nor any construction manager acting on behalf of the Government shall, in its bid specifications, project agreements, or other controlling documents:
- (a) Require or prohibit bidders, offerors, contractors, or subcontractors to enter into or adhere to agreements with one or more labor organizations, on the same or other related construction project(s); or
- (b) Otherwise discriminate against bidders, offerors, contractors, or subcontractors for becoming or refusing to become or remain signatories or otherwise to adhere to agreements with one or more labor organizations, on the same or other related construction project(s).
- (c) Nothing in this section shall prohibit contractors or subcontractors from voluntarily entering into agreements described in subsection (a).
- Sec. 2. Contracts awarded before the date of this order, and subcontracts awarded pursuant to such contracts, whenever awarded, shall not be governed by this order.
- Sec. 3. To the extent permitted by law, any executive agency issuing grants, providing financial assistance, or entering into cooperative agreements for construction projects, shall ensure that neither the bid specifications, project agreements, nor other controlling documents for construction contracts awarded after the date of this order by recipients of grants or financial assistance or by parties to cooperative agreements, nor those of any construction manager acting on their behalf, shall contain any of the requirements or prohibitions set forth in section 1(a) or (b) of this order.
- Sec. 4. In the event that an awarding authority, a recipient of grants or financial assistance, a party to a cooperative agreement, or a construction manager acting on behalf of the foregoing, performs in a manner contrary to the provisions of sections 1 or 3 of this order, the executive agency awarding the contract, grant, or assistance shall take such action, consistent with law and regulation, as the agency determines may be appropriate.
- Sec. 5. (a) The head of an executive agency may exempt a particular project, contract, subcontract, grant, or cooperative agreement from the requirements of any or all of the provisions of sections 1 and 3 of this order, if the agency head finds that special circumstances require an exemption in order to avert an imminent threat to public health or safety or to serve the national security.
- (b) A finding of "special circumstances" under section 5(a) may not be based on the possibility or presence of a labor dispute concerning the use of contractors or subcontractors who are nonsignatories to, or otherwise do not adhere to, agreements with one or more labor organizations, or concerning employees on the project who are not members of or affiliated with a labor organization.
- Sec. 6. (a) The term "construction contract" as used in this order means any contract for the construction, rehabilitation, alteration, conversion, extension, or repair of buildings, highways, or other improvements to real property.
- (b) The term "executive agency" as used in this order shall have the same meaning it has in 5 U.S.C. 105, excluding the General Accounting Office.
 - (c) The term "labor organization" as used in this order shall have the same meaning it has in 42 U.S.C. 2000e(d).
- Sec. 7. With respect to Federal contracts, within 60 days of the issuance of this order, the Federal Acquisition Regulatory Council shall take whatever action is required to amend the Federal Acquisition Regulation in order to implement the provisions of this order.
- Sec. 8. As it relates to project agreements, Executive Order 12836 of February 1, 1993, which, among other things, revoked Executive Order 12818 of October 23, 1992, is revoked.

- Sec. 9. The Presidential Memorandum of June 5, 1997, entitled "Use of Project Labor Agreements for Federal Construction Projects" (the "Memorandum"), is also revoked.
- Sec. 10. The heads of executive departments and agencies shall revoke expeditiously any orders, rules, regulations, guidelines, or policies implementing or enforcing the Memorandum or Executive Order 12836 of February 1, 1993, as it relates to project agreements, to the extent consistent with law.
- Sec. 11. This order is intended only to improve the internal management of the executive branch and is not intended to, nor does it, create any right to administrative or judicial review, or any right, whether substantive or procedural, enforce-able by any party against the United States, its agencies or instrumentalities, its officers or employees, or any other person.

GEORGE W. BUSH

THE WHITE HOUSE, February 17, 2001.

TITLE 37

CHAPTER 2.1 DOMESTIC STEEL

Section 37-2.1-1. Short Title 37-2.1-2. Purpose 37-2.1-3. Purchase of steel and steel products 37-2.1-4 Payment 37-2.1-5. Definitions

37-2.1-1. Short title.

This chapter shall be known and may be cited as the "Steel Products Procurement Act".

37-2.1-2. Purpose.

- (a) This chapter shall be deemed to be an exercise of the police powers of the state for the protection of the health, safety, and general welfare of the people of the state.
- (b) It is hereby determined by the general assembly of Rhode Island and declared as a matter of legislative findings that:
 - (1) The United States is one of the leading countries in the production and use of steel and its allied products;
 - (2) The use of steel products constitutes a major industry of the United States and, as such, provides the jobs and family incomes of millions of persons in the United States;
 - (3) The taxes paid to Rhode Island and the United States by employers and employees engaged in the production and sale of steel products are one of the largest single sources of public revenues in this country;
 - (4) It has, for many years, been the policy of the state to aid and support the development and expansion of industry in the United States in order to foster the economic well-being of the state and its people; and
 - (5) The economy, general welfare, and national security of the United States, are inseparably related to the preservation and development of the steel industry in the United States.
- (c) The general assembly therefore declares it to be the policy of the state that all public officers and agencies should, at all times, aid and promote the development of the steel industry of the United States in order to stimulate and improve the economic well-being of the state and its people.

37-2.1-3. Purchase of steel and steel products.

- (a) Every public agency shall require that every contract document for the construction, reconstruction, alteration, repair, improvement, or maintenance of public works contain a provision that, if any steel products are to be used or supplied in the performance of the contract, only steel products as herein defined shall be used or supplied in the performance of the contract or any subcontracts thereunder.
- (b) This section shall not apply in any case where the head of the public agency, in writing, determines that steel products as herein defined are not produced in, or readily available in the United States or that such steel products shall not exceed fifteen percent (15%) of the costs of any other steel products obtainable nationally or internationally.

37-2.1-4. Payment.

No public agency shall authorize, provide for, or make any payments to any person under any contract containing the provision required by 37-2.1-3 unless the public agency is satisfied that such person has fully complied with that provision. Any such payments made to any person by any public agency which should not have been made, as a result of this section, shall be recoverable directly from the contractor or subcontractor who did not comply with 37-2.1-3 by either such public agency or the attorney general upon suit filed in the court of any county.

37-2.1-5. Definitions.

The following words and phrases when used in this chapter shall have, unless the context clearly indicates otherwise, the meanings given to them in this section:

- (a) "Person" means natural persons as well as corporations, partnerships, business units, and associations;
- (b) "Public agency" means (1) the state and its departments, boards, commissions and agencies, (2) cities, towns, school districts, and any other governmental unit or district, (3) any and all other public bodies, authorities, officers, agencies, or instrumentalities, whether exercising a governmental or proprietary function;
- (c) "Public works" means steel to construct, frame or reinforce any public structure, building, highway, waterway, street, bridge, transit system, airport, or other betterment, work or improvement, whether of a permanent or temporary nature, and whether for governmental or proprietary use;
- (d) "Steel products" means products rolled, formed, shaped, drawn, extruded, forged, cast, fabricated, or otherwise similarly processed, or processed by a combination of two or more of such operations, from steel made in the United States by the open hearth, basic oxygen, electric furnace, Bessemer, or other steel making process;
- (e) "United States" means the United States of America and includes all territory, continental or insular, subject to the jurisdiction of the United States.

TITLE 37

CHAPTER 12 CONTRACTORS' BONDS

Sections	
37-12-1.	Contractors required to give bond – Terms and conditions.
37-12-2.	Rights of persons furnishing labor and materials.
37-12-3.	Remedies of creditors and state – Priority of claims.
37-12-4.	Intervention by creditor in suit brought by state.
37-12-5.	Time limitation on creditors' actions.
37-12-6.	Intervention in suit brought by creditor – Consolidation of suits.
37-12-7	Notice of Pendency of Suit
37-12-8.	Certified copies of documents.
37-12-9.	Payment into court by surety – Discharge.
37-12-10.	Retainers relating to contracts for public works or sewer or water main construction.
37-12-11	Substitution of securities for retained earnings

§ 37-12-1 Contractors required to give bond – Terms and conditions. – Every person (which word for the purposes of this chapter shall include a copartnership, a number of persons engaged in a joint enterprise, or a corporation), before being awarded a contract by the department of transportation or by the department of administration, as the case may be, and every person awarded such a contract as a general contractor or construction or project manager for the construction, improvement, completion, or repair of any public road or portion thereof or of any bridge in which the contract price shall be in excess of fifty thousand dollars (\$50,000), or for a contract for the construction, improvement, completion, or repair of any public building, or portion thereof, shall be required to furnish to the respective department a bond of that person to the state, with good and sufficient surety or sureties (hereafter in this chapter referred to as surety), acceptable to the respective department, in a sum not less than fifty percent (50%) and not more than one hundred percent (100%) of the contract price, conditioned that the contractor, principal in the bond, the person's executors, administrators, or successors, shall in all things, well and truly keep and perform the covenants, conditions, and agreements in the contract, and in any alterations thereof made as therein provided, on the person's part to be kept and performed, at the time and in the manner therein specified, and in all respects according to their true intent and meaning, and shall indemnify and save harmless the state, the respective department, and all of its officers, agents, and employees, as therein stipulated, and shall also promptly pay for all such labor performed or furnished and for all such materials and equipment furnished, (which as to equipment shall mean payment of the reasonable rental value, as determined by the respective department, of its use during the period of its use), as shall be used in the carrying on of the work covered by the contract, or shall see that they are promptly paid for, whether or not the labor is directly performed for or furnished to the contractor or is even directly performed upon the work covered by the contract, and whether or not the materials are furnished to the contractor or become component parts of the work, and whether or not the equipment is furnished to the contractor or even directly used upon the work. The bond shall contain the provisions that it is subject to all such rights and powers of the respective department and such other provisions as are set forth in the contract and the plans, specifications, and proposal incorporated by reference in the contract, and that no extension of the time of performance of the contract or delay in the completion of the work thereunder or any alterations thereof, made as therein provided, shall invalidate the bond or release the liability of the surety thereunder. Waiver of the bonding requirements of this section is expressly prohibited.

37-12-2. Rights of persons furnishing labor and materials.

Every person who shall have performed labor and every person who shall have furnished or supplied labor, material, or equipment in the prosecution of the work provided for in the contract, in respect of which a payment bond is furnished under § 37-12-1, and who has not been paid in full therefor before the expiration of a period of ninety (90) days after the day on which the last of the labor was performed or furnished by him or her, or material or equipment furnished or supplied by him or her for which a claim is made, shall have the right to sue on the payment bond for the amount, or the balance thereof, unpaid at the time of institution of the suit and to prosecute the action to final execution and judgment for the sum or sums justly due him or her; provided, however, that any person having direct contractual relationship with a subcontractor but no contractual relationship express or implied with the contractor

furnishing the payment bond shall have a right of action upon the payment bond upon giving written notice to the contractor within ninety (90) days from the date on which the person furnished or performed the last of the labor, or furnished or supplied the last of the material or equipment for which the claim is made, stating with substantial accuracy the amount claimed and the name of the party to whom the labor was furnished or performed or the material or equipment was furnished or supplied. The notice shall be served by mailing the same by certified mail, postage prepaid, in an envelope addressed to the contractor at any place he or she maintains an office, conducts his or her business, or his or her residence.

37-12-3. Remedies of creditors and state - Priority of claims.

The remedy on the bond shall be by a civil action brought in the superior court for the counties of Providence and Bristol and in any suit brought on the bond the rights of the state shall be prior to those of all creditors. The rights of persons who shall have performed labor as aforesaid shall be prior to the rights of all other creditors, and there shall be no priorities among laborers or among other creditors under the bond. The state, either after having recovered a judgment against the contractor on the contract or without having recovered a judgment, may bring a suit on the bond against the contractor and surety on the bond, and may join as parties defendant in the suit any persons claiming to have rights under the bond as creditors; and, if it has not brought such a suit, it may at any time before a final and conclusive decree, intervene and become a party in any suit brought, as hereafter provided in this chapter, by any person claiming to be a creditor under the bond.

37-12-4. Intervention by creditor in suit brought by state.

Any person claiming to be a creditor under the bond may at any time intervene and become a party in any pending suit brought as aforesaid by the state on the bond, and by so intervening may have the rights to the person adjudicated in the suit.

37-12-5. Time limitation on creditors' actions.

No suit instituted under § 37-12-2 shall be commenced after the expiration of two (2) years, or under the maximum time limit as contained within any labor or material payment bond required under § 37-12-1, whichever period is longer, after the day on which the last of the labor was furnished or performed or material or equipment was furnished or supplied by any person claiming under the section.

37-12-6. Intervention in suit brought by creditor - Consolidation of suits.

When a suit has been so brought on the bond by a person claiming to be a creditor under the bond and is pending, any other person claiming to be a creditor under the bond may intervene and become a party in the first suit thus brought and pending and by so intervening may have the rights of the other person adjudicated in the suit. If two (2) or more of the suits be filed in the court on the same day, the one in which the larger sum shall be claimed shall be regarded as the earlier suit. All suits brought upon the bond as provided in this chapter shall be consolidated together by the court and heard as one suit.

37-12-7. Notice of pendency of suit.

In any suit brought under the provisions of this chapter such personal notice of the pendency of the suit as the court may order shall be given to all such known creditors and persons claiming to be creditors under the bond as shall not have entered their appearances in the suit and, in addition to the notice, notice of the pendency of the suit shall be given by publication in some newspaper published in this state of general circulation in the city or town or every city or town in which the work covered by the contract was carried on, once a week for three (3) successive weeks, in such form as the court may order. The court, however, may dispense with the notices if satisfied that sufficient notices shall have been given in some other suit brought under the provisions of this chapter.

37-12-8. Certified copies of documents.

Any person claiming to be a creditor under the bond and having filed a claim with the respective department, in accordance with the requirements of § 37-12-2, shall have the right, at any time when the person could under this chapter file a suit or intervene in a pending suit, to require the respective department to furnish to the person certified copies of the contract, proposal, plans specifications, and bond.

37-12-9. Payment into court by surety - Discharge.

The surety on the bond may pay into the registry of the court, for distribution among those who may be or become entitled thereto under the decree of the court, the penal sum named in the bond less any amount which the surety

may have paid to the state in satisfaction of the liability of the surety to the state under the bond, and then shall be entitled to be discharged from all further liability under the bond.

37-12-10. Retainers relating to contracts for public works or sewer or water main construction.

- (a) Upon substantial completion of the work required by a contract aggregating in amount less than five hundred thousand dollars (\$ 500,000) with any municipality, or any agency or political subdivision thereof, for the construction, reconstruction, alteration, remodeling, repair, or improvement of sewers and water mains, or any public works project defined in § 37-13-1, the awarding authority may deduct from its payment a retention to secure satisfactory performance of the contractual work not exceeding five percent (5%) of the contract price unless otherwise agreed to by the parties. Upon substantial completion of the work required by a contract aggregating in an amount of five hundred thousand dollars (\$ 500,000) or greater with any municipality, or any agency or political subdivision thereof, for the construction, reconstruction, alteration, remodeling, repair, or improvement of sewers and water mains, or any public works project defined in § 37-13-1, the awarding authority may deduct from its payment a retention to secure satisfactory performance of the contractual work not exceeding five percent (5%) of the contract price. In the case of periodic payments with respect to contracts less than the aggregate amount of five hundred thousand dollars (\$ 500,000), the awarding authority may deduct from its payment a retention to secure satisfactory performance of the contractual work not exceeding five percent (5%) of the approved amount of any periodic payment unless otherwise agreed to by the parties. In the case of periodic payments with respect to contracts in the aggregate amount of five hundred thousand dollars (\$ 500,000) or greater, the awarding authority may deduct from its payment a retention to secure satisfactory performance of the contractual work not exceeding five percent (5%) of the approved amount of any periodic payment.
- (b) The retainage shall be paid to any contractor or subcontractor within ninety (90) days of the date the work is accepted by the awarding authority unless a dispute exists with respect to the work. If payment is not made within ninety (90) days for any reason other than a dispute, which, if resolved and it is not the fault of the contractor, interest shall be assessed at the rate of ten percent (10%) per annum on all money which is to be paid to the contractor or subcontractor.
- (c) The retainage shall be paid to any contractor or subcontractor within ninety (90) days of the date his or her work is completed and accepted by the awarding authority. If payment is not made, interest shall be assessed at the rate of ten percent (10%) per annum.
- (d) There shall also be deducted and retained from the contract price an additional sum sufficient to pay the estimated cost of municipal police traffic control on any public works project. Municipalities shall directly pay the officers working traffic details and shall bill and be reimbursed by the withholding authority for which the contract is being performed every thirty (30) days until the project is complete.
- (e) Notwithstanding the foregoing, with respect to projects located within the town of Warren, the withholding authority shall hold an amount from the contract price which shall be reasonably sufficient to pay the estimated cost of municipal police traffic control. The withholding authority shall pay to the town of Warren within seventy-two (72) hours of written demand the actual costs of police traffic control associated with said project on an ongoing basis.

37-12-11. Substitution of securities for retained earnings.

- (a) Where any public works contract as defined by § 37-13-1 provides for the retention of earned estimates by the state of Rhode Island, the contractor may, from time to time, withdraw the whole or any portion of the amount retained for payments to the contractor pursuant to the terms of the contract, upon depositing with the general treasurer either; (1) United States treasury bonds, United States treasury notes, United States treasury certificates of indebtedness, or United States treasury bills; (2) Bonds or notes of the state of Rhode Island; or (3) Bonds of any political subdivision in the state of Rhode Island.
- (b) No amount shall be withdrawn in excess of the market value of the securities at the time of deposit or of the par value of the securities, whichever is lower. The general treasurer shall, on a regular basis, collect all interest or income on the obligations so deposited and shall pay the interest or income, when and as collected, to the contractor who deposited the obligations. If the deposit is in the form of coupon bonds, the general treasurer shall deliver each coupon as it matures to the contractor. Any amount deducted by the state, or by any public department or official thereof, pursuant to the terms of the contract, from the retained payments otherwise due the contractor, shall be

deducted, first from that portion of the retained payments for which no security has been substituted, then from the proceeds of any deposited security. In the latter case, the contractor shall be entitled to receive interest, coupons, or income only from those securities which remain after the amount has been deducted. The securities so deposited shall be properly endorsed by the contractor in such manner so as to enable the general treasurer to carry out the provisions of this section.

TITLE 37

CHAPTER 12.1 SUBSTITUTION OF SECURITY FOR RETAINED EARNINGS OF ARCHITECTS AND ENGINEERS

Sections	
37-12.1-1. Definition of Terms.	
37-12.1-2. Substitution of security for retained earnings	by designers
37-12.1-3. Deduction from retained earnings.	
37-12.1-4. Endorsement on securities.	
37-12.1-5. Applicability.	

37-12.1-1. Definition of terms.

Terms used in this chapter shall be construed as follows:

- (a) "Designers", means any person, firm or corporation duly authorized pursuant to the laws of this state to engage in the practice of architecture and/or engineering within this state.
- (b) "Public works contract" means a contract to perform design or planning services by a designer with the state or any agency or governmental subdivisions thereof.
- (c) "Retained earnings" means any moneys or earned estimates withheld from a designer pursuant to the terms of a public works contract.

37-12.1-2. Substitution of security for retained earnings by designers.

- (a) Where any public works contract provides for the holding of retained earnings from a designer, the designer may from time to time withdraw the whole or any portion of the amount retained upon either depositing with the general treasurer:
- (1) United States treasury bonds, United States treasury notes, United States treasury certificates of indebtedness, or United States treasury bills;
- (2) Bonds or notes of the state of Rhode Island; or
- (3) Bonds of any political subdivision of the state of Rhode Island.
- (b) With respect to the deposit of securities, the general treasurer shall, on a regular basis, collect all interest or income on the securities so deposited and shall pay the interst or income when and as collected to the designer depositing the securities. If the security is in the form of coupon bonds, the general treasurer shall deliver each coupon as it matures to the designer.

37-12.1-3. Deduction from retained earnings.

In the event that pursuant to the terms of the public works contract it is necessary to deduct any sum from retained earnings, the state or governmental unit or agency thereof shall first apply such deduction against sums not withdrawn and thereafter from the proceeds of the sale of any securities deposited or from the income earned on such securities, whichever is applicable.

37-12.1-4. Endorsement on securities.

All securities deposited with the general treasurer pursuant to this chapter shall be properly endorsed by the designer in such manner as to enable the general treasurer to carry out the provisions of this chapter.

37-12.1-5. Applicability.

This chapter shall apply to all retained earnings held pursuant to any public works contract as of [June 16, 1991].

TITLE 37

CHAPTER 13 LABOR AND PAYMENT OF DEBTS BY CONTRACTORS

Sections	
37-13-1.	"Public Works" defined
37-13-2.	"Contractor" defined – information required.
37-13-3.	Contractors subject to provisions – Weekly payment of employees.
37-13-3.1	State public works contract apprenticeship requirements
37-13-4.	Provisions applicable to public works contracts – List of Subcontractors.
37-13-5.	Payment for trucking or materials furnished – Withholding of sums due.
37-12-6.	Ascertainment of prevailing rate of wages and other payments – Specification of rate in call for bids and in contract.
37-13-7.	Specification in contract of amount and frequency of payment and wages.
37-13-8.	Investigation and determination of prevailing wages – Filing of schedule.
37-13-9.	Statutory provisions included in contracts.
37-13-10.	Overtime compensation.
37-13-11.	Posting of prevailing wage rates.
37-13-12.	Wage records of contractors.
37-13-12.1.	Obstruction of enforcement.
37-13-12.2.	Subpoena powers.
37-13-12.3.	Compelling obedience to subpoenas.
37-13-12.4.	Penalty for violations.
37-13-13.	Furnishing payroll record to director of labor.
37-13-13.1.	Audits of wage records of out of state contractors and subcontractors.
37-13-14.	Contractor's bond.
37-13-14.1.	Enforcement – Hearings.
37-13-15.	Review.
37-13-16.	Termination of work on failure to pay agreed wages – Completion of work.
37_13_17	Private right of action to collect wages or benefits

37-13-1. "Public works" defined.

"Public works" as used in this chapter shall mean any public work consisting of grading, clearing, demolition, improvement, completion, repair, alteration, or construction of any public road or any bridge, or portion thereof, or any public building or portion thereof, or any heavy construction, or any public works projects of any nature or kind whatsoever.

37-13-2. "Contractor" defined - Information required.

The term "contractor" as used in this chapter shall mean the bidder whose bid has been accepted by an authorized agency or awarding authority as the bidder possessing the skills, ability, and integrity necessary to the faithful performance of the contract or work, and who shall certify that he or she is able to furnish labor that can work in harmony with all other elements of labor employed or to be employed on the contract or work. Essential information in regard to qualifications shall be submitted in such form to the awarding authority and the director of labor and training as the director of labor and training shall require. The authorized agency or awarding authority shall reserve the right to reject all bids, if it be in the public interest to do so.

37-13-3. Contractors subject to provisions - Weekly payment of employees.

All contractors, who have been awarded contracts for public works by an awarding agency or authority of the state or of any city, town, committee, or by any person or persons therein, in which state or municipal funds are used and of which the contract price shall be in excess of one thousand dollars (\$1,000) whether payable at the time of the signing of the contract or at a later date, and their subcontractors, on such public works shall pay their employees at weekly intervals and shall comply with the provisions set forth in 37-13-4 - 37-13-14, inclusive, and 37-13-16.

37-13-3.1. State public works contract apprenticeship requirements.

Notwithstanding any laws to the contrary, all general contractors and subcontractors who perform work on any public works contract awarded by the state after passage of this act and valued at one million dollars (\$ 1,000,000) or more shall employ apprentices required for the performance of the awarded contract. The number of apprentices shall comply with the apprentice to journeyman ratio for each trade approved by the apprenticeship council of the department of labor and training.

37-13-4. Provisions applicable to public works contracts - Lists of subcontractors.

All public works shall be done by contract, subject to the same provisions of law relating thereto and to the letting thereof, which are applicable to similar contracts of the awarding authority or authorized agency, hereinafter called the "proper authority," in the general location where the work is to be performed and which are not contrary to the provisions of 37-13-1 - 37-13-14, and 37-13-16. Each contractor after the award of a contract for public works shall submit to the proper authority a list of his or her subcontractors of any part or all of the work. The list shall be submitted in such manner or form as the proper authority shall uniformly require from contractors in all public works.

37-13-5. Payment for trucking or materials furnished - Withholding of sums due.

A contractor or subcontractor on public works authorized by a proper authority shall pay any obligation or charge for trucking and material which have been furnished for the use of the contractor or subcontractor, in connection with the public works being performed by him or her, within ninety (90) days after the obligation or charge is incurred or the trucking service has been performed or the material has been delivered to the site of the work, whichever is later. When it is brought to the notice of the proper authority in a city or town, or the proper authority in the state having supervision of the contract, that the obligation or charge has not been paid by the contractor or subcontractor, the proper authority may deduct and hold for a period not exceeding sixty (60) days, from sums of money due to the contractor or subcontractor, the equivalent amount of such sums certified by a trucker or material man creditor as due him or her, as provided in this section, and which the proper authority determines is reasonable for trucking performed or materials furnished for the public works.

37-13-6. Ascertainment of prevailing rate of wages and other payments - Specification of rate in call for bids and in contract.

Before awarding any contract for public works to be done, the proper authority shall ascertain from the director of labor and training the general prevailing rate of the regular, holiday, and overtime wages paid and the general prevailing payments on behalf of employees only, to lawful welfare, pension, vacation, apprentice training, and educational funds (payments to the funds must constitute an ordinary business expense deduction for federal income tax purposes by contractors) in the city, town, village, or other appropriate political subdivision of the state in which the work is to be performed, for each craft, mechanic, teamster, laborer, or type of worker needed to execute the contract for the public works. The proper authority shall, also, specify in the call for bids for the contract and in the contract itself the general prevailing rate of the regular, holiday, and overtime wages paid and the payments on behalf of employees only, to the welfare, pension, vacation, apprentice training, and education funds existing in the locality for each craft, mechanic, teamster, laborer, or type of worker needed to execute the contract or work.

37-13-7. Specification in contract of amount and frequency of payment of wages.

(a) Every call for bids for every contract in excess of one thousand dollars (\$ 1,000), to which the state of Rhode Island or any political subdivision thereof or any public agency or quasi-public agency is a party, for construction, alteration, and/or repair, including painting and decorating, of public buildings or public works of the state of Rhode Island or any political subdivision thereof, or any public agency or quasi-public agency and which requires or involves the employment of employees, shall contain a provision stating the minimum wages to be paid various types of employees which shall be based upon the wages that will be determined by the director of labor and training to be prevailing for the corresponding types of employees employed on projects of a character similar to the contract work in the city, town, village, or other appropriate political subdivision of the state of Rhode Island in which the work is to be performed. Every contract shall contain a stipulation that the contractor or his or her subcontractor shall pay all the employees employed directly upon the site of the work, unconditionally and not less often than once a week, and without subsequent deduction or rebate on any account, the full amounts accrued at time of payment computed at wage rates not less than those stated in the call for bids, regardless of any contractual relationships which may be alleged to exist between the contractor or subcontractor and the employees, and that the scale of wages to be paid shall be posted by the contractor in a prominent and easily accessible place at the site of the work; and the further stipulation that there may be withheld from the contractor so much of the accrued payments as may be considered necessary to pay to the employees employed by the contractor, or any subcontractor on the work, the difference between the rates of wages required by the contract to be paid the employees on the work and the rates of wages received by the employees and not refunded to the contractor, subcontractors, or their agents.

- (b) The terms "wages", "scale of wages", "wage rates", "minimum wages", and "prevailing wages" shall include:
- (1) The basic hourly rate of pay; and
- (2) The amount of:
- (A) The rate of contribution made by a contractor or subcontractor to a trustee or to a third person pursuant to a fund, plan, or program; and
- (B) The rate of costs to the contractor or subcontractor which may be reasonably anticipated in providing benefits to employees pursuant to an enforceable commitment to carry out a financially responsible plan or program which was communicated in writing to the employees affected, for medical or hospital care, pensions on retirement or death, compensation for injuries or illness resulting from occupational activity, or insurance to provide any of the foregoing, for unemployment benefits, life insurance, disability and sickness insurance, or accident insurance, for vacation and holiday pay, for defraying costs of apprenticeship or other similar programs, or for other bona fide fringe benefits, but only where the contractor or subcontractor is not required by other federal, state, or local law to provide any of the benefits; provided, that the obligation of a contractor or subcontractor to make payment in accordance with the prevailing wage determinations of the director of labor and training insofar as this chapter of this title and other acts incorporating this chapter of this title by reference are concerned may be discharged by the making of payments in cash, by the making of contributions of a type referred to in subsection (b)(2), or by the assumption of an enforceable commitment to bear the costs of a plan or program of a type referred to in this subdivision, or any combination thereof, where the aggregate of any payments, contributions, and costs is not less than the rate of pay described in subsection (b)(1) plus the amount referred to in subsection (b)(2).
- (c) The term "employees", as used in this section, shall include employees of contractors or subcontractors performing jobs on various types of public works including mechanics, apprentices, teamsters, chauffeurs, and laborers engaged in the transportation of gravel or fill to the site of public works, the removal and/or delivery of gravel or fill or ready-mix concrete, sand, bituminous stone, or asphalt flowable fill from the site of public works, or the transportation or removal of gravel or fill from one location to another on the site of public works, and the employees shall be subject to the provisions of subsections (a) and (b) .
- (d) The terms "public agency" and "quasi-public agency" shall include, but not be limited to, the Rhode Island industrial recreational building authority, the Rhode Island economic development corporation, the Rhode Island airport corporation, the Rhode Island industrial facilities corporation, the Rhode Island refunding bond authority, the Rhode Island housing and mortgage finance corporation, the Rhode Island resource recovery corporation, the Rhode Island public transit authority, the Rhode Island student loan authority, the water resources board corporate, the Rhode Island health and education building corporation, the Rhode Island higher education assistance authority, the Rhode Island turnpike and bridge authority, the Narragansett Bay water quality management district commission,

Rhode Island telecommunications authority, the convention center authority, the board of governors for higher education, the board of regents for elementary and secondary education, the capital center commission, the housing resources commission, the Quonset Point-Davisville management corporation, the Rhode Island children's crusade for higher education, the Rhode Island depositors economic protection corporation, the Rhode Island lottery commission, the Rhode Island partnership for science and technology, the Rhode Island public building authority, and the Rhode Island underground storage tank board.

37-13-8. Investigation and determination of prevailing wages - Filing of schedule.

The director of labor and training shall investigate and determine the prevailing wages and payments made to or on behalf of employees, as set forth in § 37-13-7, paid in the trade or occupation in the city, town, village, or other appropriate political subdivision of the state and keep a schedule on file in his or her office of the customary prevailing rate of wages and payments made to or on behalf of the employees which shall be open to public inspection. In making a determination, the director of labor may adopt and use such appropriate and applicable prevailing wage rate determinations as have been made by the secretary of labor of the United States of America in accordance with the Davis-Bacon Act, as amended, 40 U.S.C. § 276a; provided, however, that each contractor awarded a public works contract after July 1, 2007 shall contact the department of labor and training on or before July first of each year, for the duration of such contract to ascertain the prevailing wage rate of wages on a hourly basis and the amount of payment or contributions paid or payable on behalf of each mechanic, laborer or worker employed upon the work contracted to be done each year and shall make any necessary adjustments to such prevailing rate of wages and such payment or contributions paid or payable on behalf of each such employee every July first.

37-13-9. Statutory provisions included in contracts.

A copy of 37-13-5, 37-13-6, and 37-13-7 shall be inserted in all contracts for public works awarded by the state or any city or town, committee, an authorized agency or awarding authority thereof, or any person or persons in their behalf in which state or municipal funds are used if the contract price be in excess of one thousand dollars (\$1,000).

37-13-10. Overtime compensation.

Labor performed under the provisions of 37-13-1 - 37-13-16, inclusive, during the period of forty (40) hours in any one week and during the period of eight (8) hours in any one day, shall be considered a legal week's work or a legal day's work, as the case may be, and any number of hours of employment in any one week greater than the number of forty (40) hours or in any one day greater than the number of eight (8) hours shall be compensated at the prevailing rate of wages for overtime employment; provided, however, when the director of labor and training has determined in the investigation provided for in 37-13-7 and 37-13-8 that there is a prevailing practice in a city, town, or other appropriate political subdivision to pay an overtime rate of wages for work of any craft, mechanic, teamster, laborer, or type of worker needed to execute the work other than hours worked in any one week greater than the number of forty (40) or in hours worked in any one day greater than the number of eight (8), then the prevailing practice shall determine the legal workday and the legal workweek in the city or town for the work and the prevailing rate of overtime wages shall be paid for such work in excess of that legal workday or week, as the case may be.

37-13-11. Posting of prevailing wage rates.

Each contractor awarded a contract for public works with a contract price in excess of one thousand dollars (\$ 1,000), and each subcontractor who performs work on those public works, shall post in conspicuous places on the project, where covered workers are employed, posters which contain the current, prevailing rate of wages and the current, prevailing rate of payments to the funds required to be paid for each craft or type of worker employed to execute the contract as set forth in §§ 37-13-6 and 37-13-7, and the rights and remedies of any employee described in § 37-13-17 for nonpayment of any wages earned pursuant to this chapter. Posters shall be furnished to contractors and subcontractors by the director of labor and training, who shall determine the size and context thereof from time to time, at the time a contract is awarded. A contractor or subcontractor who fails to comply with the provisions of this section shall be deemed guilty of a misdemeanor and shall pay to the director of labor and training one hundred dollars (\$ 100) for each calendar day of noncompliance as determined by him or her. Contracts set forth in this section shall not be awarded by the state, any city, town, or any agency thereof until the director of labor and training has prepared and delivered the posters to the division of purchases, if the state or any agency thereof is the proper authority, or to the city, town, or an agency thereof, if it is the proper authority, and the contractor to whom the contract is to be awarded.

37-13-12. Wage records of contractors.

Each contractor awarded a contract with a contract price in excess of one thousand dollars (\$1,000) for public works, and each subcontractor who performs work on those public works, shall keep an accurate record showing the name, occupation, and actual wages paid to each worker employed by him or her and the payments to all the employee funds specified in sections 37-13-6 and 37-13-7 by him or her in connection with the contract or work. The director and his or her authorized representatives shall have the right to enter any place of employment at all reasonable hours for the purpose of inspecting the wage records and seeing that all provisions of this chapter are complied with.

37-13-12.1. Obstruction of enforcement.

Any effort of any employer to obstruct the director and his or her authorized representatives in the performance of their duties shall be deemed a violation of this chapter and punishable as such.

37-13-12.2. Subpoena powers.

The director and his or her authorized representatives shall have power to administer oaths and examine witnesses under oath, issue subpoenas, subpoenas duces tecum, compel the attendance of witnesses, and the production of papers, books, accounts, records, payrolls, documents, and testimony, and to take depositions and affidavits in any proceeding before the director.

37-13-12.3. Compelling obedience to subpoenas.

In case of failure of any person to comply with any subpoena lawfully issued, or subpoena duces tecum, or on the refusal of any witness to testify to any matter regarding which he may be lawfully interrogated, it shall be the duty of the superior court, or any judge thereof, on application by the director, to compel obedience by proceedings in the nature of those for contempt.

37-13-12.4. Penalty for violations.

Except as otherwise provided in this chapter, any employer who shall violate or fail to comply with any of the provisions of this chapter shall be guilty of a misdemeanor and shall be punished by a fine of not less than five hundred dollars (\$ 500) nor more than one thousand dollars (\$ 1,000) for each separate offense, or by imprisonment for not less than ten (10) nor more than ninety (90) days, or by both fine and imprisonment. Each day of failure to pay wages due an employee at the time specified in this chapter shall constitute a separate and distinct violation.

37-13-13. Furnishing payroll record to director of labor.

- (a) Every contractor and subcontractor awarded a contract for public works as defined by this chapter shall furnish a certified copy of his or her payroll records of his or her employees employed upon the project to the director of labor and training on a monthly basis for the preceding month's work.
- (b) The director of labor and training may promulgate reasonable rules and regulations to enforce the provisions of this section.
- (c) Any contractor or subcontractor who fails to comply with the provisions of this section shall be deemed guilty of a misdemeanor and shall pay to the director of labor and training five hundred dollars (\$ 500) for each calendar day of noncompliance as determined by the director of labor and training. Any of those revenues shall be deposited as general revenues. Any person, firm, or corporation found to have willfully made a false or fraudulent representation in connection with reporting their certified payroll records shall be required to pay a civil penalty to the department of labor and training in an amount of no less than one thousand dollars (\$ 1,000) and not greater than three thousand dollars (\$ 3,000) per representation. For purposes of this subsection "willfully" shall mean representations that are known to be false, or representations made with deliberate ignorance or reckless disregard for their truth or falsity.

37-13-13.1. Audits of wage records of out of state contractors and subcontractors.

Out of state contractors or subcontractors who perform work on public works in this state authorize the director of labor and training to conduct wage and hour audits of their payroll records pursuant to the provisions of chapter 14 of title 28.

37-13-14. Contractor's bond.

The state or any city, town, agency, or committee therein awarding contracts for public works shall require the contractor awarded a contract with a contract price in excess of fifty thousand dollars (\$ 50,000) for public works to file with the proper authority good and sufficient bond with surety furnished by any surety company authorized to do business in the state, conditioned upon the faithful performance of the contract and upon the payment for labor performed and material furnished in connection therewith, a bond to contain the terms and conditions set forth in chapter 12 of this title, and to be subject to the provisions of that chapter. Waiver of the bonding requirements of this section is expressly prohibited.

37-13-14.1. Enforcement - Hearings.

- (a) Before issuing an order or determination, the director of labor and training shall order a hearing thereon at a time and place to be specified, and shall give notice thereof, together with a copy of the complaint or the purpose thereof, or a statement of the facts disclosed upon investigation, which notice shall be served personally or by mail on any person, firm, or corporation affected thereby. The person, firm, or corporation shall have an opportunity to be heard in respect to the matters complained of at the time and place specified in the notice, which time shall be not less than five (5) days from the service of the notice personally or by mail. The hearing shall be held within ten (10) days from the order of hearing. The hearing shall be conducted by the director of labor and training or his or her designee. The hearing officer in the hearing shall be deemed to be acting in a judicial capacity, and shall have the right to issue subpoenas, administer oaths, and examine witnesses. The enforcement of a subpoena issued under this section shall be regulated by Rhode Island civil practice law and rules. The hearing shall be expeditiously conducted and upon such hearing the hearing officer shall determine the issues raised thereon and shall make a determination and enter an order within ten (10) days of the close of the hearing, and forthwith serve a copy of the order, with a notice of the filing thereof, upon the parties to the proceeding, personally or by mail. The order shall dismiss the charges or direct payment of wages or supplements found to be due, including interest at the rate of twelve percentum (12%) per annum from the date of the underpayment to the date of payment, and may direct payment of reasonable attorney's fees and costs to the complaining party.
- (b) In addition to directing payment of wages or supplements including interest found to be due, the order shall also require payment of a further sum as a civil penalty in an amount up to three times the total amount found to be due. Further, if the amount of salary owed to an employee pursuant to this chapter but not paid to the employee in violation of thereof exceeds five thousand dollars (\$ 5,000), it shall constitute a misdemeanor and shall be referred to the office of the attorney general. The misdemeanor shall be punishable for a period of not more than one year in prison and/or fined not more than one thousand dollars (\$ 1,000). In assessing the amount of the penalty, due consideration shall be given to the size of the employer's business, the good faith of the employer, the gravity of the violation, the history of previous violations and the failure to comply with recordkeeping or other nonwage requirements. The surety of the person, firm, or corporation found to be in violation of the provisions of this chapter shall be bound to pay any penalties assessed on such person, firm, or corporation. The penalty shall be paid to the department of labor and training for deposit in the state treasury; provided, however, it is hereby provided that the general treasurer shall establish a dedicated "prevailing wages enforcement fund" for the purpose of depositing the penalties paid as provided herein. There is hereby appropriated to the annual budget of the department of labor and training the amount of the fund collected annually under this section, to be used at the direction of the director of labor and training for the sole purpose of enforcing prevailing wage rates as provided in this chapter.
- (c) For the purposes of this chapter, each day or part thereof of violation of any provision of this chapter by a person, firm, or corporation, whether the violation is continuous or intermittent, shall constitute a separate and succeeding violation.
- (d) In addition to the above, any person, firm, or corporation found in violation of any of the provisions of this chapter by the director of labor and training, an awarding authority, or the hearing officer, shall be ineligible to bid on or be awarded work by an awarding authority or perform any such work for a period of no less than eighteen (18) months and no more than thirty-six (36) months from the date of the order entered by the hearing officer. Once a person, firm, or corporation is found to be in violation of this chapter, all pending bids with any awarding authority shall be revoked, and any bid awarded by an awarding authority prior to the commencement of the work shall also be revoked.
- (e) In addition to the above, any person, firm, or corporation found to have committed two (2) or more willful violations in any period of eighteen (18) months of any of the provisions of this chapter by the hearing officer, which violations are not arising from the same incident, shall be ineligible to bid on or be awarded work by an Conspecspackage Rev 3/15/11 27of 50

awarding authority or perform any work for a period of sixty (60) months from the date of the second violation.

- (f) The order of the hearing officer shall remain in full force and effect unless stayed by order of the superior court.
- (g) The director of labor and training, awarding authority, or hearing officer shall notify the bonding company of any person, firm, or corporation suspected of violating any section of this chapter. The notice shall be mailed certified mail, and shall enumerate the alleged violations being investigated.
- (h) In addition to the above, any person, firm, or corporation found to have willfully made a false or fraudulent representation on certified payroll records shall be referred to the office of the attorney general. The false or fraudulent representation shall be considered a misdemeanor and shall be punishable for a period of not more than one year in prison and/or fined one thousand dollars (\$ 1,000). Further, any person, firm, or corporation found to have willfully made a false or fraudulent representation on certified payroll records shall be required to pay a civil penalty to the department of labor and training in an amount of no less than two thousand dollars (\$ 2,000) and not greater than fifteen thousand dollars (\$ 15,000) per representation.

37-13-15. Review.

- (a) There is hereby created an appeals board which shall be comprised of three (3) members who shall be appointed by the governor; provided, however, that each member of the appeals board shall have at least five (5) years experience with prevailing wage rates as they apply to the construction industry. The members of such appeals board shall serve without compensation. The members of the appeals board shall be appointed for terms of three (3) years except that of the three (3) members originally appointed by each of the appointing authorities; one (1) shall be appointed for a term of one (1) year, one (1) shall be a appointed for a term of two (2) years and one (1) for a term of three (3) years.
- (b) Any person aggrieved by any action taken by the director of labor and training or his or her designated hearing officer under the authority of this chapter, or by the failure or refusal of the director of labor and training to take any action authorized by this chapter, may obtain a review thereof for the purpose of obtaining relief from the action or lack of action by filing a petition for administrative review and relief, to the appeals board as provided herein. The petition for administrative review shall be filed within twenty (20) days of the action taken by the director of labor and training or designated hearing officer: The petition for administrative review shall be heard within ten (10) days of the date of filing. An aggrieved person under this section shall include:
 - (1) Any person who is required to pay wages to his or her employees or make payments to a fund on behalf of his or her employees, as provided in this chapter;
 - (2) Any person who is required to be paid wages for his or her labor or on whose behalf payments are required to be paid to funds, as provided by this chapter;
 - (3) The lawful collective bargaining representative of a person defined in subdivision (2) above;
 - (4) A trade association of which a person defined in subdivision (1) above is a member;
 - (5) A proper authority as defined in this chapter;
 - (6) A contractor who submitted a bid for work to be or which has been awarded under the provisions of this chapter or a trade association of which he or her is a member, and
 - (7) A labor organization which has one or more written collective bargaining agreements with one or more employers or a trade association which sets forth the hours, wages, and working conditions of a craft, mechanic, teamster, or type of worker needed to execute the work, as provided in this chapter to the extent that it would be affected by the action or the failure to act of the director of labor and training or the hearing officer.
- (c) Any aggrieved person as defined herein may obtain a review of a decision of the appeals board by filing a petition in the superior court in Providence county pursuant to the provisions of the administrative procedures act, praying for review and relief and the petition shall follow the course of and be subject to the procedures for causes filed in the court.
- (d) The director is hereby empowered to enforce his or her decision and/or the decision of the appeals board in the superior court for the county of Providence.

37-13-16. Termination of work on failure to pay agreed wages - Completion of work.

Every contract within the scope of this chapter shall contain the further provision that in the event it is found by the director of labor and training that any employee employed by the contractor or any subcontractor directly on the site of the work covered by the contract has been or is being paid a rate of wages less than the rate of wages required by the contract to be paid as aforesaid, the awarding party may, by written notice to the contractor or subcontractor, terminate his or her right as the case may be, to proceed with the work, or such part of the work as to which there has been a failure to pay the required wages, and shall prosecute the work to completion by contract or otherwise, and the contractor and his or her sureties shall be liable to the awarding party for any excess costs occasioned the awarding authority thereby.

37-13-17. Private right of action to collect wages or benefits

- (a) An employee or former employee, or any organization representing such an employee or former employee, of a contractor or subcontractor may bring a civil action for a violation of § 37-13-7 for appropriate injunctive relief, or actual damages, or both within three (3) years after the occurrence of the alleged violation. An action commenced pursuant to this section, may be brought in the superior court for the county where the alleged violation occurred, the county where the complainant resides, or the county where the person against whom in the civil complaint is filed resides or has their principal place of business. Any contractor or subcontractor who violates the provisions of § 37-13-7 shall be liable to the affected employee or employees in the amount of unpaid wages or benefits, plus interest. A civil action filed in court under this section may be instituted instead of, but not in addition to the director of labor and training enforcement procedures authorized by § 37-13-14.1, provided the civil action is filed prior to the date the director of labor and training issues notice of an administrative hearing.
- (b) An employer's responsibility and liability is solely for its own employees.
- (c) An action instituted pursuant to this section may be brought by one or more employees or former employees on behalf of himself/herself or themselves and other employees similarly situated, except that no employee shall be a party plaintiff to any such action unless he/she gives his/her consent in writing to become such a party and such consent is filed in the court in which such action is brought.
- (d) In an action filed under this section in which the plaintiff prevails, the court shall, in addition to any judgment awarded to the plaintiff, require reasonable attorneys' fees and the costs of the action to be paid by the defendant.
- (e) The court in an action filed under this section shall award affected employees or former employees liquidated damages in an amount equal to two (2) times the amount of unpaid wages or benefits owed. Unpaid fringe benefit contributions owed pursuant to this section in any form shall be paid to the appropriate benefit fund, however, in the absence of an appropriate fund the benefit shall be paid directly to the individual.
- (f) The filing of a civil action under this section shall not preclude the director of labor and training from referring a matter to the attorney general as provided in § 37-13-14.1(b), from prohibiting a contractor or subcontractor from bidding on or otherwise participating in contracts as provided in § 37-13-14.1(d), (e) and (h), or from prohibiting termination of work on failure to pay agreed wages pursuant to § 37-13-16.
- (g) Any person, firm, or corporation found to have willfully made a false or fraudulent representation in connection with wage obligations owed on a contract shall be required to pay a civil penalty to the department of labor and training in an amount of no less than one thousand dollars (\$ 1,000) and not greater than three thousand dollars (\$ 3,000) per representation. Such penalties shall be recoverable in civil actions filed pursuant to this section. For purposes of this subsection "willfully" shall mean representations that are known to be false, or representations made with deliberate ignorance or reckless disregard for their truth or falsity.
- (h) An employer shall not discharge, threaten, or otherwise discriminate against an employee, or former employee, regarding compensation terms, conditions, locations or privileges of employment because the employee or former employee, or a person or organization acting on his or her behalf: (1) Reports or makes a complaint under this section; or otherwise asserts his or her rights under this section; and/or (2) Participates in any investigation, hearing or inquiry held by the director of labor and training under § 37-13-14.1. In the event a contractor or subcontractor retaliates or discriminates against an employee in violation of this section, the affected employee may file an action in any court of competent jurisdiction and the court shall order reinstatement and/or restitution of the affected employee, as appropriate, with back pay to the date of the violation, and an additional amount in liquidated damages equal to two (2) times the amount of back pay and reasonable attorneys' fees and costs.

(i) If any one or more subsections of this section shall for any reason be adjudged unconstitutional or otherwise nvalid, the judgment shall not affect, impair, or invalidate the remaining subsections.	

PREVAILING WAGE RATES

(Appropriate wage rate to be inserted by bidder in specifications)

For a copy of the appropriate wage rate, contact:

R.I. Department of Labor Division of Labor Standards 610 Manton Avenue Providence, RI 02909

TITLE 37

CHAPTER 14.1 MINORITY BUSINESS ENTERPRISE

Sections	
37-14.1-1.	Purpose.
37-14.1-2.	Applicability.
37-14.1-3.	Definitions.
37-14.1-4.	Policy.
37-14.1-5.	Discrimination prohibited.
37-14.1-6.	Minority business enterprise guidelines
37-14.1-7.	Establishment of criteria and guidelines
37-14 1-8	Sanctions

37-14.1-1. Purpose.

The purpose of this chapter is to carry out the state's policy of supporting the fullest possible participation of firms owned and controlled by minorities and women (MBE's), in state funded and state directed public construction programs and projects and in state purchases of goods and services. This includes assisting MBE's throughout the life of contracts in which they participate.

37-14.1-2. Applicability.

This chapter shall apply to any and all state purchasing, including, but not limited to the procurement of goods and services and construction projects or contracts funded in whole or in part by state funds, or funds which, in accordance with a federal grant or otherwise, the state expends or administers or in which the state is a signatory to the construction contract.

37-14.1-3. Definitions.

- (a) "Affirmative action" means taking specific steps to eliminate discrimination and its effects, to ensure nondiscriminatory results and practices in the future, and to involve minority business enterprises fully in contracts and programs funded by the state.
- (b) "Compliance" means the condition existing when a contractor has met and implemented the requirements of this chapter.
- (c) "Contract" means a mutually binding legal relationship or any modification thereof obligating the seller to furnish supplies or services, including construction, and the buyer to pay for them. For purposes of this chapter, a lease is a contract.
- (d) "Contractor" means one who participates, through a contract or subcontract, in any procurement or program covered by this chapter, and includes lessees and material suppliers.
- (e) "Minority" means a person who is a citizen or lawful permanent resident of the United States and who is:
 - (1) Black (a person having origins in any of the black racial groups of Africa);
 - (2) Hispanic (a person of Mexican, Puerto Rican, Cuban, Central or South American, or other Spanish culture or origin, regardless of race);
 - (3) Portuguese (a person of Portuguese, Brazilian, or other Portuguese culture or origin, regardless of race);
 - (4) Asian American (a person having origins in any of the original peoples of the Far East, Southeast Asia, the Indian subcontinent, or the Pacific Islands);
 - (5) American Indian and Alaskan Native (a person having origins in any of the original peoples of North America.); or
 - (6) Members of other groups, or other individuals, found to be economically and socially disadvantaged by the Small Business Administration under section 8(a) of the Small Business Act, as amended [15 U.S.C. 637(a)].
- (f) "Minority business enterprise" or "MBE" means a small business concern, as defined pursuant to section 3 of the federal Small Business Act [15 U.S.C. 632] and implementing regulations, which is owned and controlled by one or more minorities or women. For the purposes of this chapter, owned and controlled means a business.

- (1) Which is at least fifty-one percent (51%) owned by one or more minorities or women or, in the case of a publicly owned business, at least fifty-one percent (51%) of the stock of which is owned by one or more minorities or women; and
- (2) Whose management and daily business operations are controlled by one or more such individuals.
- (g) "MBE coordinator" means the official designated to have overall responsibility for promotion of minority business enterprise in his or her departmental element.
- (h) "Noncompliance" means the condition existing when a recipient or contractor has failed to implement the requirements of this chapter.

37-14.1-4. Policy.

It is the policy of the state of Rhode Island that minority business enterprises (MBE's) shall have the maximum opportunity to participate in the performance of procurements and projects outlined in 37-14.1-2.

37-14.1-5. Discrimination prohibited.

No person shall be excluded from participation in, denied the benefits of, or otherwise discriminated against in connection with the award and performance of any project covered by this chapter, on the grounds of race, color, national origin, or sex.

37-14.1-6. Minority business enterprise participation.

Minority business enterprises shall be included in all procurements and construction projects under this chapter and shall be awarded a minimum of ten percent (10%) of the dollar value of the entire procurement or project. The director of the department of administration is further authorized to establish by rules and regulation formulas for giving minority business enterprises a preference in contract and subcontract awards.

37-14.1-7. Establishment of criteria and guidelines.

The director of the department of administration shall establish, by rule and regulations adopted in accordance with chapter 35 of title 42, standards which shall determine whether a construction project is covered by this chapter, compliance formulas, procedures for implementation, and procedures for enforcement which are not inconsistent with 49 CFR 23 of the federal regulations. As to Rhode Island department of transportation contracts, the director of administration may delegate this authority to the director of transportation.

37-14.1-8. Sanctions.

- (a) The director of the department of administration shall have the power to impose sanctions upon contractors not in compliance with this chapter and shall include but not be limited to:
 - (1) Suspension of payments;
 - (2) Termination of the contract;
 - (3) Recovery by the state of ten percent (10%) of the contract award price as liquidated damages; and
 - (4) Denial of right to participate in future projects for up to three (3) years.
- (b) As to Rhode Island department of transportation contracts, the director of the department of administration may delegate this authority to the director of transportation.

REGULATIONS GOVERNING PARTICIPATION BY MINORITY BUSINESS ENTERPRISES IN STATE

FUNDED AND DIRECTED PUBLIC CONSTRUCTION PROJECTS, CONSTRUCTION CONTRACTS

AND PROCUREMENT CONTRACTS FOR GOODS AND SERVICES

I. GENERAL

1. Purpose

- (a) The purpose of these regulations is to carry out the state's policy of supporting the fullest possible participation of firms owned and controlled by minorities and women (MBEs) in state-funded and directed public construction programs and projects and in state purchases of goods and services. This includes assisting MBEs throughout the life of contracts in which they participate.
- (b) These regulations implement, in part, R. I. Gen. Laws, Chapter 37-14.1. These regulations are effective immediately and supersede all Department of Administration regulations issued previously under these authorities insofar as such regulations affect minority business enterprise matters in the State.

2. Applicability

These regulations apply to any construction project, construction contract or procurement contract for goods and services funded in whole or in part by state funds, or funds which, in accordance with federal grant or otherwise, the state expends or administers or in which the state is a signatory. Quasi-independent state agencies, such as the Rhode Island Public Buildings Authority, the Narragansett Bay Commission and the Rhode Island Port Authority, are subject to the requirements outlined under these regulations. With respect to Department of Transportation contracts, The Director of Transportation may promulgate regulations consistent with R. I. Gen. Laws Sections 37-14.1-8 and 37-14.1-9, thereby exempting Department of Transportation contracts from the requirements of these regulations.

3. **Definition**

The terms "building" or "work" means construction activity as distinguished from manufacturing, furnishing of materials, or servicing and maintenance work. The terms include, without limitation, buildings, structures, and improvement of all types, such as bridges, dams, plants, highways, parkways, streets, subways, tunnels, sewers, mains, power lines, pumping stations, railways, airports, terminals, docks, piers, wharves, ways lighthouses, buoys, jetties, breakwaters, levees, and canals; dredging, shoring, scaffolding, drilling, blasting, excavating, clearing and landscaping. Unless conducted in connection with and at the site of such a building or work as described in the foregoing sentence, the manufacture or furnishing of materials, articles, supplies, or equipment (whether or not a Federal or State agency acquires title to such materials, articles, supplies, or equipment during the course of the manufacture or furnishing, or owns the materials from which they are manufactured or furnished) is not a "building" or "work" within the meaning of these regulations.

"Compliance" means the conditions existing when a prime contractor has met and implemented the requirements of these regulations.

"Construction" means all types of on-site work done on a particular building or work, including, without limitation, altering, remodeling, painting and decorating, the transporting of materials and supplies to or from the building or work by the employees of the construction contractor or construction subcontractor, and the manufacturing or furnishing of materials, articles, supplies, or equipment on the site of the building or work, by persons employed at the site by the contractor or subcontractor.

"Construction Project" means a contract or group of contracts for construction work that a prime contractor has agreed to perform, whether directly or through the use of subcontractors.

- "Contract" means a mutually binding legal relationship or any modification thereof obligating the seller to furnish supplies or services, including construction, and the buyer to pay for them. For purposes of these regulations, a lease is a contract.
- "Contractor" means one who participates, through a contract or subcontract, in any program covered by these regulations and includes lessees.
- "Director" means the Director of the Department of Administration or any person whom he/she has designated to act for him/her.
- "Goods" means materials or supplies of any kind provided by a vendor, his agents or employees.
- "Services" means professional or non-professional activities requiring mental or physical labor to be performed by the contractor, vendor, his agents or employees.
- "Minority" means a person who is a citizen or lawful permanent resident of the United States and who is:
 - (a) Black (a person having origins in any of the black racial groups of Africa);
 - (b) Hispanic (a person of Mexican, Puerto Rican, Cuban, Central or South American or other Spanish culture or origin, regardless of race);
 - (c) Portuguese (a person of Portuguese, Brazilian or other Portuguese culture or origin, regardless of race);
 - (d) Asian American (a person having origins in any of the original peoples of the Far East, South East Asia, the Indian Subcontinent, or the Pacific Islands);
 - (e) American Indian and Alaskan Native (a person having origins in any of the original peoples of North America); or
 - (f) Members of other groups or other individuals found to be economically and socially disadvantaged by the Small Business Administration under Section 8(a) of the Small Business Act, as amended (15 U.S.C. 637 (a)).
- "Minority Business Enterprise" or "MBE" means a small business concern as defined pursuant to Section 3 of the Federal Small Business Act and implementing regulations, which is owned and controlled by one (1) or more minorities or women and which has been certified as a Minority Business Enterprise under these regulations by the Rhode Island Department of Administration. For the purposes of these regulations, an owned and controlled business means one:
 - (a) which is at least 51% owned by one (1) or more minorities or women or, in the case of a publicly owned business, at least fifty-one percent (51%) of the stock of which is owned by one (1) or more minorities or women; and
 - (b) whose management and daily business operations are controlled by one (1) or more such individuals.
- "MBE Coordinator" means the official designated to have overall responsibility for promotion of minority business enterprises within each department and agency for each contract covered by these regulations. He or she shall be appointed not later than the time the Request for Proposal for each contract is submitted.
- "Non-compliance" means the condition existing when a contractor has failed to implement the requirements of these regulations.
- "**Prime Contractor**" means the contractor that is charged with total construction on a contract or group of contracts, portions of which are, or will be subcontracted to their parties.
- "**Specialty Contractor**" means a contractor charged with total construction on a contract or group of contracts, portions of which will <u>not</u> be subcontracted to third parties.
- "Vendor" means the party with which the State contracts to provide goods or services.

4. Policy

These regulations shall be construed in accordance with the policy of the State of Rhode Island that minority business enterprises (MBEs) shall have the maximum opportunity to participate in the performance of projects or provision of goods or services outlined hereunder.

5. Construction Contracts

(a) MBE Liaison Officer

The chief executive officer of each prime contractor shall designate an MBE Liaison Officer who will coordinate with the MBE Coordinator from the Department of Administration or other state department or agency responsible for monitoring the contract.

(b) Ten Percent (10%) Requirement

- (i) Each Department shall structure its procedures for procuring construction contracts to attempt to achieve the result that a minimum of ten (10%) percent of the total dollar value of these procurements is made directly or indirectly from MBEs. This result shall be achieved through on of the two methods described in paragraphs 5(b) (ii) or 5 (b) (iii) below.
- (ii) Prime Contractor Method. Each prime contractor shall ensure that a minimum of ten percent (10%) of the dollar value of work to be performed on a construction project will be performed by MBEs. The prime contractor must meet or exceed this requirement or demonstrate that it could not meet this requirement despite its good-faith efforts. A prime contractor that is an MBE will satisfy the ten percent (10%) requirement by ensuring that a least ten percent (10%) of the dollar volume of work performed under the contract is performed by its employees.
- (iii) Construction Contracts not involving the use of prime contractors. In lieu of using the prime contractor method described in paragraph 5(b) (ii) above, a Department may meet the ten percent (10%) requirement under these regulations by ensuring that ten percent (10%) of the dollar value of construction contracts in the aggregate for each fiscal year is awarded to MBEs. MBEs may be solicited directly to accomplish this requirement.
- (iv) The ten percent (10%) requirements set forth under these regulations can be satisfied concurrently with similar requirements mandated under federal law.
- (v) Nothing in these regulations shall be construed to require the award of a contract to an MBE whose bid exceeds the lowest bid by five percent (5%). Nothing in these Regulations shall be construed to require the acceptance of non-conforming goods or services.

(c) Solicitation of Bids

All departments and agencies soliciting requests for proposals for construction projects identified as having subcontracting opportunities must include in the advertisements for the project the following language: "This project is subject to Chapter 37-14.1 of the Rhode Island General Laws, and regulations promulgated thereunder, which require that ten percent of the dollar value of work performed on the project be performed by minority business enterprises."

(ii) MBE Compliance Plan

A prospective prime contractor shall include in its bid on any construction project covered by these regulations, a simple statement acknowledging its obligation to meet the ten percent (10%) requirement under these regulations. After it has been identified as the apparent low bidder, the prime contractor shall, within ten (10) working days, prepare an MBE Compliance Plan and submit it to the Director or his designee for approval. The Plan shall identify by MBE name, subcontract dollar amount and type, each subcontract that the prime contractor projects will be awarded to MBEs over the period of the project.

(d) Approval or Disapproval of MBE Plan

- (i) The Director or his designee will review and approve plans that reasonably ensure compliance with the ten percent (10%) requirement.
- (ii) Where the prime contractor has proved that for reasons beyond the prime contractor's control, compliance with the ten percent (10%) requirement is impossible, the Director or his designee may approve a plan that ensures compliance with an MBE utilization rate of less than ten percent (10%). To prove impossibility of compliance, there shall be a hearing, which interested parties will be notified of and permitted to attend, during which the contractor shall demonstrate the following:
- (1) The prime contractor is making all appropriate efforts, including those listed in paragraph 5 (e) of these regulations, to increase MBE participation in its construction project to the ten percent (10%) level.
- (2) Despite the prime contractor's efforts, the prime contractor's plan represents a reasonable expectation for the participation of MBEs in state contracts given the availability of MBEs to work on the contract.
- (iii) If the Director or his designee does not approve the plan the prime contractor has submitted, the prime contractor, after consulting with the Director or his designee, shall present a revised plan.
- (iv) The Director may condition the approval or establishment of any adjusted requirement on any reasonable future action by the prime contractor.
- (v) Each prime contract covered under these regulations shall include the following: "The contractor agrees to ensure that minority business enterprises as defined in R.I. Gen. Laws Section 37-14.1-3, shall have the maximum opportunity to participate in the performance of subcontracts performed under this agreement. The contractor will take all reasonable steps in accordance with regulations promulgated under Chapter 37-14.1 of the Rhode Island General Laws to ensure that minority business enterprises have the maximum opportunity to compete for and perform subcontracts under this agreement."

e. Compliance

- (i) Each MBE coordinator will periodically conduct on-site inspections to determine compliance with the provisions of these regulations. The Division of Purchasing, the Director or the MBE Coordinator may require a prime contractor to furnish copies of purchase orders, subcontracts, cancelled checks, and other records that may indicate the number, names, dollar value of MBE subcontracts, dates, and schedule time for performance of work by an MBE subcontractor.
- (ii) A prime contractor's failure to have an approved MBE Compliance Plan as required by these regulations constitutes non-compliance with these regulations.
- (iii) If a prime contractor fails to meet the requirements outlined in its approved MBE Compliance Plan, it shall explain to the Director, in writing, why the requirements could not be met and why meeting the requirements was beyond the prime contractor's control.
- (iv) To determine whether a prime contractor has a good faith reason for failing to meet its requirements, the Director may consider, among other factors:
- (1) Whether the prime contractor attended any pre-solicitation or pre-bid meetings that were scheduled by the state contracting authority to inform MBEs of contracting or subcontracting opportunities;
- (2) Whether the prime contractor advertised in general circulation, trade association, and minority focus media concerning the subcontracting opportunities;
- (3) Whether the prime contractor provided written notice to a reasonable number of specific MBEs that their interest in a contract was being solicited, in sufficient time to allow the MBEs to participate effectively;

- (4) Whether the prime contractor followed up initial solicitations of interest by contacting MBEs to determine with certainty whether the MBEs were interested;
- (5) Whether the prime contractor selected portions of work to be performed by MBEs in order to increase the likelihood of meeting MBE participation requirements (including, where appropriate, breaking down contracts into economically feasible units to facilitate MBE participation);
- (6) Whether the prime contractor provided interested MBEs with adequate information about the plans, specifications and requirements of the contract;
- (7) Whether the prime contractor negotiated in good faith with interested MBEs;
- (8) Whether the prime contractor made suggestions to interested MBEs to assist them in obtaining bonding, lines of credit, or insurance required by the prime contractor;
- (9) Whether the prime contractor effectively used the services of available minority community organizations, minority contractors' groups, local, state and Federal minority business assistance offices; and other organizations that provide assistance in the recruitment and placement of MBEs.
- (v) If the prime contractor does not make such an explanation, or if the Director determines that the prime contractor's explanation does not justify its failure to meet the requirements in its approved MBE Plan, the Director may direct the prime contractor to take appropriate remedial action. Failure to take remedial action directed by the Director is noncompliance with these regulations.
- (vi) In the event of non-compliance with these regulations, the Director may take appropriate enforcement action. Such action may include suspension of payments, termination of the contract, recovery by the state of 10% of the contract price as liquidated damages and/or denial of the right to participate in future projects for up to three (3) years.

TITLE 37

CHAPTER 16 PUBLIC WORKS ARBITRATION

Sections	
37-16-1.	Short Title.
37-16-2.	Contract provisions for arbitration.
37-16-3.	Application for subcontracts.
37-16-4.	Stay of legal proceedings pending arbitration.
37-16-5.	Jurisdiction of superior court to enforce arbitration provisions and awards.
37-16-6.	Trial upon evidence of substantial issue.
37-16-7.	Method of appointing arbitrators.
37-16-8.	Scheduling and notice of arbitration hearing – Adjournment.
37-16-9.	Power of court to direct prompt hearing.
37-16-10.	Arbitrator's oath – Waiver.
37-16-11.	Powers of arbitrators.
37-16-12.	Fees.
37-16-13.	Validity of awards.
37-16-14.	Arbitration under chapter deemed special proceeding – Jurisdiction of superior court
37-16-15.	Procedure for hearing of application to court.
37-16-16.	Form of award.
37-16-17.	Court order confirming award.
37-16-18.	Court order vacating award.
37-16-19.	Rehearing after vacation of award.
37-16-20.	Court order modifying or correcting award.
37-16-21.	Notice of motion to vacate, modify, or correct an award.
37-16-22.	Entry of judgment – Costs
37-16-23.	Filing of papers after judgment.
37-16-24.	Effect of judgment.
37-16-25.	Appeals.
37-16-26.	Satisfaction of award.
37 16 27	Application of suration

37-16-1. Short title.

This chapter shall be known as the "Public Works Arbitration Act".

37-16-2. Contract provision for arbitration.

- (a) A provision in a written contract executed on or after January 1, 1962, for the construction, alteration, repair, or painting of any public building, sewer, highway, bridge, water treatment or disposal projects one party to which is the state, a city, a town, or an authority, a board, a public corporation, or any similar body created by statute or ordinance or any committee, agency, or subdivision of any of them, to settle by arbitration any dispute or claim arising out of or concerning the performance or interpretation of the contract shall be valid, irrevocable, and enforceable, save upon grounds existing in law or equity for the revocation of the contract.
- (b) (1) Every contract for the construction, alteration, repair, painting, or demolition of any public building, sewer, water treatment or disposal project, highway, or bridge one party to which is the state, a city, a town, or an authority, a board, a public corporation, or any similar body created by statute or ordinance or any committee, agency, or subdivision of any of them which has a contract price of ten thousand dollars (\$ 10,000) or more and which is executed on or after July 1, 1967, shall contain a provision for arbitration of disputes and claims arising out of or concerning the performance or interpretation of the contract as follows:
- (2) "All claims, disputes, and other matters in question arising out of or relating to this contract or the performance or interpretation thereof shall be submitted to arbitration. Arbitration shall be commenced by a demand in writing made by one party to the contract upon the other within a reasonable time after the dispute, claim, or other matter in question arose but in no event after payment in full of the contract price has been made and accepted. The written demand shall contain a statement of the question to be arbitrated and a detailed statement of each item or matter in

dispute and the name of the arbitrator appointed by that party. The other party to the contract within ten (10) days of the receipt of the written demand shall appoint an arbitrator and give notice in writing thereof to the party who commenced arbitration. The two (2) arbitrators appointed by the parties shall within ten (10) days of the date of the appointment of the second arbitrator select a third arbitrator who shall be designated as chairperson and who immediately shall give written notice to the parties of his or her appointment. The third arbitrator shall select a time, date, and place for hearing and give each party five (5) days notice in writing thereof. The date for hearing shall not be more than fifteen (15) days after the date of appointment of the third arbitrator. The award shall be made promptly by the arbitrators and, unless otherwise agreed by the parties or specified by law, no later than thirty (30) days from the date of closing the hearing, or, if oral hearings have been waived, from the date of the transmittal of the final statements and proofs to the arbitrators. The award shall be in writing and shall be signed by a majority of the arbitrators. It shall be executed in the manner required by law. The arbitrator shall provide a written explanation of the reasoning for the award. In the event the party of whom arbitration is demanded shall fail to appoint his or her arbitrator within the time specified or the two (2) arbitrators appointed by the parties are unable to agree on an appointment of the third arbitrator within the time specified, either party may petition the presiding justice of the superior court to appoint a single arbitrator who shall hear the parties and make an award as provided herein. The petitioner shall give five (5) days notice in writing to the other party before filing his or her petition."

- (c) Any dispute involving claims less than one hundred thousand dollars (\$ 100,000) and associated with construction of a highway or bridge as referred to in subsection (b) shall be submitted to arbitration. Any dispute involving claims of one hundred thousand dollars (\$ 100,000) or more and associated with construction of a highway or bridge as referred to in subsection (b) shall only be arbitrated with the consent of the parties. If the parties fail to consent to arbitration and the state of Rhode Island is a party to the dispute, then the claim will proceed in accordance with § 37-13.1-1.
- (d) For the purposes of this section, the term "claims" shall not mean the aggregate amount sought under the contract or in the arbitration, but shall refer specifically to each item or matter in dispute for which additional compensation is sought or for each item for which a credit is sought.
- (e) Notwithstanding subsection (a) or (b) of this section, if any contract except for highway and bridge contracts provides for an arbitration procedure, and a method of appointment of an arbitrator or arbitrators, that method shall be followed instead of the method provided in subsection (b) of this section.
- (f) This section shall apply to all written contracts executed on or after January 1, 1986.

37-16-3. Application to subcontracts.

When a contract described in 37-16-2 is in effect and any party thereto has entered into a subcontract to perform part of the work and/or furnish any materials in connection with the work described in the contract and the terms of the subcontract provide for arbitration of a dispute or claim concerning the performance or interpretation thereof, or the subcontract, expressly or by reference to the terms of the contract, provides that the parties to the subcontract shall comply with the arbitration provisions of the contract, the following shall apply when a request is made or an order of court is entered for arbitration either under the terms of the contract or subcontract.

- (a) When arbitration under the contract may adversely affect the interest of a party thereto because of the effect of an award of the arbitrator or arbitrators upon the performance or interpretation of the terms of a subcontract to which he or she is also a party, he or she may require any other party or all other parties to the subcontract to become a party or parties to the arbitration.
- (b) When a party to a subcontract makes a demand or an order of court is entered for arbitration under the terms of the subcontract which comply with the provision of this chapter, any party thereto who is also a party to the contract and whose rights under the contract may be adversely affected by the effect of an award of the arbitrator or arbitrators upon the performance or interpretation of the contract, may require any other party to the contract to become a party to the arbitration.
- (c) When a party to a contract or to a subcontract is made a party to arbitration by virtue of the provisions of this section, he or she shall have all the rights of a party to arbitration as provided in this chapter except the appointment of an arbitrator. Provided, however, he or she may object to the arbitrators appointed by the parties in which event a single arbitrator shall be appointed as provided in 37-16-2 in the petition of either of the original parties to arbitration. The award of the arbitrator or arbitrators shall be valid and shall be binding on him or her to

the extent that it affects the performance or interpretation of the contract and/or subcontract to which he or she is a party. The award of the arbitrator or arbitrators may be enforced, modified, or vacated as this chapter provides an award made in an arbitration of a contract described in 37-16-2 may be enforced, modified, or vacated.

37-16-4. Stay of legal proceedings pending arbitration.

If any suit or proceedings be brought upon any issue referable to arbitration under contract in writing providing for arbitration, the court in which the suit is pending upon being satisfied that the issue involved in the suit or proceedings is referable to arbitration under the contract, shall on application of one of the parties, stay the trial of the action until arbitration has been held.

37-16-5. Jurisdiction of superior court to enforce arbitration provision and awards.

The entering into a contract in writing providing for arbitration shall be deemed a consent of all parties, including those enumerated in 37-16-2, thereto to the jurisdiction of the superior court of this state to enforce the arbitration provision and any award made pursuant to that provision. A party aggrieved by the failure, neglect, or refusal of another to perform under a contract providing for arbitration, may petition the superior court, or a judge thereof, for an order directing that arbitration proceed in the manner provided for in the contract. Five (5) days' notice in writing of the application shall be served upon the part in default. Service thereof shall be made in the manner specified in the contract, and if no manner specified therein, then in the manner provided by law for personal service of a summons, within or without the state, or substituted service of a summons, or upon satisfactory proof that the party aggrieved has been or will be unable with due diligence to make service in any of the foregoing manners, then notice shall be served in such manner as the court or judge may direct. A judge of the superior court shall hear the parties and upon being satisfied that there is no substantial issue as to the making of the contract or the failure to comply therewith, the court, or the judge thereof, hearing the application, shall make an order directing the parties to proceed to arbitration in accordance with the terms of the contract.

37-16-6. Trial upon evidence of substantial issue.

If evidentiary facts are set forth raising a substantial issue as to the making of the contract or the failure to comply therewith, the court, or the judge thereof, shall proceed immediately to the trial of the issues. Whenever an immediate trial is ordered, the order therefor shall provide that, if the court finds that a written contract providing for arbitration was made, and that there was a failure to comply therewith, the parties shall proceed with the arbitration in accordance with the terms of the contract and the order shall provide that if the court finds that there was no contract or failure to comply with the contract, then the proceeding shall be dismissed.

37-16-7. Method of appointing arbitrators or umpire.

If in the contract providing for arbitration, provision is made for a method of naming or appointing an arbitrator or arbitrators or an umpire, that method shall be followed, but if no method be provided therein, then the parties to the contract shall agree to the method of naming or appointing an arbitrator or arbitrators or an umpire and if the parties shall fail to agree, then the court or the judge thereof upon application of either of the parties after due notice to the other party shall appoint an arbitrator to hear the dispute.

37-16-8. Scheduling and notice of arbitration hearing - Adjournment.

Subject to the terms of the contract, if any are specified therein, the arbitrators selected as prescribed in this chapter must appoint a time and place for the hearing of the matters submitted to them, and must cause notice thereof to be given to each of the parties. They, or a majority of them, may adjourn the hearing from time to time upon the application of either party for good cause shown or upon their own motion, but not beyond the day fixed if a date in the contract, if any, for rendering their award, unless the time so fixed is extended by the written consent of the parties to the contract or their attorney, or the parties have continued with the arbitration without objection to such adjournment.

37-16-9. Power of court to direct prompt hearing.

The court shall have power to direct the arbitrators to proceed promptly with the hearing and determination of the dispute, claim, or matter in question.

37-16-10. Arbitrator's oath - Waiver.

Before hearing any testimony, arbitrators selected as prescribed in this chapter must be sworn, by an officer authorized by law to administer an oath, faithfully and fairly to hear and examine the claim, dispute, or matter in question and to make a just award according to the best of their understanding, unless the oath is waived by the written consent of the parties to the contract or their attorneys or the parties have continued with the arbitration without objection to the failure of the arbitrators to take the oath.

37-16-11. Powers of arbitrators.

The arbitrator or arbitrators selected as prescribed in this chapter, may require any person to attend before them as a witness; and he or she and they have, and each of them has, the same powers with respect to all the proceedings before them which are conferred upon a board or a member of a board authorized by law to hear testimony. All the arbitrators selected as prescribed in this chapter must meet together and hear all the allegations and proofs of the parties; but an award by a majority of them is valid.

37-16-12. Fees.

In any proceeding under this chapter, unless the parties agree as to the arbitrator's or arbitrators' fees, such fees shall be fixed by the court or the judges thereof who shall require the payment equally by both parties of the arbitrators' fees.

37-16-13. Validity of awards.

An award shall be valid and enforceable according to its terms and under the provisions of this chapter, without previous adjudication of the existence of a contract to arbitrate, subject, nevertheless, to the provisions of this section:

- (a) A party who has participated in any of the proceedings before the arbitrator or arbitrators may object to the confirmation of the award only on one or more of the grounds hereinafter specified (provided that he did not continue with the arbitration with notice of the facts or defects upon which his objection is based) because of a failure to comply with 37-16-8 or with 37-16-10 or because of the improper manner of the selection of the arbitrators.
- (b) A party who has not participated in any of the proceedings had before the arbitrator or arbitrators and who has not made or been served with an application to compel arbitration under 37-16-5 may also put in issue the making of the contract or the failure to comply therewith, either by a motion for a stay of the arbitration or in opposition to the confirmation of the award. If a notice shall have been personally served upon such party of an intention to conduct the arbitration pursuant to the provisions of a contract specified in the notice, then the issues specified in this subdivision may be raised only by a motion for a stay of the arbitration, notice of which motion must be served within ten (10) days after the service of the notice of intention to arbitrate. The notice must state in substance that unless within ten (10) days after its service, the party served therewith shall serve a notice of motion to stay the arbitration, he or she shall thereafter be barred from putting in issue the making of the contract or the failure to comply therewith. The arbitration hearing shall be adjourned upon service of the notice pending the determination of the motion. Where the opposing party, either on a motion for a stay or in opposition to the confirmation of an award, sets forth evidentiary facts raising a substantial issue as to the making of the contract or the failure to comply therewith, an immediate trial of the same shall be had. In the event that the party is unsuccessful he or she may, nevertheless, participate in the arbitration if the same is still being carried on.

37-16-14. Arbitration under chapter deemed special proceeding - Jurisdiction of superior court.

Arbitration of a claim, dispute, or matter in question under a contract described in this chapter shall be deemed a special proceeding, of which the superior court for Providence County shall have jurisdiction.

37-16-15. Procedure for hearing of application to court.

Any application to the court, or a judge thereof, hereunder shall be made and heard in the manner provided by law for the making and hearing of motions, except as otherwise herein expressly provided.

37-16-16. Form of award.

To entitle the award to be enforced, as prescribed in this chapter, it must be in writing; and, within the time limited in the contract, if any, subscribed by the arbitrator or arbitrators making it and either filed in the office of the clerk of the court having jurisdiction as provided in 37-16-14 or delivered to one of the parties or his or her attorney.

37-16-17. Court order confirming award.

At any time within one year after the award is made, as prescribed in 37-16-16, any party to the contract by the terms of which arbitration was had, may apply to the court having jurisdiction as provided in 37-16-14 for an order confirming the award. Thereupon the court must grant the order unless the award is vacated, modified, or corrected, as prescribed in 37-16-18 and 37-16-19 or unless the award is unenforceable under the provisions of 37-16-13. Notice of the motion must be served upon the adverse party or parties or his or her or their attorneys, as prescribed by law for service of notice of a motion upon an attorney in an action in the same court.

37-16-18. Court order vacating award.

In any of the following cases, the court must make an order vacating the award, upon the application of any party to the controversy which was arbitrated

- (a) When the award was procured by fraud.
- (b) Where the arbitrator or arbitrators exceeded their powers, or so imperfectly executed them, that a mutual, final, and definite award upon the subject matter submitted was not made.
- (c) If there was no valid contract, and the objection has been raised under the conditions set forth in 37-16-13.

37-16-19. Rehearing after vacation of award.

Where an award is vacated, the court, in its discretion may direct a rehearing either before the same arbitrator or arbitrators or before a new arbitrator or arbitrators to be chosen in the manner provided in the contract for the selection of the original arbitrator or arbitrators or as provided for in 37-16-7 and any provision limiting the time in which the arbitrator or arbitrators may make a decision shall be deemed applicable to the new arbitration and to commence from the date of the court's order.

37-16-20. Court order modifying or correcting award.

In any of the following cases, the court must make an order modifying or correcting the award, upon the application of any party to the contract by the terms of which the arbitration was held.

- (a) Where there was an evident miscalculation of figures or an evident mistake in the description of any persons, thing, or property referred to in the award.
- (b) Where the arbitrator or arbitrators have awarded upon a matter not submitted to them, not affecting the merits of the decision upon the matter submitted.
- (c) Where the award is imperfect in a matter of form not affecting the merits of the controversy, and, if it had been a master's report the defect could have been amended or disregarded by the court.

37-16-21. Notice of motion to vacate, modify, or correct an award.

Notice of a motion to vacate, modify, or correct an award must be served upon all adverse parties, or their attorneys, within sixty (60) days after the award is filed or delivered, as prescribed by law for service of notice of a motion upon an attorney in an action; except that in opposition to a motion to confirm an award, any of the grounds specified in 37-16-18 may be set up. For the purpose of the motion, any judge who might make an order, to stay the proceedings in an action brought in the same court may make an order, to be served with the notice of motion, staying the proceedings of an adverse party or parties to enforce the award.

37-16-22. Entry of judgment - Costs.

Upon the granting of an order confirming, modifying, or correcting an award, judgment may be entered in conformity therewith, except as is otherwise prescribed in this chapter. Costs of the application and of the proceedings subsequent thereto, not exceeding twenty-five dollars (\$25.00) and disbursements, may be awarded by the court in its discretion. If awarded, the amount thereof must be included in the judgment.

37-16-23. Filing of papers after judgment.

- (a) Immediately after entering judgment, the clerk must attach together and file the following papers:
 - (1) The contract, and each written extension of the time, if any, within which to make the award.
 - (2) The award.
 - (3) Each notice, affidavit or other paper used upon an application to confirm, modify, or correct the award, and a copy of each order of the court upon the application.
 - (4) A copy of the judgment.
- (b) The judgment may be docketed as if it was rendered in an action.

37-16-24. Effect of judgment.

The judgment so entered has the same force and effect, in all respects as, and is subject to all the provisions of law relating to a judgment in an action. The judgment may be enforced as if it had been rendered in an action in the court in which it is entered.

37-16-25. Appeals.

An appeal may be taken from an order made in a proceeding under this chapter, or from a judgment entered upon an award. The proceedings upon the appeal, including the judgment thereupon and the enforcement of the judgment, are governed by the provisions of statute and rule regulating appeal in actions as far as they are applicable.

37-16-26. Satisfaction of award.

- (a) An award which requires the payment of a sum of money by a city, town, or the state or any body described in 37-16-2 created or organized by or through the authority of any of them, shall be satisfied to the extent of payment of that sum by payment thereof to the party to whom the award was made by the treasurer or officer exercising the duties of a treasurer thereof from its general funds.
- (b) An award which requires the payment of a sum of money to a city, a town, or the state or any body described in 37-16-2 created or organized by or through the authority of any of them shall be satisfied to the extent of payment of that sum by payment thereof to its treasurer or officer exercising the duties of a treasurer thereof who shall deposit the same in its general funds.

37-16-27. Application to sureties.

- (a) If a contractor principal on a bond furnished to guarantee performance or payment on a construction contract and the claimant are parties to a written contract with a provision to submit to arbitration any controversy thereafter arising under the contract, or subject to arbitration as provided in 37-16-2(b), the arbitration provisions shall apply to the surety for all disputes involving questions of the claimant's right of recovery against the surety. Either the claimant, the contractor principal, or surety may demand arbitration in accordance with the written contract or as provided in 37-16-2(b) if applicable in one arbitration proceeding, provided that the provisions of 37-16-3 shall be applicable to any such demand for arbitration. The arbitration award shall decide all controversies subject to arbitration between the claimant, on the one hand, and the contractor principal and surety on the other hand, including all questions involving liability of the contractor principal and surety on the bond, but a claimant must file suit for recovery against the surety within the time limits set forth in 37-12-2 and 37-12-5. The arbitration shall be in accordance with this chapter and the court shall enter judgment thereon as provided therein.
- (b) The arbitrator or arbitrators, if more than one, shall make findings of fact as to the compliance with the requirements for recovery against the surety, and those findings of fact shall be a part of the award binding on all parties to the arbitration.

TITLE 45

CHAPTER 55 AWARD OF MUNICIPAL CONTRACTS

SECTIONS

45-55-1	Legislative findings
45-55-2.	Method of source selection
45-55-3.	Purchasing agent - Appointment - Duties.
45-55-4.	Definitions.
45-55-5.	Competitive sealed bidding.
45-55-5.1.	Business exempt.
45-55-5.2.	Town of North Smithfield - Exemption.
45-55-6.	Competitive negotiation.
45-55-7.	Negotiations after unsuccessful competitive sealed bidding
45-55-8.	Sole source procurement and emergency procurements.
45-55-8.1	Qualification based selection of architects and engineers.
45-55-9.	Small purchases.
45-55-10.	Cancellation of invitation for bids and requests for proposals.
45-55-11.	Responsibilities of bidders and offerors
45-55-12.	Prequalification of contractors - General.
45-55-13.	Exclusion of state mandated costs.
45-55-13.1.	Exclusion of multi-cities or towns insurance corporations and cooperative risk management programs.
45-55-13.2.	Exclusion of multi-cities or towns energy aggregation programs.
45-55-13.3.	Exclusion of multi-school district combined purchasing consortia
45-55-14.	Staff consultants.
45-55-15.	Severability.
45-55-16	Prohibition against the use of lead based paints.

45-55-1. Legislative findings.

It is hereby declared that a need exists to establish a uniform system for the award of contracts by municipalities, utilizing open cooperative bids.

45-55-2. Method of source selection.

Except as otherwise authorized by law, all municipal contracts shall be awarded by:

- (1) Competitive sealed bidding, pursuant to 45-55-5;
- (2) Competitive negotiations, pursuant to 45-55-6;
- (3) Non-competitive negotiations, pursuant to 45-55-7 and 45-55-8;
- (4) Small purchase procedures, pursuant to 45-55-9.
- (5) Qualification based selection (QBS) process for architecs/engineers pursuant to 45-55-8.1

45-55-3. Purchasing agent - Appointment - Duties.

Within each city or town or quasi public agency there shall be designated a person or persons to act as purchasing officer to exercise the powers and duties as set forth in this chapter.

45-55-4. Definitions.

The words defined in this section have the following meanings whenever they appear in this chapter, unless the context in which they are used clearly requires a different meaning or a different definition is prescribed for a particular section, group of sections or provision.

- (1) "Business" means any corporation, partnership, individual, sole proprietorship, joint stock company, joint venture, or any other legal entity through which business is conducted.
- (2) "Change order" means a written order signed by the purchasing agent, or contractor directing or allowing the contractor to make changes which the changes clause of the contract authorizes the purchasing agent or contractor to order without the consent of the contractor or purchasing agent.
- (3) "Construction" means the process of building, altering, repairing, improving, or demolishing any public structures or building, or other public improvements of any kind to any public real property. It does not include the routine maintenance or repair of existing structures, buildings, or real property performed by salaried employees of the municipality in the usual course of their job.
- (4) "Contract" means all types of agreements, including grants and orders, for the purchase or disposal of supplies, services, construction, or any other item. It includes awards; contracts of a fixed-price, cost, cost-plus-a-fixed-fee, or incentive type; contracts providing for the issuance of job or task orders; leases; letter contracts, purchase orders, and construction management contracts. It also includes supplemental agreements with respect to any of the preceding. "Contract" does not include labor contracts with employees of the municipality.
- (5) "Contract modification" means any written alteration in the specifications, delivery point, rate of delivery, contract period, price, quantity, or other contract provisions of any existing contract, whether accomplished by unilateral action in accordance with a contract provision, or by mutual action of the parties to the contract. It includes bilateral actions, as supplemental agreements, and unilateral actions, as change orders, administrative changes, notices of termination, and notices of the exercise of a contract option.
 - (6) "Contractor" means any person having a contract with a municipality.
 - (8) "Data" means recorded information, regardless of form or characteristic.
 - (8) "Designee" means a duly authorized representative of a person holding a superior position.
- (9) "Employee" means an individual drawing a salary from a municipality, whether elected or not, and any nonsalaried individual performing personal services for any municipality.
 - (10) "May" means permissive.
 - (11) "Municipality" means the individual cities and towns of the state of Rhode Island.
 - (12) "Negotiation" means contracting by either of the methods described in §§ 45-55-6, 45-55-7, and 45-55-8.
 - (13) "Person" means any business, individual, organization, or group of individuals.
- (14) "Procurement" means the purchasing, buying, renting, leasing, or otherwise obtaining of any supplies, services, or construction. It also includes all functions that pertain to the obtaining of any supply, service, or construction item, including description of requirements, selection and solicitation of sources, preparation and award of contract, and all phases of contract administration.
- (15) "Purchasing officer" means the person designated in each municipality or quasi public agency pursuant to section 45-55-3.
- (16) "Regulations" means rules and regulations adopted by the individual cities or towns, concerning the implementation of the provisions of this chapter.

- (17) "Services" means the rendering, by a contractor, of its time and effort rather than the furnishing of a specific end product, other than reports which are merely incidental to the required performance of services. "Services" does not include labor contracts with employees of governmental agencies.
- (18) "Shall" means imperative.
- (19) "Supplemental agreement" means any contract modification which is accomplished by the mutual action of the parties.
- (20) "Supplies" means all property, including, but not limited, to leases of real property, printing and insurance, except land or permanent interest in land.

45-55-5. Competitive sealed bidding.

- (a) Contracts exceeding the amount provided by 45-55-9 shall be awarded by competitive bidding unless they are professional engineering/architectural services pursuant to 45-55-8.1 and it is determined in writing that this method is not practicable. Factors to be considered in determining whether competitive sealed bidding is practicable shall include whether:
- (1) Specifications can be prepared that permit award on the basis of either the lowest qualified bid price or the lowest qualified evaluated bid price; and
- (2) The available sources, the time and place of performance, and other relevant circumstances as are appropriate for the use of competitive sealed bidding.
- (b) The invitation for bids shall state whether award shall be made on the basis of the lowest bid price or the lowest evaluated or responsive bid price. If the latter basis is used, the objective measurable criteria to be utilized shall be shall be stated in the invitation for bids, if available.
- (c) Adequate public notice of the invitation for bids shall be given a sufficient time prior to the date stated in the notice for the opening of bids. Notice may include publication in a newspaper of general circulation in the state as determined by the purchasing officer for the municipality not less than seven (7) days nor more than twenty-one (21) days before the date set for opening of the bids. The purchasing officer may make a written determination that the twenty-one (21) day limitation needs to be waived. The written determination shall state the reason why the twenty-one (21) day limitation is being waived and shall state the number of days, giving a minimum and maximum, before the date set for the opening of bids when public notice is to be given.
- (4) Bids shall be opened publicly in full view of the public at the time and place designated in the invitation for bids. Each bid, together with the name of the bidder, shall be recorded and an abstract made available for public inspection. Subsequent to the awarding of the bid, all documents pertinent to the awarding of the bid shall be made available and open to public inspection and retained in the bid file.
- (5) The contract shall be awarded with reasonable promptness by written notice to the responsive and responsible bidder whose bid is either the lowest bid price, or lowest evaluated or responsive bid price.
- (6) Correction or withdrawal of bids may be allowed only to the extent permitted by regulations issued by the purchasing officer.

45-55-5.1. Business exempt.

The North Kingstown Bus Contractors Association and the Scituate School Bus Owners Club shall be exempt from the provisions of this chapter.

45-55-5.2. Town of North Smithfield - Exemption.

The town of North Smithfield is exempt from the provisions of this chapter with regard to the contracting for fire and rescue services with the Primrose Volunteer Fire Department and/or North Smithfield Fire Department and/or their respective successors and assigns.

45-55-6. Competitive negotiation.

- (a) When, under regulations adopted by the city or town council, the purchasing agent determines in writing that the use of competitive sealed bidding is not practicable, and except as provided in 45-55-8, 45-55-9, and 45-55-10 a contract may be awarded by competitive negotiation.
- (b) Adequate public notice of the request for proposals shall be given in the same manner as provided in 45-55-5(c).
- (c) Contracts may be competitively negotiated when it is determined, in writing, by the purchasing agent that the bid prices received by competitive sealed bidding either are unreasonable as to all or part of the requirements, or were not independently reached in open competition, and for which:
 - (1) Each competitive bidder has been notified of the intention to negotiate and is given reasonable opportunity to negotiate; and
 - (2) The negotiated price is lower than the lowest rejected bid by any competitive bidder; and
 - (3) The negotiated price is the lowest negotiated price offered by a competitive offeror.
- (d) The request for proposals shall indicate the relative importance of price and other evaluation factors.
- (e) Award shall be made to the responsible offeror whose proposal is determined in writing to be the most advantageous to the municipality taking into consideration price and the evaluation factors set forth in the request for proposals.
- (f) Written or oral discussions shall be conducted with all responsible offerors who submit proposals determined, in writing, to be reasonably susceptible of being selected for award. Discussions shall not disclose any information derived from proposals submitted by competing offerors. Discussions need not be conducted:
 - (1) With respect to prices, where such prices are fixed by law or regulation, except that consideration shall be given to competitive terms and conditions; or
 - (2) Where time of delivery or performance will not permit discussions; or
 - (3) Where it can be clearly demonstrated and documented from the existence of adequate competition or accurate prior cost experience with the particular supply, service, or construction item, that acceptance of an initial offer without discussion would result in fair and reasonable prices, and the request for proposals notifies all offerors of the possibility that award may be made on the basis of the initial offers.

45-55-7. Negotiations after unsuccessful competitive sealed bidding.

- (a) In the event that all bids submitted pursuant to competitive sealed bidding under 45-55-5 result in bid prices in excess of the funds available for the purchase, and the purchasing officer determines in writing:
 - (1) That there are no additional funds available from any source so as to permit an award to the lowest responsive and responsible bidder, and
 - (2) The best interest of the municipality will not permit the delay attendant to a resolicitation under revised specifications, or for revised quantities, under competitive sealed bidding as provided in 45-55-5, then a negotiated award may be made be made as stated in subsection (b) or (c) of this section.
- (b) Where there is more than one bidder, competitive negotiations pursuant to 45-55-6, shall be conducted with the three (3) (two (2) if there are only two (2)) bidders determined in writing, to be the lowest responsive and responsible bidders to the competitive sealed bid invitation. Competitive negotiations shall be conducted under the following restrictions:
 - (1) If discussions pertaining to the revision of the specifications or quantities are held with any potential offeror, all other potential offerors shall be afforded an opportunity to take part in the discussions; or

- (2) A request for proposals, based upon revised specifications or quantities, shall be issued as promptly as possible, shall provide for an expeditious response to the revised requirements, and shall be awarded upon the basis of the lowest bid price, or lowest evaluated bid price submitted by any responsive and responsible offeror.
- (c) When after competitive sealed bidding, it is determined in writing, that there is only one responsive and responsible bidder, a noncompetitive negotiated award may be made with such bidder in accordance with 45-55-8

45-55-8. Sole source procurement and emergency procurements.

- (a) A contract may be awarded for a supply, service, or construction item without competition when, under published regulations, the purchasing officer determines, in writing, that there is only one source for the required supply, service, or construction item.
- (b) Notwithstanding any other provision of this chapter, the purchasing agent may make or authorize others to make emergency procurements when there exists a threat to public health, welfare, or safety under emergency conditions as defined in regulations or where the procurement will be in the best interest of the city as established by properly promulgated rules and regulations; provided, that such emergency procurements shall be made with such competition as is practicable under the circumstances. A written determination of the basis for the emergency, and for the selection of the particular contractor, shall be included in the contract file.

45-55-8.1. Qualification based selection of architects and engineers.

When the purchasing agent determines that the city or town needs the services of a professional architect or engineer, the purchasing agent shall follow the qualification based selection process for the procurement of architectural and engineering consulting services.

45-55-9. Small purchases.

Procurements, not to exceed an aggregate amount of ten thousand dollars (\$10,000) for construction and five thousand dollars (\$5,000) for all other purchases may be made in accordance with small purchase regulations promulgated by the municipality. These amounts shall be increased or decreased annually hereafter at the same rate as the Boston Regional Consumer Price Index. Procurement requirements shall not be artificially divided so as to constitute a small purchase under this section. A municipality may further reduce the aggregate purchase amount, as provided for in this section by ordinance.

45-55-10. Cancellation of invitation for bids and requests for proposals.

An invitation for bids, a request for proposals, or other solicitation may be canceled, or all bids or proposals rejected, if it is determined, in writing, that such action if taken is not in the best interest of the municipality and approved by the chief purchasing officer.

45-55-11. Responsibilities of bidders and offerors.

(1) A written determination of responsibility of a bidder or offeror shall be made and it shall be made in accordance with regulations issued by the municipality.

A reasonable inquiry to determine the responsibility of a bidder or offeror may be conducted. The failure of a bidder or offeror to promptly supply information in connection with a reasonable inquiry may be grounds for a determination of nonresponsibility with respect to a bidder or offeror.

(2) Except as otherwise provided, by law, information furnished by a bidder or offeror pursuant to this section may not be disclosed outside of the purchasing department administering the contract without prior written consent of the bidder or offeror.

45-55-12. Prequalification of contractors - General.

The municipality may provide for prequalification of suppliers as responsible prospective contractors for particular types of supplies, services, and construction. Municipalities which choose to provide for prequalification of suppliers shall adopt regulations for prequalification in the same manner provided for in the adoption of ordinances in the manner provided for in the legislative or home rule charter of the municipality. Solicitation

mailing lists of potential contractors of supplies, services, and construction shall include but need not be limited to prequalified contractors. Prequalification shall not foreclose a written determination:

- (1) Between the time of the bid opening or receipt of offers and the making of an award, that a prequalified supplier is not responsible; or
- (2) That a supplier who is not prequalified at the time of bid opening or receipt of offers is responsible.

45-55-13. Exclusion of state mandated costs.

The provisions of 45-13-7 through 45-13-10 do not apply to this section.

45-55-13.1. Exclusion of multi-cities or towns insurance corporations and cooperative risk management programs.

The provisions of this chapter shall not apply to entities organized pursuant to section 45-5-20.1. Those entities are exempt from all of the provisions of this chapter.

45-55-13.2. Exclusion of multi-cities or towns energy aggregation programs.

The provisions of this chapter do not apply to entities organized for the purpose of negotiating the purchase of electric power pursuant to § 39-3-1.1, or energy or energy related services. Those entities are exempt from all provisions of this chapter.

45-55-13.3. Exclusion of multi-school district combined purchasing consortia

The provisions of this chapter do not apply to purchases and contracts entered into by those consortia established pursuant to § 16-2-9.2, and such entities shall be exempt from all provisions of this chapter.

45-55-14. Staff consultants.

The procurement of the service of an attorney, physician or dentist by a municipality, is exempt from the provisions of this chapter.

45-55-15. Severability.

If any one or more sections, clauses, sentences or parts of this chapter are for any reason be adjudged unconstitutional or otherwise invalid in any court, that judgment shall not affect, impair or invalidate the remaining provisions of this chapter but shall be confined in its operation to the specific provisions so held unconstitutional or invalid and the inapplicability or invalidity of any section, clause or provisions of this chapter in any one or more instances or circumstances shall not be taken to affect or prejudice in any way its applicability or validity in any other instance.

45-55-16. Prohibition against the use of lead based paints.

When purchasing paint products or contracting or subcontracting for painting, construction, improvement, completion, or repair of any public buildings, public road, public bridge, or public construction, all municipalities, as defined by 45-55-4(11), shall be prohibited from the use of lead based paint.

STATE CONTRACT ADDENDUM

RHODE ISLAND DEPARTMENT OF LABOR AND TRAINING

PREVAILING WAGE REQUIREMENTS (37-13-1 ET SEQ.)

The prevailing wage requirements are generally set forth in RIGL 37-13-1 et seq. These requirements refer to the prevailing rate of pay for regular, holiday, and overtime wages to be paid to each craftsmen, mechanic, teamster, laborer, or other type of worker performing work on public works projects when state or municipal funds exceed one thousand dollars (\$1,000).

All Prevailing Wage Contractors and Subcontractors are required to:

- 1. Submit to the Awarding Authority a list of the contractor's subcontractors for any part or all of the prevailing wage work in accordance with RIGL § 37-13-4;
- 2. Pay all prevailing wage employees at least once per week and in accordance with RIGL §37-13-7 (see Appendix B attached);
- 3. Post the prevailing wage rate scale and the Department of Labor and Training's prevailing wage poster in a prominent and easily accessible place on the work site in accordance with RIGL §37-13-11; posters may be downloaded at www.dlt.ri.gov/pw/Posters.htm .poster/htm or obtained from the Department of Labor and Training, Center General Complex, 1511 Pontiac Avenue, Cranston, Rhode Island;
- 4. Access the Department of Labor and Training website, at www.dlt.ri.gov on or before July 1st of each year, until such time as the contract is completed, to ascertain the current prevailing wage rates and the amount of payment or contributions for each covered prevailing wage employee and make any necessary adjustments to the covered employee's prevailing wage rates effective July 1st of each year in compliance with RIGL §37-13-8;
- 5. Attach a copy of this CONTRACT ADDENDUM and its attachments as a binding obligation to any and all contracts between the contractor and any subcontractors and their assignees for prevailing wage work performed pursuant to this contract;
- 6. Provide for the payment of overtime for prevailing wage employees who work in excess of eight (8) hours in any one day or forty (40) hours in any one week as provided by RIGL §37-13-10;

- 7. Maintain accurate prevailing wage employee payroll records on a Rhode Island Certified Weekly Payroll form available for download at www.dlt.ri.gov/pw.forms/htm, as required by RIGL §37-13-13, and make those records available to the Department of Labor and Training upon request;
- 8. Furnish the fully executed RI Certified Weekly Payroll Form to the awarding authority on a monthly basis for all work completed in the preceding month.
- 9. For general or primary contracts one million dollars (\$1,000,000) or more, shall maintain on the work site a fully executed RI Certified Prevailing Wage Daily Log listing the contractor's employees employed each day on the public works site; the RI Certified Prevailing Wage Daily Log shall be available for inspection on the public works site at all times; this rule shall not apply to road, highway, or bridge public works projects. Where applicable, furnish both the Rhode Island Certified Prevailing Wage Daily Log together with the Rhode Island Weekly Certified Payroll to the awarding authority.
- 10. Assure that all covered prevailing wage employees on construction projects with a total project cost of one hundred thousand dollars (\$100,000) or more has a OSHA ten (10) hour construction safety certification in compliance with RIGL § 37-23-1;
- 11. Employ apprentices for the performance of the awarded contract when the contract is valued at one million dollars (\$1,000,000) or more, and comply with the apprentice to journeyperson ratio for each trade approved by the apprenticeship council of the Department of Labor and Training in compliance with RIGL §37-13-3.1;
- 12. Assure that all prevailing wage employees who perform work which requires a Rhode Island trade license possess the appropriate Rhode Island trade license in compliance with Rhode Island law; and
- 13. Comply with all applicable provisions of RIGL §37-13-1, et. seq;

Any questions or concerns regarding this CONTRACT ADDENDUM should be addressed to the contractor or subcontractor's attorney. Additional Prevailing Wage information may be obtained from the Department of Labor and Training at www.dlt.ri.gov/pw.

CERTIFICATION

I hereby certify that I have reviewed this CONTRACT ADDENUM and understand my obligations as stated above.

By:		
Subscribed and sworn before me this	s day of, 20	
	Notary Public	
	My commission expires:	

DAVIS-BACON PREVAILING WAGE REQUIREMENTS

(a) GENERAL CONTRACT AND SUBCONTRACT PROVISIONS

For any contract in excess of \$2,000 which is entered into for the actual construction, alteration and/or repair, including painting and decorating, of a treatment work under the CWSRF or a construction project under the DWSRF financed in whole or in part from Federal funds or in accordance with guarantees of a Federal agency or financed from funds obtained by pledge of any contract of a Federal agency to make a loan, grant or annual contribution (except where a different meaning is expressly indicated), and which is subject to the labor standards provisions of any of the acts listed in §5.1 or the FY 2010 appropriation, the following clauses shall be inserted in full:

(1) Minimum Wages

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

Contributions made or costs reasonably anticipated for bona fide fringe benefits under section 1(b)(2) of the Davis-Bacon Act on behalf of laborers or mechanics are considered wages paid to such laborers or mechanics, subject to the provisions of paragraph (a)(1)(iv) of this section; also, regular contributions made or costs incurred for more than a weekly period (but not less often than quarterly) under plans, funds, or programs which cover the particular weekly period, are deemed to be constructively made or incurred during such weekly period. Such laborers and mechanics shall be paid the appropriate wage rate and fringe benefits on the wage determination for the classification of work actually performed, without regard to skill, except as provided in §5.5(a)(4). Laborers or mechanics performing work in more than one classification may be compensated at the rate specified for each classification for the time actually worked therein: Provided, That the employer's payroll records accurately set forth the time spent in each classification in which work is performed. The wage determination (including any additional classification and wage rates conformed under paragraph (a)(1)(ii) of this section) and the Davis-Bacon poster (WH-1321) shall be posted at all times by the contractor and its subcontractors at the site of the work in a prominent and accessible place where it can be easily seen by the workers.

Wage determinations may be obtained from the U.S. Department of Labor's website, www.dol.gov.

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

- (1) The work to be performed by the classification requested is not performed by a classification in the wage determination; and
- (2) The classification is utilized in the area by the construction industry; and
- (3) The proposed wage rate, including any bona fide fringe benefits, bears a reasonable relationship to the wage rates contained in the wage determination.
- (B) If the contractor and the laborers and mechanics to be employed in the classification (if known), or their representatives, and the Owner agree on the classification and wage rate (including the amount designated for fringe benefits where appropriate), documentation of the action taken and the request, including the local wage determination shall be sent by the Owner to the State award official. The State award official will transmit the request to the Administrator of the Wage and Hour Division, Employment Standards Administration, U.S. Department of Labor, Washington, DC 20210 and to the EPA DB Regional Coordinator concurrently. The Administrator, or an authorized representative, will approve, modify, or disapprove every additional classification action within 30 days of receipt and so advise the State award official or will notify the State award official within the 30-day period that additional time is necessary.
- (C) In the event the contractor, the laborers or mechanics to be employed in the classification or their representatives, and the Owner do not agree on the proposed classification and wage rate (including the amount designated for fringe benefits, where appropriate), the award official shall refer the questions, including the views of all interested parties and the recommendation of the State award official, to the Administrator for determination. The request shall be sent to the EPA DB Regional Coordinator concurrently. The Administrator, or an authorized representative, will issue a determination within 30 days of receipt and so advise the State award official or will notify the State award official within the 30-day period that additional time is necessary.
- (D) The wage rate (including fringe benefits where appropriate) determined pursuant to paragraphs (a)(1)(ii) (B) or (C) of this section, shall be paid to all workers performing work in the classification under this contract from the first day on which work is performed in the classification.
- (iii) Whenever the minimum wage rate prescribed in the contract for a class of laborers or mechanics includes a fringe benefit which is not expressed as an hourly rate, the contractor shall either pay the benefit as stated in the wage determination or shall pay another bona fide fringe benefit or an hourly cash equivalent thereof.
- (iv) If the contractor does not make payments to a trustee or other third person, the contractor may consider as part of the wages of any laborer or mechanic the amount of any costs reasonably anticipated in providing bona fide fringe benefits under a plan or program, *Provided*, That the Secretary of Labor has found, upon the written request of the contractor, that the applicable standards of the Davis-Bacon Act have been met. The Secretary of Labor may require the contractor to set aside in a separate account assets for the meeting of obligations under the plan or program.

(2) Withholding

The Owner, shall upon written request of the EPA Award Official or an authorized representative of the Department of Labor, withhold or cause to be withheld from the contractor under this

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

(3) Payrolls and Basic Records

- (i) Payrolls and basic records relating thereto shall be maintained by the contractor during the course of the work and preserved for a period of three years thereafter for all laborers and mechanics working at the site of the work. Such records shall contain the name, address, and social security number of each such worker, his or her correct classification, hourly rates of wages paid (including rates of contributions or costs anticipated for bona fide fringe benefits or cash equivalents thereof of the types described in section 1(b)(2)(B) of the Davis-Bacon Act), daily and weekly number of hours worked, deductions made and actual wages paid. Whenever the Secretary of Labor has found under 29 CFR 5.5(a)(1)(iv) that the wages of any laborer or mechanic include the amount of any costs reasonably anticipated in providing benefits under a plan or program described in section 1(b)(2)(B) of the Davis-Bacon Act, the contractor shall maintain records which show that the commitment to provide such benefits is enforceable, that the plan or program is financially responsible, and that the plan or program has been communicated in writing to the laborers or mechanics affected, and records which show the costs anticipated or the actual cost incurred in providing such benefits. Contractors employing apprentices or trainees under approved programs shall maintain written evidence of the registration of apprenticeship programs and certification of trainee programs, the registration of the apprentices and trainees, and the ratios and wage rates prescribed in the applicable programs.
- (ii)(A) The contractor shall submit weekly for each week in which any contract work is performed a copy of all payrolls to the Owner, that is, the entity that receives the sub-grant or loan from the State capitalization grant recipient. Such documentation shall be available on request of the State recipient or EPA. As to each payroll copy received, the Owner shall provide written confirmation in a form satisfactory to the State indicating whether or not the project is in compliance with the requirements of 29 CFR 5.5(a)(1) based on the most recent payroll copies for the specified week. The payrolls submitted shall set out accurately and completely all of the information required to be maintained under 29 CFR 5.5(a)(3)(i), except that full social security numbers and home addresses shall not be included on weekly payrolls. Instead the payrolls shall only need to include an individually identifying number for each employee (e.q. , the last four digits of the employee's social security number). The required weekly payroll information may be submitted in any form desired. Optional Form WH-347 is available for this purpose from the Wage and Hour Division Web site at http://www.dol.gov/esa/whd/forms/wh347instr.htm or its successor site. The prime contractor is responsible for the submission of copies of payrolls by all subcontractors. Contractors and subcontractors shall maintain the full social security number and current address of each covered worker, and shall provide them upon request to the owner for transmission to the State or EPA if requested by EPA, the State, the contractor, or the Wage and Hour Division of the Department of Labor for purposes of an investigation or audit of

compliance with prevailing wage requirements. It is not a violation of this section for a prime contractor to require a subcontractor to provide addresses and social security numbers to the prime contractor for its own records, without weekly submission to the Owner.

- (B) Each payroll submitted shall be accompanied by a "Statement of Compliance," signed by the contractor or subcontractor or his or her agent who pays or supervises the payment of the persons employed under the contract and shall certify the following:
- (1) That the payroll for the payroll period contains the information required to be provided under §5.5 (a)(3)(ii) of Regulations, 29 CFR part 5, the appropriate information is being maintained under §5.5 (a)(3)(i) of Regulations, 29 CFR part 5, and that such information is correct and complete;
- (2) That each laborer or mechanic (including each helper, apprentice, and trainee) employed on the contract during the payroll period has been paid the full weekly wages earned, without rebate, either directly or indirectly, and that no deductions have been made either directly or indirectly from the full wages earned, other than permissible deductions as set forth in Regulations, 29 CFR part 3;
- (3) That each laborer or mechanic has been paid not less than the applicable wage rates and fringe benefits or cash equivalents for the classification of work performed, as specified in the applicable wage determination incorporated into the contract.
- (C) The weekly submission of a properly executed certification set forth on the reverse side of Optional Form WH–347 shall satisfy the requirement for submission of the "Statement of Compliance" required by paragraph (a)(3)(ii)(B) of this section.
- (D) The falsification of any of the above certifications may subject the contractor or subcontractor to civil or criminal prosecution under section 1001 of title 18 and section 231 of title 31 of the United States Code.
- (iii) The contractor or subcontractor shall make the records required under paragraph (a)(3)(i) of this section available for inspection, copying, or transcription by authorized representatives of the State, EPA or the Department of Labor, and shall permit such representatives to interview employees during working hours on the job. If the contractor or subcontractor fails to submit the required records or to make them available, the Federal agency or State may, after written notice to the contractor, sponsor, applicant, or owner, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds. Furthermore, failure to submit the required records upon request or to make such records available may be grounds for debarment action pursuant to 29 CFR 5.12.

(4) Apprentices and Trainees

(i) Apprentices. Apprentices will be permitted to work at less than the predetermined rate for the work they performed when they are employed pursuant to and individually registered in a bona fide apprenticeship program registered with the U.S. Department of Labor, Employment and Training Administration, Office of Apprenticeship Training, Employer and Labor Services, or with a State Apprenticeship Agency recognized by the Office, or if a person is employed in his or her first 90 days of probationary employment as an apprentice in such an apprenticeship program, who is not individually registered in the program, but who has been certified by the Office of

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

- (ii) Trainees. Except as provided in 29 CFR 5.16, trainees will not be permitted to work at less than the predetermined rate for the work performed unless they are employed pursuant to and individually registered in a program which has received prior approval, evidenced by formal certification by the U.S. Department of Labor, Employment and Training Administration. The ratio of trainees to journeymen on the job site shall not be greater than permitted under the plan approved by the Employment and Training Administration. Every trainee must be paid at not less than the rate specified in the approved program for the trainee's level of progress, expressed as a percentage of the journeyman hourly rate specified in the applicable wage determination. Trainees shall be paid fringe benefits in accordance with the provisions of the trainee program. If the trainee program does not mention fringe benefits, trainees shall be paid the full amount of fringe benefits listed on the wage determination unless the Administrator of the Wage and Hour Division determines that there is an apprenticeship program associated with the corresponding journeyman wage rate on the wage determination which provides for less than full fringe benefits for apprentices. Any employee listed on the payroll at a trainee rate who is not registered and participating in a training plan approved by the Employment and Training Administration shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any trainee performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. In the event the Employment and Training Administration withdraws approval of a training program, the contractor will no longer be permitted to utilize trainees at less than the applicable predetermined rate for the work performed until an acceptable program is approved.
- (iii) Equal employment opportunity. The utilization of apprentices, trainees and journeymen under this part shall be in conformity with the equal employment opportunity requirements of Executive Order 11246, as amended, and 29 CFR part 30.

(5) Compliance with Copeland Act Requirements

The contractor shall comply with the requirements of 29 CFR part 3, which are incorporated by reference in this contract.

(6) Subcontracts

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

(7) Contract Termination: Debarment

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

(8) Compliance with Davis-Bacon and Related Act Requirements

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

(9) Disputes Concerning Labor Standards

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

(10) Certification of Eligibility

- (i) By entering into this contract, the contractor certifies that neither it (nor he or she) nor any person or firm who has an interest in the contractor's firm is a person or firm ineligible to be awarded Government contracts by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).
- (ii) No part of this contract shall be subcontracted to any person or firm ineligible for award of a Government contract by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).
- (iii) The penalty for making false statements is prescribed in the U.S. Criminal Code, 18 U.S.C. 1001.

(b) CONTRACT WORK HOURS AND SAFETY STANDARDS ACT

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

(1) Overtime Requirements

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

(2) Violation; Liability for Unpaid Wages; Liquidated Damages

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

(3) Withholding for Unpaid Wages and Liquidated Damages

The Owner, upon written request of the EPA Award Official or an authorized representative of the Department of Labor shall withhold or cause to be withheld, from any moneys payable on account of work performed by the contractor or subcontractor under any such contract or any other Federal contract with the same prime contractor, or any other federally-assisted contract subject to the Contract Work Hours and Safety Standards Act, which is held by the same prime contractor, such sums as may be determined to be necessary to satisfy any liabilities of such contractor or subcontractor for unpaid wages and liquidated damages as provided in the clause set forth in paragraph (b)(2) of this section.

(4) Subcontracts

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

(c) MAINTENANCE OF RECORDS

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

(d) COMPLIANCE VERIFICATION

- (1) The Owner shall periodically interview a sufficient number of employees entitled to DB prevailing wages (covered employees) to verify that contractors or subcontractors are paying the appropriate wage rates. As provided in 29 CFR 5.6(a)(6), all interviews must be conducted in confidence. The Owner must use Standard Form 1445 (SF 1445) or equivalent documentation to memorialize the interviews. Copies of the SF 1445 are available from EPA on request.
- (2) The Owner shall establish and follow an interview schedule based on its assessment of the risks of noncompliance with DB posed by contractors or subcontractors and the duration of the contract or subcontract. At a minimum, the Owner should conduct interviews with a representative group of covered employees within two weeks of each contractor or subcontractor's submission of its initial weekly payroll data and two weeks prior to the estimated completion date for the contract or subcontract. Owners must conduct more frequent interviews if the initial interviews or other information indicates that there is a risk that the contractor or subcontractor is not complying with DB. Owners shall immediately conduct necessary interviews in response to an alleged violation of the prevailing wage requirements. All interviews shall be conducted in confidence.
- (3) The Owner shall periodically conduct spot checks of a representative sample of weekly payroll data to verify that contractors or subcontractors are paying the appropriate wage rates. The Owner shall establish and follow a spot check schedule based on its assessment of the risks of noncompliance with DB posed by contractors or subcontractors and the duration of the contract or subcontract. At a minimum, if practicable, the Owner should spot check payroll data within two weeks of each contractor or subcontractor's submission of its initial payroll data and two weeks prior to the completion date the contract or subcontract. Owners must conduct more frequent spot checks if the initial spot check or other information indicates that there is a risk that the contractor or subcontractor is not complying with DB. In addition, during the examinations the Owner shall verify evidence of fringe benefit plans and payments thereunder by contractors and subcontractors who claim credit for fringe benefit contributions.
- (4) The Owner shall periodically review contractors and subcontractors use of apprentices and trainees to verify registration and certification with respect to apprenticeship and training programs approved by either the U.S Department of Labor or a state, as appropriate, and that contractors and subcontractors are not using disproportionate numbers of, laborers, trainees

and apprentices. These reviews shall be conducted in accordance with the schedules for spot checks and interviews described in Item 5(b) and (c) above.

(5) Owners must immediately report potential violations of the DB prevailing wage requirements to the EPA DB contact listed above and to the appropriate DOL Wage and Hour District Office listed at http://www.dol.gov/esa/contacts/whd/america2.htm.

APPENDIX A

TITLE 37 Public Property and Works

CHAPTER 37-13 Labor and Payment of Debts by Contractors

SECTION 37-13-5

§ 37-13-5 Payment for trucking or materials furnished – Withholding of sums due. – A contractor or subcontractor on public works authorized by a proper authority shall pay any obligation or charge for trucking and material which have been furnished for the use of the contractor or subcontractor, in connection with the public works being performed by him or her, within ninety (90) days after the obligation or charge is incurred or the trucking service has been performed or the material has been delivered to the site of the work, whichever is later. When it is brought to the notice of the proper authority in a city or town, or the proper authority in the state having supervision of the contract, that the obligation or charge has not been paid by the contractor or subcontractor, the proper authority may deduct and hold for a period not exceeding sixty (60) days, from sums of money due to the contractor or subcontractor, the equivalent amount of such sums certified by a trucker or materialman creditor as due him or her, as provided in this section, and which the proper authority determines is reasonable for trucking performed or materials furnished for the public works.

APPRENDIX B

TITLE 37 Public Property and Works

CHAPTER 37-13 Labor and Payment of Debts by Contractors

SECTION 37-13-7

§ 37-13-7 Specification in contract of amount and frequency of payment of wages. - (a) Every call for bids for every contract in excess of one thousand dollars (\$1,000), to which the state of Rhode Island or any political subdivision thereof or any public agency or quasi-public agency is a party, for construction, alteration, and/or repair, including painting and decorating, of public buildings or public works of the state of Rhode Island or any political subdivision thereof, or any public agency or quasi-public agency and which requires or involves the employment of employees, shall contain a provision stating the minimum wages to be paid various types of employees which shall be based upon the wages that will be determined by the director of labor and training to be prevailing for the corresponding types of employees employed on projects of a character similar to the contract work in the city, town, village, or other appropriate political subdivision of the state of Rhode Island in which the work is to be performed. Every contract shall contain a stipulation that the contractor or his or her subcontractor shall pay all the employees employed directly upon the site of the work, unconditionally and not less often than once a week, and without subsequent deduction or rebate on any account, the full amounts accrued at time of payment computed at wage rates not less than those stated in the call for bids, regardless of any contractual relationships which may be alleged to exist between the contractor or subcontractor and the employees, and that the scale of wages to be paid shall be posted by the contractor in a prominent and easily accessible place at the site of the work; and the further stipulation that there may be withheld from the contractor so much of the accrued payments as may be considered necessary to pay to the employees employed by the contractor, or any subcontractor on the work, the difference between the rates of wages required by the contract to be paid the employees on the work and the rates of wages received by the employees and not refunded to the contractor, subcontractors, or their agents.

- (b) The terms "wages", "scale of wages", "wage rates", "minimum wages", and "prevailing wages" shall include:
 - (1) The basic hourly rate of pay; and
 - (2) The amount of:

- (A) The rate of contribution made by a contractor or subcontractor to a trustee or to a third person pursuant to a fund, plan, or program; and
- (B) The rate of costs to the contractor or subcontractor which may be reasonably anticipated in providing benefits to employees pursuant to an enforceable commitment to carry out a financially responsible plan or program which was communicated in writing to the employees affected, for medical or hospital care, pensions on retirement or death, compensation for injuries or illness resulting from occupational activity, or insurance to provide any of the foregoing, for unemployment benefits, life insurance, disability and sickness insurance, or accident insurance, for vacation and holiday pay, for defraying costs of apprenticeship or other similar programs, or for other bona fide fringe benefits, but only where the contractor or subcontractor is not required by other federal, state, or local law to provide any of the benefits; provided, that the obligation of a contractor or subcontractor to make payment in accordance with the prevailing wage determinations of the director of labor and training insofar as this chapter of this title and other acts incorporating this chapter of this title by reference are concerned may be discharged by the making of payments in cash, by the making of contributions of a type referred to in subsection (b)(2), or by the assumption of an enforceable commitment to bear the costs of a plan or program of a type referred to in this subdivision, or any combination thereof, where the aggregate of any payments, contributions, and costs is not less than the rate of pay described in subsection (b)(1) plus the amount referred to in subsection (b)(2).
- (c) The term "employees", as used in this section, shall include employees of contractors or subcontractors performing jobs on various types of public works including mechanics, apprentices, teamsters, chauffeurs, and laborers engaged in the transportation of gravel or fill to the site of public works, the removal and/or delivery of gravel or fill or ready-mix concrete, sand, bituminous stone, or asphalt flowable fill from the site of public works, or the transportation or removal of gravel or fill from one location to another on the site of public works, and the employment of the employees shall be subject to the provisions of subsections (a) and (b).
- (d) The terms "public agency" and "quasi-public agency" shall include, but not be limited to, the Rhode Island industrial recreational building authority, the Rhode Island economic development corporation, the Rhode Island airport corporation, the Rhode Island industrial facilities corporation, the Rhode Island refunding bond authority, the Rhode Island housing and mortgage finance corporation, the Rhode Island resource recovery corporation, the Rhode Island public transit authority, the Rhode Island student loan authority, the water resources board corporate, the Rhode Island health and education building corporation, the Rhode Island higher education assistance authority, the Rhode Island turnpike and bridge authority, the Narragansett Bay water quality management district commission, Rhode Island telecommunications authority, the convention center authority, the board of governors for higher education, the board of regents for elementary and secondary education, the capital center commission, the housing resources commission, the Quonset Point-Davisville management corporation, the Rhode Island depositors economic protection corporation, the Rhode Island lottery commission, the Rhode Island

partnership for science and technology, the Rhode Island public building authority, and the Rhode Island underground storage tank board.

DEBARMENT & SUSPENSION

Executive Order 12549--Debarment and Suspension

Source: The provisions of Executive Order 12549 of Feb. 18, 1986, appear at 51 FR 6370, 3 CFR, 1986 Comp., p. 189, unless otherwise noted.

By the authority vested in me as President by the Constitution and laws of the United States of America, and in order to curb fraud, waste, and abuse in Federal programs, increase agency accountability, and ensure consistency among agency regulations concerning debarment and suspension of participants in Federal programs, it is hereby ordered that:

- **Section 1.** (a) To the extent permitted by law and subject to the limitations in Section 1(c), Executive departments and agencies shall participate in a system for debarment and suspension from programs and activities involving Federal financial and nonfinancial assistance and benefits. Debarment or suspension of a participant in a program by one agency shall have government-wide effect.
- (b) Activities covered by this Order include but are not limited to: grants, cooperative agreements, contracts of assistance, loans, and loan guarantees.
- (c) This Order does not cover procurement programs and activities, direct Federal statutory entitlements or mandatory awards, direct awards to foreign governments or public international organizations, benefits to an individual as a personal entitlement, or Federal employment.
- Sec. 2. To the extent permitted by law, Executive departments and agencies shall:
- (a) Follow government-wide criteria and government-wide minimum due process procedures when they act to debar or suspend participants in affected programs.
- (b) Send to the agency designated pursuant to Section 5 identifying information concerning debarred and suspended participants in affected programs, participants who have agreed to exclusion from participation, and participants declared ineligible under applicable law, including Executive Orders. This information shall be included in the list to be maintained pursuant to Section 5.
- (c) Not allow a party to participate in any affected program if any Executive department or agency has debarred, suspended, or otherwise excluded (to the extent specified in the exclusion agreement) that party from participation in an affected program. An agency may grant an exception permitting a debarred, suspended, or excluded party to participate in a particular transaction upon a written determination by the agency head or authorized designee stating the reason(s) for deviating from this Presidential policy. However, I intend that exceptions to this policy should be granted only infrequently.
- Sec. 3. Executive departments and agencies shall issue regulations governing their implementation of this Order that shall be consistent with the guidelines issued under Section 6. Proposed regulations shall be submitted to the Office of Management and Budget for review within four months of the date of the guidelines issued under Section 6. The Director of the Office of Management and Budget may return for reconsideration proposed regulations that the Director believes are inconsistent with the guidelines. Final regulations shall be published within twelve months of the date of the guidelines.

Sec. 4. There is hereby constituted the Interagency Committee on Debarment and Suspension, which shall monitor implementation of this Order. The Committee shall consist of representatives of agencies designated by the Director of the Office of Management and Budget.

Sec. 5. The Director of the Office of Management and Budget shall designate a Federal agency to perform the following functions: maintain a current list of all individuals and organizations excluded from program participation under this Order, periodically distribute the list to Federal agencies, and study the feasibility of automating the list; coordinate with the lead agency responsible for government-wide debarment and suspension of contractors; chair the Interagency Committee established by Section 4; and report periodically to the Director on implementation of this Order, with the first report due within two years of the date of the Order.

Sec. 6. The Director of the Office of Management and Budget is authorized to issue guidelines to Executive departments and agencies that govern which programs and activities are covered by this Order, prescribe government-wide criteria and government-wide minimum due process procedures, and set forth other related details for the effective administration of the guidelines.

Sec. 7. The Director of the Office of Management and Budget shall report to the President within three years of the date of this Order on Federal agency compliance with the Order, including the number of exceptions made under Section 2(c), and shall make recommendations as are appropriate further to curb fraud, waste, and abuse.

Implementation in the SRF Programs

A company or individual who is debarred or suspended cannot participate in primary and lower-tiered covered transactions. These transactions include SRF loans and contracts and subcontracts awarded with SRF loan funds.

Under 40 C.F.R. 32.510, the SRF agency must submit a certification stating that it shall not knowingly enter into any transaction with a person who is proposed for debarment, suspended, declared ineligible, or voluntarily excluded from participation in the SRF program. This certification is reviewed by the EPA regional office before the capitalization grant is awarded.

A recipient of SRF assistance directly made available by capitalization grants must provide a certification that it will not knowingly enter into a contract with anyone who is ineligible under the regulations to participate in the project. Contractors on the project have to provide a similar certification prior to the award of a contract and subcontractors on the project have to provide the general contractor with the certification prior to the award of any subcontract.

In addition to actions taken under 40 C.F.R. Part 32, there are a wide range of other sanctions that can render a party ineligible to participate in the SRF program. Lists of debarred, suspended and otherwise ineligible parties are maintained by the General Services Administration and should be checked by the SRF agency and all recipients of funds directly made available by capitalization grants to ensure the accuracy of certifications.

Additional References

C 40 C.F.R. Part 32: EPA Regulations on Debarment and Suspension.

CERTIFICATION REGARDING DEBARMENT & SUSPENSION AND OTHER RESPONSIBILITY MATTERS

In accordance with the Executive Order 12549, the prospective primary participant certifies to the best of his / her knowledge and belief, that its principals:

- a. Are not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from covered transactions by any federal department or agency;
- b. Have not within a three-year period preceding this proposal been convicted of or had a civil judgment rendered against them for commission of fraud or a criminal offence in connection with obtaining, attempting to obtain, or performing a public (federal, state, or local) transaction or contract under a public transaction; violation of federal or state antitrust statutes or commission of embezzlement, theft, forgery, bribery, falsification or destruction or records, making false statements, or receiving stolen property;
- c. Are not presently indicted for or otherwise criminally or civilly charged by a governmental entity (federal, state, or local) with commission of any of the offenses enumerated in paragraph (1) (b) of this certification.
- d. Have not within a three-year period preceding this application / proposal had one or more public transactions (federal, state, or local) terminated for cause of default.
- e. Acknowledge that all sub-contractors selected for this project must be in compliance with paragraphs (1)(a-d) of this certification.

Name and Title of Authorized Agent	Date
Signature of Authorized Agent	

Good Faith Efforts

What is the Purpose of the Good Faith Efforts?

The Good Faith Efforts are methods employed by all EPA financial assistance agreement recipients to ensure that disadvantaged business enterprises (DBEs) have the opportunity to compete for procurements funded by EPA financial assistance funds.

What Are the Good Faith Efforts?

- Ensure DBEs are made aware of contracting opportunities to the fullest extent practicable through outreach and recruitment activities. For Indian Tribal, State and local government recipients, this will include placing DBEs on solicitation lists and soliciting them whenever they are potential sources.
- Make information on forthcoming opportunities available to DBEs and arrange time frames for contracts and establish delivery schedules, where the requirements permit, in a way that encourages and facilitates participation by DBEs in the competitive process. This includes, whenever possible, posting solicitations for bids or proposals for a minimum of 30 calendar days before the bid or proposal closing date.
- Consider in the contracting process whether firms competing for large contracts could subcontract with DBEs. For Indian Tribal, State and local Government recipients, this will include dividing total requirements, when economically feasible, into smaller tasks or quantities to permit maximum participation by DBEs in the competitive process.
- Encourage contracting with a consortium of DBEs when a contract is too large for one of these firms to handle individually.
- Use the services and assistance of the SBA and the Minority Business Development Agency of the Department of Commerce.
- If the prime contractor awards subcontracts, require the prime contractor to take the steps in paragraphs (a) through (e) of this section.

What are the New Contract Administration Provisions?

When the DBE rule goes into effect, there are a number of new provisions designed to prevent unfair practices that adversely affect DBEs. Those provisions are as follows:

- A recipient must require its prime contractor to pay its subcontractor for satisfactory performance no more than 30 days from the prime contractor's receipt of payment from the recipient.
- A recipient must be notified in writing by its prime contractor prior to any

termination of a DBE subcontractor for convenience by the prime contractor.

- If a DBE subcontractor fails to complete work under the subcontract for any reason, the recipient must require the prime contractor to employ the Six Good Faith Efforts if soliciting a replacement subcontractor.
- ❖ A recipient must require its prime contractor to employ the Six Good Faith Efforts even if the prime contractor has achieved its fair share objectives.

What are the New Forms Associated With the New Contract Administration Provisions?

EPA Form 6100-2 - DBE Program Subcontractor Participation Form. This form gives a DBE subcontractor the opportunity to describe the work the DBE subcontractor received from the prime contractor, how much the DBE subcontractor was paid and any other concerns the DBE subcontractor might have.

EPA Form 6100-3 - DBE Program Subcontractor Performance Form. This form captures an intended subcontractor's description of work to be performed for the prime contractor and the price of the work submitted to the prime.

EPA Form 6100-4 – DBE Program Subcontractor Utilization Form. This form captures the prime's intended use of an identified DBE subcontractor, and the estimated dollar amount of the subcontract.

Form	Requirement	Provided By	Completed By	Submitted To
EPA Form 6100-2	Recipients required to have prime contractors provide form to Subcontractors	Prime Contractors	DBE Subcontractors	EPA DBE Coordinator
EPA Form 6100-3	Recipients required to have prime contractors provide form to Subcontractors	Prime Contractors	DBE Subcontractors	Recipients as part of bid or proposal package
EPA Form 6100-4	Recipients required to have prime contractors complete the form	Recipients	Prime Contractors	Recipients as part of bid or proposal package



Subcontractor Name

Rid / Proposal No.

OMB Control No: 2090-0030 Approved: 8/13/2013 Approval Expires: 8/31/2015

Disadvantaged Business Enterprise (DBE) Program DBE Subcontractor Participation Form

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

Project Name

Assistance Agreement ID No. (if known) | Point of Contact

		0		
Address				
Telephone No.			Email Address	
Prime Contrac	tor Name	lssuing/Funding Entity:		
	W 44			
Contract Item Number		of Work Received from th Instruction, Services, Equ	e Prime Contractor Involving ipment or Supplies	Amount Received by Prime Contractor

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

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



OMB Control No: 2090-0030 Approved: 8/13/2013

Approval Expires: 8/31/2015

Disadvantaged Business Enterprise (DBE) Program DBE Subcontractor Participation Form

Please use the space below to report any concerns regarding the above EPA-funded project:		
Subcontractor Signature	Print Name	
Title	Date	

The public reporting and recordkeeping burden for this collection of information is estimated to average three (3) hours per response. Send comments on the Agency's need for this information, the accuracy of the provided burden estimates, and any suggested methods for minimizing respondent burden, including through the use of automated collection techniques to the Director, Collection Strategies Division, U.S. Environmental Protection Agency (2822T), 1200 Pennsylvania Ave., NW, Washington, D.C. 20460. Include the OMB control number in any correspondence. Do not send the completed form to this address.



Subcontractor Name

Bid/Proposal No.

OMB Control No: 2090-0030 Approved: 8/13/2013 Approval Expires: 8/31/2015

Disadvantaged Business Enterprise (DBE) Program DBE Subcontractor Performance Form

Point of Contact

This form is intended to capture the DBE¹ subcontractor's² description of work to be performed and the price of the work submitted to the prime contractor. An EPA Financial Assistance Agreement Recipient must require its prime contractor to have its DBE subcontractors complete this form and include all completed forms in the prime contractors bid or proposal package.

Assistance Agreement ID No. (if known)

Project Name

Address	·				
Telephone No.		Email Address			
Prime Contractor Name		Issuing/Fundin	g Entity:	Entity:	
Contract Item Number	Description of Worl	k Submitted to the Pri	me Contractor	Price of Work	
		on, Services, Equipm		Submitted to the	
		, , , , ,		Prime Contractor	
DBE Certified By: DOT	SBA	Meets/exceeds EPA c	ertification standar	ds?	
Other:		YES NO	Unknown		

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

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



OMB Control No: 2090-0030 Approved: 8/13/2013

Approval Expires: 8/31/2015

Disadvantaged Business Enterprise (DBE) Program DBE Subcontractor Performance Form

I certify under penalty of perjury that the forgoing statements are true and correct. Signing this form does not signify a commitment to utilize the subcontractors above. I am aware of that in the event of a replacement of a subcontractor, I will adhere to the replacement requirements set forth in 40 CFR Part 33 Section 33.302 (c).

Prime Contractor Signature	Print Name
Title	Date

Subcontractor Signature	Print Name
Title	Date

The public reporting and recordkeeping burden for this collection of information is estimated to average three (3) hours per response. Send comments on the Agency's need for this information, the accuracy of the provided burden estimates, and any suggested methods for minimizing respondent burden, including through the use of automated collection techniques to the Director, Collection Strategies Division, U.S. Environmental Protection Agency (2822T), 1200 Pennsylvania Ave., NW, Washington, D.C. 20460. Include the OMB control number in any correspondence. Do not send the completed form to this address.



OMB Control No: 2090-0030 Approved: 8/13/2013 Approval Expires: 8/31/2015

Disadvantaged Business Enterprise (DBE) Program DBE Subcontractor Utilization Form

This form is intended to capture the prime contractor's actual and/or anticipated use of identified certified DBE¹ subcontractors² and the estimated dollar amount of each subcontract. An EPA Financial Assistance Agreement Recipient must require its prime contractors to complete this form and include it in the bid or proposal package. Prime contractors should also maintain a copy of this form on file.

Prime Contractor Name		Project Name			
Bid/ Proposal No.	Assistance Agreement ID No. (if known)		Point of Co	ntact	
Address					
Telephone No.		Email Address			
Issuing/Funding Entity:					
I have identified potential DBE certified subcontractors		YES		_	NO
If yes, please complete the tabl	e below. If no, please expla	in: 			
Subcontractor Name/ Company Name	Company Addres	ss/Phone/Ema	il	Est. Dollar Amt	Currently DBE Certified?
	Continue on	back if needed			ı

EPA FORM 6100-4 (DBE Subcontractor Utilization Form)

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

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



OMB Control No: 2090-0030 Approved: 8/13/2013

Approval Expires: 8/31/2015

Disadvantaged Business Enterprise (DBE) Program DBE Subcontractor Utilization Form

I certify under penalty of perjury that the forgoing statements are true and correct. Signing this form does not signify a commitment to utilize the subcontractors above. I am aware of that in the event of a replacement of a subcontractor, I will adhere to the replacement requirements set forth in 40 CFR Part 33 Section 33.302 (c).

Prime Contractor Signature	Print Name
Title	Date

The public reporting and recordkeeping burden for this collection of information is estimated to average three (3) hours per response. Send comments on the Agency's need for this information, the accuracy of the provided burden estimates, and any suggested methods for minimizing respondent burden, including through the use of automated collection techniques to the Director, Collection Strategies Division, U.S. Environmental Protection Agency (2822T), 1200 Pennsylvania Ave., NW, Washington, D.C. 20460. Include the OMB control number in any correspondence. Do not send the completed form to this address.



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

WASHINGTON, D.C. 20460

MAR 2 0 2014

OFFICE OF WATER

MEMORANDUM

SUBJECT:

Implementation of American Iron and Steel provisions of P.L. 113-76,

Consolidated Appropriations Act, 2014

FROM:

F.(

Andrew D. Sawyers, Director

Office of Wastewater Management (4201M)

Peter C. Grevatt, Director

Office of Ground Water and Drinking Water (4601M)

TO:

Water Management Division Directors

Regions I - X

P.L. 113-76, Consolidated Appropriations Act, 2014 (Act), includes an "American Iron and Steel (AIS)" requirement in section 436 that requires Clean Water State Revolving Loan Fund (CWSRF) and Drinking Water State Revolving Loan Fund (DWSRF) assistance recipients to use iron and steel products that are produced in the United States for projects for the construction, alteration, maintenance, or repair of a public water system or treatment works if the project is funded through an assistance agreement executed beginning January 17, 2014 (enactment of the Act), through the end of Federal Fiscal Year 2014.

Section 436 also sets forth certain circumstances under which EPA may waive the AIS requirement. Furthermore, the Act specifically exempts projects where engineering plans and specifications were approved by a State agency prior to January 17, 2014.

The approach described below explains how EPA will implement the AIS requirement. The first section is in the form of questions and answers that address the types of projects that must comply with the AIS requirement, the types of products covered by the AIS requirement, and compliance. The second section is a step-by-step process for requesting waivers and the circumstances under which waivers may be granted.

Implementation

The Act states:

Sec. 436. (a)(1) None of the funds made available by a State water pollution control revolving fund as authorized by title VI of the Federal Water Pollution Control Act (33 U.S.C. 1381 et seq.) or made available by a drinking water treatment revolving loan fund as authorized by section 1452 of the Safe Drinking Water Act (42 U.S.C. 300j–12) shall be used for a project for the construction, alteration, maintenance, or repair of a public water system or treatment works unless all of the iron and steel products used in the project are produced in the United States.

- (2) In this section, the term "iron and steel products" means the following products made primarily of iron or steel: lined or unlined pipes and fittings, manhole covers and other municipal castings, hydrants, tanks, flanges, pipe clamps and restraints, valves, structural steel, reinforced precast concrete, and construction materials.
- (b) Subsection (a) shall not apply in any case or category of cases in which the Administrator of the Environmental Protection Agency (in this section referred to as the "Administrator") finds that—
 - (1) applying subsection (a) would be inconsistent with the public interest;
 - (2) iron and steel products are not produced in the United States in sufficient and reasonably available quantities and of a satisfactory quality; or
 - (3) inclusion of iron and steel products produced in the United States will increase the cost of the overall project by more than 25 percent.
- (c) If the Administrator receives a request for a waiver under this section, the Administrator shall make available to the public on an informal basis a copy of the request and information available to the Administrator concerning the request, and shall allow for informal public input on the request for at least 15 days prior to making a finding based on the request. The Administrator shall make the request and accompanying information available by electronic means, including on the official public Internet Web site of the Environmental Protection Agency.
- (d) This section shall be applied in a manner consistent with United States obligations under international agreements.
- (e) The Administrator may retain up to 0.25 percent of the funds appropriated in this Act for the Clean and Drinking Water State Revolving Funds for carrying out

the provisions described in subsection (a)(1) for management and oversight of the requirements of this section.

(f) This section does not apply with respect to a project if a State agency approves the engineering plans and specifications for the project, in that agency's capacity to approve such plans and specifications prior to a project requesting bids, prior to the date of the enactment of this Act.

The following questions and answers provide guidance for implementing and complying with the AIS requirements:

Project Coverage

1) What classes of projects are covered by the AIS requirement?

All treatment works projects funded by a CWSRF assistance agreement, and all public water system projects funded by a DWSRF assistance agreement, from the date of enactment through the end of Federal Fiscal Year 2014, are covered. The AIS requirements apply to the entirety of the project, no matter when construction begins or ends. Additionally, the AIS requirements apply to all parts of the project, no matter the source of funding.

2) Does the AIS requirement apply to nonpoint source projects or national estuary projects?

No. Congress did not include an AIS requirement for nonpoint source and national estuary projects unless the project can also be classified as a 'treatment works' as defined by section 212 of the Clean Water Act.

3) Are any projects for the construction, alteration, maintenance, or repair of a public water system or treatment works excluded from the AIS requirement?

Any project, whether a treatment works project or a public water system project, for which engineering plans and specifications were approved by the responsible state agency prior to January 17, 2014, is excluded from the AIS requirements.

4) What if the project does not have approved engineering plans and specifications but has signed an assistance agreement with a CWSRF or DWSRF program prior to January 17, 2014?

The AIS requirements do not apply to any project for which an assistance agreement was signed prior to January 17, 2014.

5) What if the project does not have approved engineering plans and specifications, but bids were advertised prior to January 17, 2014 and an assistance agreement was signed after January 17, 2014?

If the project does not require approved engineering plans and specifications, the bid advertisement date will count in lieu of the approval date for purposes of the exemption in section 436(f).

6) What if the assistance agreement that was signed prior to January 17, 2014, only funded a part of the overall project, where the remainder of the project will be funded later with another SRF loan?

If the original assistance agreement funded any construction of the project, the date of the original assistance agreement counts for purposes of the exemption. If the original assistance agreement was only for planning and design, the date of that assistance agreement will count for purposes of the exemption only if there is a written commitment or expectation on the part of the assistance recipient to fund the remainder of the project with SRF funds.

7) What if the assistance agreement that was signed prior to January 17, 2014, funded the first phase of a multi-phase project, where the remaining phases will be funded by SRF assistance in the future?

In such a case, the phases of the project will be considered a single project if all construction necessary to complete the building or work, regardless of the number of contracts or assistance agreements involved, are closely related in purpose, time and place. However, there are many situations in which major construction activities are clearly undertaken in phases that are distinct in purpose, time, or place. In the case of distinct phases, projects with engineering plans and specifications approval or assistance agreements signed prior to January 17, 2014 would be excluded from AIS requirements while those approved/signed on January 17, 2014, or later would be covered by the AIS requirements.

8) What if a project has split funding from a non-SRF source?

Many States intend to fund projects with "split" funding, from the SRF program and from State or other programs. Based on the Act language in section 436, which requires that American iron and steel products be used in any project for the construction, alteration, maintenance, or repair of a public water system or treatment works receiving SRF funding between and including January 17, 2014 and September 30, 2014, any project that is funded in whole or in part with such funds must comply with the AIS requirement. A "project" consists of all construction necessary to complete the building or work regardless of the number of contracts or assistance agreements involved so long as all contracts and assistance agreements awarded are closely related in purpose, time and place. This precludes the intentional splitting of SRF projects into separate and smaller contracts or assistance agreements to avoid AIS coverage on some portion of a larger

project, particularly where the activities are integrally and proximately related to the whole. However, there are many situations in which major construction activities are clearly undertaken in separate phases that are distinct in purpose, time, or place, in which case, separate contracts or assistance agreement for SRF and State or other funding would carry separate requirements.

9) What about refinancing?

If a project began construction, financed from a non-SRF source, prior to January 17, 2014, but is refinanced through an SRF assistance agreement executed on or after January 17, 2014 and prior to October 1, 2014, AIS requirements will apply to all construction that occurs on or after January 17, 2014, through completion of construction, unless, as is likely, engineering plans and specifications were approved by a responsible state agency prior to January 17, 2014. There is no retroactive application of the AIS requirements where a refinancing occurs for a project that has completed construction prior to January 17, 2014.

10) Do the AIS requirements apply to any other EPA programs, besides the SRF program, such as the Tribal Set-aside grants or grants to the Territories and DC?

No, the AIS requirement only applies to funds made available by a State water pollution control revolving fund as authorized by title VI of the Federal Water Pollution Control Act (33 U.S.C. 1381 et seq.) or made available by a drinking water treatment revolving loan fund as authorized by section 1452 of the Safe Drinking Water Act (42 U.S.C. 300j–12)

Covered Iron and Steel Products

11) What is an iron or steel product?

For purposes of the CWSRF and DWSRF projects that must comply with the AIS requirement, an iron or steel product is one of the following made primarily of iron or steel that is permanently incorporated into the public water system or treatment works:

Lined or unlined pipes or fittings;

Manhole Covers;

Municipal Castings (defined in more detail below);

Hydrants:

Tanks:

Flanges:

Pipe clamps and restraints;

Valves;

Structural steel (defined in more detail below);

Reinforced precast concrete; and

Construction materials (defined in more detail below).

12) What does the term 'primarily iron or steel' mean?

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

13) Can you provide an example of how to perform a cost determination?

For example, the iron portion of a fire hydrant would likely be the bonnet, body and shoe, and the cost then would include the pouring and casting to create those components. The other material costs would include non-iron and steel internal workings of the fire hydrant (i.e., stem, coupling, valve, seals, etc). However, the assembly of the internal workings into the hydrant body would not be included in this cost calculation. If one of the listed products is not made primarily of iron or steel, United States (US) provenance is not required. An exception to this definition is reinforced precast concrete, which is addressed in a later question.

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

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

15) What is the definition of steel?

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

16) What does 'produced in the United States' mean?

Production in the United States of the iron or steel products used in the project requires that all manufacturing processes, including application of coatings, must take place in the United States, with the exception of metallurgical processes involving refinement of steel additives. All manufacturing processes includes processes such as melting, refining, forming, rolling, drawing, finishing, fabricating and coating. Further, if a domestic iron and steel product is taken out of the US for any part of the manufacturing process, it becomes foreign source material. However, raw materials such as iron ore, limestone and iron and steel scrap are not covered by the AIS requirement, and the

material(s), if any, being applied as a coating are similarly not covered. Non-iron or steel components of an iron and steel product may come from non-US sources. For example, for products such as valves and hydrants, the individual non-iron and steel components do not have to be of domestic origin.

17) Are the raw materials used in the production of iron or steel required to come from US sources?

No. Raw materials, such as iron ore, limestone, scrap iron, and scrap steel, can come from non-US sources.

18) If an above listed item is primarily made of iron or steel, but is only at the construction site temporarily, must such an item be produced in the US?

No. Only the above listed products made primarily of iron or steel, permanently incorporated into the project must be produced in the US. For example trench boxes, scaffolding or equipment, which are removed from the project site upon completion of the project, are not required to be made of U.S. Iron or Steel.

19) What is the definition of 'municipal castings'?

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

Access Hatches;

Ballast Screen;

Benches (Iron or Steel);

Bollards:

Cast Bases;

Cast Iron Hinged Hatches, Square and Rectangular;

Cast Iron Riser Rings;

Catch Basin Inlet;

Cleanout/Monument Boxes;

Construction Covers and Frames;

Curb and Corner Guards;

Curb Openings;

Detectable Warning Plates;

Downspout Shoes (Boot, Inlet);

Drainage Grates, Frames and Curb Inlets;

Inlets;

Junction Boxes:

Lampposts;

Manhole Covers, Rings and Frames, Risers;

Meter Boxes;
Service Boxes;
Steel Hinged Hatches, Square and Rectangular;
Steel Riser Rings;
Trash receptacles;
Tree Grates;
Tree Guards;
Trench Grates; and
Valve Boxes, Covers and Risers.

20) What is 'structural steel'?

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

21) What is a 'construction material' for purposes of the AIS requirement?

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

22) What is not considered a 'construction material' for purposes of the AIS requirement?

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

The following examples (including their appurtenances necessary for their intended use and operation) are NOT considered construction materials: pumps, motors, gear reducers, drives (including variable frequency drives (VFDs)), electric/pneumatic/manual accessories used to operate valves (such as electric valve actuators), mixers, gates, motorized screens (such as traveling screens), blowers/aeration equipment, compressors, meters, sensors, controls and switches, supervisory control and

data acquisition (SCADA), membrane bioreactor systems, membrane filtration systems, filters, clarifiers and clarifier mechanisms, rakes, grinders, disinfection systems, presses (including belt presses), conveyors, cranes, HVAC (excluding ductwork), water heaters, heat exchangers, generators, cabinetry and housings (such as electrical boxes/enclosures), lighting fixtures, electrical conduit, emergency life systems, metal office furniture, shelving, laboratory equipment, analytical instrumentation, and dewatering equipment.

23) If the iron or steel is produced in the US, may other steps in the manufacturing process take place outside of the US, such as assembly?

No. Production in the US of the iron or steel used in a listed product requires that all manufacturing processes must take place in the United States, except metallurgical processes involving refinement of steel additives.

24) What processes must occur in the US to be compliant with the AIS requirement for reinforced precast concrete?

While reinforced precast concrete may not be at least 50% iron or steel, in this particular case, the reinforcing bar and wire must be produced in the US and meet the same standards as for any other iron or steel product. Additionally, the casting of the concrete product must take place in the US. The cement and other raw materials used in concrete production are not required to be of domestic origin.

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

Compliance

25) How should an assistance recipient document compliance with the AIS requirement?

In order to ensure compliance with the AIS requirement, specific AIS contract language must be included in each contract, starting with the assistance agreement, all the way down to the purchase agreements. Sample language for assistance agreements and contracts can be found in Appendix 3 and 4.

EPA recommends the use of a step certification process, similar to one used by the Federal Highway Administration. The step certification process is a method to ensure that producers adhere to the AIS requirement and assistance recipients can verify that products comply with the AIS requirement. The process also establishes accountability and better enables States to take enforcement actions against violators.

Step certification creates a paper trail which documents the location of the manufacturing process involved with the production of steel and iron materials. A step certification is a process under which each handler (supplier, fabricator, manufacturer,

processor, etc) of the iron and steel products certifies that their step in the process was domestically performed. Each time a step in the manufacturing process takes place, the manufacturer delivers its work along with a certification of its origin. A certification can be quite simple. Typically, it includes the name of the manufacturer, the location of the manufacturing facility where the product or process took place (not its headquarters), a description of the product or item being delivered, and a signature by a manufacturer's responsible party. Attached, as Appendix 5, are sample certifications. These certifications should be collected and maintained by assistance recipients.

Alternatively, the final manufacturer that delivers the iron or steel product to the worksite, vendor, or contractor, may provide a certification asserting that all manufacturing processes occurred in the US. While this type of certification may be acceptable, it may not provide the same degree of assurance. Additional documentation may be needed if the certification is lacking important information. Step certification is the best practice.

26) How should a State ensure assistance recipients are complying with the AIS requirement?

In order to ensure compliance with the AIS requirement, States SRF programs must include specific AIS contract language in the assistance agreement. Sample language for assistance agreements can be found in Appendix 3.

States should also, as a best practice, conduct site visits of projects during construction and review documentation demonstrating proof of compliance which the assistance recipient has gathered.

27) What happens if a State or EPA finds a non-compliant iron and/or steel product permanently incorporated in the project?

If a potentially non-compliant product is identified, the State should notify the assistance recipient of the apparent unauthorized use of the non-domestic component, including a proposed corrective action, and should be given the opportunity to reply. If unauthorized use is confirmed, the State can take one or more of the following actions: request a waiver where appropriate; require the removal of the non-domestic item; or withhold payment for all or part of the project. Only EPA can issue waivers to authorize the use of a non-domestic item. EPA may use remedies available to it under the Clean Water Act, the Safe Drinking Water Act, and 40 CFR part 31 grant regulations, in the event of a violation of a grant term and condition.

It is recommended that the State work collaboratively with EPA to determine the appropriate corrective action, especially in cases where the State is the one who identifies the item in noncompliance or there is a disagreement with the assistance recipient.

If fraud, waste, abuse, or any violation of the law is suspected, the Office of Inspector General (OIG) should be contacted immediately. The OIG can be reached at 1-

888-546-8740 or OIG_Hotline@epa.gov. More information can be found at this website: http://www.epa.gov/oig/hotline.htm.

28) How do international trade agreements affect the implementation of the AIS requirements?

The AIS provision applies in a manner consistent with United States obligations under international agreements. Typically, these obligations only apply to direct procurement by the entities that are signatories to such agreements. In general, SRF assistance recipients are not signatories to such agreements, so these agreements have no impact on this AIS provision. In the few instances where such an agreement applies to a municipality, that municipality is under the obligation to determine its applicability and requirements and document the actions taken to comply for the State.

Waiver Process

The statute permits EPA to issue waivers for a case or category of cases where EPA finds (1) that applying these requirements would be inconsistent with the public interest; (2) iron and steel products are not produced in the US in sufficient and reasonably available quantities and of a satisfactory quality; or (3) inclusion of iron and steel products produced in the US will increase the cost of the overall project by more than 25 percent.

In order to implement the AIS requirements, EPA has developed an approach to allow for effective and efficient implementation of the waiver process to allow projects to proceed in a timely manner. The framework described below will allow States, on behalf of the assistance recipients, to apply for waivers of the AIS requirement directly to EPA Headquarters. Only waiver requests received from states will be considered. Pursuant to the Act, EPA has the responsibility to make findings as to the issuance of waivers to the AIS requirements.

Definitions

The following terms are critical to the interpretation and implementation of the AIS requirements and apply to the process described in this memorandum:

<u>Reasonably Available Quantity</u>: The quantity of iron or steel products is available or will be available at the time needed and place needed, and in the proper form or specification as specified in the project plans and design.

<u>Satisfactory Quality</u>: The quality of iron or steel products, as specified in the project plans and designs.

<u>Assistance Recipient:</u> A borrower or grantee that receives funding from a State CWSRF or DWSRF program.

Step-By-Step Waiver Process

Application by Assistance Recipient

Each local entity that receives SRF water infrastructure financial assistance is required by section 436 of the Act to use American made iron and steel products in the construction of its project. However, the recipient may request a waiver. Until a waiver is granted by EPA, the AIS requirement stands, except as noted above with respect to municipalities covered by international agreements.

The waiver process begins with the SRF assistance recipient. In order to fulfill the AIS requirement, the assistance recipient must in good faith design the project (where applicable) and solicit bids for construction with American made iron and steel products. It is essential that the assistance recipient include the AIS terms in any request for proposals or solicitations for bids, and in all contracts (see Appendix 3 for sample construction contract language). The assistance recipient may receive a waiver at any point before, during, or after the bid process, if one or more of three conditions is met:

- 1. Applying the American Iron and Steel requirements of the Act would be inconsistent with the public interest;
- 2. Iron and steel products are not produced in the United States in sufficient and reasonably available quantities and of a satisfactory quality; or
- 3. Inclusion of iron and steel products produced in the United States will increase the cost of the overall project by more than 25 percent.

Proper and sufficient documentation must be provided by the assistance recipient. A checklist detailing the types of information required for a waiver to be processed is attached as Appendix 1.

Additionally, it is strongly encouraged that assistance recipients hold pre-bid conferences with potential bidders. A pre-bid conference can help to identify iron and steel products needed to complete the project as described in the plans and specifications that may not be available from domestic sources. It may also identify the need to seek a waiver prior to bid, and can help inform the recipient on compliance options.

In order to apply for a project waiver, the assistance recipient should email the request in the form of a Word document (.doc) to the State SRF program. It is strongly recommended that the State designate a single person for all AIS communications. The State SRF designee will review the application for the waiver and determine whether the necessary information has been included. Once the waiver application is complete, the State designee will forward the application to either of two email addresses. For CWSRF waiver requests, please send the application to: cwsrfwaiver@epa.gov. For DWSRF waiver requests, please send the application to: dwsrfwaiver@epa.gov.

Evaluation by EPA

After receiving an application for waiver of the AIS requirements, EPA Headquarters will publish the request on its website for 15 days and receive informal comment. EPA Headquarters will then use the checklist in Appendix 2 to determine whether the application properly and adequately documents and justifies the statutory basis cited for the waiver – that it is quantitatively and qualitatively sufficient – and to determine whether or not to grant the waiver.

In the event that EPA finds that adequate documentation and justification has been submitted, the Administrator may grant a waiver to the assistance recipient. EPA will notify the State designee that a waiver request has been approved or denied as soon as such a decision has been made. Granting such a waiver is a three-step process:

- 1. Posting After receiving an application for a waiver, EPA is required to publish the application and all material submitted with the application on EPA's website for 15 days. During that period, the public will have the opportunity to review the request and provide informal comment to EPA. The website can be found at: http://water.epa.gov/grants_funding/aisrequirement.cfm
- 2. Evaluation After receiving an application for waiver of the AIS requirements, EPA Headquarters will use the checklist in Appendix 2 to determine whether the application properly and adequately documents and justifies the statutory basis cited for the waiver that it is quantitatively and qualitatively sufficient and to determine whether or not to grant the waiver.
- 3. Signature of waiver approval by the Administrator or another agency official with delegated authority As soon as the waiver is signed and dated, EPA will notify the State SRF program, and post the signed waiver on our website. The assistance recipient should keep a copy of the signed waiver in its project files.

Public Interest Waivers

EPA has the authority to issue public interest waivers. Evaluation of a public interest waiver request may be more complicated than that of other waiver requests so they may take more time than other waiver requests for a decision to be made. An example of a public interest waiver that might be issued could be for a community that has standardized on a particular type or manufacturer of a valve because of its performance to meet their specifications. Switching to an alternative valve may require staff to be trained on the new equipment and additional spare parts would need to be purchased and stocked, existing valves may need to be unnecessarily replaced, and portions of the system may need to be redesigned. Therefore, requiring the community to install an alternative valve would be inconsistent with public interest.

EPA also has the authority to issue a public interest waiver that covers categories of products that might apply to all projects.

EPA reserves the right to issue national waivers that may apply to particular classes of assistance recipients, particular classes of projects, or particular categories of iron or steel products. EPA may develop national or (US geographic) regional categorical waivers through the identification of similar circumstances in the detailed justifications presented to EPA in a waiver request or requests. EPA may issue a national waiver based on policy decisions regarding the public's interest or a determination that a particular item is not produced domestically in reasonably available quantities or of a sufficient quality. In such cases, EPA may determine it is necessary to issue a national waiver.

If you have any questions concerning the contents of this memorandum, you may contact us, or have your staff contact Jordan Dorfman, Attorney-Advisor, State Revolving Fund Branch, Municipal Support Division, at dorfman.jordan@epa.gov or (202) 564-0614 or Kiri Anderer, Environmental Engineer, Infrastructure Branch, Drinking Water Protection Division, at anderer.kirsten@epa.gov or (202) 564-3134.

Attachments

Appendix 1: Information Checklist for Waiver Request

The purpose of this checklist is to help ensure that all appropriate and necessary information is submitted to EPA. EPA recommends that States review this checklist carefully and provide all appropriate information to EPA. This checklist is for informational purposes only and does not need to be included as part of a waiver application.

Items	✓	Notes
General		
Waiver request includes the following information:		
 Description of the foreign and domestic construction materials 		
 Unit of measure 		
Quantity		
— Price		
 Time of delivery or availability 		
 Location of the construction project 		
 Name and address of the proposed supplier 		
 A detailed justification for the use of foreign construction materials 		
Waiver request was submitted according to the instructions in the memorandum		
 Assistance recipient made a good faith effort to solicit bids for domestic iron and steel products, as demonstrated by language in 		
requests for proposals, contracts, and communications with the prime contractor		
Cost Waiver Requests		
Waiver request includes the following information:		
 Comparison of overall cost of project with domestic iron and steel products to overall cost of project with foreign iron and 		
steel products		
 Relevant excerpts from the bid documents used by the contractors to complete the comparison 		
 Supporting documentation indicating that the contractor made a reasonable survey of the market, such as a description of the 		
process for identifying suppliers and a list of contacted suppliers		
Availability Waiver Requests		
 Waiver request includes the following supporting documentation necessary to demonstrate the availability, quantity, and/or quality of the materials for which the waiver is requested: 		
 Supplier information or pricing information from a reasonable number of domestic suppliers indicating availability/delivery date for construction materials 		
 Documentation of the assistance recipient's efforts to find available domestic sources, such as a description of the process for identifying suppliers and a list of contacted suppliers. 		
Project schedule		
 Relevant excerpts from project plans, specifications, and permits indicating the required quantity and quality of construction 		
materials		
Waiver request includes a statement from the prime contractor and/or supplier confirming the non-availability of the domestic		
construction materials for which the waiver is sought		
Has the State received other waiver requests for the materials described in this waiver request, for comparable projects?		

Appendix 2: HQ Review Checklist for Waiver Request

Instructions: To be completed by EPA. Review all waiver requests using the questions in the checklist, and mark the appropriate box as Yes, No or N/A. Marks that fall inside the shaded boxes may be grounds for denying the waiver. If none of your review markings fall into a shaded box, the waiver is eligible for approval if it indicates that one or more of the following conditions applies to the domestic product for which the waiver is sought:

- 1. The iron and/or steel products are not produced in the United States in sufficient and reasonably available quantities and of a satisfactory quality.
- 2. The inclusion of iron and/or steel products produced in the United States will increase the cost of the overall project by more than 25 percent.

Review Items	Yes	No	N/A	Comments
Cost Waiver Requests				
Does the waiver request include the following information?				
 Comparison of overall cost of project with domestic iron and steel products to overall cost of project with foreign iron and steel products 				
 Relevant excerpts from the bid documents used by the contractors to complete the comparison 				
 A sufficient number of bid documents or pricing information from domestic sources to constitute a reasonable survey of the market 				
• Does the Total Domestic Project exceed the Total Foreign Project Cost by more than 25%?				
Availability Waiver Requests				
 Does the waiver request include supporting documentation sufficient to show the availability, quantity, and/or quality of the iron and/or steel product for which the waiver is requested? Supplier information or other documentation indicating availability/delivery date for materials Project schedule Relevant excerpts from project plans, specifications, and permits indicating the required quantity and quality of materials 				
Does supporting documentation provide sufficient evidence that the contractors made a reasonable effort to locate domestic suppliers of materials, such as a description of the process for identifying suppliers and a list of contacted suppliers?				
Based on the materials delivery/availability date indicated in the supporting documentation, will the materials be unavailable when they are needed according to the project schedule? (By item, list schedule date and domestic delivery quote date or other relevant information)				
• Is EPA aware of any other evidence indicating the non-availability of the materials for which the waiver is requested? Examples include:				
 Multiple waiver requests for the materials described in this waiver request, for comparable projects in the same State Multiple waiver requests for the materials described in this waiver request, for comparable projects in other States Correspondence with construction trade associations indicating the non-availability of the materials Are the available domestic materials indicated in the bid documents of inadequate quality compared those required by the 				
project plans, specifications, and/or permits?				

Appendix 3: Example Loan Agreement Language

ALL ASSISTANCE AGREEMENT MUST HAVE A CLAUSE REQUIRING COMPLIANCE WITH THE AIS REQUIREMENT. THIS IS AN EXAMPLE OF WHAT COULD BE INCLUDED IN SRF ASSISTANCE AGREEMENTS. EPA MAKES NO CLAIMS REGARDING THE LEGALITY OF THIS CLAUSE WITH RESPECT TO STATE LAW:

Comply with all federal requirements applicable to the Loan (including those imposed by the 2014 Appropriations Act and related SRF Policy Guidelines) which the Participant understands includes, among other, requirements that all of the iron and steel products used in the Project are to be produced in the United States ("American Iron and Steel Requirement") unless (i) the Participant has requested and obtained a waiver from the Agency pertaining to the Project or (ii) the Finance Authority has otherwise advised the Participant in writing that the American Iron and Steel Requirement is not applicable to the Project.

Comply with all record keeping and reporting requirements under the Clean Water Act/Safe Drinking Water Act, including any reports required by a Federal agency or the Finance Authority such as performance indicators of program deliverables, information on costs and project progress. The Participant understands that (i) each contract and subcontract related to the Project is subject to audit by appropriate federal and state entities and (ii) failure to comply with the Clean Water Act/Safe Drinking Water Act and this Agreement may be a default hereunder that results in a repayment of the Loan in advance of the maturity of the Bonds and/or other remedial actions.

Appendix 4: Sample Construction Contract Language

ALL CONTRACTS MUST HAVE A CLAUSE REQUIRING COMPLIANCE WITH THE AIS REQUIREMENT. THIS IS AN EXAMPLE OF WHAT COULD BE INCLUDED IN ALL CONTRACTS IN PROJECTS THAT USE SRF FUNDS. EPA MAKES NO CLAIMS REGARDING THE LEGALITY OF THIS CLAUSE WITH RESPECT TO STATE OR LOCAL LAW:

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

Appendix 5: Sample Certifications

compliance. Documentation must be provided on company letterhead.
Date
Company Name
Company Address
City, State Zip
Subject: American Iron and Steel Step Certification for Project (XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

The following information is provided as a sample letter of **step** certification for AIS

I, (company representative), certify that the (melting, bending, coating, galvanizing, cutting, etc.) process for (manufacturing or fabricating) the following products and/or materials shipped or provided for the subject project is in full compliance with the American Iron and Steel requirement as mandated in EPA's State Revolving Fund Programs.

Item, Products and/or Materials:

- 1. Xxxx
- 2. Xxxx
- 3. Xxxx

Such process took place at the following location:

If any of the above compliance statements change while providing material to this project we will immediately notify the prime contractor and the engineer.

Signed by company representative

The following information is provided as a sam	ple letter of certification for AIS compliance.
Documentation must be provided on company l	etterhead.

Date

Company Name

Company Address

City, State Zip

I, (company representative), certify that the following products and/or materials shipped/provided to the subject project are in full compliance with the American Iron and Steel requirement as mandated in EPA's State Revolving Fund Programs.

Item, Products and/or Materials:

- 1. Xxxx
- 2. Xxxx
- 3. Xxxx

Such process took place at the following location:

If any of the above compliance statements change while providing material to this project we will immediately notify the prime contractor and the engineer.

Signed by company representative



SECTION 03040

SELECTIVE SITE DEMOLITION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

- 1. Demolition and removal of pavements, curbs and gutters, designated site structures, utilities and piping, site signs, and landscaping.
- 2. Disconnecting and capping or removal of identified utilities.
- 3. Filling voids in subgrade created as a result of removals or demolition.
- 4. Disposal of demolished materials.
- B. Related Documents: The Contract Documents, as defined in Section 01010 Summary of Work, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in the following Documents.

C. Related Sections:

- 1. Section 01380 Environmental Protection
- 2. Section 03100 Site Clearing
- 3. Section 03200 Earth Moving

1.2 QUALITY ASSURANCE

A. Regulatory Requirements:

- 1. Conform to applicable local and state codes for demolition, safety of adjacent buildings and structures, dust control and runoff control.
- 2. Obtain required permits and licenses from authorities having jurisdiction. Pay associated fees including disposal charges.
- 3. Notify affected utility companies before starting work and comply with utility company requirements.
- 4. Do not close or obstruct roadways, sidewalks or fire hydrants without permits.
- 5. Barricade and mark hazards as necessary.
- 6. Conform to applicable regulatory procedures when discovering hazardous or contaminated materials. Notify Owner immediately upon discovery of hazardous or contaminated materials. Do not commence removals, remediation, or abatement without authorization from Owner.

PART 2 - PRODUCTS

2.1 FILL MATERIALS

A. Refer to in Section 03200 – Earth Moving.

03040-1

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Execution: Verification of existing conditions before starting work.
- B. Site Verification of Conditions: Verify that field measurements, surfaces, substrates, and conditions are as required, and ready to receive Work.
 - 1. Locate existing utilities as specified in Section 03200 Earth Moving.
 - 2. Verify:
 - a. Site utilities to be removed.
 - b. Site utilities to be capped, filled (if applicable), and remain in place.
 - c. Existing utilities to remain active during this scope of work
- C. Report in writing to Contracting Officer prevailing conditions that will adversely affect satisfactory execution of the Work of this Section. Do not proceed with Work until unsatisfactory conditions have been corrected.
- D. By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to the Owner.

3.2 PREPARATION

- A. Provide, erect, and maintain erosion control devices, dust control measures, temporary barriers, and security devices at locations indicated on Drawings and as specified in the Contract Documents.
- B. Protect appurtenances and structures which are not indicated to be demolished. Repair damage caused by demolition operations at no additional cost to Owner.
- C. Prevent movement or settlement of adjacent structures. Provide bracing and shoring as required.
- D. Mark location of utilities. Protect and maintain, in safe and operable condition, utilities to remain. Provide temporary services during interruptions to existing utilities acceptable to governing authorities and the Owner.
- E. Clear areas around items and structures indicated to be demolished as specified in Section 03100
 Site Clearing.

3.3 CONSTRUCTION

- A. Demolition Requirements:
 - 1. Conduct demolition to minimize interference with adjacent structures or pavements.
 - 2. Stop operations immediately if adjacent structures appear to be in danger. Notify Owner immediately. Do not resume operations until directed by Owner.
 - 3. Conduct operations with minimum interference to public or private access. Maintain access and egress at all times.

03040-2

- 4. Obtain written permission from Owner when demolition equipment will traverse, infringe upon, or limit access to their facilities that are to remain in operation during the completion of this scope of work.
- 5. Sprinkle soil and demolition work area with water to minimize dust. Provide hoses and water connections for this purpose.
- 6. Comply with governing regulations pertaining to environmental protection.
- 7. Clean adjacent structures and improvements of dust, dirt, and debris caused by demolition operations. Return adjacent areas to condition existing prior to start of work.

B. Demolition:

1. Disconnect and remove designated utilities, and support utilities to remain within excavation areas.

C. Filling Voids:

- 1. Completely fill below grade areas and voids existing or resulting from demolition or removal of structures (pits, wells, cisterns, etc.) using approved select fill materials consisting of stone, gravel, and sand free from debris, trash, frozen materials, roots, and other organic matter.
- 2. Remove standing water, frost, frozen, or unsuitable material, trash, and debris from areas to be filled before fill placement.
- 3. Place fill materials in horizontal layers and compact each layer at optimum moisture content of fill material to proposed density as specified in Section 03200 Earth Moving.
- 4. Grade surface to match adjacent grades and to provide flow of surface drainage after fill placement and compaction.

D. Demolition and Disposal of Asbestos Containing Pipe Materials and Insulation:

- 1. The Contractor shall anticipate asbestos containing pipe materials to be present within the work area, specifically but not limited to, the municipal water service.
- 2. The Contractor shall remove and dispose of all asbestos containing pipe material in accordance with the United States Environmental Protection Agency, the Rhode Island Department of Health, the Rhode Island Department of Environmental Management, and other local, state, and federal regulations applicable to this work.
- 3. The Contractor shall provide two copies of the Waste Shipping Record (WSR), signed by the owner or operator of the Owner pre-approved disposal facility, to the Owner upon completion of the waste disposal.

END OF SECTION

SECTION 03100

SITE CLEARING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

- 1. Cleaning site of debris, grass, trees and other plant life in preparation for site or building excavation Work.
- 2. Protection of existing structures, trees or vegetation indicated to remain.
- 3. Stripping topsoil from areas indicated.
- B. Related Documents: The Contract Documents, as defined in Section 01010 Summary of Work, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other Documents.

C. Related Sections:

- 1. Section 01380 Environmental Protection
- 2. Section 01570 Traffic Controls
- 3. Section 03040 Selective Site Demolition
- 4. Section 03200 Earth Moving
- 5. Section 03800 Erosion and Sediment Controls

1.2 QUALITY ASSURANCE

A. Regulatory Requirements:

- 1. Provide temporary erosion control systems as indicated on Drawings or as directed by Owner's Representative to protect adjacent properties and water resources from erosion and sedimentation.
- 2. CWA (1972) and WQA (1987) Requirements:
 - a. Provide storm water management in accordance with NPDES permit, Soil Erosion and Sediment Control (SESC) and for any enforcement action taken or imposed by Federal or State agencies, including cost of fines, construction delays and remedial actions resulting from failure to comply with all provisions.
 - b. The Contractor shall prepare SESC reports, weekly, in accordance with the SESC provided in the Contract Documents. The report shall be submitted to the WSA and Engineer monthly with the payment requisition.
 - c. The Contractor shall keep the SESC on site and make available for inspection by appropriate authority having jurisdiction at any time.

1.3 PROJECT CONDITIONS OR SITE CONDITIONS

A. Existing Conditions:

1. Notify the Engineer of variations to conditions or discrepancies in actual site conditions prior to start of site preparation Work.

- 2. Traffic: Conduct operations and removal of debris with minimum interference to roads, streets, walks, and other adjacent facilities. Do not close or obstruct streets, walks or other facilities without permission from authorities having jurisdiction.
- 3. Protections: Provide protection for safe passage of persons around area of site preparation. Take precautions and conduct operations to prevent injury to adjacent buildings, structures, other facilities, and persons.
 - a. Provide interior and exterior shoring, bracing, or support to prevent movement, settlement or collapse of structures to be demolished and adjacent facilities to remain.

PART 2 - PRODUCTS

(Not used)

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Execution: Verification of existing conditions before starting work.
- B. Verification of Conditions: Verify that field measurements, surfaces, substrates and conditions are as required, and ready to receive Work.
 - 1. Locate existing utilities as required.
 - 2. Verify that survey benchmark and intended elevations for the Work are as indicated and are not located in an area that may be damaged.
 - 3. Verify that existing plant life and clearing limits are clearly tagged, identified and marked in such a manner as to insure their safety throughout construction operations.
- C. Report in writing to the Engineer prevailing conditions that will adversely affect satisfactory execution of the Work of this Section. Do not proceed with Work until unsatisfactory conditions have been corrected.
- D. By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to the Owner.

3.2 PREPARATION

A. Provide temporary erosion control systems as indicated on Drawings or as directed by the Engineer to protect project site and adjacent properties and water resources from erosion and sedimentation.

3.3 CLEARING

- A. Clear areas required for access to site and execution of Work.
- B. Remove trees, shrubs, grass, other vegetation, improvements, or obstructions interfering with installation of Work as indicated on Drawings. Removal includes digging out stumps and roots. Fill depressions caused by clearing and grubbing operations to subgrade elevation. Prevent water ponding. Place suitable fill material in horizontal layers not exceeding 8 inches loose depth, and compact as specified herein and in Section 03200 Earth Moving.

- C. Remove grass, trees, plant life, stumps and all other construction debris from site.
 - 1. Collect, recycle, reuse, and dispose of demolished materials as specified in Section 01380 Environmental Protection and as approved by the Owner and/or Engineer.

3.3 REMOVAL

- A. Remove debris, rock, extracted plant life, paving, curbs, and other structures indicated on Drawings as specified in the Contract Documents.
 - 1. Collect, recycle, reuse, and dispose of demolished materials as specified in Section 01380 Environmental Procedures and as approved by the Owner and/or Engineer.

3.4 PROTECTION

- A. Protect existing streets, structures, and utilities as specified in Section 03200 Earth Moving.
- B. Protect trees, plant growth, and features indicated to remain, including but not limited to protection of natural resources as specified in Section 01380 Environmental Procedures and as approved by the Owner and/or Engineer.

END OF SECTION

SECTION 03200

EARTH MOVING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Preparation of subgrade for pavements, and other site work.
 - 2. Rough grading.
 - 3. Excavation for utilities.
- B. Related Documents: The Contract Documents, as defined in Section 01010 Summary of Work, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other Documents.
- C. Related Sections:
 - 1. Section 01380 Environmental Protection
 - 2. Section 03040 Selective Site Demolition
 - 3. Section 03100 Site Clearing
 - 4. Section 03350 Excavation and Fill
 - 5. Section 03380 Rock Excavation
 - 6. Section 03800 Erosion and Sediment Controls

1.2 REFERENCES

- A. American Society for Testing and Materials (ASTM):
 - 1. ASTM C 136 Method for Sieve Analysis of Fine and Course Aggregates.
 - 2. ASTM D 698 Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort.
 - 3. ASTM D 1556 Test Method for Density of Soil in Place by the Sand-Cone Method.
 - 4. ASTM D 1557 Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort.
 - 5. ASTM D 2167 Test Method for Density and Unit Weight of Soil In-Place by the Rubber Balloon Method.
 - 6. ASTM D 2487 Classification of Soils for Engineering Purposes (Unified Soil Classification System).
 - 7. ASTM D 2922 Test Methods for Density of Soil and Soil- Aggregate in Place by Nuclear Methods (Shallow Depth).
 - 8. ASTM D 3017 Test Method for Moisture Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth)
 - 9. STM D 4318 Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.
- B. American Association of State Highway and Transportation Officials (AASHTO):
 - 1. AASHTO T 88 Particle Size Analysis of Soils

1.3 SUBMITTALS

A. Submittal Procedures

- 1. Shop Drawings:
 - a. Submit drawings or details indicating proposed alternate earthwork procedures or proposed procedures not indicated in Contract Documents.
- 2. Assurance/Control Submittals:
 - a. Material Source: Submit name of imported materials suppliers. Provide materials from same source throughout the Work. Change of source requires the Engineers approval.
 - b. Test Reports: Submit the following reports directly to the Engineer from Testing Laboratory, with copy to Contractor.
 - i. Test reports on borrow material.
 - ii. Field density test reports.
 - iii. Optimum moisture-maximum density curve for each type of soil encountered.
 - iv. Report of actual unconfined compressive strength and bearing tests/results for each strata tested. Give "three-dimensional" description of each test location.
 - c. Certificates: Gradation and certification of aggregate material for Testing Laboratory review.
 - d. Qualification Documentation: Submit earthwork company documentation of experience indicating compliance with specified qualification requirements.

1.4 QUALITY ASSURANCE

- A. Regulatory Requirements: Perform earthwork in accordance with applicable requirements of governing authorities having jurisdiction.
- B. Pre-Installation Meetings:
 - 1. Convene a pre-installation meeting one week prior to commencing Work of this Section.
 - 2. Require attendance of parties directly affecting Work of this Section.
 - 3. Review conditions of earthwork operations, earthwork procedures and coordination with related Work.
 - 4. Agenda:
 - a. Tour, inspect, and discuss conditions of existing soils and soil substrates.
 - b. Review dust control measures and their requirements.
 - c. Review required submittals, both completed and yet to be completed.
 - d. Review Survey and Civil site work Drawings.
 - e. Approve proposed earthwork equipment.
 - f. Approve excess material dump location.
 - g. Approve import material storage location.
 - h. Review and finalize construction schedule related to earthwork and verify availability of materials, personnel, equipment, and facilities needed to make progress and avoid delays.
 - i. Review required inspections, testing, certifying, and material usage accounting procedures.
 - j. Review weather and forecasted weather conditions, and procedures for coping with unfavorable conditions.
 - k. Review safety precautions relating to earthwork operations.
 - 1. Review environmental procedures.

1.5 PROJECT CONDITIONS OR SITE CONDITIONS

A. Existing Conditions:

- 1. Geotechnical Data:
 - a. Soils boring logs and Geo-technical Report are provided in the Appendix of the Contract Documents.
- 2. Classification of Excavations: Contractor acknowledges that Contractor has investigated project site to determine type, quantity, quality, and character of excavation work to be performed. Consider excavation as unclassified excavation, except where Rock Excavation is required. Rock Excavation criteria is as follows:
 - a. Rock Excavation not indicated in Report:
 - i. Notify the Engineer immediately, and in writing, prior to start of Rock Excavation operations.
 - ii. The Engineer will visit Project Site, verify requirement for Rock Excavation, determine estimated quantity Rock Excavation required, and provide Contractor written authorization to proceed.
 - iii. The Engineer will verify measurements and quantities of actual Rock Excavation required and make adjustments to Contract as required.
 - b. Rock excavation specified in the Contract Documents.
- 3. Existing Utilities: Contact local utility companies and make arrangements to obtain utility company location and marking service prior to start of earthwork operations.
 - a. Locate existing underground utilities in areas of Work. If utilities are to remain in place, provide means of support and protection during earthwork operations.
 - i. The Contractor shall conduct Test Pits and locate existing underground utilities at locations to assure that no conflict with work of this Contract will occur and required clearance is available to prevent damage to existing utilities.
 - ii. Test pits shall be conducted at a minimum 10 days before start of excavation or underground work.
 - iii. Prior to performing test pits, the location shall be cleared and approved by the Engineer and Archaeologist.
 - b. Should uncharted, or incorrectly charted, piping or other utilities be encountered during excavation, consult utility company and the Engineer immediately for directions.
 - c. Coordinate with the Engineer and utility companies to keep existing utility services and facilities in operation.
 - d. Repair damaged utilities to satisfaction of utility company, at no additional cost to the Owner
 - e. Do not interrupt existing utilities serving facilities occupied and used by the Owner or others, during occupied hours, except when permitted in writing by the Engineer and then only after acceptable temporary utility services have been provided and approved by the Engineer.
 - f. Demolish and completely remove from site existing underground utilities indicated on Drawings to be removed. Coordinate with utility companies for shut-off of services if lines are active.

PART 2 - PRODUCTS

- A. Aggregate: Approved by Testing Laboratory and the Engineer.
 - 1. Common Borrow shall be in accordance with the Rhode Island Standard Specifications for Road and Bridge Construction, Latest Edition. Common borrow shall be gravelly in nature. Boulders (retained on a 3-inch sieve) up to 9 inches in diameter and not exceeding three-quarters of the thickness of horizontal layers placed after compaction. These sizes are not

- included in the analysis for gradation. The material shall not contain more than 17 percent by weight passing the No. 200.
- 2. Gravel Borrow shall be in accordance with the Rhode Island Standard Specifications for Road and Bridge Construction, Latest Edition. Gravel Borrow shall consist of bank run sand and gravel or plant- processed, crushed or uncrushed gravel with fine aggregate added as filler. Alternatively, Gravel Borrow may consist of selected materials which have been reclaimed from within project limits, are proportioned and processed to produce granular material for reuse as Gravel Borrow within the source project limits. Gravel Borrow, whether consisting of bank run or plant processed sand and gravel, or reclaimed and processed granular material, shall consist of sound, durable particles free from loam, clay, organic soil, vegetative matter, soft and elongate particles.

Gravel Borrow - Bank Run

SIEVE SIZE	PERCENT PASSING
3 inch	60-100
1/2 inch	50 to 85
3/8 inch	45 to 80
No. 4	40 to 75
No. 40	0 to 45
No. 200	0 to 10

Gravel Borrow - Processed

PERCENT PASSING
100
70 to 100
50 to 85
30 to 55
8 to 25
2 to 10

3. Crushed Stone shall be in accordance with the Rhode Island Standard Specifications for Road and Bridge Construction, Latest Edition.

Crushed Stone

SIEVE SIZE	PERCENT PASSING
2 inch	100
1 1/2 inch	90 to 100
1 inch	30 to 55
3/4 inch	0 to 25
1/2 inch	0 to 10
No. 100	0 to 1

4. Sand Bedding: Natural river or bank sand; poorly graded, washed; free of silt, clay, loam, friable or soluble materials, and organic matter; graded in accordance with ASTM D 2487.

Sand Bedding

SIEVE SIZE PERCENT PASSING 03200- 4

No. 4	100
No. 14	10 to 100
No. 50	5 to 90
No. 100	4 to 30
No. 200	0

5. Riprap shall be Type R-3 in accordance with the Rhode Island Standard Specifications for Road and Bridge Construction, Latest Edition.

Riprap

SIEVE SIZE	PERCENT PASSING
8 inches	100
4 inch	0 to 50
2 inch	0 to 15

- B. Filter/Drainage Fabrics:
 - 1. Mirafi 140N or approved equal.
- 2.2 SOURCE QUALITY CONTROL
 - A. Quality Requirements: Testing Laboratory services.
 - B. Testing and Analysis:
 - 1. Soil: Perform in accordance with ASTM D 698, ASTM D 1557, ASTM D 2167, ASTM D 2922, and ASTM D 3017.
 - 2. Aggregate: Perform in accordance with ASTM D 698, ASTM D 1557, ASTM D 2167, ASTM D 2922, ASTM D 3017, ASTM D 4318, and ASTM C 136.
 - C. If tests indicate materials do not meet specified requirements, change material and retest.
 - D. Provide materials from same source throughout the Work.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Execution: Verification of existing conditions before starting work.
- B. Verification of Conditions: Verify that field measurements, surfaces, substrates and conditions are as required, and ready to for earthwork operations to begin.
 - 1. Verify that existing site soils and soil conditions encountered are as indicated in the Geotechnical Report.
 - 2. Verify quantity and type of each soil material before start of material installation.
 - 3. Backfilling:
 - a. Verify imported fill and stockpiled fill to be reused is approved.

- b. Verify trenches to be backfilled are free of debris, snow, ice, or water, and ground surfaces are not frozen.
- C. Report in writing to the Engineer prevailing conditions that will adversely affect satisfactory execution of the Work of this Section. Do not proceed with Work until unsatisfactory conditions have been corrected.
- D. By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to the Owner.

3.2 PREPARATION

- A. Clear site as specified in Section 03100 Site Clearing.
- B. Identify required lines, elevations, levels, contours, grades, and datum necessary to perform earthwork operations as indicated on Drawings.
- C. Examine Project Site with the Engineer before start of earthwork operations. Identify areas and prepare to brace or shore areas of adjacent property subject to rotation, slumping, or cave-in to prevent dislocation of adjacent soil, pavement, utilities, structures, or other items to remain.
- D. Verify that survey benchmark and intended elevations for Work are as indicated on Drawings. Short form contour designations are intended to be a continuing of the long form bench mark.
- E. Locate, identify, and protect existing utilities to remain and previously installed utilities that may be damaged by construction operations.
 - 1. Notify the Engineer and utility company immediately of utilities, not indicated on Drawings, encountered
 - 2. Maintain existing utilities, active utilities, and drainage systems in operating condition.
 - 3. Comply with utility company requirements and directions of the Engineer to keep utilities in operation.
 - 4. Repair damage to utilities as directed by the Engineer.
- F. Protect plant life, lawns, fences, existing structures, sidewalks, paving and curbs from earthwork operations, excavating equipment, and vehicular traffic.
- G. Protect benchmarks, property corners, and other survey monuments from damage or displacement. Where markers are required to be removed, provide removal and reinstallation by licensed land surveyor licensed in State where project is located.
- H. Remove material encountered in grading operations that is unsuitable for backfilling or subgrade purposes as determined by Testing Laboratory and as directed by the Engineer. Dispose of materials off-site in an approved manner in accordance with requirements of authorities having jurisdiction.

3.3 EXCAVATION FOR FILLING AND GRADING

A. Provide dewatering, drainage, and ground water management to control moisture of soils when performing grading operations during periods of wet weather.

- B. Shore, brace, and drain excavations to maintain excavations safe, secure, and free of water at all times.
- C. Provide protection for workers within trench areas in accordance with local, State, and Federal Occupational Safety and Health requirements and regulations.
- D. Unacceptable Fill Material for Backfill: Excavated material containing rock or stone greater than 6 inches in largest dimension.

E. Acceptable Fill Material:

- 1. Rock or stone less than 6 inches in largest dimension as fill to within 24 inches of surface of proposed subgrade when mixed with suitable material.
- 2. Rock or stone less than 2 inches in largest dimension mixed with suitable material as fill within the upper 24 inches of proposed subgrade.

3.4 FILLING AND SUBGRADE PREPARATION

- A. Fill areas to contours and elevations as indicated on Drawings with materials specified herein.
- B. Place fill in continuous lifts as specified herein.
- C. Refer to Section 03350 Excavation and Fill, for filling requirements for structures, utilities, and pavements.
- D. Areas Exposed by Excavation or Stripping:
 - 1. Compact to minimum 95 percent optimum density in accordance with ASTM D 698 at minimum moisture content 1 percent below and maximum 3 percent above optimum moisture content.
 - 2. Proofroll to detect any areas of insufficient compaction by making minimum of 2 complete passes with fully-loaded tandem-axle dump truck, or Owner approved equivalent, in each of two perpendicular directions under supervision and direction of Testing Laboratory and the Owner.
 - 3. Excavate and re-compact areas failing to meet specified requirements.

E. Fill Material Placement:

1. Place in 12-inch maximum lifts compacted minimum 95 percent optimum density in accordance with ASTM D 698 at minimum moisture content of 1 percent below and maximum moisture content 3 percent above optimum moisture content.

3.5 MAINTENANCE OF SUBGRADE

- A. Verify finished subgrades for conformance to elevations as indicated on Drawings and for specified conditions for subgrade.
- B. Remove areas of finished subgrade with compaction density below specified density to depth required as directed by Testing Laboratory and Engineer. Fill removed areas and compact to specified compaction density

3.6 FINISH GRADING

- A. Grade areas other than paved areas to finish grade elevations or contours as indicated on Drawings including the following:
 - Excavated areas.
 - 2. Filled and transition areas.
 - 3. Landscaped areas.
- B. Provide finish graded areas uniform and smooth, free from rocks, debris, or irregular surface changes with maximum tolerance of 0.10 feet above or below established finish subgrade elevation. Provide graded surfaces sloping uniformly between indicated elevations.

3.7 FIELD QUALITY CONTROL

- A. Quality Requirements: Field testing and inspection.
- B. Excavation: Notify Testing Laboratory and the Owner for visual inspection, 48 hours prior to backfilling and other subsequent Work.
- C. Site Tests Quantity:
 - 1. As Determined by the Engineer.
- D. Site Tests Methods:
 - 1. Perform tests on each type of existing on-site or imported off-site material used for compacted fill.
 - a. Moisture and Density Relationship: ASTM D 698 or ASTM D 1557.
 - b. Mechanical Analysis: AASHTO T-88
 - c. Plasticity Index: ASTM D 4318
 - i. One optimum moisture-maximum density curve for each type of soil encountered.
 - ii. Report of actual unconfined compressive strength and bearing tests/results for each strata tested. Give "three-dimensional" description of each test location.
 - 2. Perform field density tests for in-place materials in accordance to one of the following standards:
 - a. Sand-Cone Method: ASTM D 1556
 - b. Balloon Method: ASTM D 2167
 - c. Nuclear Method: ASTM D 2922 (Method B-Direct Transmission)
- E. If tests indicate the Work does not meet specified requirements, remove Work, replace, compact, and retest at no additional cost to the Owner.

3.8 PROTECTION

A. Protect earthwork from damage by construction operations and erosion.

END OF SECTION

SECTION 03350

EXCAVATION AND BACKFILL

PART 1 – GENERAL

1.1 SUMMARY

- A. Includes all labor, materials and appliances, and perform all operations in connection with excavating and backfilling for and all related work incidental to the completion thereof, as shown on the drawings, complete, in strict accordance with the drawings and as specified herein. Section includes:
 - 1. Excavating and backfilling for structures and utilities,
 - 2. Pipe bedding,
 - 3. Compacting fill materials,
 - 4. Borings and casings under roads,
- B. Related Documents: The Contract Documents, as defined in Section 01010 Summary of Work, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other Documents.
- C. Related Sections:
 - 1. Section 03100 Site Clearing
 - 2. Section 03200 Earth Moving
 - 3. Section 03380 Rock Excavation
 - 4. Section 03750 Dewatering Project Wide

1.2 REFERENCES

- A. American Society for Testing and Materials (ASTM):
 - 1. ASTM D2922 Standard Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods
 - 2. ASTM D3017 Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods
- B. American Association of State Highway and Transportation Officials (AASHTO):
 - 1. AASHTO M 45 Aggregate for Masonry Mortar

1.3 SUBMITTALS

- A. Submittal Procedures: Procedures for submittals.
 - 1. Shop Drawings:
 - a. Submit drawings or details indicating proposed alternate earthwork procedures or proposed procedures not indicated in Contract Documents.
- B. Pre-construction Requirements for Backfilling
 - 1. Prior to construction operations, the Contractor shall submit a detailed outline of methods of compacting backfills for the following three areas.
 - a. Bottom of excavations to within three feet of finish grade
 - b. Top three feet of trench
 - c. Below all transverse utility/drain crossings.

03350 - 1

- 2. The outline shall be submitted in writing prior to the Pre-construction Conference. The methods outlined shall be subject to review and approval of the Engineer.
- 3. Upon approval of the Backfill methods, the Contractor shall have the document printed and available for review at all times during construction operations.
- C. Submittals required for Earth Retaining Systems, as specified herein.

1.4 PROJECT CONDITIONS OR SITE CONDITIONS

A. Reference Section 03200 – Earth Moving.

PART 2 - MATERIALS

2.1 SELECT MATERIAL

A. Select material of satisfactory quality and size shall be furnished to construct the stone bedding for all pipes except pressure sewer pipes, to replace unsuitable material excavated below grade, to bed the pipe in rock trench, to replace unauthorized excavation, for bedding under R-5 riprap, and elsewhere as shown by the Contract Drawings, or as directed by the Engineer. Selected material shall be commercial grade 3/4" crushed stone or "Filter Stone" as specified in Para. M.01.07 of the R.I. Standard Specifications for Road and Bridge Construction. All stone shall be suitably graded from the smallest to the largest particles; it shall be clean, hard, durable and free from dust, loam, clay or organic matter, it shall be washed or screened, or both, if required. All materials furnished under this clause shall be well compacted in place.

2.2 GRAVEL BORROW

A. It is expected that on some of the trenching and under paving work, gravel borrow will be required for replacing rock or other unsuitable material excavated from the project. The gravel shall be bankrun granular material or processed gravel consisting of clean gravel and coarse sand practically free from loam and conforming to the requirements of Para. M.01.02 and M. 01. 09 Table I, Col. 1a or 1b of the R.I. Standard Specifications as directed.

2.3 SAND BEDDING

- A. Sand material of satisfactory quality and size shall be furnished to construct the bedding for pressure sewer pipes. Sand shall conform to the requirements of AASHTO M 45 and the RI Standard Specifications for Road and Bridge Construction. All sand shall be clean, hard, and free from dust, loam, clay, or organic matter. All materials furnished under this clause shall be compacted in place to 95% modified proctor.
- B. Sand shall not be used to replace unsuitable material excavate below grade, to replace unauthorized excavation, or to bed the pipe in rock trench below normal depth. Select Material or Gravel Borrow shall be utilized in accordance with this Section.

PART 3 – EXECUTION

3.1 TRENCHES AND OTHER EXCAVATION

- A. The trenches and other excavations shall be of sufficient width and depth at all points to allow pipes to be laid, joints to be formed, and appurtenant construction to be built in the most thorough and workmanlike manner, and to allow for sheeting and shoring, pumping and draining, and for removing and replacing any material unsuitable for pipe foundations. The trenches and excavations shall be at least 18 inches but not greater than 36 inches wider than the outside dimensions of the structures they are to contain; trenches must be not unnecessarily wide so as to materially increase the load on the pipe resulting from backfill, or to damage any unnecessary paving. The bottoms of trenches and other excavations shall be excavated to lines and shapes satisfactory to the Engineer. Bottoms of trenches for lateral sewers, service connections and force mains shall be excavated to a depth of 6 inches below bottom of pipes and to a depth of 6 inches below concrete encasement at chimneys and pipe cradles to allow for the placement of selected material. No tunneling will be permitted in place of open trench construction unless especially authorized by the Engineer. Excavations adjacent to existing underground pipelines and other underground structures shall be dug by hand to insure against possible damage to such pipelines and structures. Excavation just above the bottom of structures shall be dug by hand so that the foundations of structures shall rest on undisturbed earth.
- B. Wherever the bottom of the trench is rock or boulders, it shall be excavated to dimensions indicated on the Plans and refilled to grade with well-compacted selected material. Wherever boulders or ledge rock are encountered in excavating for structures, such boulders or ledge rock shall be removed to a depth of 6 inches below grade and the space occupied by them shall be refilled to grade with well-compacted selected material. Selected material shall be as specified in this Section.
- C. As stated above, grade, or normal depth of excavation is 6 inches below the bottom of all lateral sewers; service connections; and force main pipes. Excavation is also 6 inches below precast or cast-in-place concrete masonry.
- D. The trenches shall be opened at such times and to such extent only as permitted by the Engineer. Roadway pavement in City streets having bituminous concrete pavement shall be cut prior to trench excavation. Pavement will be cut a minimum of 6 inches wider than the top of the trench excavation. All street paving, sidewalks, crosswalks, curbs, sods, shrubs, trees, and any other surface material affected by the work shall be carefully taken up and kept separate from "other excavated materials" and later reset as directed by the Engineer. Unless otherwise required or permitted by the Engineer, the "other excavated material" in highways may be placed in the roadway, subject to conditions of the permits granted for the work and provided ample room is left for traffic and a clear space of not less than 2 feet is left between the material and the edge of the trench, or provided that interference with business or with use of private property does not require otherwise. Excavated material shall be kept neatly trimmed along the line of work. The total length of open trench shall be as short as is practicable. Excavated material, if suitable, shall be used for embankments or backfill at the direction of the Engineer. It is expected that in order to keep certain streets and driveways open to traffic, a part or all of the excavated material in these streets and driveways will have to be removed and stored during the construction of the sewer lines and appurtenances in these streets and re-handled for use as backfill. Additional requirements regarding maintenance of travel are explained these Specifications.
- E. Side slopes of excavation shall be less than the angle of repose of the material excavated and shall be flat enough to prevent slides or cave-ins. Any excavation required as a result of slides or cave-ins shall be performed by the Contractor at his own expense.

F. The final trimming excavation, which is to be performed by hand, shall not commence until the ground has been thoroughly dewatered and the Contractor is ready to install the pipe or to construct the foundations of the various structures.

3.2 MISCELLANEOUS EARTH EXCAVATION

- A. Wherever required by the Engineer, the Contractor shall perform earth excavation and backfilling in addition to the excavation and backfilling needed to construct the work as required by the Plans.
- B. Utility test pits may be required to determine the location of existing utilities or for any other desired purpose. Test pits shall be conducted at the Contractor's discretion to identify potential obstructions including but not limited to: utilities and/or underground structures. The Contractor shall inform the Engineer prior to conducting test pits.
- C. The Engineer and Owner reserves the right to request test pits at select locations.

3.3 UNATHORIZED EXCAVATION

A. Defined as excavation removed below the grade shown on the Plans or that prescribed by the Engineer. All unauthorized excavations shall be restored as directed by the Engineer.

3.4 EARTH EXCAVATION BELOW GRADE

A. Wherever, in the opinion of the Engineer, the material at or below grade line is unsuitable for foundations, it shall be excavated to such additional depths and widths as directed by the Engineer and shall be refilled with well compacted selected material. Grade line for all pipes and masonry is 6 inches below the bottom of the pipe or masonry and 6 inches below concrete encasement at chimneys and pipe cradles.

3.5 EARTH RETAINING SYSTEMS

A. The Contractor shall furnish, put in place and maintain trench boxes, temporary sheet piling, temporary sheet piling with ground anchors; and soldier piles and lagging, at the locations where pipe and structures are to be installed. All earth retaining systems shall conform to Section 805 of the Rhode Island Standard Specifications. The Contractor shall conform to the following performance standards for the installation of pipe:

1. Performance Standards

- a. All earth retaining systems shall be designed by an engineer registered in the State of Rhode Island with the exception of OSHA approved trench boxes. Trench boxes may be approved by an engineer registered in the state the trench box was designed or manufactured. Structural computations shall be provided for earth retaining systems for the various depths of trench. Computations shall be submitted to the Engineer and the Authority for record, prior to the start of construction.
- b. The Contractor shall conform to the latest rules and regulations of OSHA for all construction work.
- c. Earth retaining systems shall be designed to prevent damage to adjacent pavements, utilities, properties, structures, and curbs; to prevent voids outside of the retaining system; to prevent settlement outside of the payment limits; and prevent any damage outside of the pay limits. Damage outside of the payment limits shall be repaired at the Contractors expense.

03350 - 4

- d. Retaining systems shall not be carried to a depth at manholes, such that it crosses the pipeline, it will bear upon the pipe. Special precautions shall be taken to guard against any damage or settlement to buildings, walls, utilities or other structures which are adjacent to the sewer.
- e. Designs placing earth retaining systems below the pipe spring line are permissible, but their removal shall not alter and/or impact installed pipe.
- f. The Contractor shall remove all earth retaining systems when the work is complete.
- 2. The Contractor shall be required to coordinate the relocation of overhead or underground utilities for the purpose of installing earth retaining systems. The Contractor shall coordinate his activities with all utility companies, the Engineer, and the Authority. Also, the Contractor, with the assistance of the Engineer and the Authority, shall be required to coordinate with local businesses and residences to plan utility service downtime. The Engineer and the Authority shall approve all utility relocation work.

3.6 PROTECTION AND REPAIR OF EXISTING UNDERGROUND STRUCTURES

- A. Wherever culverts, sewers, drains, manholes, catch basins, catch basin connections, water mains, valve chambers, utility tunnel, gas pipes, electric and telephone conduits, house service connections, or any other underground constructions are encountered in excavating, they shall be protected and firmly supported by the Contractor, at the Contractor's own expense, until the excavation is backfilled and the existing structures are made secure.
- B. The authority having charge of any particular underground structure shall be immediately notified of any damage to the structure and that authority shall order and supervise its repair.
- C. Broken water services shall not be spliced but shall be replaced from the main to the curb stop.

3.7 RECONSTRUCTION OF EXISTING UNDERGROUND STRUCTURES

- A. Unless otherwise indicated by the Plans, and if it shall become necessary in the opinion of the Engineer to move or reconstruct any water main, gas main, electric conduit, telephone conduit, any connections thereto, or any appurtenant structures, the work will be performed by the proper City Department or utility company owning same, and is not a part of this Contract.
- B. In case it shall become necessary, in the opinion of the Engineer, to reconstruct any underground structure encountered other than those above mentioned, the work shall be performed upon written order from the Engineer.
- C. Utility services are known to exist in all roadways and shall not be relocated for the convenience of excavation unless approved by the Engineer.

3.8 BACKFILLING

- A. Methods and Requirements:
 - 1. After the various pipelines and structures have been constructed, the space outside the walls of the structure and within the trenches, and other such areas shall be backfilled with select material to the limits shown on the Plans.
 - 2. Areas within the excavation that are beyond the limits of the select material shall be backfilled wherever possible with suitable material excavated for the construction of the various structures.

- 3. Excessively wet material must be adequately dried and dewatered before being used as backfill.
- 4. No backfilling will be allowed around the manholes or other masonry structures until the concrete or brick masonry has set sufficiently as determined by the Engineer.
- 5. All material for backfilling shall be free of roots, stumps, frost, organic soils or other deleterious material. Materials used for backfilling trenches shall be free of stone weighing over 50 pounds.
- 6. Backfill Requirements:
 - a. The trench shall be backfilled by hand around each pipe to a height of one half of the pipe diameter with sand bedding as the pipe is laid, unless concrete cradle backing is required for the pipe.
 - b. Sand bedding shall continue as backfill to a height of 6 inches above the pipe but may be placed by machine.
 - c. Sand bedding shall be placed evenly on both sides of the pipe and firmly compacted by suitable power tools or by other satisfactory methods. All the sand bedding shall be covered with geo-textile filter fabric as specified in the Contract Documents.
 - d. The remaining portion of the trench shall be backfilled with suitable excavated material and shall be compacted at the time of backfill as specified below. Backfill shall be placed in lifts no greater than 12 inches, by suitable power tools, ramming, or otherwise, in equally effective manner as approved by the Engineer.
 - e. On local streets trench backfill from the trench bottom to within three (3) feet of finish grade shall be compacted to 95% modified proctor and the remaining top three (3) feet of the trench backfill shall be compacted to 95% modified proctor.
 - f. On all state highways and selected local high use roadways, the entire trench shall be compacted to 95% modified proctor.
 - g. Maximum lifts shall be 12-inches.
 - h. If the backfill is compacted by jetting the stream shall be manually directed so that the backfill material shall be washed and jetted to leave as few voids as practical. Prior to jetting, all trenches may be excavated the full width and to a depth which will allow upon completion of the jetting the placement of the gravel paving base where required.
 - i. Any crusted over sections of the trench which remain after puddling and jetting shall be immediately broken down and the paving gravel placed where required.
 - j. The Contractor will be required to supply himself with water for jetting, and if obtained from the City of Warwick, Regulations of the City of Warwick with regard to procuring, using, and paying for water must be strictly complied with.
 - k. Backfill that is compacted by ramming, at least one rammer shall be provided to every three men backfilling. Power tampers shall exert a minimum blow of 250 foot-pounds per square foot of tamper face.
 - 1. Backfill around all structures appurtenant to the pipelines shall be placed and compacted as specified above for backfill around pipes.
 - m. No stones weighing over 50 pounds shall be backfilled into the trench.
 - n. Backfilling by mechanical equipment may be permitted if conditions warrant.
 - o. Special precautions shall be taken against undue damage to existing surface materials by mechanical equipment.
 - p. Unnecessary damage to such surface materials shall be repaired at the Contractor's expense.
 - q. Unless otherwise specifically required, all paving, sidewalks, crosswalks, curbs and gutters damaged by the work shall be built anew and all loam sods, shrubs, trees, and other surface material shall be replaced in good condition.

- r. In private property and elsewhere, if replacement of sods does not produce a satisfactory turf, the area shall be loamed, rolled, seeded and wetted to produce satisfactory results.
- s. Damage to trees shall be repaired by an experienced forester at the Contractor's expense.
- 7. Compacting by use of water will not generally be permitted between the period of December 1 to March 1.
- 8. All surplus or excess excavated materials of all types, including excavated pavement, not used for backfill or embankment shall be hauled from the site to an approved dry upland disposal area obtained by the Contractor.
- 9. The Engineer may direct the Contractor to backfill sewer pipe crossing under transite water mains with excavatable flowable concrete fill.

3.9 COMPACTION TESTING

- A. Testing shall conform to ASTM
- B. D2922 and ASTM D3017, nuclear methods.
- C. Field density tests shall be taken at the depths and intervals specified herein to insure compaction requirements are attained.
- D. Test locations shall be established at horizontal intervals that in the opinion of the Engineer represent the overall condition of the backfilled trenches.
- E. As conditions warrant, the Engineer may reduce or increase the interval as he feels necessary to properly monitor the backfilling/compaction operation.
- F. Two tests shall be taken at each test location. One test shall be taken at 5 feet above the pipe invert and a second test shall be taken at 2 feet below existing grade. The Engineer shall keep a log of all test results. If backfill is compacted by jetting or puddling the Contractor shall excavate pits at the test locations to the test levels as stated above for compaction testing. After testing, the pits shall be backfilled and compacted.
- G. Soil compaction testing and field density test shall be performed by a testing firm determined by the Authority.
- H. If tests show compaction requirements are not met, the Contractor shall continue his compaction effort until satisfactory results are attained.
- I. Continued nonconformance will result in the shutdown of excavation until the Contractor submits and receives approval of backfill methods to prevent nonconformance with backfill compaction requirements.

END OF SECTION

SECTION 03380

ROCK EXCAVATION

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Removal of identified and discovered rock during construction.
 - 2. Incorporating removed rock into fills and embankments.
- B. Related Documents: The Contract Documents, as defined in Section 01010 Summary of Work, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other Documents.
- C. Related Sections:
 - 1. Section 03200 Earth Moving
 - 2. Section 03350 Excavation and Fill
 - 3. Section 05812 Horizontal Directional Drilling

1.2 QUALITY ASSURANCE

- A. Regulatory Requirements:
 - 1. Perform rock removal in accordance with applicable requirements of governing authorities having jurisdiction.

1.3 SUBMITTALS

- A. The Contractor shall submit a 'Rock Excavation Plan' to the Engineer describing the processes for trenchless rock excavation by horizontal drilling and excavation at the jack and receiving areas, and for open cut rock excavation. The plan shall include but not be limited to: equipment, process, and handling methods. The Engineer's written approval is required prior to any rock excavation activities.
- B. All alternative methods from the original approved 'Rock Excavation Plan' shall receive written approval from the Engineer.

1.4 PROJECT CONDITIONS OR SITE CONDITIONS

- A. Environmental Requirements: Determine all environmental effects associated with proposed rock removal Work and safeguard those concerns as regulated by law and authorities having jurisdiction by approved methods.
- B. Explosives: Not permitted.

03380-1

BAYSIDE SEWER SYSTEM Date: 11/2019 ROCK EXCAVATION

C. Existing Conditions:

- 1. Geotechnical Data:
 - a Reports of Subsurface Investigation and data are not a part of Contract Documents.
 - b Soil and subsurface investigations were conducted at the site by an independent testing laboratory and a report with log of borings prepared. This report was obtained for the Owner's design use only.
 - c A copy of the report is provided by the Engineer and is made available for convenience of the Contractor.
 - d Soils investigation data is not warranted to indicate actual conditions. Owner and Architect/Engineer do not assume responsibility for variations in kind, depth, quantity and condition of soils; they disclaim responsibility for accuracy, true location, and extent of soils investigation that has been prepared by others; and they further disclaim responsibility for interpretation of that data by Contractor as in projecting soil bearing values, rock profiles, soil stability, and presence, level, and extent of underground water.
 - e Additional test borings and other exploratory operations may be made by Contractor at no additional cost to the Owner.
- 2. Immediately report any discrepancy between Contract Documents and amount and type of rock to be removed to the Engineer.

PART 2 - EXECUTION

2.1 EXAMINATION

- A. Execution: Verification of existing conditions before starting work.
- B. Verification of Conditions: Verify that field measurements, surfaces, substrates and conditions are as required, and ready to for rock excavation to begin.
- C. Report in writing to the Engineer prevailing conditions that will adversely affect satisfactory execution of the Work of this Section. Do not proceed with Work until unsatisfactory conditions have been corrected.
- D. By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to the Owner.

2.2 FIELD QUALITY CONTROL

- A. Quality Requirements: Field inspection.
- B. Inspection: The Engineer shall inspect bearing surfaces and cavities formed by removed rock prior to the installation of all structures and utilities.

2.3 ROCK EXCAVATION

- A. Perform rock excavation in a manner that will produce material of such size as to permit it being re-used in accordance with the Contract Documents. Rocks shall be removed as indicated on the Contract Drawings or at the instruction of the Engineer.
- B. Rock shall be removed to install the required system and all appurtenant construction. Remove loose or shattered rock, overhanging ledges and boulders which might dislodge.

2.4 ROCK EXCAVATION – TRENCHLESS

A. Trenchless rock excavation includes the removal of rock during the horizontal drilling operation as described in Section 05812.

2.5 ROCK EXCAVATION – TRENCHLESS AT OPERATING / RECEIVING PIT

- A. Trenchless rock excavation at the jack and receiving pits shall only be performed within the designated areas approved for construction, as indicated on the Contract Drawings.
- B. The Contractor shall remove rock from the designated area in accordance with the Mechanical Method described in this Specification.

2.6 ROCK EXCAVATION – OPEN CUT

- A. Open cut rock excavation shall be conducted only on the areas designated on the Contract Drawings and as directed by the Engineer.
- B. Rock Excavation Mechanical Method:
 - 1. Excavate for and remove rock by mechanical method. Drill holes and utilize expansive tools and wedges to fracture rock.
 - 2. Cut away rock at excavation bottom to form level bearing. Remove shaled layers to provide sound and unshattered base for foundations.
 - 3. In utility trenches, excavate to 6 inches below invert elevation of pipe and 24 inches wider than pipe diameter.
 - 4. Remove shaled layers to provide sound unshattered base for footings and foundations.
 - 5. Re-use excavated rock materials on-site in accordance with the Contract Documents.
 - 6. Remove excavated rock materials not re-used off-site.

END OF SECTION

SECTION 03750

DEWATERING PROJECT WIDE

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

- 1. Dewatering as necessary in excavations for all demolition and construction, within temporary earth retaining structures, utility construction, and for any and all other work requiring dewatering project wide.
- B. Related Documents: The Contract Documents, Section 01010 Summary of Work, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other Documents.

C. Related Sections:

- 1. 03040 Selective Site Demolition
- 2. 03350 Excavation and Fill
- 3. 03380 Rock Excavation

1.2 REFERENCES

- A. Section 203 of the Rhode Island Department of Transportation Standard Specifications for Road and Bridge Construction, 2010 Edition, all revisions.
- B. RIDEM Office of Water Resources, Groundwater Quality Rules dated June 2010, and all revisions.

1.3 SUBMITTALS

- A. The following submittals shall apply to dewatering and shall be made by the Contractor for review and approval by the Owner prior to the start of dewatering. The Contractor shall conform to all submittal requirements of the Contract, including submitting the information specified herein to the Owner.
 - 1. The Contractor shall submit the following information:
 - a. The Contractor's Designer shall be a Professional Engineer registered in the State of Rhode Island. The Contractor's Professional Engineer shall have a minimum of 10 years of relevant experience in designing dewatering systems.
 - b. The Contractor shall submit the proposed location of the dewatering equipment, the dewatering basin, and the dewatering system discharge outfall to the Owner for approval. A submittal is required for each dewatering system, dewatering basin, and dewatering system outfall location if dewatering is required in multiple locations. The Contractor shall not install dewatering equipment, the dewatering basin, or the discharge outfall until their respective locations are approved by the Owner.
 - c. Shop drawings showing the proposed types and details of the surface water control, dewatering system (including but not limited to well details, well screen openings, and

filter pack materials), the observation well locations, sedimentation tank and discharge systems. Complete back-up system as required in this document shall be included.

- i. The shop drawings shall include the arrangements, sizes, capacities, plan locations and depths of the proposed dewatering systems, a complete description of equipment and materials to be used and the procedure to be followed in installation, operation, maintenance and removal in relation to the proposed sequence of excavation, demolition, foundation construction and backfilling. The shop drawing shall also describe the standby equipment and standby power supply; and the proposed dewatering effluent discharge locations, and their relationship to sediment control facilities and water disposal points.
- d. The design and details of the on-site sedimentation control structures and associated piping, including calculations, supporting technical information, and a schedule for cleaning the sedimentation control structures.
- e. Design calculations documenting that the dewatering system can handle all seepage into the excavation and will prevent piping or boiling of the excavation subgrade.
- f. The anticipated peak and average dewatering rates.
- g. The name of the licensed Testing Agency performing the laboratory testing.
- h. The proposed methods for removing the dewatering system elements, including methods to ensure that no significant ground movements will occur as a result of extraction that could adversely impact any completed structures. If deemed necessary, the Contractor shall describe locations of, or conditions under which dewatering systems will be left in place, including proposed cutoff levels and methods for tremie grouting the wells or well points.

2. Assurance/Control Submittals:

- a. Samples
 - i. During dewatering and as required, the Contractor shall provide results of laboratory testing, monitoring, and inspection records dictated by the applicable permit requirements or conditions.
- b. The Contractor shall provide a one-week advance notice to the Owner prior to any discharge of dewatering effluent.

1.4 QUALITY ASSURANCE

A. Regulatory Requirements:

Provide, operate, maintain, and remove temporary sedimentation control structures to reduce concentrations of total suspended solids in the dewatering effluent in accordance with applicable permit requirements or as required by the Owner. All treated construction dewatering effluent shall comply with requirements of the applicable permits and shall be in accordance with all federal, state and local codes, ordinances, and regulations.

1.5 MAINTENANCE

A. The Contractor shall ensure the dewatering system is properly operating and maintained at all times.

PART 2 - EXECUTION

2.1 PREPARATION

- A. Design, provide, install, operate, maintain, and subsequently remove temporary dewatering systems that shall perform the following functions:
 - 1. Lower groundwater levels or hydrostatic pressure heads in the soils within open cut excavation limits to a minimum of at least 2 feet below excavation level.
 - 2. Maintain a dry and stable subgrade and/or work area and prevent piping, boiling or detrimental saturation of the excavation base.
 - 3. Divert surface water away from excavations and all other work areas on the project.
 - 4. Control and remove seepage, surface water, and precipitation in excavations and/or work areas.
 - 5. Prevent disturbance of adjacent structures due to the dewatering.
 - 6. Provide sedimentation control to reduce total suspended solids in effluent prior to discharge.
 - 7. Maintain construction-dewatering effluent in compliance with applicable permit requirements.

2.2 INSTALLATION

A. Design and Performance Criteria:

- 1. The methods of controlling water, inside and outside the work area being dewatered, are at the option of the Contractor who shall be solely responsible for the design, operation, performance, location, arrangement, and depth of any system or systems selected to accomplish the work. Equipment shall be of suitable size, capacity and type to perform dewatering and to maintain dry and stable working surfaces, and to pump, store, manage, treat and discharge the dewatering effluent.
- 2. The Contractor shall adapt and modify the dewatering and sedimentation treatment system(s) as required throughout the course of the work to meet the requirements of the work.
- 3. The Contractor shall maintain construction dewatering equipment, and subsurface drainage in an acceptable manner during the course of the work. The Contractor shall maintain site grades to direct surface runoff to collection points and shall prevent surface water from running or collecting over prepared subgrades, fill surfaces, or the work area being dewatered. The Contractor shall collect and discharge surface water, seepage, precipitation, groundwater and other water that enters work areas being dewatered. No standing water shall be allowed to accumulate in excavations or work areas being dewatered.
- 4. The Contractor shall install observation wells, as approved by the Owner, in order to monitor the effectiveness of the dewatering system.
- 5. The Contractor shall dewater to allow installation of temporary excavation support elements without loss of ground or unacceptable ground movements.
- 6. The Contractor shall minimize impacts to groundwater levels outside the site limits at all times during construction.
- 7. The Contractor shall dewater such that all construction and demolition is conducted "in-the-dry", unless otherwise stated. "In-the-dry" shall be construed to mean lower groundwater levels or hydrostatic pressure heads in the soils within the excavation limits to a minimum of at least 2 feet below excavation level. The excavation shall be without standing water or saturated conditions that may interfere with construction operations and the successful completion of the work.

03750-3

- 8. The Contractor shall take measures to prevent damage to properties, buildings or structures, utilities, and all other existing and newly constructed work.
- 9. The Contractor shall be aware that the subgrade likely consists of sand and gravelly sand which, given its high hydraulic conductivity (permeability), will impact the amount of seepage into the excavation. The Contractor shall include as part of their dewatering methods design calculations documenting that the selected dewatering system(s) can handle this seepage and prevent piping into the excavation.
- 10. The Contractor shall modify the system(s) at no additional cost to the State if, after installation and while in operation, it causes or threatens to cause damage to properties, buildings or structures, utilities, and all other existing or newly constructed work, or otherwise does not perform as required.
- 11. The Contractor shall repair damage to any utility, structure, and/or facility resulting directly or indirectly from dewatering activities, including inadequate performance of such systems, to the satisfaction of the Owner at no additional cost.
- 12. The Contractor shall manage construction dewatering effluent on-site provided that the on-site discharge of the effluent does not result in erosion and off-site surface runoff, damage any on-site construction, and does not spread contamination and/or increase levels of contamination on any portion of the site.
- 13. The Contractor shall include dewatering basins in the system design, and shall be responsible for implementing appropriate measures and/or using appropriate equipment to capture, remove, and dispose of suspended solids. The Contractor shall be responsible for providing a treatment system to effectively handle the expected flows.
- 14. The Contractor shall comply with all federal, state, and local codes, ordinances and regulations for disposal of all discharge water and for sediment control.
- 15. The Contractor shall maintain continuous and complete effectiveness of dewatering systems and surface water control 24 hours per day, 7 days per week at all times until no longer required.
- 16. The Contractor shall maintain and employ adequate back-up equipment, dewatering system components, and power in the case of equipment breakdown. The Contractor shall devise emergency procedures for maintaining continuous, uninterrupted dewatering operations. The Contractor shall regularly check the back-up equipment for proper operation at the start of the work and every week thereafter.

B. Demobilization:

- 1. The Contractor shall be responsible for demobilizing the dewatering system equipment and restoring the dewatering system location as required in the Contract Specifications and Plans.
- 2. The Contractor shall be responsible for abandoning dewatering wells and/or points in accordance with the RIDEM's Groundwater Quality regulations requirements. The Contractor shall be responsible for disposing of dewatering well and/or point materials after well/point abandonment.

2.3 EQUIPMENT

A. Dewatering System:

1. The Contractor shall provide, install, maintain and operate pumps, wells, and related equipment of sufficient capacity to adequately dewater excavations or work areas until the required construction, installation, and backfilling of underground structures are completed to a level at which the construction is no longer impacted, as approved by the Owner.

Dewatering systems may include gravity wells, vacuum well points or open pumping from sumps and/or drainage trenches, or a combination of such systems and seepage cutoff walls, depending upon location on-site, and/or soil conditions. All sumps shall include a properly designed sand filter or filter fabric, or other acceptable materials to prevent the migration or pumping of fine-grained materials and subgrade disturbance.

The Contractor shall construct dewatering basin(s) as required to treat the dewatering flow. The dewatering basin(s) shall be constructed and maintained in accordance with Section 208 of the Rhode Island Department of Transportation Standard Specifications for Road and Bridge Construction 2010 edition with all addenda.

Sedimentation tanks, if required, shall be of sufficient size and capacity to handle the dewatering flows and to reduce suspended materials in the dewatering effluent in accordance with all permits obtained for the Project. Tanks shall contain baffles to reduce velocities and allow sediment to settle inside the tank. At the discharge port, a filter cloth or bag assembly shall be installed to reduce the sediments in the discharge water. If storage units are used to handle quantities of water in excess of the sedimentation tank capacity, they shall be of sufficient size and capacity to allow work to proceed without interruption.

2. The Contractor shall maintain water levels or hydrostatic pressure heads at least 2 feet below excavation and fill subgrades or greater as may be necessary to maintain an "in-the-dry" stable work area and/or subgrade, whichever is deeper, continuously, 24 hours per day.

Dewatering operations shall prevent loss of fine materials into bedding, piping, boiling up of trench and excavation bottoms, or other disturbances that may cause subsidence or loss of strength of the underlying natural soils.

If requested by the Owner, the Contractor shall excavate all soils made unsuitable due to inadequate dewatering or disturbance by construction operations and replace the unsuitable soils with compacted fill, to the satisfaction of the Owner at no additional cost.

If the dewatering procedures result in boiling, loss of fines, ground instability, uncontrolled flow, or other detrimental effects, the Contractor shall immediately notify the Owner of these unsuitable conditions. The Contractor shall be required to modify its operations or take other supplementary measures to correct the situation as approved by the Owner at no additional cost.

- 3. When installing tank vaults, sewer manholes, or other structures that are subject to buoyant forces, the Contractor shall maintain dewatering operations until sufficient structure dead weight or backfill is placed to resist uplift forces.
- 4. Permanent utilities and piping shall not be used as part of dewatering system(s).
- 5. The Contractor shall remove and backfill dewatering elements when they are no longer required, using methods acceptable to the Owner and in compliance with the RIDEM Groundwater Quality Regulations. The Contractor shall backfill any voids resulting from dewatering system removal with cement grout, concrete, or other material as directed by the Owner to prevent potential loss of ground.
- 6. The Contractor shall inform the Owner in writing of any changes in the dewatering system that he wishes to make to accommodate field conditions prior to making the changes.
- 7. The Contractor shall discharge dewatering effluent to the designated discharge point(s) identified in the applicable permits according to the stipulations in the applicable permits

- obtained for the project. The discharge shall be conducted after receiving approval from the applicable permit agencies.
- 8. The Contractor shall provide a calibrated flow meter to measure the discharges flow rate and the total volume of water discharged. The Contractor shall maintain daily discharge flow-monitoring logs indicating the daily flow rate.
- 9. The Contractor shall provide access to the dewatering system(s) at all times to facilitate obtaining samples of the dewatering effluent prior to and after treatment.
- 10. The Contractor shall ensure that contaminated groundwater is not treated with the dewatering system. If the dewatering system influent contains hazardous materials at concentrations sufficient to cause a sheen or other visual/olfactory evidence of contamination in the receiving discharge system the Contractor shall immediately notify the Owner and discontinue the discharge until the system can be modified to the satisfaction of the Owner in accordance with all applicable federal, state and local regulations and permits.

The Contractor's licensed Testing Agency shall obtain samples of the dewatering effluent at the frequencies specified in the Permit, or as otherwise requested by the Owner. Results of testing shall be submitted to the appropriate permit and regulatory agencies and the Owner.

If the results of analyses indicate that the water quality does not comply with the applicable Permit criteria, the Contractor shall take immediate action to meet the requirements, including, but not limited to, continuing to store any pumped water on-site until an adequate treatment system can be implemented. The design and operation of the treatment system to meet the requirements shall be the sole responsibility of the Contractor.

- 11. The Contractor shall pay for all fines, penalties and other costs associated with noncompliance of the discharge permits at no additional cost.
- 12. The Contractor shall remove and backfill dewatering elements when they are no longer required, using methods acceptable to the Owner and in compliance with the RIDEM Groundwater Quality Regulations. The Contractor shall backfill any voids resulting from dewatering system removal with cement grout, concrete, or other material as directed by the Owner to prevent potential loss of ground. The Contractor shall restore the dewatering system location to the conditions required in the Contract Specifications and Plans.

2.4 FIELD QUALITY CONTROL

A. Perform dewatering effluent sampling in accordance with all applicable permits and regulations. The Contractor shall hire a licensed Testing Agency which shall monitor total suspended solids in the effluent and compare the results with the permitted discharge criteria.

2.5 PROTECTION

A. Operate all construction dewatering in a manner that prevents disturbance of adjacent structures due to the lowering of groundwater levels outside of the project limits.

PART 3 - EXECUTION

(Not used).

END OF SECTION

03750-6

Date: 11/2019

BAYSIDE SEWER SYSTEM

DEWATERING PROJECT WIDE

SECTION 03800

EROSION AND SEDIMENTATION CONTROLS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Temporary and permanent erosion control systems.
 - 2. Slope protection systems.
- B. Related Documents: The Contract Documents, as defined in Section 01010 Summary of Work, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other Documents.
- C. Related Sections:
 - 1. Section 03100 Site Clearing
 - 2. Section 03200 Earth Moving
 - 3. Section 03350 Excavation and Fill
 - 4. Section 03750 Dewatering Project Wide

1.2 SUBMITTALS

- A. Submittal Procedures: Procedures for Quality Assurance/Control submittals.
 - 1. Material Source: Submit name of material suppliers.
 - 2. Provide materials from same source throughout Work. Change of source requires the Engineer's approval.

1.3 PROJECT CONDITIONS OR SITE CONDITIONS

A. Environmental Requirements: Protect adjacent properties and water resources from erosion and sediment damage throughout Work.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Quick Growing Grasses: Wheat, rye, or oats.
- B. Compost Filter Sock: Indicated on Drawings.
- C. Temporary Mulches: Loose straw, netting, wood cellulose, or agricultural silage free of seed.

03800-1

BAYSIDE SEWER SYSTEM Date: 11/2019 EROSION & SEDIMENTATION CONTROLS

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Execution: Verification of existing conditions before starting Work.
- B. Verification of Conditions: Verify that field measurements, surfaces, substrates and conditions are as required, and ready to receive Work.
- C. Report in writing to the Engineer the prevailing conditions that will adversely affect satisfactory execution of the Work of this Section. Do not proceed with Work until unsatisfactory conditions have been corrected.
- D. By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to the Owner.

3.2 PREPARATION

- A. Review Soil Erosion and Sediment Control (SESC) Plan.
- B. Notify the Engineer of deficiencies or changes in the Soil Erosion and Sediment Control Plan (SESC) required by current site conditions. Revisions of plan will be made as determined by the Owner.

3.3 EROSION CONTROL AND SLOPE PROTECTION IMPLEMENTATION

- A. The Owner may direct the Contractor to limit surface area of erodible earth material exposed by clearing and grubbing, excavation, borrow and embankment operations and may direct Contractor to provide immediate permanent or temporary pollution control measures.
- B. Provide permanent erosion control measures at earliest practical time to minimize requirement for temporary erosion controls. Permanently seed and mulch cut slopes as excavation proceeds.
- C. Maintain temporary erosion control systems installed by Contractor as directed by the Owner to control siltation at all times throughout Work. Provide maintenance or additional Work directed by the Owner within 48 hours of notification by the Owner.
- D. Apply soil stabilization or seed slopes that may be easily eroded with wheat, rye or oat grasses.

END OF SECTION

03800 - 2

Date: 11/2019

BAYSIDE SEWER SYSTEM

EROSION & SEDIMENTATION CONTROLS

SECTION 03920

TURF AND GRASSES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Seed.
 - 2. Water.
 - 3. Erosion Control Material.
- B. Related Documents: The Contract Documents apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other documents.
- C. Related Sections:
 - 1. Section 03200 Earth Moving
 - 2. Section 03800 Erosion and Sedimentation Controls

1.2 REFERENCES

- A. American Society For Testing and Materials (ASTM):
 - 1. ASTM C 602 Specification for Agricultural Liming Materials.
 - 2. ASTM D 977 Specification for Emulsified Asphalt.
- B. American Sod Producers Association (ASPA):
 - 1. ASPA STSMT Specification for Turfgrass Sod Materials and Transplanting/Installing.

1.3 SUBMITTALS

- A. Section 013300 Submittal Procedures: Procedures for submittals.
 - 1. Assurance/Control Submittals:
 - a. Certificates:
 - 1) Submit certificate from seed supplier for each grass-seed mixture stating the botanical and common name and percentage by weight of each species and variety, and percentage of purity, germination, and weed seed. Include the year of production and date of packaging.
 - 2) Submit certificate from sod supplier for each seed mixture, identifying sod source, including name and telephone number of supplier.

1.4 QUALITY ASSURANCE

A. Regulatory Requirements: Conform to applicable requirements of the Local and State Department of Agriculture Extension Service of the state in which the project is located.

PART 2 - PRODUCTS

2.1 SEED

A. Classification:

- 1. State-Certified of latest season's crop delivered in original sealed packages bearing producer's guaranteed analysis for percentages of mixtures, purity, germination, weed seed content, and inert material.
- 2. Label in conformance with applicable state seed laws.
- 3. Wet, moldy, or damaged seed will be rejected.

2.2 STABILIZING MATERIALS

- A. Specified in Section 313200.
- B. Asphalt Adhesive: ASTM D 977, Grade RS-1. Use with straw or hay mulch.
- C. Cellulose Fiber: Use for anchoring straw. Fiber binding shall be applied at a net dry weight of 750 pounds per acre. Cellulose fiber may be mixed with water. Mixture shall contain maximum of 50 pounds of cellulose fiber per 100 gallons of water.
- D. Mulch Netting: Stake light weight plastic netting over the mulch according to manufacturer's recommendations. Stakes shall be driven to ground level.

2.3 WATER

A. Suitable quality for irrigation.

2.4 EROSION CONTROL MATERIAL

A. Net: Heavy, twisted jute mesh, plastic mesh, biodegradable paper fabric with knitted yarns, or standard weave burlap.

2.5 TOPSOIL

A. Topsoil:

- 1. Containing organic matter as needed to support establishment of plants; minimum 5 percent and maximum 20 percent organic matter as determined by soil testing service. Maximum particle size, 3/4 inch, with maximum 3 percent retained on 1/4 inch screen.
- 2. Component Percentages:

a. Silt: 25 to 50

03920 - 2

BAYSIDE SEWER SYSTEM Date: 11/2019 TURF AND GRASSES

b. Clay: 10 to 30 c. Sand: 20 to 30 d. pH: 5.5 to 7.6

2.6 pH ADJUSTERS

A. Lime:

- 1. Material: ASTM C 602, Class T, agricultural commercial grade ground limestone containing not less than 50 percent of total oxides.
- 2. Gradation: Minimum 75 percent passing 100 mesh sieve and 100 percent passing 20 mesh sieve.

2.7 FERTILIZER

- A. Bonemeal: Commercial, raw, finely ground; minimum 4 percent nitrogen and 20 percent phosphoric acid.
- B. Superphosphate: Commercial-Grade complete fertilizer of neutral character consisting of fastand-slow-release nitrogen, 50 percent derived from natural organic sources of urea-form, phosphorous, and potassium in following composition:

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verification of Conditions: Verify that field measurements, surfaces, and conditions are as required, and ready to receive Work.
- B. Report in writing to Contracting Officer prevailing conditions that will adversely affect satisfactory execution of the Work of this Section. Do not proceed with Work until unsatisfactory conditions have been corrected.

3.2 PREPARATION OF SUBSOIL

- A. Prepare subsoil to eliminate uneven areas and low spots. Maintain lines, levels, profiles, and contours. Make changes in grade gradual. Blend slopes into level areas.
- B. Remove foreign materials, weeds, and undesirable plants and their roots. Remove contaminated subsoil.
- C. Scarify subsoil to a depth of 3 inches where topsoil is to be placed. Repeat cultivation in areas where equipment, used for hauling and spreading topsoil, has compacted subsoil.

3.3 FERTILIZING

- A. Apply fertilizer in accordance with manufacturer's published instructions.
- B. Apply after smooth after smooth raking of topsoil and prior to roller compaction.
- C. Do not apply fertilizer at same time or with same machine as will be used to apply seed.
- D. Mix thoroughly into upper 2 inches of topsoil.
- E. Lightly water to aid the dissipation of fertilizer.
- F. No chemical fertilizers.

3.4 SEEDING

- A. Sow one-half of seed in one direction and remainder at right angles to first sowing.
- B. Cover seed to average depth of 1/2 inch by means of spike-tooth harrow, cultipacker, or other recommended device.

C. Rolling:

- 1. Immediately after seeding, firm entire area except for slopes in excess of 3 to 1 with a roller not exceeding 90 pounds for each foot of roller width.
- 2. If seeding is performed with cultipacker-type seeder or hydroseeding, rolling may be eliminated.
- D. Erosion Control Material: Install in accordance with manufacturer's instructions.

PART 4 - 3.7 CLEANING AND PROTECTION

- A. Remove soil and debris created by lawn work from paved areas. Clean wheels of vehicles before leaving site to avoid tracking soil onto surface of roads, walks, or other paved areas.
- B. Immediately after seeding, sodding or sprigging, protect the area against traffic or other use.
- C. Restore existing lawn and grass areas which have been damaged during execution of this work to original condition.
- D. Keep one paved pedestrian access route and one paved vehicular access route to each building clean at all time. Clean other paving when work in adjacent areas is complete.

4.2 ESTABLISHMENT PERIOD

A. Definitions:

- 1. Lawns and grasses establishment period will be in effect until lawns and grasses have been moved 3 times.
- 2. Stand of lawn and grass is 95 percent ground cover of established species.

4.3 FINAL INSPECTION AND ACCEPTANCE

- A. Final Inspection and Acceptance:
 - 1. Final inspection will be made upon written request from the Contractor at least 10 days prior to last day of lawn and grasses establishment period.
- B. Replanting: Replant areas which do not have a satisfactory stand of lawns and grasses.
- C. Contractor is to maintain lawns and grasses for one year from completion.

END OF SECTION



SECTION 04305

ASPHALT PAVING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Bituminous concrete paving.
 - 2. Surface course.
 - 3. Base course.
- B. Related Documents: The Contract Documents, as defined in Section 011000 Summary of Work, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other Documents.
- C. Related Sections:
 - 1. Section 03200 Earth Moving: Earthwork for Pavement.

1.2 REFERENCES

- A. Asphalt Institute (AI):
 - 1. AI MS-2 Mix Design Methods for Asphalt Concrete and Other Hot Mix Types.
 - 2. AI MS-3 Asphalt Plant Manual.
 - 3. AI MS-8 Asphalt Paving Manual.
 - 4. AI MS-19 Basic Asphalt Emulsion Manual.
- B. American Society for Testing and Materials (ASTM):
 - 1. ASTM D 242 Specification for Mineral Fiber for Bituminous Paving Mixtures.
 - 2. ASTM D 698 Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures, Using 5.5 Pound Rammer and 12 inch Drop.
 - 3. ASTM D 1188 Method for Bulk Specific Gravity and Density of Compacted Bituminous Mixtures Using Paraffin-Coated Specimens.
 - 4. ASTM D 1557 Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 10 Pound Rammer and 18 inch Drop.
 - 5. ASTM D 1560 Test Method for Resistance to Deformation and Cohesion of Bituminous Mixtures by Means of Hveem Apparatus.
 - 6. ASTM D 2397 Specification for Cationic Emulsified Asphalt.
 - 7. ASTM D 2399 Practice for Selection of Cutback Asphalt.
 - 8. ASTM D 2726 Test Method for Bulk Specific Gravity and Density of Nonabsorbative Compacted Bituminous Mixtures.
 - 9. ASTM D 3381 Specification for Viscosity-Graded Asphalt Cement for Use in Pavement Construction.
 - 10. ASTM D 3549 Test Method for Thickness or Height of Compacted Bituminous Paving Mixture Specimens.
 - 11. ASTM D 4318 Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.

- C. American Association of State Highway and Transportation Officials (AASHTO):
 - 1. AASHTO T 88 Particle Size Analysis of Soils.
- D. The Rhode Island Standard Specifications for Road and Bridge Construction, 2004 Edition including all addenda.

1.3 SYSTEM DESCRIPTION

A. Design Requirements: All work and materials shall be done in accordance with the Rhode Island Standard Specifications for Road and Bridge Construction, 2004 Edition including all addenda.

1.4 SUBMITTALS

- A. Section 013300 Submittal Procedures: Procedures for submittals.
 - 1. Assurance/Control Submittals:
 - a. Design Data:
 - 1) Submit design mix following format indicated Asphalt Institute Manual MS-2, Marshall Stability Method; including type/name of mix, gradation analysis, grade of asphalt cement used, Marshall Stability (pounds), flow, effective asphalt content (percent), and direct references to applicable state highway department specification sections for each material.
 - 2) Provide design mixture listed in current edition of applicable state highway department specifications.
 - 3) Use mix designs prepared within 2 years maximum.
 - 4) Provide documentation of state highway limitations, if any, on use of recycled content materials.
 - b. Certificates: Submit materials certificate to Testing Laboratory signed by material supplier and Contractor, certifying that materials comply with, or exceed, the requirements specified herein.
 - c. Qualification Documentation: Paving installer documentation of experience indicating compliance with specified qualification requirements.

1.5 QUALITY ASSURANCE

- A. Perform Work in accordance with AI MS-8
- B. Installer Qualifications: Company specializing in performing the Work of this Section with minimum 5 years documented experience.
- C. Regulatory Requirements:
 - 1. Conform to applicable requirements for paving work on public property.
 - 2. Maintain access for vehicular and pedestrian traffic as required for other construction activities. Use temporary striping, flagmen, barricades, warning signs, and warning lights as required.

1.6 PROJECT CONDITIONS OR SITE CONDITIONS

A. Jobsite Requirements:

- 1. Apply prime and tack coats when ambient temperature is above 40 degrees F, and when temperature has been above 35 degrees F for 12 hours immediately prior to application. Do not apply when base is wet, contains excess moisture, or during rain.
- 2. Construct bituminous concrete paving when atmospheric temperature is above 40 degrees F.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Base Course shall be 2-inch Bituminous HMA CL 9.5. Placement shall be as indicated on Drawings, complying with Rhode Island Standard Specifications for Road and Bridge Construction, 2004 Edition including all addenda.
- B. Surface Course Class shall be HMA CL 9.5. Placement shall be as indicated on Drawings, complying with Rhode Island Standard Specifications for Road and Bridge Construction, 2004 Edition including all addenda.
- C. Tack Coat: Emulsified asphalt; ASTM D 2397 or ASTM D 2399, SS-1h, CSS-1, or CSS-1h, diluted with one-part water to one part emulsified asphalt.

2.2 EQUIPMENT

A. Maintain equipment in satisfactory operating condition and correct breakdowns in a manner that will not delay or be detrimental to progress of paving operations.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Section 017300 Execution: Verification of existing conditions before starting work.
- B. Verification of Conditions: Verify that field measurements, surfaces, substrates and conditions are as required, and ready to for earthwork operations to begin.
 - 1. Verify gradients and elevations of base are correct, and base is dry.
- C. Report in writing to Owner prevailing conditions that will adversely affect satisfactory execution of the Work of this Section. Do not proceed with Work until unsatisfactory conditions have been corrected.
- D. By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to Owner. Where pipe lines and service connections are constructed, a bituminous pavement patch shall be placed over a well-compacted trench in all streets. After the trench is fully consolidated, and settlement of earth backfill is complete, but not before 75 days after installation of the main pipelines or services in any particular street, the street shall be prepared for a permanent pavement overlay. The roadway shall be swept clean with a motorized sweeper; frames and covers adjusted to grade; a tack coat applied; and the new pavement overlay installed. All bituminous pavements shall be applied with a self-propelled motorized spreader.

- E. The driveway surface course and street overlay surface course shall be placed at the same time.
- F. Cut edges of bituminous concrete paving shall be coated with asphalt emulsion prior to placing of new paving against the cut edge. This requirement applies to roadways and to bituminous sidewalk and driveway construction.
- G. Where road surfaces are to be overlaid curb line to curb line, or gutter line to gutter line, any necessary adjustment to existing drainage, sewer, or utility structures shall be made. There shall be no separate payment made for the adjustments.
- H. New paving shall be guaranteed for one year from the date of completion of the Contract. Any settlement noted within the one-year guarantee period shall be cut out and replaced to the proper grade, at no additional cost. Where road surfaces are to be overlaid the Contractor shall apply an asphalt emulsion tack coat at the rate of 0.075 gallons per square yard of surface to be overlaid. There shall be no separate payment made for the tack coat, and it shall be included in the unit prices bid for the various paving items.
- I. Where road surfaces are overlaid curb-to-curb or gutter-to-gutter, private lawns or public sidewalks which are needlessly damaged by the work shall be restored to their original conditions at no additional cost.
- J. Where regrading work is required, side slopes in or adjacent to the sidewalk areas shall be loamed and seeded at the direction of the Engineer.

3.2 BASE COURSE PLACEMENT

- A. Perform base course construction in a manner that will drain surface properly at all times and at the same time prevent runoff from adjacent areas from draining onto base course construction.
- B. Compact base material, 8-inch gravel borrow, to not less than 98 percent of optimum density as determined by ASTM D 698 or 95 percent of optimum density, as determined by ASTM D 1557, unless otherwise indicated on the Drawings.
- C. As soon as utility trenches for sewers, water and/or drainage are installed and backfill has been thoroughly compacted, a 2" bituminous concrete pavement patch shall be placed over all trenches without any overlapping.

3.3 SURFACE COURSE AND COLD PLANED STRIP PLACEMENT

- A. Perform base course construction in a manner that will drain surface properly at all times and at the same time prevent runoff from adjacent areas from draining onto base course construction.
- B. After the trenches have fully settled and the trenches restored to proper grade, but not before 75 days after installation of the pipelines, weather permitting, local streets shall be prepared and shall subsequently be provided with a 1-1/2 inch bituminous concrete overlay from curb line to curb line or gutter line. The sequence of operations is as follows:
 - 1. A four-foot wide strip shall be cold planed along each gutter line as determined by the Contractor to properly match grade, and driveway pavements shall be cut and prepared as detailed on the plans.
 - 2. The existing road surface shall be swept clean with a motorized street sweeper of all sand and debris. Loose or broken pavement shall be removed and disposed of as previously specified in these Specifications. Existing potholes, depressions or holes resulting from the removal of loose or broken pavement or material displaced by cold planning or sweeping within limits of the proposed

- overlay shall be filled with bituminous material. Edge or surface irregularities shall be smoothed out or straightened, a leveling course shall be placed to create a roadway crown where required and as directed by the Engineer.
- 3. Existing drainage or sewer structures, gas or water roadway boxes or any other roadway utilities shall be adjusted to grade as previously specified.
- 4. The road surface shall have an asphalt emulsion tack coat applied at the rate of 0.075 gallons per square yard immediately prior to overlay.
- 5. 1-1/2 inch bituminous concrete surface course HMA CL 9.5 shall then be placed over the prepared surface.

3.4 APPLICATIONS

A. Tack Coat:

- 1. Apply to contact surfaces of previously constructed bituminous concrete base courses or portland cement concrete and surfaces abutting or projecting into bituminous concrete or into bituminous concrete pavement.
- 2. Apply emulsified asphalt tack coat in accordance with applicable state highway specifications.

3.5 BITUMINOUS CONCRETE PLACEMENT

A. Placement of Bituminous Concrete shall be in accordance with the Rhode Island Standard Specifications for Road and Bridge Construction, 2004 Edition including all addenda.

3.6 ROLLING AND COMPACTION

- A. The mixture, after being spread, shall be thoroughly compacted by rolling as soon as it will bear the weight of the rollers without undue displacement. The number, weight, and types of rollers and sequences of rolling operations shall be such that the required density and surface are consistently attained while the mixture is in a workable condition.
- B. Compact mixture with hot hand tampers or vibrating plate compactors in areas inaccessible to rollers.
- C. Breakdown Rolling: Accomplish breakdown or initial rolling immediately following rolling of joints and outside edge. Check surface after breakdown rolling, and repair displaced areas by loosening and filling with hot material.
- D. Second Rolling: Follow breakdown rolling as soon as possible, while mixture is hot. Continue second rolling until mixture has been thoroughly compacted.
- E. Finish Rolling: Perform finish rolling while mixture is still warm enough for removal of roller marks. Continue rolling until roller marks are eliminated and course has attained maximum density.
- F. Patching: Remove and replace paving areas mixed with foreign materials and defective areas. Cut out such areas and fill with fresh, hot bituminous concrete. Compact by rolling to maximum surface density and smoothness.

G. Protection: After final rolling, do not permit vehicular traffic on pavement until it has cooled and hardened. Erect barricades to protect paving from traffic until mixture has cooled enough not to become marked.

3.7 CONSTRUCTION

A. Site Tolerances:

- 1. Paving Surface Smoothness: Maximum allowable 10-foot straightedge tolerance for smoothness.
 - a. Base Course Surface: 1/4 inch.
 - b. Wearing Surface Course: 3/16 inch.

B. City Requirements:

The Contractor shall conform to the City of Warwick Ordinance Amendment No. 0-3.0.1 dated February 24, 2003, of Section I, Chapter 56, Sec. 56-16. "On all construction projects which require excavation in the roadway of any street in the City, the Contractor performing the work shall apply pavement to the roadway within three (3) days of backfilling and closing the excavated portion of the roadway. Failure to apply pavement within the three-day period shall subject the Contractor to a penalty of \$500.00 per day for each day of the violation. Relief from the requirement to apply paving may be granted by the Director of Public Works and the Warwick Sewer Authority for weather conditions of other circumstances, which, in his or her discretion, would warrant the relief being granted."

3.8 FIELD QUALITY CONTROL

A. Section 014000 - Quality Requirements: Field inspection and testing procedures

B. Site Tests:

- 1. Paving Base Course: Perform testing of in-place base courses for compliance with requirements for thickness, compaction, density, and tolerance.
 - a. Moisture/Density Test: ASTM D 698 or ASTM D 1557.
 - b. Mechanical Analysis Test: AASHTO T-88.
 - c. Plasticity Index Test: ASTM D 4318.
 - d. Base Material Thickness Test: Minimum one test for every 20,000 square feet.
 - e. Base Material Compaction Test: Minimum one test for every 20,000 square feet.
 - f. Field Density Tests: Perform testing of in-place base courses for compliance with requirements for density using one of the following methods:
 - 1) Nuclear Method: ASTM D 2922, Method B (Direct Transmission).
 - g. Test each source of base material for compliance with applicable state highway specifications.
- 2. Compaction: Field density test for in place materials shall be performed by examination of field cores in accordance with one of the following standards:
 - a. Bulk Specific Gravity Using Saturated Surface-Dry Specimens: ASTM D 2726, minimum one core per 10,000 square feet, 3 cores.

END OF SECTION

SECTION 04310

CONCRETE PAVING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Concrete Pavement
 - 2. Concrete walks and terraces.
 - 3. Concrete curbs, and curb and gutters.
- B. Related Documents: The Contract Documents, as defined in Section 01010 Summary of Work, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other documents.
- C. Related Sections:
 - 1. Section 03200 Earth Moving
 - 2. Section 04305 Asphalt Paving

1.2 REFERENCES

- A. American Concrete Institute (ACI):
 - 1. ACI 301 Specifications for Structural Concrete.
 - 2. ACI 308 Standard Practice for Curing Concrete.
- B. American society for Testing and Materials (ASTM):
 - 1. ASTM A 185 Specification for Steel Welded Wire, Fabric, Plain, for Concrete Reinforcement.
 - 2. ASTM A 615 Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.
 - 3. ASTM C 494 Standard Specification for Chemical Admixtures for Concrete.
 - 4. ASTM C 618 Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Concrete.
 - 5. ASTM D 1751 Specification for Preformed Expansion Joint Fillers for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types).

1.3 SUBMITTALS

- A. Submittal Procedures Section 01340 Shop Drawings.
 - 1. Product Data: Submit product data for the following:
 - a. Joint filler.
 - b. Joint sealant.
 - c. Concrete admixtures.
 - d. Concrete curing compounds.
 - 2. Assurance/Control Submittals:
 - a. Concrete Mix Design: Submit three copies of each proposed mix design for each class of concrete in accordance with ACI 301, Sections 3.9 "Proportioning on the basis of previous

field experience or trial mixture", or 3.10 "Proportioning based on empirical data". Submit separate mix design for concrete to be placed by pumping, in addition to the mix design for concrete to be placed directly from the truck chute.

- b. Include the following information in concrete mix design:
 - 1) Proportions of cement, fine and coarse aggregate, and water.
 - 2) Water-cement ratio, 28-day compressive design strength, slump, and air content.
 - 3) Type of cement and aggregate.
 - 4) Aggregate gradation.
 - 5) Type and dosage of admixtures.
 - 6) Special requirements for pumping.
 - 7) Range of ambient temperature and humidity for which design is valid.
 - 8) Special characteristics of mix which require precautions in mixing, placing, or finishing techniques to achieve finished product specified.

1.4 OUALITY ASSURANCE

- A. Perform work in accordance with ACI 301.
- B. Conform to ACI 305R when mixing and placing concrete during hot weather.
- C. Conform to ACI 306R when mixing and placing concrete during cold weather.
- D. Regulatory Requirements:
 - 1. Conform to applicable requirements for paving work on public property.
 - 2. Contractor shall maintain access for vehicular and pedestrian traffic as required for other construction activities. Utilize temporary striping, flagmen, barricades, warning signs, and warning lights as required.

PART 2 - PRODUCTS

2.1 FORM AND REINFORCING MATERIAL

- A. Forms: Steel, wood, or other suitable material of size and strength to resist movement during concrete placement and to retain horizontal and vertical alignment until removal. Use straight forms, free of distortion and defects. Use flexible spring steel forms or laminated boards to form radius bends as required.
 - 1. APA Exterior Plyform BB with a medium density, smooth, hard, fused resin fiber overlay, or metal forms.
 - 2. Form Oil: Coat forms with nonstaining type coating that will not discolor or deface surface of concrete. Subject to compliance with requirements, manufacturers offering specified items which may be incorporated in the work include the following.
 - a. "Eucoslip" Euclid Chemical Co., Cleveland, OH (800) 321-7628.
 - b. "Form Coating" Nox-Crete Chemicals, Omaha, NE (800) 669-2738.
 - c. Substitutions: Under provisions of Section 016000.
- B. Curb, Curb and Gutter Forms: Use flexible spring-steel forms or laminated boards to form radius bends. Tolerance: Not to deviate more than 1/4 inch in 10 feet in grade and alignment.

C. Reinforcing:

- 1. Welded Wire Mesh: Welded plain cold-drawn steel wire fabric, ASTM A 185. Furnish in flat sheets, not rolls, unless otherwise acceptable to Owner.
- 2. Reinforcing Bars: Deformed steel bars, ASTM A 615, Grade 60.
- 3. Fiber reinforced concrete mixtures having the same strength or exceeding as specified for concrete mixes, as verified by Manufacturer's testing laboratory procedures, shall be considered as an alternate for welded wire mesh in exterior flat work, curbs and sidewalks.

D. Reinforcing Accessories:

- 1. Reinforcing Accessories: Subject to compliance with requirements, manufacturers offering specified items which may be incorporated in the work include the following.
 - a. Dayton Superior Corp., Miamisburg, OH (800) 745-3700.
 - b. Heckmann Building Products, Inc., Chicago, IL (800) 621-4140.
 - c. Hohmann & Barnard, Inc., Hauppauge, NY (800) 645-0616.
 - d. Richmond Screw Anchor Co., Inc., Ft. Worth, TX (817) 284-4981.
- 2. Conform to Concrete Reinforcing Steel Institute Manual of Standard Practice. Include spacers and chairs with plastic tipped legs, ties and other devices necessary for properly assembling, placing, spacing and supporting forms and reinforcement in place.
- 3. Section 016000 Product Requirements: Product options and substitutions. Substitutions: Permitted.

2.2 CONCRETE MATERIALS

A. Comply with requirements the Rhode Island Department of Transportation Standard Specifications for Rod and Bridge Construction, 2004 Edition and all addenda, Part 600 Concrete for concrete materials, admixtures, bonding materials, curing materials, surface sealers and others as required.

B. Cement:

- 1. Portland Cement: ASTM C150 Type 1.
- 2. High-early Strength Portland Cement: ASTM C150, Type III.

C. Aggregates: ASTM C33.

- 1. Fine aggregate shall be natural sand, or sand prepared from stone or gravel. Grains shall; be clean, hard, durable, uncoated and free from silt, loam and clay.
- 2. Coarse Aggregates: Crushed stone, gravel, or other approved inert materials of similar characteristics, or combinations thereof, having hard, strong, durable pieces free from adherent coatings. Maximum size of pieces shall be 3/4" to #4 except for footings, which may be 1-1/2". The maximum size of aggregate may also be not larger than one fifth of the narrowest dimension between forms, nor larger than three fourths of the minimum clear spacing between reinforcing bars.
- D. Water: Clean and free from injurious amounts of oil, acids, salts, organic or other deleterious matter.

E. Air Entrainment: ASTM C260.

- Use air-entrained concrete for exterior exposed concrete including walls, walks, paving, etc. where minimum daily temperatures are expected below 38 degrees F during pouring or subsequent 38 day curing period.
- 2. Proportion air-entraining concrete to attain minimum 28-day compressive strength specified.
- 3. Total Air Entrainment in Concrete: Not less than four percent nor more than six percent volume of concrete.

F. Admixtures:

- 1. May be used at contractors option to provide workability at low slumps, increased compressive strength, retardation or acceleration of the concrete.
- 2. Chemical Admixtures: ASTM C494. Mineral Admixtures: ASTM C618.
- 3. The cement factor shall not be reduced and changes shall be made in the other mix proportions to ensure the minimum strength requirements.
- 4. Use of admixtures approved in writing by Architect. No additional expense to the Owner will be allowed.
- 5. No calcium chloride shall be used.
- 6. Before any admixture is accepted for use, the Contractor shall submit certified laboratory reports on each additive material to the architectural consultant. The report shall show the following:
 - a. Confirmation of compliance with the applicable ASTM Standard.
 - b. Evaluation of the effects of the admixture on the properties of the concrete to be made on the job, including consideration of the anticipated ambient conditions on the job, and proposed construction procedures.
 - c. Determination of within-lot uniformity of product proposed for use.

2.3 CONCRETE MIXES

A. Concrete Proportions:

- 1. Concrete shall be homogenous, and when hardened, shall have the required strength, resistance to deterioration, durability, water tightness and the properties as specified.
- 2. Minimum concrete strength at 28 days shall be;
 - a. 3,000 psi for walks, terraces, curbs and gutters.
 - b. 4,000 psi for concrete pavement and pads.
- 3. Slump of concrete:
 - a. Pavement: 2-1/2 inch minimum to 4 inch maximum.
 - b. Ramps and sloping surfaces: Not more than 3 inches.

B. Ready-Mix Concrete:

- 1. Ready-mix concrete shall conform to ASTM C94. The mixing agitation shall begin within 30 minutes, and the concrete shall be discharged from the truck within one hour after the water has been added to the concrete mix.
- 2. Delivery tickets are to accompany each concrete truck and shall be kept in the job superintendent's file. Delivery tickets must indicate the following information or be subject to rejection:
 - a. Name of project.
 - b. Supplier of concrete.
 - c. Truck identity and ticket serial number.
 - d. Date of delivery.
 - e. Brand of cement.
 - f. Cement content.
 - g. Strength classification.
 - h. Batching time.
 - i. Point of deposit.
 - j. Total amount of water.
 - k. Weight of aggregate.
 - 1. Daily temperature.
 - m. Number of cubic yards in load.
 - n. Admixture content.

- o. Name of Contractor.
- p. Name of driver.
- q. Time loaded and first mixing of concrete.
- r. Reading of revolution counter.
- 3. Quantity of water used for each batch shall be accurately measured.

2.4 JOINT MATERIALS

A. Sealed expansion and contraction joints: Filler of nonbituminous rubber or cork conforming to ASTM D1752.

B. Non-sealed joints:

- 1. Non-sealed Joints: Subject to compliance with requirements, manufacturers offering specified items which may be incorporated in the work include the following.
 - a. "Flexcell" Celotex Corp., Tampa, FL (813) 873-1700.
 - b. "Seal Tight Fiber Expansion Joint" W.R. Meadows, Inc., Hampshire, IL (800) 342-5976.
- 2. Filler premolded bituminous type conforming to ASTM D1751.
- 3. Section 016000 Product Requirements: Product options and substitutions. Substitutions: Permitted.

C. Noncompressive Filler:

- 1. Noncompressive Filler: Subject to compliance with requirements, manufacturers offering specified items which may be incorporated in the work include the following.
 - a. "Styrofoam SM" Dow Chemical Co., Midland, MI (517) 636-0754.
 - b. "Foamular" Owens Corning, Toledo, OH (800) 828-7155.
 - 2 inch or 1 inch thick sheets.

D. Compressive Filler:

2.

- 1. Compressive Filler: Subject to compliance with requirements, manufacturers offering specified items which may be incorporated in the work include the following.
 - a. "Ethafoam" Dow Chemical Co., Midland, MI (800) 322-8723.
 - b. "Rodofoam No. 423" Sternson Group, Brampton, ON (800) 265-8417.
- 2. 2 inch or 1 inch thick sheets, compression modulus within the range of 15 to 25 pounds per square inch per inch.
- E. Filler Adhesive for Noncompressive Filler and Compressive Filler:
 - 1. Filler Adhesive: Subject to compliance with requirements, manufacturers offering specified items which may be incorporated in the work include the following.
 - a. "General Purpose Mastic No. 11" Dow Chemical Co., Midland, MI (800) 322-8723.
 - b. "Rodofast" Sternson Group, Brampton, ON (800) 265-8417.
- F. Slab-on-grade Construction Joints: Provide a full slab depth 24 gauge metal preshaped key, approximate depth of key to be 1/4 slab thickness and a key width of about 1/10 slab thickness.
- G. Joint Sealants: ASTM C920. Non-priming, pourable, self-leveling polyurethane. Subject to compliance with project requirements manufacturers offering joint sealants which may be incorporated in the Work include, but are not limited to the following:
 - 1. Sonolastic Paving Joint Sealant, by Sonneborn, Shakopee, MN (800) 433-9517.
 - 2. Sonomeric CT 1 Sealant, by Sonneborn, Shakopee, MN (800) 433-9517.
 - 3. Sonomeric CT 2 Sealant, by Sonneborn, Shakopee, MN (800) 433-9517.

- 4. Vulkem 45, by Mameco, Cleveland, OH (800) 321-6412.
- 5. Chem-Caulk, by Bostik, Middleton, MA (800) 726-7845.
- 6. "THC-900" Tremco, Beachwood, OH (800) 562-2728.
- 7. Section 016000 Product Requirements: Product options and substitutions. Substitutions: Permitted.

2.5 CURING MATERIALS

A. Sealers:

- 1. Sealers: Subject to compliance with requirements, manufacturers offering specified items which may be incorporated in the work include the following.
 - a. "Polyseal" W.R. Meadows, Inc., Hampshire, IL (800) 342-5976.
 - b. "Kure-N-Seal" Sonneborn, Shakopee, MN (800) 433-9517.
 - c. "Cure-Hard" W.R. Meadows, Inc., Elgin, IL (312) 683-4500.
- 2. ASTM C156 and ASTM C309, Type I. Material shall become integral part of concrete and leave slab free of residue or film.
- B. Membrane: Opaque-white polyethylene sheet, 0.006 inch thick, meeting requirements of ASTM C171.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verification of Conditions: Verify that field measurements, surfaces, substrates and conditions are as required, and ready to for earthwork operations to begin.
 - 1. Verify gradients and elevations of base are correct, and base is dry.
- B. Report in writing to Contracting Officer prevailing conditions that will adversely affect satisfactory execution of the Work of this Section. Do not proceed with Work until unsatisfactory conditions have been corrected.
- C. By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to the Owner.
- D. All work shall be in accordance with the Rhode Island Department of Transportation Standard Specifications for Road and Bridge Construction, 2004 Edition including all addenda.

3.2 SUBGRADE PREPARATION

- A. Conform with the requirements specified in Section 03200.
- B. Thoroughly wet subgrade and then compact with two passes of a 500 pound roller.
- C. Pumping: Where concrete paving or sidewalks, and curbs are to be placed, yielding material deflecting more than 1/2 inch under a 500 lb. roller shall be removed to a depth of not less than 4 inches below subgrade elevation and replaced with an approved granular material which shall then be compacted as described above.

D. The subgrade shall be in a moist condition when the concrete is placed. In cold weather the subgrade shall be prepared and protected so as to provide a subgrade free from frost when the concrete is deposited.

3.3 FORM CONSTRUCTION

- A. Install sufficient quantity of forms to allow continuous progress of the work and so that forms can remain in place at least 24 hours after concrete placement.
- B. Check complete formwork for grade and alignment to the following tolerances:
 - 1. Top of form: Not more than 1/8 inch in 10 feet.
 - 2. Vertical face: Longitudinal axis not more than 1/4 inch in 10 feet.

3.4 PLACING REINFORCEMENT

- A. Support reinforcing and wire securely together to prevent displacement by construction loads and traffic, or the placing of concrete. For slabs on grade, supporting pieces of concrete blocks or bricks may be used.
- B. Place wire mesh reinforcing two inches above bottom of slab unless otherwise indicated.
- C. Reinforcement shall be kept clean from oil, dirt and loose mill scale or other coatings which might destroy the concrete bond. Remove tags and markings prior to concrete placement.
- D. Do not place concrete until reinforcement has been inspected and approved by local authorities, if required.

3.5 CONCRETE PLACEMENT AND FINISHING

- A. Tamp and consolidate concrete with a suitable wood or metal tamping bar and the surface shall be finished to grade with a wood float.
- B. Finished surfaces shall not vary more than 3/16 inch from the testing edge of a 10 foot straightedge.
- C. Curb Expansion Joints: Fill joints with 1/2 inch thick joint filler strips conforming to ASTM D1751 or ASTM D1752.
- D. Contraction Joints: Divide the surface of paving, walks and terraces into rectangular areas not to exceed 5 feet 0 inches each way.
 - 1. Cut a groove in the top portion of the slab to a depth of at least one-fourth of the slab thickness using a jointer or by sawing a groove in the hardened concrete with a power-driven saw.
 - 2. Membrane-cured surface damaged during the sawing operations shall be resprayed as soon as the surface becomes dry.
- E. Slab Finishes: ACI 301, Paragraph 11.7 and as follows:
 - 1. Broom Finish: On stair treads with abrasive nosings and on walks, unless other finishes have been indicated or specified.

2. Broom or Belt Finish: On level walks. Broom in direction perpendicular to travel and approved sample panel. Submit joint pattern layout prior to starting work.

3.6 TOLERANCES

- A. Horizontal slabs: Finished surfaces true with no deviation in excess of 1/8 inch when tested with a 10-foot straightedge, non-accumulative. No coarse aggregate showing.
- B. Steps:
 - 1. Variation in steps within a flight of stairs:
 - a. Rise: 1/8 inch.
 - b. Tread: 1/4 inch.
 - 2. Variation in consecutive steps:
 - a. Rise: 1/16 inch.b. Tread: 1/8 inch.

3.7 EXPANSION JOINTS

- A. Install transverse expansion joints at returns and 15 feet on center.
- B. Install longitudinal expansion joints where curbs and paved areas abut each other, buildings, other concrete slabs and pads or vertical restraints.
- C. Place joint filler with top edge 1/4 inch below the surface and shall be held in place with steel pins or other devices to prevent warping of the filler during floating and finishing.
- D. Immediately after finishing operations are completed, round joint edges with edging tool having a radius of 1/8 inch. Remove concrete over the joint filler.
- E. At the end of the curing period, clean and fill expansion joints with joint sealer. Fill joints flush with concrete surface. Dummy groove joints shall not be sealed.

3.8 CURING

A. Immediately after the finishing operations, the exposed concrete surface shall be cured for 7 days by the mat, impervious sheet, or membrane-curing method.

3.9 BACKFILLING

A. After curing, remove debris and backfill the adjoining areas, grade and compact to conform to the surrounding area in accordance with the lines and grades indicated.

3.10 PROTECTION

A. Protect the completed work from damage. Repair damaged concrete and clean concrete discolored during construction. Remove work that is damaged and reconstruct to entire length between regularly scheduled joints. Refinishing damaged portion is not acceptable.

В.	Prevent cars and trucks from driving on new pavement for a minimum of 14 days.						
	END OF SECTION						

SECTION 04400

PAVEMENT MARKINGS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Painted pavement markings.
- B. Related Documents: The Contract Documents, as defined in Section 011000 Summary of Work, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other Documents.
- C. Related Sections:
 - 1. Section 04305 Asphalt Paving: Asphalt paving substrate for marking application.
 - 2. Section 04310 Concrete Paving: Concrete paving substrate for marking application.

1.2 SUBMITTALS

- A. Section 013300 Submittal Procedures: Procedures for submittals.
 - 1. Product Data: Technical data sheets indicating manufacturer's catalog number, paint type description, and VOC content for each paint type specified.
 - 2. Assurance/Control Submittals:
 - a. Certificates: Manufacturer certificate that Products meet or exceed specified requirements.
 - b. Test Reports: Manufacturer Material Safety Data Sheets (MSDS) for each paint type specified.

1.3 QUALITY ASSURANCE

A. Regulatory Requirements: Provide paint materials that conform to Federal, State, and local restrictions for Volatile Organic Compounds (VOC) and lead free content.

1.4 DELIVERY, STORAGE AND HANDLING

- A. Deliver paint materials in sealed original labeled containers, bearing manufacturer's name, type of paint, brand name, lot number, brand code, coverage, surface preparation, drying time, cleanup requirements, color designation, and instructions for mixing and/or reducing.
- B. Store paint materials at minimum ambient temperature of 45 degrees F and a maximum of 90 degrees F, in ventilated area, and as required by manufacturer's published instructions.

1.5 PROJECT CONDITIONS OR SITE CONDITIONS

A. Maintain access for vehicular and pedestrian traffic as required for other construction activities. Utilize flagmen, barricades, warning signs and warning lights as required.

PART 2 - PRODUCTS

2.1 MATERIALS

Pavement markings shall be expoxy resin in accordance with the Rhode Island Standard Specifications for Road and Bridge Construction, 2004 Edition including all addenda.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verification of Conditions: Verify that field measurements, surfaces, substrates and conditions are as required, and ready to receive Work.
- B. Report in writing to Contracting Officer prevailing conditions that will adversely affect satisfactory execution of the Work of this Section. Do not proceed with Work until unsatisfactory conditions have been corrected.
- C. By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to the City.

3.2 PREPARATION

- A. Sweep pavement and surfaces to receive paint markings clean of dust and dirt. Allow pavement to cure a minimum of 60 days prior to application of paint markings.
- B. Clean surfaces free of glaze and grease, road film, and other foreign materials.
- C. Where existing pavement markings are indicated on Drawings to be removed or would interfere with the adhesion of new paint, use a motorized abrasive device to remove existing markings.
 - 1. Use equipment that will not damage existing paving or create surface hazardous to vehicle or pedestrian traffic.
 - 2. Use marking removal methods approved by governing authority having jurisdiction in areas within public rights-of-way.

3.3 APPLICATION

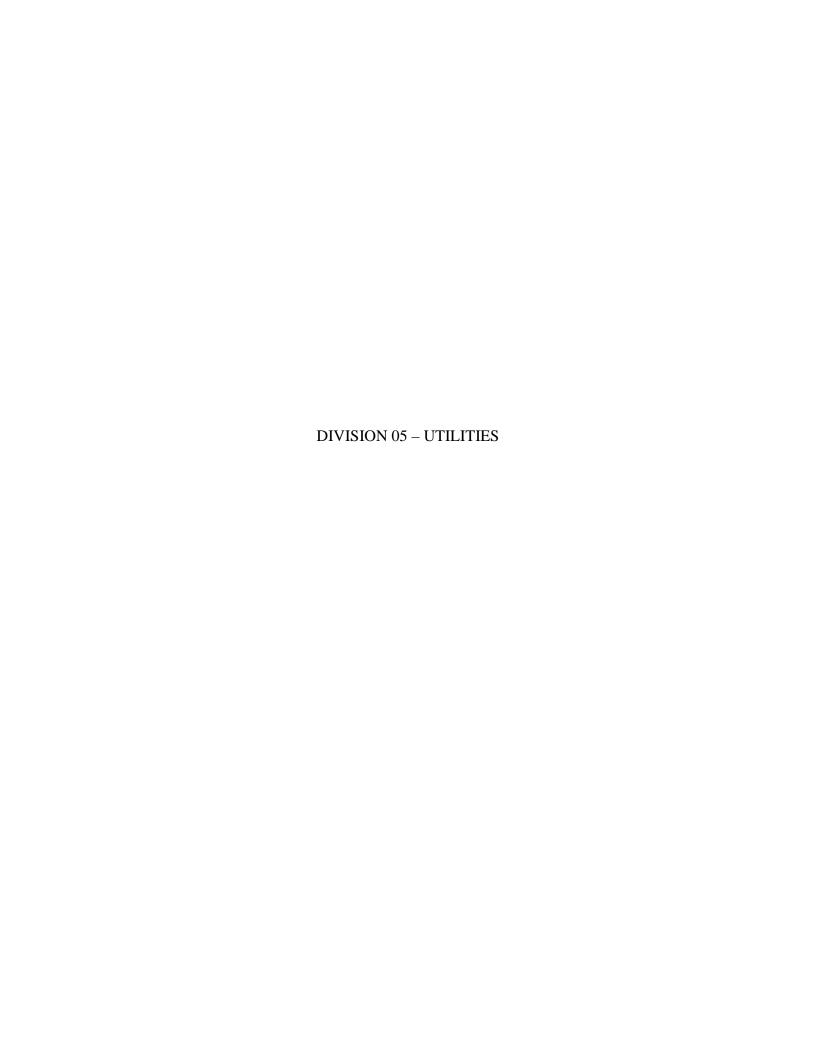
- A. Apply paint products in accordance with manufacturer's published instructions using application procedures approved for the particular application and substrate to the specified Minimum Dry Film Thickness (MDF). Apply each coat to uniform finish.
- B. Do not apply paint markings on surfaces that are not dry and if rain is expected within 24 hours.

- C. Do not apply paint markings when surface or air temperature is below 50 degrees F.
- D. Apply 2 coats at manufacturer recommended rate without addition of thinner. Apply with mechanical equipment to produce uniform straight edges. At sidewalk curbs and crosswalks, use straightedge to provide uniform, clean, and straight stripe.

3.4 PAINT MARKING SCHEDULE

- A. Paint the following items with colors indicated below:
 - 1. Pedestrian Crosswalks: White.
 - 2. Lane Striping Where Separating Traffic in Opposite Directions: Yellow.
 - 3. Lane Striping Where Separating Traffic in Same Direction: White.

END OF SECTION



SECTION 05150

WATER UTILITIES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Relocation work
 - 2. Service connections
 - 3. Testing and disinfection
- B. Related Documents: The Contract Documents, as defined in Section 01010 Summary of Work, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other Documents.

1.2 REFERENCES

- A. American Society of Mechanical Engineers (ASME):
 - 1. ASME B16.18 Cast Copper Alloy Solder Joint Pressure Fittings.
 - 2. ASME B16.22 Wrought Copper and Copper Alloy Solder Joint Pressure Fittings.
- B. American Society for Testing and Materials (ASTM):
 - 1. ASTM B 88 Specification for Seamless Copper water Tube.
 - 2. ASTM D 1785 Specification for Polyvinyl Chloride (PVC) Plastic Pipe, Schedules 40, 80, and 120.
 - 3. ASTM D 2241 Specification for Polyvinyl Chloride (PVC) Pressure Rated Pipe (SDR Series).
 - 4. ASTM D 3034 Specification for Type PSM Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings.
 - 5. ASTM D 3139 Specification for Joints for Plastic Pressure Pipes using Flexible Elastomeric Seals.
- C. American Water Works Association (AWWA):
 - 1. AWWA C 110 Gray-Iron Fittings, 3 inches Through 48 Inches, for Water and Other Liquids.
 - 2. AWWA C 111 Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.
 - 3. AWWA C 151 Ductile-Iron Pipe, Centrifugally Cast in Metal Molds or Sand-Lined Molds, for Water or Other Liquids.
 - 4. AWWA C 504 Rubber Seated Butterfly Valves.
 - 5. AWWA C 509 Resilient Seated Gate Valves 3 inch through 12 inch NPS, for Water and Sewage Systems.
 - 6. AWWA C 600 Installation of Ductile-Iron Water Mains and Appurtenances.
 - 7. AWWA C 900 Standard for Polyvinyl Chloride (PVC) Pressure Pipe, 4 inch through 12 inch, for Water.

1.3 SUBMITTALS

- A. Submittal Procedures: Procedures for submittals.
 - 1. Product Data: Data for each type of pipe, pipe fitting, valve and accessory specified.
- B. Closeout Procedures and Training: Procedures for closeout submittals.
 - 1. Project Record Documents: Accurately record the following:
 - a. Locations of piping mains, valves, connections, and top of pipe elevations.
 - b. Identify and describe unexpected variations to subsoil conditions and location of uncharted utilities.

1.4 QUALITY ASSURANCE

- A. Regulatory Requirements: Perform work in accordance with utility company requirements and local authority having Warwick Water Department additional requirements.
- B. Valves: Manufacturer's name and pressure rating marked on valve body.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Product Requirements: Transport, handle, store, and protect Products.
- B. Deliver and store valves in shipping containers with labeling in place.

1.6 GENERAL REQUIREMENTS

- A. Inspection of all installations shall be conducted to ensure compliance with the rules and regulations of the Owner. Owner employees shall be given full access to the project at all times for inspection or observation of construction in progress as deemed necessary. Failure to construct the new extension of the system as per the approved design drawings or Owner's rules and regulations will cause immediate cessation of all construction work.
- B. Contractor shall provide shop drawings of all proposed water materials.
- C. All valves in the system are the property of the Warwick Water Department and as such shall not be opened by any individual without the approval of and in the presence of a Warwick Water Department representative.
- D. Existing water services which are impact shall not be spliced, but made continuous from the main to the curb stop.
- E. All contractors are strictly forbidden from operating any hydrants or valves within the system without approval and presence of the Warwick Water Department.
- F. A minimum of ten-foot horizontal separation shall be maintained in the placement of water mains, services or appurtenances within the vicinity of sewer facilities or vice versa. Where water mains cross sewer mains, the crown of the sewer main shall be at least 18-inches below the bottom of the water main. In cases where it is not possible to maintain a 10-foot, horizontal separation or in the case of crossing the eighteen-inch, vertical separation, a deviation from this restriction may be allowed on a case by case basis

05150 - 2

- with prior approval from the Warwick Water Department as to the proposed materials and interventions to be taken to protect the water system from the possibility of contamination. In all cases, force main sewer infrastructure must be located below water mains.
- G. A minimum of 24-inches horizontal separation shall be maintained in the placement of water mains, services or appurtenances within the proximity of other utilities such as gas, drainage, electrical or telephone. Where water mains cross other utilities, the vertical separation between the water infrastructure and utility shall be at least 18- inches. The placement of other utilities in the proximity of water facilities shall maintain these separation distances. In cases where it is not possible to maintain these separation distances, a deviation from this restriction may be allowed on a case-by-case basis with prior approval from the Warwick Water Department.
- H. Product Requirements: Transport, handle, store, and protect Products.
- I. Deliver and store valves in shipping containers with labeling in place.
- J. New services shall be installed from the new main to existing curb stops. Existing curb stops shall be replaced with new where new or replacement services are required.
- K. All service concrete thrust Blocks shall be installed at all tees, bends and hydrant branches. Thrust blocks shall bear against undisturbed trench wall and conform to the dimensions shown on the bearing thrust block detail.
- L. Sand bedding shall be installed from 6-inches below all water pipes to 6-inches above the crown of the pipe for the full trench width.
- M. Bituminous Pavement Patch (2-inch minimum thickness) shall be installed over all water line trenches.
- N. Temporary Water Pipe shall be 4-inch galvanized steel with wall thickness capable of withstanding normal working pressure in the area. Couplings shall be as manufactured by "Victaulic" or approved equal. Temporary hydrants shall be approved by the Warwick Water Department prior to installation.

PART 2 - PRODUCTS

2.1 PIPE

- A. Ductile Iron Water Pipe shall be made in USA and conform to ANSI/AWWA C151/A21.51, AWWA/ANSI C150/A21.50 thickness Class 52 with double cement mortar lining conforming to AWWA/ANSI C104/A21.4. End Joints shall be Rubber-Gasketed "Push On" type for line piping and mechanical joint gasketed and bolted for all fittings and bends in accordance with AWWA/ANSI C111/A21.11 or latest revision. The exterior of all ductile iron pipe and fittings shall be covered with an asphaltic coating approximately 1 mil thick. The finish coating shall be continuous, smooth, neither brittle when cold nor sticky when exposed to the sun, and shall be strongly adhered to the pipe. Size for pipe and fittings shall be as shown on the Plans.
- B. Polyvinyl Chloride Water Pipe shall be Class 150 (DR 18) and conform to the requirements of AWWA standard C900. The pipe shall be manufactured from PVC cell classification 12454-A or B (per ASTM D1784), and Class 150 (DR 18). The outside diameter shall be the equivalent to those of ductile iron.

05150 - 3

The standard lay length shall be 20 feet (bottom of bell to end of spigot). The minimum burst pressure for Class 150 shall be 755 psi. Pressure and leakage tests shall be carried out in the installed pipeline in accordance with AWWA C600. The pipe shall be of the gasketed bell or gasketed coupling type. Solvent cement connections will not be allowed. Rubber ring gaskets shall consist of a solid cross-Section elastomeric ring which meets the requirements of ASTM 1869. Sizes for pipe and fittings shall be as shown on the plans. Plastic warning/locator tape, 4-inch width, shall be furnished 12-inches below surface over PVC water pipe. Tape shall be labeled "WATER."

2.2 FITTINGS

- A. Ductile Iron Fittings shall be made in USA and conform to AWWA/ANSI C153/A21.53. Double cement lined, interior and exterior coatings shall be as specified for Water Pipe above. Gaskets for fittings shall be rubber conforming to AWWA/ANSI C111/A21.11.
- B. Polyvinyl Chloride Fittings shall be Class 150 PVC pipe and conform to AWWA Standard C900 or to CSA Standard B137.3. PVC fittings shall be Class 150 injection molded. The fittings shall be color-coded blue. The fittings shall also meet the requirements of Standard UNI-B-12," Recommended Standard Specification for PVC Pressure Fittings", as published by the Uni-Bell PVC Pipe Association. The fittings shall be made from PVC compound12454-B (ASTM D1784) having a Hydrostatic Design Basis of 4000 psi, and be approved for potable water service by the National Sanitation Foundation.

2.3 VALVES

- A. Gate Valves shall be Mueller or Kennedy Valve Resilient Gate, Resilient Seat meeting or exceeding AWWA C-509 and opening right. All external fasteners of the valves shall be stainless steel Type 304. Interior and exterior of the valves shall be coated with two-part epoxy-thermosetting style; minimum thickness shall be 8 mils nominally meeting or exceeding AWWA C550. Size of valves shall be as indicated on the Plans.
- B. Tapping Sleeves and Valves shall be full port and conform to the requirements of Para. 5, above. Sleeves shall be full body ductile iron of the same manufacturer of the tapping valve and shall be bituminous or epoxy coated. Size of tapping sleeves shall be as indicated on the Plans.

2.4 TAPPING SLEEVES AND VLAVES

- A. All size on size tapping sleeves shall be full size cast iron or ductile iron, mechanical joint with stainless steel fasteners made in the North America, as approved by the Warwick Water Department.
- B. Sleeve couplings and accessories shall be pressure rated to at least equal that of the pipe. Couplings shall be ductile iron. The interior of the coupling shall be epoxy-coated in accordance with American Water Works Association ASTM & ANSI standards. Coating shall be thermosetting epoxy with a minimum dry film thickness of 10 mils and a maximum of 20 mils. Fabricated sleeves will be allowed only on ductile iron mains, cast iron mains or PVC mains with prior approval by the Warwick Water Department.
- C. All sleeves shall be installed in strict compliance with the manufacturer's recommendations; copies of the installation guidance shall be available on-site Warwick Water Department installation.
- D. Water main on branch side of tapping sleeve shall be restrained in accordance with pertinent sections of the rules and regulations.

E. Valves shall be full body and full port tapping type meeting the requirements above. Sleeves shall be full port ductile iron or grade 18-8 type 304 stainless steel. Ductile iron sleeves shall be of the same manufacturer as of the valve and bituminous coated. All sleeves shall be manufactured to meet or exceed the design and operating characteristics of one of the following devices: type: resilient seat gate valves designed specifically for tapping. Seal: stainless steel sleeves shall use grid pattern virgin rubber ASTM 2000, full 360-degree pipe coverage. Ductile iron sleeves shall use mechanical joint with rubber seals. Maximum working pressure: 4 inch to 12 inch 250 psi, 16 inch to 24 inch 200 psi. Fastener: grade 18-8 type 304 stainless steel.

2.5 VALVE ROAD BOX

- A. All valves (except swing-check) shall be equipped with a cast iron "Buffalo" type, adjustable (sliding) valve road box. The upper portion shall be 26 inches long and the bottom section 48 inch (min). Covers shall be 5-1/4" in diameter solid ring seat with the word "water" (in caps) cast upon it.
- B. The upper portion of the box shall be manufactured with a heavy flange having sufficient bearing area to prevent settlement. The lower section shall be configured to enclose the valve stuffing box with an inside diameter of at least 4-1/4 inch. The installed box shall be capable of vertical adjustment of a minimum of 6 inch while maintaining an overlap of a least 4 inch between sections.

2.6 SERVICE AND GATE BOX

- A. Curb boxes may be manufactured in North America or selected foreign made. Selected foreign made boxes must receive prior approval based on design and style samples to be provided for review. They shall be heavy pattern cast iron, buffalo style, slip adjustable type with heavy cast iron cover and brass bolt fastener type lock. The word "water" shall be cast upon the cover in heavy pattern raised letters. Covers shall be drop in type without fins solid ring. Boxes shall have a bituminous internal and external coating in accordance with ANSI/AWWA C151/A21.51 and ANSI/AWWA C153/A21.53 respectively. Boxes shall have barrels of not less than 2½ inch in diameter. The upper section of each box shall have a bottom flange of sufficient bearing area to prevent settling. The base of the lower section shall be a reinforced arch configuration and sized to enclose the curb stop. Box sections shall be of sufficient length to provide complete coverage for the depth of bury.
- B. Gate valve boxes may be either manufactured in North America or selected foreign made. Selected foreign made boxes must receive prior approval bases on design and style samples to be provided for review. They shall be heavy pattern cast iron, slip adjustable type and provided with heavy cast iron cover. Cover shall have the word "water" cast upon in heavy pattern raised letters 5 ¼ inch diameter. Cover shall be drop in type without fins solid ring. Boxes shall have a bituminous internal and external coating in accordance with ANSI/AWWA C151/A21.51 and ANSI/AWWA C153/A21.53 respectively. The upper section of each box shall have a bottom flange of sufficient bearing area to prevent settling. The bottom of the lower section shall be bell shaped and sized to enclose the stuffing box and operating nut of the valve. Boxes shall have barrels of not less than 5" in diameter. Box sections shall be of sufficient length to provide complete coverage for the depth of bury. Upper portion shall be 26" long and the bottom section 48" (min) in length.

2.7 HYDRANTS

A. Hydrants shall be approved by the City of Warwick Water Department. They shall be Mueller

Centurion Warwick Water Department on A-421, 4¹/₄" Main Valve opening; Kennedy K-81A, 4¹/₂" Main Valve opening. Hydrants shall be **post** type, open to the **left**, and shall be consistent both in design and aesthetically with those in use in the City of Warwick. In addition, the following criteria shall apply:

- a. The hydrants shall be furnished with a sealed reservoir located in the bonnet so that all threaded and bearing surfaces are lubricated each time the hydrant is operated. Dry construction is also acceptable; where the dry top construction isolates the operating threads from contact with potentially corrosive water in a permanently lubricated, air tight, grease filled housing to assure ease of operation. "O-ring" seals shall be utilized to give permanent watertight seal between the water in the barrel of the hydrant and the bonnet.
- b. The hydrants shall be 3-way with two, $2\frac{1}{2}$ " hose nozzles and one $4\frac{1}{2}$ " pumper nozzle, with National Standard Threads, and $1\frac{1}{2}$ " pentagonal nuts.
- c. The hydrant main valve, which includes the drain valve and drain ring, shall be of cast bronze. Bronze to bronze construction allows for ease of disassembling for maintenance and repair. The bronze provides corrosion protection.
- d. The hydrant shall have at least two (2) bronze or copper lined drain outlets.
- e. The shoe/elbow of the hydrant shall be a mechanical joint, suitable for use either with centrifugally cast pipe, or polyvinyl chloride PVC class 150, DR 18 pipe. Extra gaskets shall be furnished as required.
- f. The shoe/elbow shall be designed for full flow with pedestal base for ease of settling. Lugs shall be vast on each side of the shoe for strapping to prevent blow-off.
- g. Hydrants shall be furnished with a breakable feature that will break cleanly upon impact. This shall consist of a two-part breakable safety flange with a breakable stem coupling. Frangible bolts are not acceptable.
- h. Hydrant nozzles must be able to rotate to any position within disassemble of groundline flange.
- i. Hydrant(s) must be delivered according to the following color specifications:

Hydrant Barrel/Base - Devoe/Devguard #4308 Alkyd Industrial Gloss Enamel Safety Red #4308 - 9000 (or equivalent)

Hydrant Caps - Devoe/Devguard #4308 Alkyd Industrial Gloss Enamel Pure Aluminum #4308 - 9020 (or equivalent)

B. Substandard color(s) and/or paint quality will be rejected upon delivery.

2.8 ACCESSORIES

A. Concrete for Thrust Blocks: Place thrust blocking consisting of 2,500 psi concrete to provide sufficient bearing area to transmit unbalanced thrust from bends, tees, caps, or plugs to undisturbed soil without loading undisturbed soil in excess of 2,500 pounds per square foot when water main pressure is 100 psi.

MINIMUM THRUST BLOCKING BEARING AREAS

Pipe	Tees	90° Bend	45° Bend	22° Bend	11° Bend
Diameter	Sq. Ft.	Sq. Ft.	Sq. Ft.	Sq. Ft.	Sq. Ft.
3"	1.0	1.0	1.0	1.0	1.0
4"	1.0	1.0	1.0	1.0	1.0
6"	1.5	2.0	1.0	1.0	1.0
8"	2.5	3.5	1.8	1.0	1.0
10"	4.0	5.5	2.8	1.5	1.0
12"	6.0	8.0	4.0	2.0	1.5
14"	8.0	11.0	5.5	3.0	2.0
16"	10.0	14.2	7.0	4.0	3.0
18"	21.0	21.0	12.0	6.0	4.0

B. Locked Mechanical Joint fittings shall be installed where vertical changes in direction are required and, if approved by Contracting Officer, can be installed in lieu of the above thrust blocking requirements.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verification of existing conditions before starting work.
- B. Verification of Conditions: Verify that field measurements, surfaces, substrates and conditions are as required, and ready to receive Work.
 - 1. Verify trench cut, excavations, dimensions, and elevations are as indicated on Drawings.
- C. Report in writing to Owner prevailing conditions that will adversely affect satisfactory execution of the Work of this Section. Do not proceed with Work until unsatisfactory conditions have been corrected.
- D. By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to the Owner.

3.2 INSTALLATION

- A. Installation of all water conveyances, mains, pipes or lines shall be in accordance with the ductile iron pipe research association's installation manual, AWWA, NFPA 24, NSF 61, and RIDOH.
- B. Water main and services shall be installed with a minimum cover of 5 feet to the crown of the pipe in an American Water Works Association "Type 5 trench". Where unsuitable material is found at or below the grade of the placement of the pipe or fitting, the undesirable material shall be removed to the required width and depth and replaced with thoroughly compacted bank run gravel above the crown of the pipe.

05150 - 7

Material shall be deposited across the full width and length of the trench in layers of not more than 12" in depth before compaction. Each layer, to within 12" of sub-grade of the permanent patch, shall be compacted to 95% standard proctor. The final 12" shall be processed gravel compacted in two (2) equal courses to 95% standard proctor.

- C. Each length of pipe and or fitting shall be inspected for cracks, defects in coating on lining, cleanliness or any other evidence of unsuitability. Piping shall be laid straight true to line.
- D. Whenever pipe requires cutting to fit the line, the work shall be done only by experienced (State of Rhode Island, licensed contractor) or plumber, and in such a manner as to leave a smooth end at right angles to the axis of the pipe and on pipe that is center rounded designed specifically for field cutting. The cut ends shall be beveled to conform to the manufactured spigot end. Particular care shall be exercised to prevent damaging the lining when cutting cement-lined cast or ductile iron pipe. Jointing of pipe or fittings shall be made only by persons thoroughly skilled in this work. For pipe diameters 16" and larger, pipe cutting shall be done by machine.
- E. Metalized detectable identification tape 2" in width or greater, blue in color and printed with "caution water line Warwick Water Department below" shall be utilized over all mains. Set to a depth from finished grade of no more than 1' 0".
- F. At all times, Warwick Water Department construction, all piping and fittings shall be kept from becoming contaminated from construction materials, dirt, non-potable water, yard waste or substances produced as a result of animals, rodents, and insects. Without exception, all stored piping shall be timber cribbed above grade, and shall be fitted with watertight plugs or plastic sheet securely fastened to the pipe. All valves, fittings, and appurtenances shall be fitted with caps, plugs or plastic sheet securely fastened to the fitting. The implementation of these protective measures is required to reduce the significant loss of water and labor hours expended Warwick Water Department multiple attempts to sufficiently clean the new mains to meet the water quality standard set by the US EPA primary drinking water regulations.
- G. Adequate, temporary provisions shall be made to care for the flow from sewers or drains interfered with by the work. All necessary measures shall be taken to prevent sewage or other contaminating matter from entering the water main. Any broken or damaged utility connection or services (water, sewer, gas, telephone, electric, etc.) Shall be fully repaired at the expense of the party responsible for the damage. Underground structures shall be thoroughly supported or otherwise protected to maintain uninterrupted service.
- H. No new piping system shall be permanently connected to an existing main until after obtaining successful results from water quality tests from a state of Rhode Island certified laboratory meeting the standards set by Rhode Island Department of Health.
- I. Temporary fittings for flushing, pressure testing and chlorination are required for all newly installed mains. New mains shall be capped at each end. Each end shall be fitted with a temporary riser of sufficient length to reach finished grade and an isolation valve. The live main tap shall be fitted with an isolation valve, two feet of main that is restrained, restrained cap and temporary riser of sufficient length to reach finished grade and an isolation valve. Risers and isolation valves shall be sized to provide a flushing water velocity of at least 2.5 feet per second based on the installed main size. A meter and testable backflow preventer is required to be placed in the jumper line between the existing and new main prior to obtaining water for any process. Depending on the size of the main, multiple taps and backflow preventers may be required to provide the required velocities within the new main.

3.3 BACKFILL

- A. Pipe bedding shall be processed sand. It shall be free from peat, vegetable or organic matter or any other debris and readily compactable. Recycled road sweepings and contaminated material are forbidden.
- B. Selected backfill may be from excavated materials that shall be free draining, clean, granular soil suitable for backfill. It shall be free from peat, vegetable or organic matter or any other debris and shall be readily compactable. Recycled road sweepings and contaminated material are forbidden. Up to 20 percent may be rock like material, not to exceed 3 inch in length or diameter and must be evenly distributed within the total volume of the fill.

3.4 PRESSURE TESTS

- A. All services, water mains, bypass piping and appurtenances must be installed prior to commencement of any test. A pressure test shall be conducted on all completed water lines prior to acceptance. The contractor at no cost to the Warwick Water Department, shall accomplish the pressure test. An authorized representative of the Warwick Water Department shall witness the test. Testing shall be in accordance with ANSI/AWWA C600 hydrostatic testing.
- B. Each valve section of the main shall be filled slowly with water at a rate no greater than one foot of pipe section per second. All air shall be released via corporation stops, hydrants, and installed automatic air release fittings. All air must be removed and the full pipe shall sit idle for a period of 24 hours prior to commencement of the pressure test. Piping installations greater than 1,000 feet shall be accomplished in sections no greater than 1,000 feet.
- C. The test pressure shall be brought up to at least 50% higher than the normal anticipated working pressure or 150 psi, whichever is greater, and maintained for a continuous two (2) hour period. An authorized representative of the Warwick Water Department shall witness the test. Any loss of pressure indicates a leak, and no pipe installation will be accepted with any leakage.
- D. Proper thrusting of all pipe fittings, caps, hydrants, and appurtenances shall be provided to resist the imposed test pressure.

3.5 CHLORINATION/DISINFECTION

- A. All new or repaired potable water system distribution mains, service pipe and the necessary connecting pipes, fittings, control valves, and all appurtenances in or adjacent to any building or premises shall be purged of deleterious matter and shall be disinfected prior to utilization or permanent connection to the Warwick Water Department system. The contractor must provide written laboratory certified documentation of the disinfection test results to the Warwick Water Department before making any permanent connection to the Warwick Water Department system or before reactivation of any existing water service can be authorized.
- B. All water main replacements, extensions, fire lines and services shall be disinfected pursuant to AWWA specification C651 disinfection of water mains, prior to being placed into service. The Warwick Water Department will accept the continuous feed method of chlorination for all water mains as specified by AWWA C651. These include but are not limited to mains, service piping, and building served.

05150 - 9

- C. The contractor is responsible for all costs associated with the disinfection process or procedure.
- D. The disinfection must result in eliminating from the various parts of the new pipe line any evidence of the existence, therein, of bacteria indicative of any contamination, as determined by tests of the bacterial content of samples of water taken from the new water main. The disinfection may be accomplished by introducing into all the various parts of the new water mains, a liquid solution containing 1% available chlorine in such volume that the rate of dosage to the water mains shall be at least 50 parts per million of available chlorine. Tablet chlorination is not allowed. The contact period for this disinfection shall be at least 24 hours, and a longer period will be required if tests of residual chlorine show it to be necessary for proper disinfection.
- E. The new water system shall be flushed out after disinfection and refilled with fresh water. All chlorinated water used in the disinfection process shall be de-chlorinated prior to discharge to the surrounding area.
- F. Water must sit in the main for at least 24 hours prior to taking a test sample. Water utilized for this purpose, flushing or pressure testing, which is obtained directly from the Warwick Water Department system, must flow through an isolated connection to the Warwick Water Department system via an approved meter, testable backflow prevention device and jumper line. The contractor shall make all necessary arrangements for the Warwick Water Department for the water for test purposes and shall bear the expense of these arrangements. The installer shall furnish and install suitable temporary testing plugs, caps, pumps, pipe connections and other appurtenances, as necessary, to obtain samples at points no further than 1,000 feet apart.
- G. After final flushing and before the new water main is connected to the distribution system, two consecutive sets of acceptable samples for coliform bacteria and heterotrophic plate count (HPC), taken 24 hours apart, shall be collected from the termination of the new main. At least one sample shall be collected every 1000 ft. Of new main, plus one set of two samples from the end of the line. At least one set of two samples shall be taken from each branch. Samples shall be collected by the contractor and tested by a laboratory approved by Warwick Water Department. The water sample test results must indicate that the water quality in the new main is consistent in quality with the Warwick Water Department system water.

3.6 FIELD QUALITY CONTROL

- A. Section 014000 Quality Requirements: Field testing and inspection.
- B. Site Tests:
 - 1. Compaction:
 - a. Perform inspections prior to and immediately after placing bedding.
 - b. Perform tests as specified in Section 312300.
 - 2. Piping: Water distribution system pipe installed below grade and outside building shall be tested in accordance with following procedures:
 - a. Perform the testing of pipe materials, joints, and/or other materials incorporated into the construction of water mains and force mains to determine leakage and water-tightness. All pressure pipeline shall be tested in accordance with Section 4 of AWWA C600 latest edition. In the event any state or local code requires a more stringent test, the more stringent shall apply.

- b. 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 1.5 times the working pressure at the point of testing and not less than 1.25 times the working pressure at the highest point along the test section.
- c. Leakage Test: The leakage test shall be conducted concurrently with the pressure test. Leakage is defined as the quantity of water that must be supplied into the newly laid pipeline, 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 pipeline has been filled with water. Leakage shall not be measured by a drop in pressure in a test section over a period of time. No pipeline installation will be accepted if the leakage is greater than that determined by the following formula:

$$L = \frac{SD P}{133200}$$

L = allowable leakage, (gallons per hour)

S = length of pipe tested, (feet)

D = nominal diameter of pipe, (inches)

P = average test pressured Warwick Water Department test, (psig)

- d. Visible Leakage: All visible leaks shall be repaired regardless of the amount of leakage.
- e. Acceptance of Installation: If any test of pipe laid in place discloses leakage greater than that specified, the Contractor shall, at his own expense, locate the leak and make repairs as necessary until the leakage is within the specified allowance. Contractor shall supply all water for testing at no additional cost to the Owner.
- f. Provide one copy of results of meter test and hydrostatic pressure test to Owner and utility company upon completion of water distribution backfilling operations.

END OF SECTION

SECTION 05200

STORM DRAINAGE UTILITIES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Relocation of Drainage Pipe
 - 2. Site storm sewer drainage piping, fittings and accessories, and bedding.
- B. Related Documents: The Contract Documents, as defined in the General Conditions, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other Documents.
- C. Related Sections:
 - 1. Section 03350 Excavation and Fill
 - 2. Section 05220 Storm Drainage Manholes, Frames, and Covers
 - 3. Section 05500 Sanitary Sewerage Utilities

1.2 REFERENCES

- A. American Society for Testing and Materials (ASTM):
 - 1. ASTM A 760 Standard Specification for Corrugated Steel Pipe, Metallic Coated for Sewers and Drains.
 - 2. ASTM C 12 Practice for Installing Vitrified Clay Pipe Lines.
 - 3. ASTM C 76 Specification for Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe.
 - 4. ASTM C 443 Specification for Joints for Circular Concrete Sewer and Culvert Pipe, Using Rubber Gaskets.
 - 5. ASTM D 2321 Recommended Practice for Underground Installation of Flexible Thermoplastic Sewer Pipe.
 - 6. ASTM D 3034 Specification for Type PSM Polyvinyl Chloride (PVC) Sewer Pipe and Fittings.
 - 7. ASTM F477 Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe.

1.3 DEFINITIONS

A. Bedding: Fill placed under, beside and directly over pipe, prior to start of backfill operations.

1.4 SUBMITTALS

- A. Closeout Procedures and Training: Procedures for closeout submittals.
 - 1. Project Record Documents: Accurately record the following.
 - a. Actual locations of pipe runs, connections, manholes, catch basins, cleanouts, and invert elevations.
 - b. Identify and describe unexpected variations to subsoil conditions and location of uncharted utilities.

05200 - 1

1.5 QUALITY ASSURANCE

A. Regulatory Requirements: Conform to local Public Works Standard Specifications for materials and installation of the work of this Section.

PART 2 - PRODUCTS

2.1 PIPE MATERIALS

A. Reinforced Concrete Pipe:

- 1. Pipe: ASTM C 76, Class III unless indicated otherwise on Drawings.
- 2. Gaskets: ASTM C 443; rubber compression gaskets installed in accordance with manufacturer's published instructions.

B. Corrugated Steel Pipe:

- 1. Pipe: ASTM A 760; galvanized, aluminized or bituminous coated round pipe, arch pipe, or slotted drain pipe as indicated on Drawings., 16 gage unless otherwise indicated.
 - a. Provide slotted drain pipe with 1.75 inch wide drain guide waterway openings and 6 inch minimum height drain guide.

2. Fittings:

- a. Matching band connectors.
- b. Sleeve gaskets in accordance with manufacturer's recommendations.

C. Spiral Rib Metal Pipe:

- 1. Pipe: ASTM A 760, Type 1R; Galvanized, aluminized or bituminous coated as indicated on Drawings.
- 2. Fittings: Provide re- corrugated pipe ends with semi-corrugated Hugger-type bands and "O" ring gaskets in accordance with manufacturers recommendations.

D. Polyvinyl Chloride (PVC) Pipe:

- 1. Pipe: ASTM D 3034, SDR 35 Rated.
 - a. Continuously mark pipe with manufacturer's name, pipe size, cell classification, SDR rating, and ASTM D 3034 classification.
- 2. Joints: ASTM D 3034, Table 2; integrally molded bell ends with factory supplied elastomeric gaskets and lubricant.

E. High-Density Polyethylene (HDPE) Pipe:

- 1. Pipe: AASHTO M252, M294 & MP7-97 Type "S" (Corrugated Polyethylene Pipe).
 - a. Pipe shall have a smooth interior and a corrugated annular exterior.
 - b. Continuously mark pipe with manufacturer's name, pipe size and AASHTO classification.
 - c. Pipe shall be installed per manufacturer's recommendations.
 - d. Subject to compliance with project requirements, manufacturers offering Products which may be incorporated in the Work include the following:
 - 1) Hancor, Findlay, OH (888) 367-7473: Sure-Lok F477.
 - 2) Section 016000 Product Requirements: Product options and substitutions. Substitutions: permitted.
- 2. Joints: Pipe shall be joined with a bell and spigot joint incorporating ASTM F477 gasket material insuring a leak resistant performance.

2.2 INLETS, CATCH BASINS AND JUNCTION BOXES

- A. Lid and Frame: Cast iron as indicated on Drawings.
- B. Structure: As indicated on Drawings.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Execution: Verification of existing conditions before starting work.
- B. Verification of Conditions: Verify that field measurements, surfaces, substrates and conditions are as required, and ready to receive Work.
 - 1. Verify that survey benchmark and intended elevations for the Work are as indicated on Drawings.
 - 2. Verify that trench cut and excavation is ready to receive Work and excavations, dimensions, and elevations are as indicated on Drawings.
- C. Report in writing to the Engineer prevailing conditions that will adversely affect satisfactory execution of the Work of this Section. Do not proceed with Work until unsatisfactory conditions have been corrected.
- D. By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to the Owner.
- E. Work shall be in accordance with the Rhode Island Department of Transportation Standard Specification for Road and Bridge Construction, 2004 Edition including all addenda.

3.2 PREPARATION

- A. Hand trim excavations to required elevations. Correct over excavation with fine aggregate.
- B. Remove large stones or other hard matter which could damage piping or impede consistent backfilling or compaction.

3.3 BEDDING

- A. Excavate pipe trench and hand trim excavation for accurate placement of pipe to elevations indicated.
- B. Place bedding material at trench bottom, level materials in continuous layers not exceeding 6 inches compacted depth, each layer. Place compacted bedding material to elevation of paving subgrade as indicated on Drawings.
- C. Maintain optimum moisture content of bedding material to attain required compaction density.
- D. Remove excess backfill and excavated material from site.

3.4 INSTALLATION - PIPE

- A. Work shall be in accordance with the Rhode Island Department of Transportation Standard Specification for Road and Bridge Construction, 2004 Edition including all addenda.
- B. Install pipe, fittings, and accessories in accordance with ASTM C 12, ASTM D 2321 or manufacturer's published instructions, and state or local requirements. Seal joints watertight.
- C. Install pipe on minimum 6-inch sand bedding.
- D. Lay pipe to slope gradients indicated on Drawings.
- E. Install aggregate at sides and over top of pipe. Provide top cover to minimum compacted thickness equal to paving subgrade indicated on Drawings.
- F. Do not displace or damage pipe when compacting.
- G. Refer to Section 05220 for manhole requirements.
- H. Connect to municipal storm sewer systems, manholes, and inlets as indicated on Drawings.

3.5 INSTALLATION - CATCH BASINS, INLETS, AND JUNCTION BOXES

- A. Form bottom of excavation clean and smooth to elevation indicated on Drawings.
- B. Form and place cast-in-place concrete base pad, with provision for storm sewer pipe to be placed at required elevations.
- C. Form and place cast-in-place concrete walls, sleeved at required elevation, to receive storm sewer pipe as indicated on Drawings.
- D. Form and place cast-in-place top of structure as indicated on Drawings.
- E. Mount grate and frame level, in grout, secured to top Section at elevation indicated.

3.6 CONSTRUCTION

A. Interface with Other work: Coordinate the Work with termination of storm sewer connection outside building including connection to municipal storm sewer system.

3.7 FIELD QUALITY CONTROL

- A. Quality Requirements: Field inspection and testing.
- B. Site Tests:
 - 1. Perform inspections prior to and immediately after placing bedding.
 - 2. Compaction: Specified in Section 03200.
 - a. If tests indicate Work does not meet specified requirements, remove Work, replace and retest.

b. Frequency of Tests: To be determined by Owner.

END OF SECTION

SECTION 05220

STORM DRAINAGE STRUCTURES, FRAMES, AND COVERS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

- 1. Monolithic concrete manhole Section with the option of monolithic concrete or masonry transition to lid frame, covers, anchorage and accessories.
- 2. Modular precast concrete manhole Section with tongue-and-groove joints and with the option of precast concrete or masonry transition to lid frame, covers, anchorage and accessories.
- 3. Masonry manhole Section with masonry transition to lid frame, covers, anchorage and accessories.

B. Related Sections:

- 1. Section 03350 Excavation and Fill: Earthwork for utilities.
- 2. Section 05200 Storm Drainage Utilities: Site storm drainage system.

1.2 REFERENCES

- A. American Society for Testing and Materials (ASTM):
 - 1. ASTM C55 Specification for Concrete Building Brick.
 - 2. ASTM A48 Specification for Gray Iron Castings.
 - 3. ASTM C478 Specification for Precast Reinforced Concrete Manhole Sections.
 - 4. ASTM C923 Specification for Resilient Connectors Between Reinforced Concrete Manhole Structures and Pipes.
- B. International Masonry Industry All-Weather Council (IMIAC): Recommended Practices and Guide Specification for Cold Weather Masonry Construction.
- C. Rhode Island Department of Transportation Standard Specifications for Road and Bridge Construction, 2004 Edition including all addenda.

1.3 SUBMITTALS

- A. Section 01340 Shop Drawings
 - 1. Product Data: Data for manhole covers, manhole steps, component construction, features, configuration, and dimensions.
 - 2. Shop Drawings: Drawings of manhole locations, elevations, piping with sizes, locations and elevations of penetrations.

1.4 PROJECT CONDITIONS OR SITE CONDITIONS

- A. Environmental Requirements:
 - 1. Cold Weather Requirements: IMIAC Recommended Practices and Specifications for Cold Weather Masonry Construction.

05220 - 1

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Manhole Section: Reinforced precast concrete. in accordance with ASTM C 478 with gaskets in accordance with ASTM C 923.
 - 1. Construct manholes of precast concrete Sections as required by Drawings to size, shape, and depth indicated, but never less than 4 foot inside diameter.
- B. Concrete Brick Units: ASTM C 55, Grade N Type I- Moisture Controlled, normal weight, of same Grade, Type and weight as block units, nominal modular size of 3 5/8 x 7 5/8 x 2 1/4 inches.
- C. Mortar and Grout: Mortar for finishing and sealing shall be Class "C". Honeycombing less than 2 inches deep shall be repaired using Class "D" mortar.
- D. Brick Transition Reinforcement: Formed steel 8 gage wire with galvanized finish.

2.2 COMPONENTS

- A. Frames and Cover: As indicated on the plans.
- B. Manhole Steps: As indicated on the plans.

2.3 CONFIGURATION

- A. Manhole Section Construction: Concentric with eccentric cone top Section.
- B. Shape: Cylindrical.
- C. Clear Inside Dimensions: 48 inch diameter or as indicated on Drawings.
- D. Design Depth: As indicated on Drawings.
- E. Clear Lid Opening: 24 inches minimum.
- F. Pipe Entry: Provide openings as indicated on Drawings.
- G. Main and Lateral Pipes: Neatly cut off main and lateral pipes flush with inside of manhole or inlet where they enter structure walls, and point up irregularities and rough edges with nonshrinking grout.
- H. Inverts: Shape inverts for smooth flow across structure floor as shown on Drawings. Use concrete and mortar to obtain proper grade and contour and finish surface with fine textured wood float.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verification of existing conditions before starting work.
- B. Verification of Conditions: Verify that field measurements, surfaces, substrates and conditions are as required, and ready to receive Work.
- C. Report in writing to Contracting Officer prevailing conditions that will adversely affect satisfactory execution of the Work of this Section. Do not proceed with Work until unsatisfactory conditions have been corrected.
- D. By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to the City.

3.2 PREPARATION

A. Coordinate placement of inlet and outlet pipe or duct sleeves as indicated on Drawings for drainage system piping.

3.3 PLACING PRE-CAST MANHOLE SECTIONS

- A. Place base pad to proper elevation and location and trowel top surface level for placement of manhole Section.
- B. Place manhole Section plumb and level to correct elevations and anchor to base pad.
 - 1. After completion of slab foundation, the first joint of manhole Section shall be lowered into position, grooved end first, and set level and plumb on concrete base. Align and adjust to proper grade prior to placing and forming invert which shall be poured immediately after setting of first Section of manhole Section.
 - 2. Prior to setting subsequent manhole Sections, apply primer to tongue and groove ends and allow to set in accordance with manufacturer recommendations. Place "Ram-nek", or equivalent, plastic rope on tongue end. Lower next Section into position, and remove excess material from interior of structure. Add additional material on exterior of joint, if necessary, for completely watertight joint.

3.4 MASONRY MANHOLE SECTION CONSTRUCTION

- A. Maintain masonry courses to uniform dimension. Form vertical and horizontal joints of uniform thickness.
- B. Lay masonry units in running bond. Course 3 brick units and 3 mortar joints to equal 8 inches.
- C. Form flush mortar joints.
- D. Lay masonry units in full bed of mortar, with full head joints, uniformly jointed with other work.
- E. Install joint reinforcement 16 inches on center
- F. Place joint reinforcement in first and second horizontal joints above base pad and below lid frame opening.

- G. As work progresses, build-in fabricated metal items.
- H. Cut and fit masonry for pipes as specified herein.
- I. Set cover frames and covers level without tipping, to correct elevations.
- J. Grout base of shaft Section to achieve slope to exit piping. Trowel smooth. Contour as required.
- K. Coordinate with other Sections of Work to provide correct size, shape and location.

3.5 BACKFILLING

A. Backfill around manholes as specified in Section 03350.

END OF SECTION

05220 - 4

SECTION 05400

ELECTRICAL UTILITY SERVICES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

- 1. Temporary shutdown of existing overhead electrical services.
- 2. Temporary overhead electrical services.

B. Work Summary:

1. Temporary shutdown or service of existing overhead electrical services may be required to facilitate directional drilling operations. The Contractor shall be responsible for determining overhead utility locations requiring temporary service or temporary shutdown Work to provide temporary service or to deactivate existing overhead electrical services shall be performed by the National Grid. The Contractor shall coordinate all work with National Grid to facility the installation of sewer pipe using trenchless technologies.

C. Related Sections:

1. Section 05812 – Horizontal Directional Drilling

1.2 SUBMITTALS

- A. Submittal Procedures: Procedures for submittals.
 - 1. Contractor shall submit a list of proposed overhead electrical services requiring temporary shutdown or relocation of services.

1.3 QUALITY ASSURANCE

A. Pre-Installation Meetings:

- 1. Convene a pre-installation meeting four weeks prior to commencing Work of this Section.
- 2. Require attendance of parties including National Grid.
- 3. Review conditions of operations, procedures and coordination with National Grid.
- 4. Agenda:
 - a. Tour, inspect, and discuss conditions of Project Site and location of utility service point.
 - b. Review required submittals, both completed and yet to be completed.
 - c. Review utility company drawings, details, and data.
 - d. Review and finalize construction schedule related to Work and verify availability of materials, personnel, equipment, and facilities needed to make progress and avoid delays.
 - e. Review required inspections, testing, certifying, and material usage accounting procedures.
 - f. Review weather and forecasted weather conditions, and procedures for coping with unfavorable conditions.
 - g. Review safety precautions relating to removing and resetting electrical services.
 - h. Review methods for coordinating electrical shutdowns with homeowners.

PART 2 - PRODUCTS

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verification of existing conditions before starting work.
- B. Verification of Conditions: Verify that field measurements and site conditions are as required, and ready to receive Work.
- C. Report in writing to the Owner conditions that will adversely affect satisfactory execution of the Work of this Section. Do not proceed with Work until unsatisfactory conditions have been corrected.
- D. By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to the Owner.

3.2 PREPARATION

A. Arrange temporary shutdowns or temporary services with National Grid and notify homeowners to be impacted.

END OF SECTION

SECTION 05500

SANITARY SEWER - OPEN EXCAVATIONS

1.1 SUMMARY

- A. Section Includes:
 - 1. Gravity and Pressure Sewer Laterals
- B. Related Sections:
 - 1. Section 03350 Excavation and Fill

1.2 SUBMITTALS

- A. Section 01340 Shop Drawings.
 - 1. Product Data: Data for each type of pipe and pipe accessory specified.
- B. Section 01780 Procedures for closeout submittals.
 - 1. Project Record Documents: Accurately record the following.
 - a. Actual locations of pipe runs, connections, manholes, cleanouts, and invert elevations.
 - b. Identify and describe unexpected variations to subsoil conditions and location of uncharted utilities.

1.3 QUALITY ASSURANCE

A. Regulatory Requirements: Perform work in accordance with environmental regulatory agencies, utility company requirements and applicable health codes and authority having jurisdiction requirements.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Product Requirements: Transport, handle, store, and protect Products.

PART 2 - PRODUCTS

2.1 INTERSECTING MAINS AND VALVE

- A. Pipe
 - 1. High Density Polyethylene (HDPE) Iron Pressure Pipe manufactured by JM Eagle® DR11 or approved equal shall be used for all sewer connections.
 - 2. Schedule 80 PVC pipe shall be used for all sizes of Intersecting Mains, In-Line Main Cleanout and Dead-End Main Cleanout Manholes.
- B. Pipe Joints

1. Stainless Steel Male thread HDPE transition fitting manufactured by Poly-Cam® Series 710HD or approved equal shall be used for 2" Intersecting Mains, In-Line Main Cleanout and Dead-End Main Cleanout connections.

C. Valves

- 1. Plug Valve manufactured by Henry Pratt company or approved equal shall be used for 3"-8" Intersecting Mains and Valve, 3"-8" In-Line Main Cleanout and Valve and 3"-8" Dead-End Main Cleanout and Valve connections.
- 2. 2" Schedule 80 PVC 2000 Standard Ball Valve manufactured by True Union shall be used for 2" Intersecting Mains and Valves, 2" In-Line Main Cleanout and Dead-End Main Cleanout connections.

D. Fittings

- 1. Schedule 80 PVC Cross manufactured by Spears or approved equal shall be used for all sizes of Intersecting Mains where a cross fitting is warranted.
- 2. Schedule 80 PVC Tee manufactured by Spears or approved equal shall be used for all sizes of Intersecting Mains where a tee fitting is warranted.
- 3. Schedule 80 PVC One Piece Flange manufactured by Spears or approved equal shall be used for 3"-8" Intersecting Mains and 3"-8" In-Line Main Cleanout and 3"-8" Dead-End Main Cleanout.

E. Adapters

1. Mechanical Joint HDPE Molded Butt Fusion Flange Adapter with Flange & Bolt Kit including Gland and Gasket manufactured by Integrity Fusion Products or approved equal shall be used for 3"-8" Intersecting Mains and 3"-8" In-Line Main Cleanout and 3"-8" Dead-End Main Cleanout.

F. Frame and Covers.

- 1. Frames and covers shall be as detailed on the Plans.
- G. The Contractor shall submit shop drawings of all proposed materials and substitutions for approval by the Engineer.

2.2 IN-LINE CLEANOUT MANHOLE

A. Fittings

- 1. 8"x4" Schedule 80 PVC Reducer (socket x socket) manufactured by Spears shall be used for 8" In-Line Main Cleanouts and 8" Dead-End Main Cleanouts.
- 2. 6"x2" Schedule 80 PVC Reducer (socket x socket) manufactured by Spears shall be used for 6" In-Line Main Cleanouts and 6" Dead-End Main Cleanouts.
- 3. 4"x2" Schedule 80 PVC Reducer (socket x socket) manufactured by Spears shall be used for 4" & 8" In-Line Main Cleanouts and 4" & 8" Dead-End Main Cleanouts.
- 4. 3"x2" Schedule 80 PVC Reducer (socket x socket) manufactured by Spears shall be used for 3" In-Line Main Cleanouts and 3" Dead-End Main Cleanouts.
- 5. 1 5/8" SS Strut Channel Support Assembly with bolted end wall plates (P2941) and 2" SS Riser Pipe Clamp (P1117) including SS bolts, nuts, washers and hardware manufactured by Unistrut or approved equal shall be used for all sizes of In-Line Main Cleanouts and all sizes of Dead-End Main Cleanouts.

B. Adapters

1. 2" SS Camlock Type A Adapter x Female NPT Part # 200-A-SS manufactured by Dixon Valve & Coupling Co. or approved equal shall be used for 2" In-Line Main Cleanouts and 2" Dead-End Main Cleanouts.

05500 - 2

- 2. 2" SS Camlock Type DC Dust Cap Part # 200-DC-SS manufactured by Dixon Valve & Coupling Co.or approved equal shall be used for 2" In-Line Main Cleanouts and 2" Dead-End Main Cleanouts.
- 3. Schedule 80 PVC Coupling Socket x FIPT manufactured by Spears or approved equal shall be used for 2" In-Line Main Cleanouts and 2" Dead-End Main Cleanouts.
- 4. Schedule 80 PVC Adapter Socket x MIPT manufactured by Spears or approved equal shall be used for 2" In-Line Main Cleanouts and 2" Dead-End main Cleanouts.

2.3 DEAD END MAIN CLEANOUTS

A. Fittings

1. Schedule 80 PVC 45° Elbow (Socket x Socket)manufactured by Spears or approved equal shall be used for all sizes of Dead-End Main Cleanout.

2.4 HDPE PIPE AND FITTINGS FOR PRESSURE SEWERS

A. Conformance with AWWA C900, latest edition, DR 18, Class 150

2.5 QUALITY ASSURANCE

- A. Mark pipe and fittings with the following information applied at intervals nor more than 5 feet:
 - 1. Manufacturer's name or trademark
 - 2. Nominal pipe size
 - 3. HDPE Cell Classification
 - 4. Applicable dimension ratio
 - 5. Date and location of manufacturer
 - 6. Applicable standard designation number

2.6 SUBMITTALS

- A. Shop Drawing showing lengths of pipe, fitting and joint details, construction details, tolerances and other information, as required.
- B. Conformance Certificates: Each shipment of pipe and fittings shall be accompanied with the pipe manufacturer's notarized certification that materials meet specification requirements.
- C. Guarantee: The Contractor shall furnish to the Authority a written guarantee signed by the manufacturer of the pipe and pipe fittings which he proposes to furnish, which shall warrant and guarantee that the pipe and pipe fittings meet all requirements of the specifications and that the pipe and fittings shall not fail or be injured as a result of conveying sewage, drainage, industrial wastes or groundwater. The form of guarantee shall in all respects be satisfactory to the Authority.

PART 3 - EXECUTION

3.1 DELIVERY, HANDLING, AND STORAGE

A. Examine the pipe and fittings for cracks, dents, abrasions or other flaws prior to installation. Mark rejected piping with a yellow crayon and remove from the project within 24 hours.

05500 - 3

- B. Avoid damage to pipe from impact, bending, compression or abrasion during handling and storage.
- C. Store pipe on flat surface which provides even support for the pipe barrel and any overhanging. Do not stack pipe higher than 5 feet. Do not store pipe and fittings in direct sunlight.
- D. Use only nylon protected sling to handle pipe. The use of hooks or bare cables will not be permitted.

3.2 CUTTING THE PIPE

- A. Cut the pipe square with saws or pipe cutters designed specifically for the material. Protect the pipe and fittings from serrated holding devices and abrasion.
- B. Bevel the end in accordance with the manufacturer's recommendations. Locate a depth mark with a pencil or crayon to assure the spigot end is inserted to the recommended depth.
- C. Remove burrs and wipe off all dust and dirt from the jointing surfaces.
- D. Perform all jointing operations in accordance with manufacturer's printed instructions. Make copies of manufacturer's printed instructions available to the Authority.
- E. Thoroughly clean and remove all dirt and foreign material from the pipe.
- F. Pipe Warning/Tracking Tape shall be plastic 4-inch wide tape with magnetic tracking wire labeled "Sewer."

3.3 LAYING PIPE

- A. Pipe shall be laid upon a trench bottom prepared as hereinbefore specified in these Specifications. All pipes shall be carefully cleaned just before laying. Extreme care shall be exercised so as not to damage the pipe in handling. Each pipe shall be laid to line and grade and so as to form a tight joint with the next adjoining pipe and to bring the inverts continuous.
- B. Pipe shall be laid in accordance with these Specifications and in accordance with the recommendations of the manufacturer of the pipe.
- C. The Contractor shall secure and reproduce ties and other pipeline appurtenances as required by the Engineer.

3.4 FLEXIBLE COUPLINGS AND ADAPTERS

A. Flexible couplings and adapters designed to take care of normal expansion and contraction movements of all pipes and to join different kinds of pipes, where shown on the Contract Drawings, shall be furnished and installed. The body and gasket retaining rings of the flexible couplings or adapters shall be cast iron. Gaskets shall be oil resistant and the bolts shall be of high corrosion resistant alloys suitable for underground burial.

05500 - 4

3.5 TESTING PRESSURE SEWERS

- A. After the pipes of the pressure main have been laid, secured in place and jointed as hereinbefore specified, the sewers shall be tested for strength at a pressure of 125 pounds per square inch. The pressure for strength test shall be maintained for at least ten minutes by pumping additional water into the pipeline.
- B. The pressure main shall be tested for leakage under a pressure of 75 pounds per square inch. The test for leakage shall last for at least one hour and may be required to last for two hours. The additional water needed to maintain the required pressures shall be accurately measured in a manner approved by the Engineer. The rate of leakage for force main sewer shall not exceed one gallon per day per 1000 linear feet. The Contractor shall repair all leaks discovered under any of the tests required above. The tests shall be made when required by the Engineer. The Contractor shall furnish all apparatus, materials, and labor and the necessary water for making the tests at no additional expense to the Authority.
- C. Before testing pipelines, the Contractor must make certain that the pipelines are securely held and all fittings are secured to prevent movement of the pipelines.
- D. The ends of the sections of force main to be tested shall be tightly closed by flanges or otherwise for the duration of each test. The Contractor shall provide such material, supplies, and equipment as necessary for carrying out the tests.
- E. The Contractor shall make all necessary arrangements for securing the water for test purposes and shall stand the expense of these arrangements and of the water required for leakage tests.

3.6 FILTER FABRIC FOR BEDDING

A. The Contractor shall provide Mirafi Geotextile Nonwoven Filter Fabric #140N, or approved equal. Filter fabric shall be placed completely over all select material, or sand as in the case for force main sewers, all in accordance with the manufacturer's recommendations and as directed by the Engineer.

3.7 CLEANING PIPE LINES AND APPURTENANCES

A. Upon completion of construction, all dirt and other foreign material shall be removed from the pipelines and their appurtenant constructions. No materials shall be left to impede the normal flow through them.

END OF SECTION

SECTION 05501

SANITARY SEWERAGE MANHOLES

PART 1 - GENERAL

1.1 SUMMARY

A. The work covered in this section of the Specifications includes construction and placement of all precast reinforced concrete sewer manholes, castings for sewer covers and frames, and all appurtenant and incidental work, complete, in strict accordance with the Specifications and the applicable Drawings.

1.2 RELATED WORK

A. Section 03400 – Precast Concrete

1.3 REFERENCES

- A. All work specified in this Section shall conform to "Standard Specifications for Road and Bridge Construction" of the Rhode Island Department of Transportation, latest revision (herein referred to as "State Standards"), excluding the provisions of Part 100 General Requirements and Covenants and any references to measurement and payment.
 - 1. All gray iron castings shall conform to the requirements of AASHTO Designation M105, Class 30 and ASTM A48-74. Test both cover and frame for H-20 Highway Loading.
 - 2. Ductile iron castings shall conform to ASTM A 536. Grade 60-40-18 unless otherwise specified.
 - 3. Cast steel shall conform to ASTM A27. Grade 70-36 and shall be thoroughly annealed.

1.4 SUBMITTALS

- A. Submittals shall be made in accordance with Section 01340. Submittals for the following items shall be required:
 - 1. The Drawings shall show the setting plans, exact profile of each unit, openings required, all inserts and other items which are to be embedded in the units.
 - 2. Shop drawings showing details of manhole cover and frame castings, construction details, tolerances and other information as required.
 - 3. Conformance Certificate: Each shipment of castings and concrete manholes shall be accompanied with the manufacturer's notarized certification that materials meet specified requirements.

1.5 QUALITY CONTROL

- A. All precast concrete shall be the product of a manufacturer who has demonstrated capability to produce precast concrete products of the quality specified. A manufacturer must be able to show that he has experienced personnel, physical facilities, established quality control procedures, and a management capability sufficient to execute the work of this contract. When requested by Owner or Engineer, the Contractor shall submit written evidence of the above requirements.
- B. Experienced plant personnel shall closely supervise the manufacturing process, and daily records of concrete strength shall be kept and submitted to the Engineer for control.
- C. Provide at least one person who shall be present at all times during execution of this portion of the work and who shall be thoroughly trained and experienced in the installation of the precast concrete structures and shall direct all work performed under this Section.

1.6 PRODUCT HANDLING

- A. Avoid damage to castings from impact, abrasion, or corrosion during handling and storage.
- B. Use all means necessary to protect precast concrete units and materials before, during and after installation and to protect the installed work and materials for all other trades.
- C. In case of damage, immediately make all repairs and replacements necessary to the approval of Engineer, at the Contractor's sole expense.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. All materials used for work of this Section shall be new, unused and purchased specifically for this Contract. All materials shall be manufactured in the United States.
- B. Cement shall be Portland cement conforming to ASTM C150, Type III, high early strength.
- C. Aggregate: shall conform to ASTM C330 and shall be graded, crushed stone with a resulting unit weight of concrete of up to one hundred fifty-five (155) pounds per cubic foot, and a minimum unit weight of not less than one hundred forty-eight (148) pounds.
- D. Water: shall be clear and free of injurious and deleterious substances.
- E. Concrete: shall have a minimum strength of 5000 psi at twenty-eight (28) days and a strength of 3000 psi at the time of form release.
 - 1. During the process of manufacturing of the units not less than two (2) test cylinders shall be tested at time of release of the form and two (2) at age twenty-eight (28) days.
 - 2. All compression test cylinders shall be made, cured and stored in accordance with ASTM C31. Cylinders shall be tested in accordance with ASTM C39.
 - 3. All concrete shall contain three (3) to five- (5) percent air entrainment.
- F. Admixtures shall only be used after prior approval of the Engineer.

- G. All reinforcing bars shall conform to the requirements of ASTM designation: A615, Grade 60.
- H. Welded wire fabric shall conform to the requirements of ASTM designation: A185.

2.2 PRECAST CONCRETE MANHOLES AND BRICK

- A. Precast Concrete Manhole sections shall be similar or equal to that shown on the Drawings and shall conform to ASTM Specifications C-478 and C-76 Class IV Wall "B". The horizontal joints between sections shall be sealed using a flexible butyl resin sealant and shall conform to Federal Specifications SS-S-210A and AASHTO M-198B. In addition, the horizontal joints on the inside and outside of the manhole shall be sealed with "Quick Plug" hydraulic cement, as manufactured by Parson or approved equal. Provide a bitumastic coating on the exterior of the entire manhole.
- B. Brick shall be hardened red clay conforming to ASTM Specification C-32 for sewer brick, except that the table therein is amended to provide that the required minimum compressive strength in pounds per square inch shall be for any individual brick 3,000 or 5,000 for the average of five bricks selected at random. The maximum absorption of water by five-hour boiling test shall not exceed 16% for any individual brick or 12% for the average of any five bricks selected at random.
- C. Gravity Sewer Manholes. All gravity sewer manholes shall have an interior diameter of 48-inches unless otherwise indicated.
- D. Openings for pipe insertions shall be round and shall be precast or cored only. The diameter of the opening shall be adequate to install a rubber boot seal. The cored or precast opening shall maintain a minimum undisturbed distance of 6" from manhole section joints. Flexible rubber boot shall be neoprene with stainless steel clamps and bands.

2.3 MANHOLE FRAMES AND COVERS

- A. Manhole Frames and Covers shall have a hot-dipped bituminous coating. Cast iron shall conform to ASTM A-48, Class 25. The underside of the cover and upper side of lip frame must present parallel plane surfaces, and at these points of contact, the frames and covers shall be machined to prevent covers from rocking in the frames under traffic.
- B. Covers shall bear evenly in the frame and both frame seats and covers shall be accurately fabricated so that covers are interchangeable for use with any and all frames. Where indicated, frames and covers shall be watertight, and locked. The sizes and weights (medium duty, heavy duty, etc.) are shown on the detail sheets for special manholes.
- C. Mortar shall consist of one part cement and two parts clean sand. No lime shall be used.
- D. Covers shall have a non-slip surface and shall have the word "SEWER" inscribed.
- E. Frames and covers shall be installed on the manholes as indicated on the Drawings. They shall be well bedded and encased in cement mortar and accurately set to the grades indicated or as directed. Red clay brick with cement mortar or precast concrete grade rings shall be used to adjust grade of frame and cover. One half inch of cement mortar plaster cast shall be applied to exterior of red clay bricks. Maximum height of brick shall be 12-inches.

F. Frame and cover shall be manufactured by East Jordan Iron Works, model NPR102774A, or approved equal.

2.4 WATER PROOFING

A. Asphalt, for waterproofing manhole structures shall conform to ASTM D449, Type A and shall be manufactured by East Jordan Iron Works, model 00200649W03 or approved equal. Asphaltic prime coat shall conform to ASTM D41.

2.5 AIR RELEASE VALVES

A. Air release valves and assembly shall be installed in manholes on the pressure sewers at the locations shown on the Plans and in accordance with the Plan details.

PART 3 – EXECUTION

3.1 INSPECTION

- A. Examine the substrate and conditions under which work of this Section is to be performed, and correct unsatisfactory conditions that would prevent proper and timely completion of the work. Do not proceed until satisfactory conditions have been corrected.
- B. Examine castings for blowholes, porosity, hard spots, shrinkage, distortion or other defects. Check coating for smoothness and tenacity.

3.2 GENERAL

- A. Excavation and backfilling requirements for installation of manhole structures shall be in accordance with the requirements as specified in Section 03200.
- B. Manhole barrel and cone sections shall be set so as to be vertical and in true alignment.

3.3 CONSTRUCTION AND INSTALLATION

- A. Manhole Joints: All joints between manhole sections shall be sealed with bitumastic sealant, and all exterior joints shall be parged.
- B. Bricks shall be laid in a workmanlike manner, true to line, and the joints shall be carefully struck and pointed on the inside. Bricks shall be thoroughly wet when laid and each brick shall be laid in mortar so as to form full bed, end and side joints in one operation. The outside of the brickwork shall be neatly plastered with ½" layer of cement mortar as the work progresses. The brickwork shall be satisfactorily bonded to the concrete and cast-iron frame. No brick masonry shall be laid in water, or any water allowed to rise on the brickwork until the masonry has set for at least 24 hours.
- C. Water-proofing: All exterior surfaces of manholes shall receive at least one coat of asphalt water-proofing.

END OF SECTION

SECTION 05610

SANITARY SEWER - TRENCHLESS TECHNOLOGIES

1.1 SUMMARY

- A. Section Includes:
 - 1. Gravity and Pressure Sewer Laterals
 - 2. Service connections
- B. Related Sections:
 - 1. Section 03350 Excavation and Fill

1.2 SUBMITTALS

- A. Section 01340 Shop Drawings.
 - 1. Product Data: Data for each type of pipe and pipe accessory specified.
- B. Section 01780 Procedures for closeout submittals.
 - 1. Project Record Documents: Accurately record the following.
 - a. Actual locations of pipe runs, connections, manholes, cleanouts, and invert elevations.
 - b. Identify and describe unexpected variations to subsoil conditions and location of uncharted utilities.

1.3 QUALITY ASSURANCE

A. Regulatory Requirements: Perform work in accordance with environmental regulatory agencies, utility company requirements and applicable health codes and authority having jurisdiction requirements.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Product Requirements: Transport, handle, store, and protect Products.

PART 2 - PRODUCTS

2.1 AIR RELEASE & VACUUM VALVE SEWER MANHOLE

- A. Pipe
 - 1. 1¼", 2", 3", 4", 6", 8" High Density Polyethylene (HDPE) Iron Pressure Pipe manufactured by JM Eagle® DR11 or approved equal shall be used for sewer and service connections.
 - 2. Schedule 80 PVC pipe shall be used for all sizes of Air Release & Vacuum Valve Sewer Manholes.
- B. Pipe Joints

1. Stainless steel male thread HDPE transition fitting manufactured by Poly-Cam Series 710HD or approved equal shall be used for 2" Intersecting Mains and Valve Type C, 2" In-Line Main Cleanout and Valve Type B and 2" Dead-End Main Cleanout and Valve Type A.

C. Valves

- 1. Wastewater Composite Combination Air Valve D-025 manufactured by ARI Flow Control or approved equal shall be used for all sizes of Air Release & Vacuum Valve Sewer Manholes.
- 2. 2" Schedule 80 PVC 2000 Standard Ball Valve manufactured by True Union or approved equal shall be used for all sizes of Air Release & Vacuum Valve Sewer Manholes.

D. Fittings

- 1. 8"x8"x2" Schedule 80 PVC Tee shall be used for 8" Air Release & Vacuum Valve Sewer Manholes.
- 2. 6"x6"x2" Schedule 80 PVC Tee shall be used for 6" Air Release & Vacuum Valve Sewer Manholes.
- 3. 4"x4"x2" Schedule 80 PVC Tee shall be used for 4" Air Release & Vacuum Valve Sewer Manholes.
- 4. 3"x3"x2" Schedule 80 PVC Tee shall be used for 3" Air Release & Vacuum Valve Sewer Manholes.
- 5. 2" Schedule 80 PVC Tee shall be used for 2" Air Release & Vacuum Valve Sewer Manholes.
- 6. 8" Schedule 80 PVC One Piece Socket Flange manufactured by Spears or approved equal shall be used for 8" Air Release & Vacuum Valve Sewer Manholes.
- 7. 6" Schedule 80 PVC One Piece Socket Flange manufactured by Spears or approved equal shall be used for 6" Air Release & Vacuum Valve Sewer Manholes.
- 8. 4" Schedule 80 PVC One Piece Socket Flange manufactured by Spears or approved equal shall be used for 4" Air Release & Vacuum Valve Sewer Manholes.
- 9. 3" Schedule 80 PVC One Piece Socket Flange manufactured by Spears or approved equal shall be used for 3" Air Release & Vacuum Valve Sewer Manholes.
- 10. 1 5/8" SS Strut Channel Support Assembly with bolted end wall plates (P2941) and 2" SS Riser Pipe Clamp (P1117) including SS bolts, nuts, washers & hardware manufactured by Unistrut or approved equal shall be used for all sizes of Air Release & Vacuum Valve Sewer Manholes all sizes of Dead-End Main Cleanouts.

E. Adapters

- 1. Molded Butt Fusion Flange Adapter and stainless-steel Backup Ring IPS manufactured by Integrity Fusion Products or approved equal shall be used for 3" 8" Air Release & Vacuum Valve Sewer Manholes.
- 2. Fusion CF101 Carbon Filter Manhole Insert System manufactured by Fusion Environmental Solutions or approved equal shall be used for all sizes of Air Release & Vacuum Valve Sewer Manholes.
- 3. Polypropylene Camlock Type A Adapter x Female NPT Part #PPA200 manufactured by Dixon Valve & Coupling Co. or approved equal shall be used for 2" Air Release & Vacuum Valve Sewer Manholes.
- 4. Schedule 80 PVC Coupling Socket x FIPT manufactured by Spears or approved equal shall be used for 2" Air Release & Vacuum Valve Sewer Manholes.
- 5. Polypropylene Camlock Type D Coupler x Female NPT Part #PPD200 manufactured by Dixon Valve & Coupling Co. or approved equal shall be used for 2" Air Release & Vacuum Valve Sewer Manholes.
- 6. Schedule 80 PVC Adapter Socket x MIPT manufactured by Spears or approved equal shall be used for 2" Air Release & Vacuum Valve Sewer Manholes.
- F. Manhole Frame, Cover & Boxes

05610 - 2

- 1. 2006A1PT ZPT Assembly Product # 00200686W01 manufactured by East Jordan Group or approved equal shall be used for all sizes of Dead-End Main Cleanout and Valve Type A, In-Line Main Cleanout and Valve Type B, Intersecting Mains and Valve Type C, and Air Release & Vacuum Valve Sewer Manhole.
- 2. Valve Box Cover Product #06800006 manufactured by East Jordan Group or approved equal shall be used for all sizes of Dead-End Main Cleanout and Valve Type A, In-Line Main Cleanout and Valve Type B, Intersecting Mains and Valve Type C, and Services and Valves Type D.
- 3. Valve Box Top 8555 Product # 85557026U manufactured by East Jordan Group or approved equal shall be used for all sizes of Dead-End Main Cleanout and Valve Type A, In-Line Main Cleanout and Valve Type B, Intersecting Mains and Valve Type C, and Services and Valves Type D.
- 4. Valve Box Bottom 8555 Product # 85556036U manufactured by East Jordan Group or approved equal shall be used for all sizes of Dead-End Main Cleanout and Valve Type A, In-Line Main Cleanout and Valve Type B, Intersecting Mains and Valve Type C, and Services and Valves Type D.
- 5. Cleanout Box and Lid Assembly 1578Z Product #00157811C02 manufactured by East Jordan Iron Works or approved equal shall be used for all sizes of Dead-End Main Cleanout and Valve Type A, In-Line Main Cleanout and Valve Type B, Intersecting Mains and Valve Type C, and Services and Valves Type D.

2.2 SERVICE AND VALVE TYPE D

A. Valves

1. 1½" Polyethylene Ball Valve manufactured by Integrity Fusion Products or approved equal shall be used for all sizes of Service and Valve Type D.

B. Fittings

- 1. 8"x2" Butt Fusion HDPE Reducing Tee shall be used for Service on 8" Main and Valve Type D and In-Line Main Cleanout and Valve Type B.
- 2. 6"x2" Butt Fusion HDPE Reducing Tee shall be used for Service on 6" Main and Valve Type D and In-Line Main Cleanout and Valve Type B.
- 3. 4"x2" Butt Fusion HDPE Reducing Tee shall be used for Service on 4" Main and Valve Type D and In-Line Main Cleanout and Valve Type B.
- 4. 3"x2" Butt Fusion HDPE Reducing Tee shall be used for Service on 3" Main and Valve Type D and In-Line Main Cleanout and Valve Type B.
- 5. 2"x2" Butt Fusion HDPE Tee shall be used for Service on 2" Main and Valve Type D and In-Line Main Cleanout and Valve Type B.
- 6. 2"x1¼" Butt Fusion Reducer shall be used for All Services on all Mains and Valve Type D.

C. Adapters

1. SDR 11 Electrofusion Coupler IPS Series manufactured by Integrity Fusion Products or approved equal shall be used for 1¹/₄" Service and Valve Type D.

2.3 INTERSECTING MAINS AND VALVE TYPE C

A. Valve

1. Plug Valve manufactured by Henry Pratt company or approved equal shall be used for 3"-8" Intersecting Mains and Valve Type C, 3"-8" In-Line Main Cleanout and Valve Type B and 3"-8" Dead-End Main Cleanout and Valve Type A.

05610 - 3

2. Polyethylene Ball Valve manufactured by Integrity Fusion Products or approved equal shall be used for 2" Intersecting Mains and Valve Type C, 2" In-Line Main Cleanout and Valve Type B and 2" Dead-End Main Cleanout and Valve Type A.

B. Fittings

- 1. 8"x8" Butt Fusion Tee manufactured by Integrity Fusion Products or approved equal shall be used for 8" Intersecting Mains and Valve Type C.
- 2. 6"x6" Butt Fusion Tee manufactured by Integrity Fusion Products or approved equal shall be used for 6" Intersecting Mains and Valve Type C.
- 3. 4"x4" Butt Fusion Tee manufactured by Integrity Fusion Products or approved equal shall be used for 4" Intersecting Mains and Valve Type C.
- 4. 3"x3" Butt Fusion Tee manufactured by Integrity Fusion Products or approved equal shall be used for 3" Intersecting Mains and Valve Type C.
- 5. 2"x2" Butt Fusion Tee shall be used for 2" Intersecting Mains and Valve Type C.
- 6. Molded Cross Tees shall be used for all sizes of Intersecting Mains where a cross fitting is warranted.
- 7. SDR 11 Epoxy Coated DI Backup Ring IPS manufactured by Integrity Fusion Products or approved equal shall be used for 3"-8" Intersecting Mains and Valve Type C.
- 8. 2" Electrofusion Coupling manufactured by Integrity Fusion Products or approved equal shall be used for 2" Intersecting Mains and Valve Type C, 2" In-Line Main Cleanout and Valve Type B and 2" Dead-End Main Cleanout and Valve Type A.

C. Adapters

- 1. 8" HDPE Mechanical Joint HDPE Flange Adapter with Flange & Bolt Kit manufactured by Integrity Fusion Products or approved equal shall be used for 8" Intersecting Mains and Valve Type C, 8" In-Line Main Cleanout and Valve Type B and 8" Dead-End Main Cleanout and Valve Type A.
- 2. 6" HDPE Mechanical Joint HDPE Flange Adapter with Flange & Bolt Kit manufactured by Integrity Fusion Products or approved equal shall be used for 6" Intersecting Mains and Valve Type C, 6" In-Line Main Cleanout and Valve Type B and 6" Dead-End Main Cleanout and Valve Type A.
- 3. 4" HDPE Mechanical Joint HDPE Flange Adapter with Flange & Bolt Kit manufactured by Integrity Fusion Products or approved equal shall be used for 4" Intersecting Mains and Valve Type C, 4" In-Line Main Cleanout and Valve Type B and 4" Dead-End Main Cleanout and Valve Type A.
- 4. 3" HDPE Mechanical Joint HDPE Flange Adapter with Flange & Bolt Kit manufactured by Integrity Fusion Products or approved equal shall be used for 3" Intersecting Mains and Valve Type C, 3" In-Line Main Cleanout and Valve Type B and 3" Dead-End Main Cleanout and Valve Type A.
- 5. SS Transition HDPE x Male NPT manufactured by Poly-Cam or approved equal shall be used for 2" Intersecting Mains and Valve Type C, 2" In-Line Main Cleanout and Valve Type B and 2" Dead End Main Cleanout and Valve Type A.
- 6. SS FIPT Cleanout Cap shall be used for 2" Intersecting Mains and Valve Type C and 2" In-Line Main Cleanout and Valve Type B.

2.4 DEAD-END MAIN CLEANOUT AND VALVE TYPE A

A. Fittings

1. 8" Butt Fusion 45° Elbow manufactured by Integrity Fusion Products or approved equal shall be used for 8" Dead-End Main Cleanout and Valve Type A.

05610 - 4

- 2. 6" Butt Fusion 45° Elbow manufactured by Integrity Fusion Products or approved equal shall be used for 6" Dead-End Main Cleanout and Valve Type A.
- 3. 4" Butt Fusion 45° Elbow manufactured by Integrity Fusion Products or approved equal shall be used for 4" Dead-End Main Cleanout and Valve Type A.
- 4. 3" Butt Fusion 45° Elbow manufactured by Integrity Fusion Products or approved equal shall be used for 3" Dead-End Main Cleanout and Valve Type A.
- 5. 2" Butt Fusion 45° Elbow manufactured by Integrity Fusion Products or approved equal shall be used for 2" Dead-End Main Cleanout and Valve Type A.
- 6. 8"x4" Butt Fusion Reducer manufactured by Integrity Fusion Products or approved equal shall be used for 8" Dead-End Main Cleanouts and Valve Type A.
- 7. 6"x4" Butt Fusion Reducer manufactured by Integrity Fusion Products or approved equal shall be used for 6" Dead-End Main Cleanouts and Valve Type A.
- 8. 4"x2" Butt Fusion Reducer manufactured by Integrity Fusion Products or approved equal shall be used for 8", 6" & 4" Dead-End Main Cleanouts and Valve Type A.
- 9. 3"x2" Butt Fusion Reducer manufactured by Integrity Fusion Products or approved equal shall be used for 3" Dead-End Main Cleanouts and Valve Type A.

B. Adapters

- 1. Dixon / Boss-Lock™ Type A Adapter x Female NPT Part # 200-A-SS manufactured by Dixon Valve & Coupling Co. or approved equal shall be used for all sizes of Dead-End Main Cleanout & Valve Type A.
- 2. Dixon Type DC Dust Cap Part # 200-DC-SS manufactured by Dixon Valve & Coupling Co. or approved equal shall be used for all sizes of Dead-End Main Cleanout & Valve Type A.

2.5 QUALITY ASSURANCE

- A. Mark pipe and fittings with the following information applied at intervals nor more than 5 feet:
 - 1. Manufacturer's name or trademark
 - 2. Nominal pipe size
 - 3. HDPE Cell Classification
 - 4. Applicable dimension ratio
 - 5. Date and location of manufacturer
 - 6. Applicable standard designation number

2.6 SUBMITTALS

- A. Shop Drawing showing lengths of pipe, fitting and joint details, construction details, tolerances and other information, as required.
- B. Conformance Certificates: Each shipment of pipe and fittings shall be accompanied with the pipe manufacturer's notarized certification that materials meet specification requirements.
- C. Guarantee: The Contractor shall furnish to the Authority a written guarantee signed by the manufacturer of the pipe and pipe fittings which he proposes to furnish, which shall warrant and guarantee that the pipe and pipe fittings meet all requirements of the specifications and that the pipe and fittings shall not fail or be injured as a result of conveying sewage, drainage, industrial wastes or groundwater. The form of guarantee shall in all respects be satisfactory to the Authority.

PART 3 - EXECUTION

3.1 DELIVERY, HANDLING, AND STORAGE

- A. Examine the pipe and fittings for cracks, dents, abrasions or other flaws prior to installation. Mark rejected piping with a yellow crayon and remove from the project within 24 hours.
- B. Avoid damage to pipe from impact, bending, compression or abrasion during handling and storage.
- C. Store pipe on flat surface which provides even support for the pipe barrel and overhanging. Do not stack pipe higher than 5 feet. Do not store pipe and fittings in direct sunlight.
- D. Ship rubber gaskets in cartons and store in a clean area away from grease, oil, ozone producing electric motors, heat and direct rays of the sun.
- E. Use only nylon protected sling to handle pipe. The use of hooks or bare cables will not be permitted.

3.2 CUTTING THE PIPE

- A. Cut the pipe square with saws or pipe cutters designed specifically for the material. Protect the pipe and fittings from serrated holding devices and abrasion.
- B. Bevel the end in accordance with the manufacturer's recommendations. Locate a depth mark with a pencil or crayon to assure the spigot end is inserted to the recommended depth.
- C. Remove burrs and wipe off all dust and dirt from the jointing surfaces.
- D. Perform all jointing operations in accordance with manufacturer's printed instructions. Make copies of manufacturer's printed instructions available to the Authority.

3.3 LAYING PIPE

A. Pipe shall be direction drilled reference Section 05812

3.4 TESTING PRESSURE SEWERS

- A. After the pipes of the pressure main have been laid, secured in place and jointed as hereinbefore specified, the sewers shall be tested for strength at a pressure of 125 pounds per square inch. The pressure for strength test shall be maintained for at least ten minutes by pumping additional water into the pipeline.
- B. The pressure main shall be tested for leakage under a pressure of 75 pounds per square inch. The test for leakage shall last for at least one hour and may be required to last for two hours. The additional water

05610 - 6

needed to maintain the required pressures shall be accurately measured in a manner approved by the Engineer. The rate of leakage for force main sewer shall not exceed one gallon per day per 1000 linear feet. The Contractor shall repair all leaks discovered under any of the tests required above. The tests shall be made when required by the Engineer. The Contractor shall furnish all apparatus, materials, and labor and the necessary water for making the tests at no additional expense to the Authority.

- C. The ends of the sections of pressure main to be tested shall be tightly closed by flanges or otherwise for the duration of each test. The Contractor shall provide such material, supplies, and equipment as necessary for carrying out the tests.
- D. The Contractor shall make all necessary arrangements for securing the water for test purposes and shall stand the expense of these arrangements and of the water required for leakage tests.

3.5 SEWER SERVICE CONNECTIONS

- A. Sewer service connections shall be constructed of HDPE Iron Pipe.
- B. Pipe for service connections shall be directionally drilled with an appropriate cap or plug provided at the end. The end location of all service connections shall be staked and approved by the Owner prior to installation. After installation the stake shall be adjusted if necessary and location record by GPS, and a minimum of 3 field ties.

3.6 CLEANING PIPE LINES AND APPURTENANCES

A. Upon completion of construction, all dirt and other foreign material shall be removed from the pipelines and their appurtenant constructions. No materials shall be left to impede the normal flow through them.

END OF SECTION

05610 - 7

SECTION 05812

HORIZONTAL DIRECTIONAL DRILLING

PART 1 - GENERAL

1.1 DESCRIPTION OF GENERAL REQUIREMENTS

- A. The Contractor shall provide all necessary tools, materials and equipment to successfully complete the installation of directionally drilled piping as specified herein and shown on the drawings. The Contractor shall be responsible for the selection of all tooling including steering and guidance systems, the final constructed product, and for furnishing the qualified labor and supervision necessary for this method of construction.
- B. The Contractor shall furnish all items necessary to perform the horizontal directional drilling operation and construct the pipe to the lines and grade shown on the drawings.
- C. Boring must use techniques of creating or directing a borehole along a predetermined path to a specified target location. This must involve use of mechanical and hydraulic deviation equipment to change the boring course and must use instrumentation to monitor the location and orientation of the boring head assembly along a predetermined course.
- D. Drilling must be accomplished with fluid-assisted mechanical cutting. Boring fluids shall be a mixture of bentonite and water or polymers and additives. Bentonite sealants and water will be used to lubricate and seal the borehole. It is mandatory that minimum pressures and flow rates required to successfully complete the boring operation be used during drilling operation, as not to fracture the sub-grade material around and/or above the bore.
- E. The mobile drilling system shall utilize small diameter fluid jets to fracture and mechanical cutters to cut and excavate the soil as the head advances forward.
- F. Steering shall be accomplished by the installation of an offset section of drill stem that causes the cutterhead to turn eccentrically about its centerline when it is rotating. When steering adjustments are required, the cutterhead offset section is rotated toward the desired direction of travel and the drill stem is advanced forward without rotation.
- G. Operation and reception pits for drilling operations shall only be located within pre-determined 8' x 8' pits shown on the plans or within the predetermined trench line on Tidewater Drive. These pits shall be created using a flat blade on a backhoe.

1.2 DESCRIPTION OF ARCHEALOGICAL GENERAL REQUIREMENTS

- A. Excavations to facilitate drilling operations shall only be located within the pre-determined 8' x 8' pits shown on the plans or within the predetermined trench path along Tidewater Drive.
- B. Excavations to facilitate drilling operations may be placed within areas indicated as "IDENTIFIED FEATURE" on the Plans or within the Archaeological Report with prior approval of Archeologist, Engineer and Owner. Contractor shall provide the Archeologist, Engineer, and Owner a minimum 14-day notice for review and approval of such work.

- C. Prior to the start of work, the Engineer and Archeologist and Contractor shall mark the limits of all "CRITICAL IDENTIFIED FEATURES". Excavations to facilitate drilling operations shall not be performed within these identified areas. All work proposed to be performed within 50 feet of a critical identified feature on the Plans or within the Archaeological Report shall be submitted for approval prior to the start of work for review and approval by the Archeologist, Engineer and Owner.
- D. Contractor shall notify the Archeologist, Engineer, and Owner of any additional excavations which may be required outside of the predetermined pits and trenches to facilitate work. The Engineer and Owner shall review and determine if the excavations are required and necessary to facilitate work. If determined necessary to complete work, the cost for archaeological investigations shall be borne by the Owner. If the excavations are determined to be for the general benefit and convenience of the Contractor, the cost shall be borne the Contractor. Contractor shall provide a minimum 21day notice to the Owner for additional excavations outside of the predetermined pits and trenches.
- E. Prior to work on Mayor Lane, archaeological investigations shall be scheduled and completed.

1.3 DESCRIPTION OF WORK

- A. The Contractor's bid shall Include all horizontal directional drilling, installation of product pipe, furnishing labor, materials, services, equipment, incidentals, technical services, and all other related work necessary to complete the following:
 - 1. Field locate and protect all existing utilities.
 - 2. Submittals included in this specification and elsewhere in the Contract Documents.
 - 3. Preparation of site including excavation and backfill of access pits and slurry containment pits, removal of vegetation, earthwork, topsoil stripping, excavating, rock excavation, obstruction removal, and grading to obtain required finish contours and elevation.
 - 4. Installation of conductor casings. Minimum casing drive lengths of 100 feet for the pressure main laterals.
 - 5. Drill a horizontal directionally drilled pilot bore and ream borehole as needed to required tolerances.
 - 6. Contain all drilling mud and ensure no spillage enters any body of water over land or through hydro-fracture.
 - 7. Monitor horizontal and vertical location of drill path, and ensure the constructed bores follow the design profile and remain within the project's right-of-way.
 - 8. Water course monitoring and testing by Qualified Aquatic Specialist.
 - 9. Installation of casing pipes and product pipes.
 - 10. Testing of installed product pipe sections.
 - 11. Restoration of all affected surfaces to their preconstruction conditions or as outlined in the contract documents.
 - 12. Removal of all drilling fluids and spoils from the construction area, and transporting them to an approved disposal site.

1.4 RELATED DOCUMENTS AND SECTIONS

- A. The Contract Documents, as defined in Section 01010 Summary of Work, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other Documents.
 - B. Related Sections:
 - 1. Section 03350 Excavation and Fill

05812-2

2. Section 05813 – Geotechnical Instrumentation and Monitoring

1.5 REFERENCES

- A. The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.
- B. The following American Water Works Association (AWWA) standards form a part of this specification as referenced:
 - 1. AWWA C906 Polyethylene Pressure Pipe and Fittings, 4 In. Through 63 In. for Water Distribution and Transmission.
- C. The following American Society for Testing and Materials (ASTM) standards form a part of this specification as referenced:
 - 1. ASTM F714 Standard Specification for Polyethylene (PE)
 - 2. ASTM D3350 Plastic Pipe (SDR-PR) Based Outside Diameter. Standard Test Method for Polyethylene Pipe and fitting Materials
 - 3. ASTM F1962, "Standard Guide for Use of Maxi-Horizontal Directional Drilling for Placement of PE Pipe or Conduit Under Obstacles, Including River Crossings,"
- D. American Petroleum Institute (API), RP 13B-1, Recommended Practice for Field Testing Water-Based Drilling Fluids.
- E. American Society of Civil Engineers (ASCE), Manual of Practice 108, "Pipeline Design for Installation by Directional Drilling."
- F. American Association of State Highway and Transportation Officials (AASHTO).
- G. Occupational Safety and Health Administration (OSHA) requirements.

1.6 DEFINITIONS

- A. Contractor's Construction Drawings: Shall be defined as drawings by which the Contractor proposes to construct the referenced item. The submission of these drawings shall be required for the sole purpose of providing sufficient detail to verify that the Contractor's work in progress is in accordance with the intent of the design.
- B. Frac-out: Release of drilling fluid to ground surface, waterways, or utilities as a result of drilling fluid pressure in excess of that pressure required to fracture or permeate the ground.
- C. Horizontal Directional Drilling: A trenchless, steerable installation method of using a drilling machine to bore a small diameter pilot hole. Pilot hole is bored by either controlled fluid jetting or fluid assisted mechanical cutting or combinations thereof. Pilot hole is reamed, as necessary, to accommodate product pipe. Product pipe is pulled back into reamed hole by drilling machine. Installed product pipe is cleaned and prepared for testing and operation.
- D. Returns and Spoils: Drilling mud and cuttings collected at the entry and exit pits, as well as any fluid which escapes from the borehole to the surface, or spilled during mixing, handling or hauling operations.

05812-3

1.7 SUBMITTALS

- A. The Engineer will base the review of submitted details and data on the requirements of the completed work, safety of the work in regards to the public, potential for damage to public or private utilities and other existing structures and facilities, and the potential for unnecessary delay in the execution of the work. Such review shall not be construed to relieve the Contractor in any way of his responsibilities under the contract or of the Contractor's responsibility for construction site safety. Contractor shall not commence work on any items requiring Contractor's construction drawings or other submittals until the drawings and submittals are reviewed and accepted by the Engineer and by the Owner.
- B. The drawings, cut sheets, and descriptions submitted as part of these requirements shall be sufficiently detailed to demonstrate to the Engineer whether the proposed materials and procedures will meet the requirements of this specification and design drawings.
- C. The Contractor shall submit the following items at least twenty-one (21) days before start of construction:
 - 1. List of qualified subcontractors to be used including contact names, addresses, and telephone numbers.
 - 2. Detailed schedule of Work including:
 - a. Pipe product delivery and fabrication.
 - b. Pipe string connection and testing.
 - c. Drill mobilization and setup.
 - d. Pilot hole drilling/boring and reaming.
 - e. Pipe product pulling.
 - f. Final pipe inspection and testing.
 - g. Record drawing preparation.
 - h. Demobilization and restoration.
 - i. Disposal of excess drilling fluids and drill/bore cuttings.
 - 3. Working plans showing general arrangement of the following:
 - a. Work, storage, staging, and pipe stringing areas.
 - b. Maintenance of traffic and site access during pipe jointing.
 - c. Laydown areas showing locations of drill entry and exit points.
 - d. Drilling fluids mixing/storage tanks
 - e. Slurry recycling plant.
 - f. Drilling equipment.
 - g. Pollution prevention measures.
 - h. Layout profile and supports for pits, conductor casings, and other excavations required to drill and install the pipe.
 - 4. Detailed working plans and analyses including:
 - a. Plan/profile along pipe drill path plotted at scale no smaller than that used in the design drawings.
 - b. Entry and exit locations and angles.
 - c. Conductor casing size, thickness and alignment with details and dimensions of cutting shoe.
 - d. Bending radii, horizontal and vertical.
 - e. Length of drives
 - f. Depth of cover
 - g. Clearance from existing piles, pipelines, encasements and structures.
 - h. Buoyancy control procedures.
 - i. Pipe stress analysis for the alignment described on the working plans above, indicating adequate factor of safety in accordance with manufacturer's recommendations and standards referenced herein.

- 5. Provide equipment specifications and manufacturer's operating manuals for the proposed drill rig, recycler, mud motor(s), and any other major equipment to be used during the drilling operations along with the Contractor's previous project experience (with references) with this equipment or equipment with similar size/capacity.
- 6. Reaming Head Description, Cutters and Size: Describe reaming procedure and method of monitoring drill fluid viscosity, density and pressure to prevent frac-out and excess ground movements. Submit proposed overcut (i.e., size of largest reamer).
- 7. Description and measurements of drill rod and drill head.
- 8. Description of how pilot hole drill will be steered and how position and inclination of bore head will be monitored; include type, operating range, and degree of accuracy of tracking equipment. This submittal shall include a plan for accurately locating drill path during drilling operations and measurement frequency and accuracy of proposed guidance system as stated by manufacturer.

9. Drilling Fluids:

- a. Complete list of all drilling fluids, additives, and mixtures to be used along with Material Safety Data Sheets and composition of drilling fluids and additives.
- b. Describe how drill fluid viscosity, density and pressure will be monitored.
- c. Describe fluid seal at entry pit conductor casing, if used.
- d. Planned density and viscosity ranges.
- e. Describe how drill fluid viscosity, density and pressure will be monitored.
- f. Target maximum drilling fluid pressure at bore station intervals of fifty feet or less.
- g. Calculations showing a factor of safety of 1.5 or more against frac-out or heave.

10. Drilling Fluids Management Plan:

- a. Identify water source water for mixing drilling mud.
- b. Method of slurry containment, including sketches and systems and fluid seal at entry pit conductor casing if used.
- c. Method of cutting removal and recycling drilling fluid during hole boring and reaming.
- d. Method of transporting drilling fluids and cuttings offsite, including anticipated total volume and type and frequency of truck traffic.
- e. Identify approved disposal site for drilling mud and spoils.
- f. Estimate anticipated daily volume to be held on-site overnight.
- 11. Product pipe assembly plans, including, welding/fusing equipment and procedures, lay down, pull guides, and rollers.
- 12. Pipe catalog information confirming pipe, fittings, joints, and other materials confirm to requirements of this section.
- 13. Drawings of connection details at ends of each directional drill.
- 14. Drilling Fluid Management and Contingency Release Plan describing means and methods for:
 - a. Containment, collecting and disposal of drill fluid, spoils and returns during the project.
 - b. Equipment and materials, included site specific Drill Fluid Spill Kit, and procedures to contain and remove inadvertent drill fluid releases, including surface seepage, both on land and in a body of water.
 - c. Monitoring and testing procedures when drilling beneath a waterway.
 - d. Procedure for shutdown of drilling operations once a release has been detected at the surface.

- e. Procedure for restarting the drilling operations once the release has been contained and both mitigation measures and future release containment at the release location have been established.
- 15. Contingency plan for the following potential situations:
 - a. Loss of drilling fluid circulation.
 - b. Obstruction encountered during drilling or reaming.
 - c. Broken drill pipe.
 - d. Collapsed or buckled product pipe.
 - e. HDD fails to advance or fails to respond to steering actions.
 - f. Failure to maintain grade and when alignment derivations are more than allowable limits.
 - g. Installation (pull back) forces reach 80 percent of the manufacturer's maximum allowable force.
 - h. Ground settlement/heave exceeding allowable limits.
- 16. Fuel and Hydraulic Fluid Containment and Contingency Plan.

D. Informational Submittals:

- 1. Preconstruction and post construction surveys including photographs, videotapes, field notes, and sketches as specified herein. Submit within one week of development.
- 2. Pipe manufacturer's fused jointing and testing instructions. Submit prior to mobilization to the site.
- 3. Field Surveys, as required: Plot survey results on drawing with scale no smaller than that used for Enlarged Plan and Profile Drawings in Contract Documents. Show proposed changes to alignment of profile.
 - a. Field survey information from end of each installation and datum for establishing location of installation.
 - b. Entry and exit locations.
- 4. Daily drilling log within 24 hours of daily completion, including predrilling field calibration, raw data record (i.e., head position, drilling fluid data, borehole pressure) and location of anomalies or frac-outs as described in Part 3 of this specification.
- 5. Record Drawings updated at each application for payment and finalized prior to contract closeout. These shall contain the following components:
 - a. Description of tools actually used on installation if they differ from what was contained in approved submittal.
 - b. Tool operators' records including predrilling field calibration, raw data record (head position, fluid data) and location of anomalies or frac-outs.
 - c. Interpretation analysis of raw data, plan and profile, and deviations to original installation plan.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Handle pipe during loading, transportation, and unloading so as to prevent injury to or abrasion of pipe.
 - 1. Pipe shall not be dropped from vehicles, nor allow pipe to roll down skids or slopes without proper restraining ropes.

- 2. Pipe and fittings shall be handled by wide belly band slings as recommended by pipe manufacturer to avoid damage to pipe. Bare chains shall not be used in contact with pipe
- 3. Inspect fabricated materials for damage. Replace materials found to be defective in manufacture or damaged in handling during and after delivery including the furnishing of material and labor required for the replacement of installed products found to be defective.

B. Storage:

- 1. Use suitable pads, strips, skids or blocks for each pipe during transportation and while awaiting installation.
- 2. Store and protect pipe at storage area designated on Drawings or other areas approved by Engineer.

1.9 SAFETY AND COMPLIANCE

A. Safety Requirements:

- 1. Perform work in a manner to maximize safety and reduce exposure of men and equipment to hazardous and potentially hazardous conditions, in accordance with applicable safety standards, including OSHA standards.
- 2. Whenever there is an emergency or stoppage of work which is likely to endanger the excavation or adjacent structures, operate a full work force for 24 hours a day, including weekends and holidays, without intermission until the emergency or hazardous conditions no longer jeopardize the stability and safety of the work.
- 3. The work will be performed in conformance with authorities having jurisdiction, and will conform to all applicable health and safety regulations.
- 4. The Contractor shall follow all safety measures recommended by the drill rig manufacturer.
- 5. The drill rig shall be equipped with a common grounding system to prevent electrical shock in the event of inadvertent strike of underground electrical cable. The grounding system shall be connected to all pieces of interconnecting machinery; namely, the drill, mud mixing system, drill power unit, drill rod trailer, operator's booth, worker grounding mats, and any other interconnected equipment, to a common ground.
- 6. The drilling rig shall be equipped with an "electrical strike" audible and/or visual warning system that notifies the system operators of an electrical strike.
- B. Air Quality: Conduct directional drilling operations by methods and with equipment, which will positively control dust, fumes, vapors, gases or other atmospheric impurities in accordance with applicable safety requirements.
- C. The contractor shall abide by bylaws and regulations of the State, County, and/or Municipality in which the work is located.
- D. Obtain any and all other permits required for prosecution of the work.

PART 2 - PRODUCTS

2.1 GENERAL

A. Refer to Section 05100 for HDPE pipe material.

2.2 HDD EQUIPMENT

A. General:

- Sized to complete installation of proposed alignment with due consideration of ground conditions, down-hole tools, drilling fluid additives, drilling technologies, size of final product pipe, and length of bore.
- B. Features: The contractor shall be responsible for the directional drilling method and equipment.
- C. The drilling rig shall be sized to complete installation of proposed alignment with due consideration of ground conditions, down-hole tools, drilling fluid additives, drilling practices, size of final product pipe, and length of bore.
- D. The drilling rig shall have a system to monitor and record maximum pullback force during the pullback operation.
- E. The drilling rig shall have an anchorage system to anchor drilling machine to the ground to resist thrust and pull forces during operation.
- F. A swivel shall be used to connect pull section to drill steel to minimize torsional stress imposed on pulled pipe.
- G. Break-aways are to be used on all directional drills to avoid overstressing the pipe. Exceptions will be subjected to approval of the Engineer.
- H. Drill fluid system shall have filters in-line to prevent solids from being pumped into the drill pipe.
- I. Drill fluid system shall have connections between the pump and drill pipe that are relatively leak-free.

2.3 DRILLING FLUID MIXING TANK

- A. Volume of holding tank to supply at least 30 minutes of full pumping capacity.
- B. HDD equipment shall maintain a minimum pumping capacity to provide sufficient quantity of drilling fluids exceeding targeted flow volume for all phases of the operation.
- C. Provide in-line flow meter to determine drilling fluid discharge.
- D. Mixing system shall be able to molecularly shear individual bentonite particles from the dry powder to avoid clumping and ensure adequate mixing.
- E. Mixing system shall continually agitate the drilling fluid during drilling operations.

2.4 TRACKING SYSTEM

- A. The steering tool/guidance system shall have orientation sensors to monitor and record pitch, roll, and left/right deviation.
- B. Operating range and degree of accuracy of the proposed tracking system shall be adequate to meet project conditions. Tracking/steering equipment shall allow for continuous monitoring of the drill head along the entire proposed alignment. If a poor contact with the sonde is expected to occur at any section, this shall be communicated to the Engineer prior to commencement of construction.

- C. The tracking system shall be capable of providing horizontal and vertical steering data along the entire drill path for each crossing, for the depths shown on the Project Plans, plus an additional 10 feet.
- D. The tracking system shall be capable of locating the drill within eighteen (18) inches radius inscribed around the drill path, and shall be set up and operated by field personnel trained and experienced with the system.
- E. The downhole annular and pipe drilling fluid pressures shall be measured and recorded throughout the pilot hole drilling. These records shall be maintained and provided daily to the Engineer.
- F. Contractor shall provide two 2-way radios to allow communication between crews. Radios shall be complete with built-in antennas, squelch and volume controls, and rechargeable battery packs. The Contractor shall not commence work until there is a working radio at each entry and exit location of an active drilling operation.

2.5 MUD MOTORS

A. Mud/Slurry Motors, if used, shall be of adequate power to operate the required drilling devices.

2.6 PIPE ROLLERS

- A. Pipe rollers shall be of sufficient size to fully support the weight of the pipe while being butt-fused, pressure-tested, and/or during pullback operations.
- B. Swivel: Use to connect pull section to drill steel to minimize torsional stress imposed on pulled pipe.
- C. Grounding System shall meet the following requirements, as a minimum:
 - 1. Common grounding system to prevent electrical shock in the event of a high voltage underground cable strike.
 - Connects interconnecting machinery including drill, mud mixing system, drill power unit, drill rod trailer, operator's booth, worker grounding mats, and other interconnected equipment to a common ground.

2.7 DRILLING FLUIDS

- A. Drilling fluids, muds, and chemical additives shall be nonhazardous materials composed and used in compliance with applicable, local, state, and Federal environmental regulations.
- B. Do not use oil-based drilling fluids or fluids containing additives that can contaminate soil or groundwater.
- C. Maximum unit weight of drilling fluid with cuttings is 9.5 pounds per gallon (ppg).

2.8 ADVANCED METERING EQUIPMENT (ELECTRIC UTILITY MAINS)

- A. For each pipe material, use only pipe from a single manufacturer.
- B. HDPE Pipe: As specified in Section 05100.

2.9 STEEL CASING (CONDUCTOR CASING)

- A. The steel casing pipe shall be a new, smooth wall, carbon steel pipe that conform to ASTM A139, Grade "B".
- B. Minimum yield strength of 35,000 psi or greater.
- C. Steel casing shall have roundness such that the difference between the major and minor outside diameters shall not exceed 1% of the specified nominal outside diameter, or 0.25", whichever is less.
- D. Steel casing shall have a minimum allowable straightness deviation in any 10 ft length of 1/8".
- E. Steel casing pipe diameter shall be determined by the contractor to suit their means and methods. It is expected that the casing pipe will be at least 6-inches larger than the outside diameter of the largest reamer to be used by the contractor.
- F. Minimum steel casing pipe wall thickness shall be 0.5 inch.
- G. The design stress in the pipe wall shall be 50 percent of the minimum yield point of the steel or 18,000 psi, whichever is less, when subjected to the loading conditions during the driving and retrial operation.
- H. Casing section joints shall be butt-welded, lap welded, or welded using butt straps in the field. Each end of the casing for butt-welding shall be prepared by providing 1/4-inch 45-degree chamfer on the outside edges. Use manufacturer's specified welding wire or rod.

2.10 GROUT

- A. Grout for Abandonment:
 - 1. Consisting of a mixture of water and Portland cement, with mineral fillers or admixtures as necessary to achieve a nonshrink, nonbleed, flowable grout.
 - 2. Sand: Clean natural silica sand, graded such that 100-percent of the material passes the No. 20 sieve and not more than 20-percent passes the No. 200 sieve.
 - 3. Compressive Strength: 50 psi minimum at 28 days.

PART 3 - EXECUTION

3.1 GENERAL

- A. The Contractor shall be responsible for his means and methods of directional drilling construction and shall ensure the safety of the work, the Contractor's employees, the public, and adjacent property, whether public or private.
- B. Contractor should anticipate that portions of the drilled excavation will be below the groundwater table.
- C. Notifications: Provide notification to the Engineer a minimum of 72 hours before mobilizing onto the site. Provide notification 48 hours in advance of casing installation and drilling. Provide notification 48 hours in advance of pressure and acceptance verification tests on the HDPE carrier pipe.
- D. Construct a perimeter control system for bentonite slurry, cuttings, and pit spoil, as well as storm water control barriers in accordance with Best Management Practices in the local area. The system shall provide positive containment for all drilling fluids and drainage from drill cuttings and prevent any of the drill fluid or drainage fluids or other drill fluid contaminated material from leaving the open pit areas.

05812-10

- E. Spill and bentonite slurry management shall be in accordance with requirements stated in the project permits, and in the approved Drill Fluid Management and Contingency Release Plan.
- F. Notify the Engineer of circulation losses greater than 25% of downhole pump volumes and for all observable bentonite slurry releases at the earliest opportunity, and include in the Daily Report.
- G. Contractor to be responsible for providing proper equipment to be used for lifting and placing the pipe.
- H. Pipe to be installed to the required alignment shown on the drawings.
- I. Every precaution shall be taken to prevent foreign material from entering the pipe. When pipe installation is not in progress, the open ends of the pipe must be closed to the satisfaction of the Engineer.
- J. The leading edge of the pipe shall be examined for significant external damage after pull back. If the pipe is deemed by the Engineer to have suffered significant damage, the damaged pipe shall be cut off and additional pipe pulled through the hole prior to the relaxation period.
- K. Disposal of waste, slurry or volatile material into waterways, storm or sanitary sewers shall not be permitted.
- L. Pumping or draining water containing slurry, silt or bentonite in suspension into waterway, sewers or drainage systems is strictly prohibited.
- M. All waste material shall be removed and disposed by the Contractor at a disposal site located by the Contractor and approved by the Engineer. Obtain required permits for waste disposal. Provide copies to the Owner. The work area shall be organized and clean by the end of each working day.
- N. Do not use pipe with physical damage such as cuts, gashes, nicks or abrasions which are deeper than 10 percent of wall thickness. Remove and dispose of damaged pipe from Site.
- O. Provide freshwater, free of hazardous or toxic substances, for drilling and grouting purposes.
- P. Provide Engineer free access to observe HDD operations and instrumentation at all times.
- Q. Install 6-foot high chain link safety fence around perimeter of open trenches and HDD pits during nonworking hours.
- R. Request and obtain written authorization prior to working overtime, nights, or weekends.
- S. Exercise care and caution during construction to ensure safety of nearby operations and residents, and to avoid damage to adjacent properties and other facilities.
- T. Site shall be free of trash and unsightly debris for duration of the Work.
- U. The Contractor shall be aware that the Owner may implement a monitoring program to monitor water quality of any drilled water course crossing.
- V. Where such effort is necessary, cost for groundwater control during the course of the drilling work shall be included in the unit contract price for the work.
- W. Dewatering required during the course of the project to lower water table, to remove standing water, surface drainage seepage, or to protect ongoing work against rising waters or floods shall be considered incidental to the work being performed.

3.2 PRECONSTRUCTION AND POSTCONSTRUCTION SURVEYS

A. Preconstruction:

- 1. After Contract is awarded and before starting the Work, examine and take photographs in color, and a color video recording in digital format, of existing structures, vegetation, other improvements which be damaged by Contractor's operations.
- 2. Prepare records in triplicate of observations. Provide two copies of each photograph and one copy of digital video to Owner within 30 days after Notice to Proceed.
- 3. The above records and photographs are intended for use as evidence in ascertaining the extent of any damage which may occur as a result of the Contractor's operations and are for the protection of the adjacent property owners, the Contractor, and the Owner. The records will provide a means of determining whether, and to what extent, damage may have occurred as a result of the Contractor's operations.

B. Post construction:

- 1. After construction is completed, perform post construction survey using same parameters as specified for preconstruction survey.
- 2. Repair all damages resulting from the construction activities to the satisfaction of Owner and without delay.

3.3 PROTECTION OF EXISTING STRUCTURES AND UTILITIES

- A. When the Plans require construction operations in close proximity to existing structures, the Contractor shall take all reasonable precautions to prevent damage to such structures. The requirements described herein apply to all types of structures (on or off the right-of-way) that may be adversely affected by construction operations due to boring, reaming, vibrations, ground loss, ground heave, dewatering, or other activities.
- B. The Contractor shall employ a qualified Specialty Engineer to inspect and document the condition of structures prior to and after excavation and drilling activities. Inspect and monitor the following structures:
- C. When excavating for construction, the Contractor is responsible for evaluating the need for, design of, and providing any necessary precautionary features to protect adjacent structures from damage, including, but not limited to, selecting construction methods and procedures that will prevent damaging the adjacent subsurface structures and monitoring and controlling the vibrations from construction activities, including driving of casings and sheeting. When sheeting and shoring are not detailed in the Plans, employ a qualified Specialty Engineer licensed in the State of Rhode Island to design the sheeting and shoring, and to sign and seal the plans and specification requirements. Send these designs to the Engineer for his record before beginning construction.
- D. Contractor shall be responsible for damage to piping or utilities shown on Drawings and/or field located prior to construction.
- E. Consult utility owner immediately when unidentified utilities are encountered during the Work.
- F. Cooperate with Engineer and utility companies in keeping respective services and facilities in operation.
- G. Do not interrupt existing utilities serving occupied facilities, except when permitted in writing by Engineer and then only after acceptable temporary utility services have been provided.
- H. Coordinate with Engineer and utility companies for service shut-off, if required.
- I. Settlement Points:

05812-12

1. Instrumentation locations and monitoring procedures shall be in accordance with this section and Section 05813 Geotechnical Instrumentation and Monitoring.

J. Protection of Utilities:

1. Protect existing utilities within 50 feet of HDD alignment and construction zone in accordance with this specification and Section 05813, Geotechnical Instrumentation and Monitoring.

3.4 PREPERATION

- A. Inspect locations where horizontal directional drilling operations will be conducted and pipe installed.
- B. Inspect existing storm sewer inlet and outlets prior to directional drilling operations.
- C. Locate positions of operation and reception pits, establish elevation and horizontal datum for bore head control, and lay out pipe assembly area. Entry and exit locations shall be surveyed by experienced survey personnel licensed in the State of Rhode Island prior to start of directional drilling.
- D. Operations Within Pipe Staging Area:
 - 1. Conduct operations in a manner that minimized disturbance to public or private properties boarding staging area or where construction easements have been obtained by Owner.
 - 2. Areas where drilling fluids are in use shall be bordered by appropriate silt fences and hay bales.
 - 3. Easement limits for exit point as well as pipe staging shall be bordered by ultraviolet stabilized polyethylene or polypropylene safety fence.
 - 4. Provide silt fences and hay bales where pipe staging areas border or are within 50-feet of river bank of the surface body of water.
 - 5. Layout and assemble pipe in manner that does not obstruct adjacent roads, nearby railroads, commercial access, or residential activities adjacent to construction easements. Elevate pipe over streets or railroads as necessary to avoid disruption to traffic.

3.5 EQUIPMENT

- A. Diesel, electrical, or air-powered equipment will be acceptable, subject to applicable federal and state regulations.
- B. Any method or equipment that the Contractor can demonstrate will produce the specified results will be considered.
- C. Provide adequate secondary containment for any and all drilling fluids mixing and storage tanks.
- D. All equipment shall meet the noise requirements set forth in the City of Warwick.
- E. The Contractor shall provide additional sound buffering around equipment in order to meet City of Warwick ordinances and the requirements of Section 05813 Geotechnical Instrumentation and Monitoring at no additional cost to the Owner.

3.6 CONTROL OF THE DRILL LINE AND GRADE

A. Construction Control.

1. The Contractor shall establish and be fully responsible for the accuracy of his own control for the construction of the entire project, including structures, drill line and grade.

- 2. The Contractor shall maintain daily records of alignment and grade and shall submit an electronic and hard copy of these records to the Engineer. However, the Contractor remains fully responsible for the accuracy of his work and the correction of it, as required.
- 3. The Contractor shall check his control for the bore alignment against an above ground undisturbed reference at least once for each rod length of bore constructed, or more often as needed or directed by the Engineer. Contractor shall furnish a "Directional Bore Log" for each bore completed inclusive of horizontal and vertical location information.

3.7 INSTALLING STEEL CASING (CONDUCTOR CASING)

- A. The casing will be rammed open-ended.
- B. A soil shoe can be installed on the leading edge of the casing. The overcut created by the soil shoe shall be limited to one inch (1") indiameter.
- C. Lubrication can be utilized to reduce friction between the casing pipe and the soil formation. The amount of lubrication directed to the outside of the pipe shall not be more than that required to fill the annular space between the casing pipe and the native formation, as created by the soil shoe.
- D. The pneumatic pipe driving device selected shall be specifically designed for installing the casing pipe through the geological material described in the geotechnical report.
- E. Spoil removal system shall be capable of being operated in a manner which prevents loss of ground during the installation.
- F. Pipe ramming work shall be executed such that settlement is minimized and the in- place casing has full-bearing against the earth.
- G. The Contractor will be monitoring settlement and vibration above the alignment of the casing during installation and following the completion of the casing installation, following Section 05813 Geotechnical Instrumentation and Monitoring.

3.8 DRILLING PILOT HOLE

- A. Drill operators shall wear electrical shock protection equipment and operate from common grounded mats as required.
- B. Install conductor casing, if used, and drill pilot hole from entrance point to exit point following vertical and horizontal alignment shown on Drawings. Loss of control due to interference from known structures and utilities will be corrected at no cost to Owner.
- C. Control drilling fluid viscosity, density, and pressure to prevent frac-outs.
- D. Monitor ground movements as specified in Section 05813, Geotechnical Instrumentation and Monitoring.
- E. As pilot hole is advanced, plot actual horizontal and vertical alignment of pilot hole at intervals not exceeding thirty feet.
 - 1. Provide Engineer with position or inclination of pilot bore upon request and at completion of installation.
 - 2. Contractor shall assume liability for loss or damage to down-hole equipment.
- F. Alignment Requirements:

05812-14

- 1. Entry point location shall be within the predetermined 8' x 8' pits or within the continuous trench on Tidewater Drive all as shown on the drawings.
- 2. Pilot hole exit points shall be within the pre-determined 8' x8' pits or within the continuous trench on Tidewater Drive all as shown on the drawings.
- 3. Where a utility exists, pilot hole shall be closer to horizontal alignment shown on Drawings, to avoid damaging existing utilities and to satisfy permit or utility owner's requirements.
- 4. Minimum separation distance is defined as the shortest distance between the outer most edge of the reamer and the outer most edge of an existing utility or another underground structure.
- 5. Pilot hole shall be no shallower than vertical alignment shown on Drawings.
- 6. No intermediate high points that might trap air in pipe.
- 7. If directional drill pipeline alignment differs from Drawings such that additional pipe or different fittings are necessary to join the excavated pipe, notify Engineer and Owner so additional pipe or different fittings can be reviewed by Owner (at their option) on a timely basis without delaying construction.
- 8. Contractor will not receive compensation for longer or deeper pipeline profile or other deviation from Drawings.

G. Acceptance:

- 1. If pilot hole alignment fails to conform to specified requirements, properly abandon the pilot hole and drill a new pilot hole with alignment meeting specified requirements.
- 2. If hole is lost or damaged during performance of the Work, loss and damage shall be borne by Contractor.
- 3. If hole is not carried to Contract length or to within exit point tolerance, withdraw partially or fully and drill a modified or new crossing. Requirement to drill a substitute crossing shall be recurring until hole is acceptable and at no additional cost to the Owner.
- 4. Owner reserves right to hire independent inspector to verify location of installed pipeline and to recover the cost of the inspection from Contractor if inspection reveals pipeline does not meet specified requirements.

3.9 PREREAMING, REAMING PILOT HOLE, AND PULLING PIPE

- A. Prereaming operations shall be conducted at discretion of the Contractor. Provisions of this Specification relating to simultaneous reaming and pulling back operations shall also pertain to prereaming operations.
- B. Obtain Engineer's approval to proceed before enlarging pilot hole and pulling pipe into position.
- C. While pulling pipe, monitor pulling force and handle pipe in manner that does not overstress pipe. Limit radius of curvature along length of pipe during installation to minimum radius of 600 feet.
- D. Use swivel to connect pipe pull section to reaming assembly to minimize torsional stress imposed on section. If pipe buckles or is otherwise damaged, remove damaged section and replace it with new pipe.
- E. Protect exterior of pipe from damage. Support pull section as it proceeds during pull back so that it moves freely and pipe is not damaged.
- F. Monitor drill fluid viscosity, density and pressure to prevent frac-outs.
- G. Maintain full control of pipe string at all times. Maintain neutral pipe buoyancy during pull back by filling pipe with water as needed. Do not use any buoyancy control measures that have not been submitted to the Engineer and returned as "No Exceptions Taken".
- H. After pullback, pipe may take several hours or days to recover from axial strain. When pulled from reamed bore hole, pull pull-nose out a distance longer than the design length to avoid having pull-nose retract

05812- 15

back below bore hole exit level. Do not make connections until stretch recovery and thermal contraction cycles are complete, and no less than 24 hours.

- I. Pull pipe so that minimum of 20 feet of pipe is exposed at both ends of bore.
- J. Open ends of installed pipeline string shall be closed or plugged with metal or plastic cover to prevent water or soil from entering pipeline during nonworking hours or as otherwise required.
- K. Notify Engineer if pullback pressures exceed maximum allowable value.

3.10 DRILLING FLUIDS

A. Testing:

- 1. Sample and test drilling fluid pH, chloride, salinity, Marsh viscosity, mud density and gel strength per API 13A and API RP 13B-1 during pilot bore to verify conformance with design.
- 2. During pullback, sample drilling fluids and measure pH and Marsh viscosity at least twice per working shift.
- 3. Record results on daily drilling logs.
- 4. Test other mud design parameters if evidence of significant variation exists or if drilling contingency actions are required.
- B. Measure drilling fluid pressure, flow rate of recirculation fluids, and flow rate of added fresh fluids.
- C. Field verify estimated drilling fluid losses by recording the observed drilling fluid return to the entry pit while continuing to temporarily pump planned mud atplanned maximum pump rate, or by other reasonable means.

D. Frac-outs:

- 1. Avoid impact to existing utilities, structures, facilities, waterways and wetlands in the Project area during drilling operation.
- 2. If drilling fluid starts leaking to surface, other than at entry and exit points, or if fluid loss results in surface movement, cease drilling until fluid loss volumes can be brought under control.
- 3. In such event, notify Engineer immediately.
- 4. Clean up locations where drilling fluids surface.
- 5. Pay particular attention to potential of inadvertent frac-outs washing out along existing utility crossings and provide preventive measures.

E. Recirculation:

- 1. Maximize recirculation of drilling fluid surface returns.
- 2. Design and construct facilities to recirculate fluids.
- 3. Remove temporary recirculation line if used.
- 4. Provide solids control and fluids cleaning equipment of a configuration and capacity that will process surface returns and produce drilling fluid suitable for reuse.

F. Density Calculations:

- 1. Drilling fluid density shall be measured a minimum of once each working hour when drilling fluid is pumped into hole.
- 2. Record density calculations in daily drilling log.

3.11 HANDLING AND DISPOSAL OF DRILLING MUD AND CUTTINGS

- A. Dispose of drilling fluids and drill cuttings in approved offsite location in accordance with local, state and Federal laws and regulations at no additional cost to the City.
- B. Do not use additives that would prevent nonhazardous disposal of drilling mud.
- C. Make adequate provisions for handling and containing muddy water, drilling mud, and cuttings during drilling operations. Do not discharge these contaminants into waterways.
- D. Construct mud pits at entry and exit points in manner that completely contains mud and prevents its escape.
- E. When onsite provisions for storing muddy water, drilling mud, or cuttings onsite are exceeded, haul contaminants away to a licensed land fill or otherwise approved disposal sites.
- F. Conduct directional drilling operation in such manner that drilling mud is not forced through bay sub-bottom or adjacent areas.

3.12 JOINING PIPE SECTIONS

- A. End Fittings:
 - 1. Fabricate and install mitered fittings at ends of pipe for attachment of adjacent sections of pipe.
 - 2. Fitting angles shall correspond to field conditions and shall be as approved by Engineer.
- B. Join pipe to one another, to fittings, and to flange connections by means of thermal butt fusion. Pipe, fittings, and flanged connections shall be same type, grade, and class of polyethylene compound.
- C. Butt Fusion Joining:
 - 1. Perform in accordance with pipe manufacturer's recommendations.
- D. Special Precautions at Flanges:
 - 1. Support pipe connected at flange to flange connections to heavy fittings, manholes, and rigid structures in such a manner that no subsequent relative movement between polyethylene pipe at flanged joint and rigid structure is possible.
 - 2. Inside edge of flange in contact with HDPE flange to be beveled and not in contact with the weld bead.

3.13 OBSTRUCTIONS AND PIPE ABANDONMENT

A. Obstruction: When condition or unknown obstruction is encountered which precludes further drilling, Contractor may elect to discontinue drilling, sidetrack to avoid obstacle, or drill in a substitute location upon written acceptance from Engineer and Owner.

B. Abandonment:

- 1. Abandon boreholes installed or partially installed that fail to meet requirements of these Specifications at Contractor's expense.
- 2. Drill/bore new borehole along alignment approved by Engineer and install new product pipe.
- 3. Grout abandoned boreholes and product pipes as follows:
 - a. Inject until borehole or product pipe is flushed of drilling fluid and return flow at collar of boring or product pipe shows undiluted grout.

- b. Plug boring or product pipe to maintain grout in boring or product pipe until grout has set.
- c. Inject additional grout as necessary to fill voids left as a result of shrinkage or bleeding of grout.

3.14 FIELD QUALITY CONTROL

- A. Daily Drilling Logs: Record at a minimum the following on an hourly basis and at every noticeable change in materials throughout each drill pass, back ream pass, and pipe installation pass.
 - 1. Drilling fluid batch quantities and mix proportions.
 - 2. Drilling fluid flow rate, both fresh and recirculated fluids.
 - 3. Drilling fluid pressure, including maximum and average valves.
 - 4. Drilling of fluid density calculations.
 - 5. Drill thrust.
 - 6. Drill pullback force, including maximum and average values.
 - 7. Head torque and rate of rotation.
 - 8. Spoil material quantities.
 - 9. Description of spoil material and drilling conditions.
 - 10. Locator/tracking system data including position, roll and tilt angles, depth, temperature of data transmitter and remaining batter life.
 - 11. Drill bit location at least every 30 feet along drill path.
 - 12. Observations of drilling conditions and periodic field tests.
- B. Provide field survey and datum for establishing location of installation at end of each installation
- C. Hydrostatic Testing
 - 1. The Contractor must supply all testing equipment and personal to perform hydrostatic tests on the installed product pipe to demonstrate that the pipe is installed in accordance with the Specifications.
 - 2. The Contractor must advise the Engineer 24 hours in advance of filling the line for testing.

3.15 MANUFACTURER'S SERVICES

A. Provide manufacturer's representative at Site for installation assistance and to certify butt fusion joints are acceptable.

3.16 SURFACE RESTORATION

- A. Promptly replace damaged pavement. Restore pavement around entry and exit pits as soon as the Work specified is completed.
- B. At completion of construction, restore work areas to preconstruction condition including, but not be limited to, damaged gravel surfaces, grassed areas or lawns, fences and gates, damaged trees and plantings.

3.17 CLOSEOUT ACTIVITIES

- A. Within 48 hours of completion of the work, remove all rubbish and debris from the job site. Remove all construction equipment, leaving the area involved in a neat condition acceptable to the Engineer. Disposal of any material onsite is strictly prohibited.
- B. Immediately clean "blow holes" or "breakouts" of drilling fluid to the surface and return the surface area to its original condition.

05812-18

- C. Repair environmental damage occurring from pipeline installation operations.
- D. Remove frac-out material from storm sewers.
- E. Submit one electronic copy and two hard copies of the record drawings to the Engineer within five days after completing the pull back. Clearly tie the record drawings to the project's survey control. Maintain and submit upon completion all work logs of guided directional drill operations. All work logs shall be signed.

3.18 FINAL INSPECTION FOR ACCEPTANCE OF HDD

A. Final inspection of the work shall include a visual inspection of each section of pipe. The pipe shall be within the tolerances specified herein and in the drawings for both, line and grade, shall show no leaks, shall be free of cracks or ovality greater than 2%, and contain no deposits of sand, dirt or other materials. All finished work shall be neat in appearance and of high-quality work.

END OF SECTION

05812-19

Date: 11/2019 HORIZONTAL DIRECTIONAL DRILLING

SECTION 05814

REMOVE AND DISPOSE ASBESTOS CEMENT PIPE (RI)

PART -1. GENERAL

1.01 SECTION INCLUDES

A. Requirements to remove and dispose of buried asbestos cement pipe.

1.02 REFERENCES

- A. Rhode Island Department of Transportation, Standard Specifications for Road and Bridge Construction, amended August 2013, including all revisions and addenda, issued by the State of Rhode Island Department of Public Works, (referred to as the Standard Specification).
- B. U.S. Department of Labor, Occupational Safety and Health Administration (OSHA) Standard 29 CFR 1926.
- C. Federal Register Vol. 83, No. 80 page 18047, approved techniques for removal and replacement of asbestos cement pipe.

1.03 SUBMITTALS

- A. In accordance with section O1300, submit the following,
 - 1. Detailed plans and descriptions outlining the asbestos abatement procedures to be followed.

1.04 **QUALITY ASSURANCE**

A. Regulatory Requirements

1. Remove and dispose of the asbestos pipe be in accordance with the requirements of Section 201.03.8 of the Rhode Island Standard Specification and the requirements of this Specification Section.

B. Qualifications

1. The qualifications of personnel required for the removal and disposal operation must be approved by the Engineer.

PART -2. PRODUCTS

2.01 MATERIAL AND EQUIPMENT

A. Any required materials or equipment, such as; overalls, gloves, air respirator and etc. for persons involved in the handling of the AC material must meet the OSHA Standard 29 CFR 1926.

2.02 PERSONNEL PROTECTION

- A. The Contractor is responsible to determine what personnel protection equipment is needed.
- B. The Contractor is required to provide all required personnel protective equipment.

05814-1

Date: 11/2019

PART -3. EXECUTION

3.01 GENERAL

- A. Keep the Engineer advised at all times of any changes made to the overall operation(s) to accommodate field conditions.
- B. No work shall begin until all provisions and requirements of this Specification have been reviewed and approved by the Engineer.
- C. The Engineer reserves the right to limit and/or otherwise restrict the Contractors overall activities and/or operations at any time without claim should the Engineer deem it to be in the Owners best interest to do so.

3.02 PREPARATION

A. The Contractor is responsible to notify the workers and others in the area of the type of work being conducted and the regulations associated with the project.

3.03 REMOVAL AND DISPOSAL PROCEDURES

- A. Removal and disposal of asbestos cement pipe/duct bank, all types and sizes, shall be performed in the following manner:
 - 1. The Contractor will excavate the trench to the necessary width on either side and to the depth which will not exceed the bottom of the pipe while maintaining a safe angle of repose. The pipe should not be disturbed in any way during excavation. The AC material may have to be wetted with water prior to breaking/cutting, depending on the requirements set forth by the selected landfill.
 - 2. The asbestos landfill sites may have different restrictions on the length of the AC pipe/duct bank which they accept for disposal. If the Contractor chooses to break or cut the AC pipe/duct bank to meet the length requirement of the accepted landfill, it shall be done inside the trench area before the pipe is removed.
 - 3. The AC pipe/duct bank shall be completely wrapped with a minimum 6-mil polyethylene sheet and/or bag fastened with high strength duct tape. The free ends of the sheeting or the end of the bag shall be folded outside and over the pipe/duct bank and be sealed transversely with the duct tape.
 - 4. The polyethylene sealed asbestos cement pipe shall be lifted intact without additional breaking and placed in a transport vehicle (box type trailer) which completely contains the wrapped and sealed portion of pipe/duct bank on all sides. A box trailer with tarpaulin top is not acceptable.
 - 5. Any remaining portions of AC material (i.e., pieces, fragments, collars, rubber gaskets, etc.) in the trench, overburden or work area will be carefully collected and placed in a 6- mil polyethylene bag or sheeting. The bags or sheeted materials will be then placed in the manner of transport mentioned above. If the polyethylene bag or sheet is tom or punctured, the Contractor must repeat the. above process to assure a sealed mode of handling at no additional cost to the Department.
 - 6. All of the removal and placement of the AC material into the transport truck shall be accomplished with the Engineer and/or designated representative present at the site.
 - 7. The Contractor shall notify the Engineer one week prior to the implementation of removal,

Date: 11/2019

- disposal and transport operations.
- 8. No dumping of AC material will be permitted under any circumstances at any site except the approved asbestos landfill.
- 9. The Contractor shall also monitor the air quality based on the requirement as set forth by OSHA 29 CFR 1926.58(t).

3.04 TRANSPORT

A. Transport the removed asbestos pipe in accordance with the appropriate Federal, State and Local regulations.

3.05 DISPOSAL

A. Approved Disposal Sites.

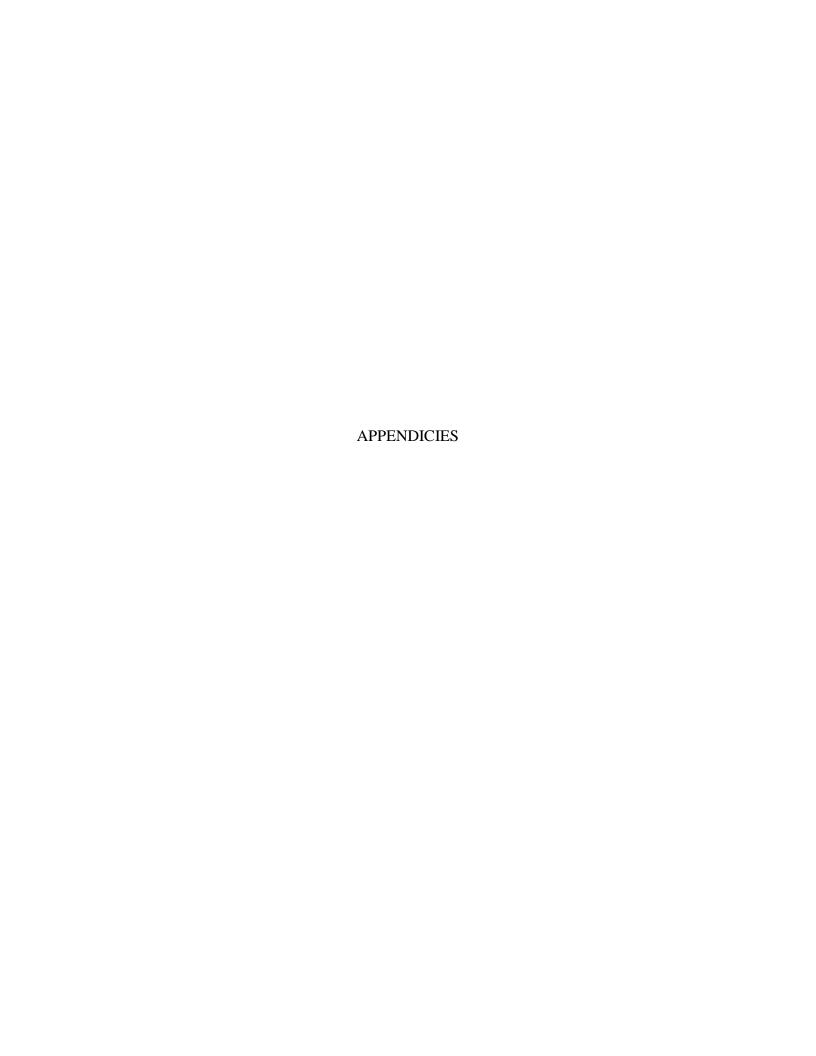
- 1. Asbestos cement pipe shall be removed and disposed of at landfill sites approved for such purpose by both the United States Environmental Protection Agency, and the Rhode Island Department of Environmental Management.
- 2. Any disposal site chosen by the Contractor must have a license from the appropriate State and Federal agency to accept this material.
- 3. A copy of the license or approval must be given to the Engineer. Said license must be valid at the time of disposal in the selected landfill.
- 4. The Contractor shall coordinate with the authorities in charge of the landfill for specific details on acceptability of the disposal of the asbestos-cement material.

B. Tipping Fees

1. The Contractor shall pay all fees associated with the disposal of asbestos at a landfill which accept asbestos waste products.

END OF SECTION

Date: 11/2019







GEOTECHNICAL REPORT

CONTRACT NO. 86B BAYSIDE SEWER SYSTEM PRESSURE SEWERS

Warwick, Rhode Island

October 2018

Prepared for:

City of Warwick, Rhode Island
Warwick Sewer Authority

Prepared by:

Gordon R. Archibald, Inc. 200 Main Street Pawtucket, Rhode Island 401-726-4084



Table of Contents

Background	3
Boring Exploration Information	
Laboratory Testing	4
Observed Subsurface Conditions	5
Soil Conditions	5
Groundwater Conditions	5
Geotechnical Evaluation & Recommendations	7
Manholes and Utility Lines	
Earthwork Recommendations	7
Reuse of Onsite Soil	8
Backfill & Compaction Requirements	8
Temporary Excavation Support Consideration	8
Dewatering and Surface Water Diversion	9
Other Design Requirements	9
	Laboratory Testing Observed Subsurface Conditions Soil Conditions Groundwater Conditions Geotechnical Evaluation & Recommendations Manholes and Utility Lines Earthwork Recommendations Reuse of Onsite Soil Backfill & Compaction Requirements Temporary Excavation Support Consideration Dewatering and Surface Water Diversion

List of Tables

Table 1 – Summary of Boring Programs

Table 2 – Summary of Groundwater Observation Well Measurements

List of Appendices

Appendix A – Supporting Documents

Appendix B – Boring Plans, June 2018

Appendix C – Boring Logs: 2006, 2016, and 2018

1.0 Background

As part of the program associated with the proposed installation of a sewer system for the Bayside area of Warwick, Rhode Island, the Public Archaeology Laboratory (PAL) conducted a Phase 1 (c) archaeological survey along Tidewater Drive. The Phase 1 (c) survey resulted in the identification of archaeological deposits that were reflective of Native American occupation and activity within the project area. Based on these findings, additional trenching and exposure was completed by PAL to designate an 8-foot sanitary sewer corridor to further discover archaeological deposits. PAL has completed the archeological study and, in accordance with the Contract Documents, the Contractor shall not perform excavation services outside of the approved area.

Based on the discovery of Native American archeological deposits within the project area, it was determined that a pressure sewer system would be proposed for the Bayside area utilizing horizontal drilling construction techniques.

1.1 Subsurface Information

Information was gathered on the site geology from the following sources to determine subsurface conditions for the project area along the proposed sewer routes

- USDA NRCS
- Rhode Island GIS for Bedrock Geology
- Borings conducted in 2006, 2016 and 2018.

US Department of Agriculture – Natural Resources Conservation Service

A review of the United States Department of Agriculture (USDA) – Natural Resources Conservation Service's (NRCS) 'web soil survey' to obtain site geologic information revealed the soil underlying the project area as classified below. Additional information is provided attached.

- Beaches, cobbly surface (Baz)
- Hinckley loamy sand, 0 to 3 percent slopes (HkA)
- Mansfield mucky silt loam (Ma)
- Merrimac Urban land complex, 0 to 8 percent slopes (MU)
- Newport silt loam, 0 to 3 percent slopes (NeA)
- Newport silt loam, 3 to 8 percent slopes (NeB)
- Newport silt loam, 8 to 15 percent slopes (NeC)
- Newport-Urban land complex (NP)
- Pittstown silt loam, 0 to 3 percent slopes (PmA)
- Pittstown silt loam, 3 to 8 percent slopes (PmB)
- Rock outcrop-Canton complex, 0 to 35 percent slopes, very stony (Rp)
- Sandyhook mucky fine sand, 0 to 2 percent slopes, very frequently flooded (Sa)
- Stissing silt loam (Se)
- Udorthents-Urban land complex (UD)
- Walpole sandy loam, 0 to 3 percent slopes

According to the USDA soil survey, the majority of the above listed soil classifications are sandy loam and silt loam. Small areas of loamy sand are present in the northwestern corner of the soil survey area. No work is being completed in areas classified as beaches or saline surface water on the soil survey.

The identification of bedrock geology in the vicinity of the project area, obtained from the Rhode Island GIS mapping is classified as Narragansett Bay Group. The bedrock was classified as stratified avalon terrane, esmond-dedham subterrane. A map of the area is provided in Appendix A.

1.2 Boring Exploration Information

Soil borings were conducted in the project area in 2006 and 2016 with a recent borings program conducted in 2018. A total of 253 borings were completed using cased borings and hollow stem auger borings with samples collected by split spoon and auger probing. Table 1 provides a summary of the boring programs conducted each year showing the boring contractor, boring type, number of borings completed and boring depths.

	Table 1					
	Summary of Boring Programs					
Exploration Program		2006	2016	2018		
Contractor		New Hampshire	New England	New England		
	Jiii actoi	Boring, Inc.	Boring Contractors	Boring Contractors		
Box	ring Type	С	C	C / HS		
Samples C	ollection Method	SS-c / SS-i	SS-i	SS-c / SS-i /A		
Total Bor	rings Completed	50	6	194		
Boring ID		B-52 through B-100	TB-100 through TB-105	C-1 through C-200 ¹		
• •	Boring Depth pelow grade)	15 to 21	16 to 21	12		
Maximum Boring Depth (if different from Typical)		50' 6''				
C	<u>Cased Borings</u> – Made by driving pipe casing and removing soil from within the casing					
	by washing. Samples collected by split spoon.					
HS	Hollow Stem Auger Borings – There were three types of HS Bores used in the 2018					
	contract: (i) split spoon continuous sampling, (ii) split-spoon interval sampling, (iii)					
	auger probing.					
SS-c	Split-spoon continuous sampling					
SS-i	Split-spoon interval sampling (5' max)					
A	Auger probing					

All information provided in this report is relative to the completed soil boring logs provided by the New Hampshire Boring, Inc., New England Boring Contractors, and GRA's field notes. The location of the borings conducted within the project area in 2018 are shown on the plans in Appendix B. The 2006, 2016, and 2018 boring logs are attached in Appendix C.

2.0 Laboratory Testing

Laboratory testing was not completed as part of the subsurface investigations conducted for the project.

¹ Six borings of the planned 200 were not completed. The numbering system was not revised to delete the six borings that were not completed in 2018.

3.0 Observed Subsurface Conditions

The generalized soil conditions encountered in the test borings, beginning at the ground surface are described below. The soil samples were collected as part of the subsurface activities conducted in 2006, 2016 and most recently in 2018 and were available for review. Test boring logs are attached in Appendix C.

3.1 Soil Conditions

Soil conditions generally encountered from test borings in the project area are described below.

<u>Asphalt</u> – Approximately 2 to 6 inches of asphalt pavement was typically encountered at the ground surface at each location. This stratum was underlain by;

- i. Glacial Outwash Glacial outwash consisting of loose fine to medium sand and/or loamy sand, trace to some coarse sand and gravel, and varying amounts of silt were encountered in the majority of the upper five feet in the test borings. Generally, the outwash consists of fine to coarse loamy sand with varying amounts of gravel and silt. Also observed during the exploration, although less common, the upper strata had trace wood, brick, cobbles and/or sea-shells in several locations². The glacial outwash encountered below the groundwater was generally a coarse sand and gravel strata.
- ii. <u>Glacial Till</u> Glacial till consisting of dense to very dense fine to coarse sand. The layer consisted of trace silt, gravel, brown fine sand, and weathered rock. The glacial till strata encountered in the groundwater was generally a grey dense fine sand and silt.
 - a. Glacial till was encountered in the 2006 borings from 15 to 26 feet below grade (fbg) in B-67, 4 fbg in B-85,
 - b. Glacial till was encountered in the 2018 borings from 10 to 12 fbg
- iii. <u>Bedrock</u> Weathered bedrock / shale was encountered in several test borings during the 2006, 2016, and 2018 boring investigation programs. Bedrock was encountered at the following depths:
 - a. Weathered bedrock / shale / and/or sandstone was encountered in the 2006 borings ranging from 5 to 50 feet below grade (fbg).
 - b. Sandstone was encountered in B-67, B-85, and B-92 during the 2006 investigation ranging from 7 to 50 fbg.
 - c. Weathered bedrock was encountered in the 2018 borings from 3 to 12 fbg

3.2 Groundwater Conditions

Groundwater levels were recorded by the New Hampshire Boring, Inc., New England Boring Contractors, and GRA at the times the borings were completed. The following groundwater observations were made as part of the boring exploration programs conducted in 2006, 2016 and 2018.

- i. According to the 2006 boring exploration, the groundwater was observed ranging from approximately 2 to 15 feet below grade.
- ii. According to the 2016 boring exploration, the groundwater was observed ranging from approximately 5 to 6 feet below grade.
- iii. According to the 2018 boring exploration, the groundwater was observed ranging from approximately 3 to 10 feet below grade.

² GRA's review of the soil samples collected as part of the 2018 boring exploration identified the soil to be consistent with the USDA web soil survey information as described in Section 1.1. The soil encountered typically represented a loamy sand, sandy loam, or silt loam. The Contractor did not describe the glacial outwash soil as loamy.

It should also be noted that several boring locations did not have evidence of groundwater at the time of installation, indicating groundwater may be present at a depth greater than the boring exploration.

Observation wells were installed at several boring locations as part of the 2006, 2016, and 2018 exploration programs. A total of 35 observation wells were installed. Groundwater levels measured in August 2018 generally ranged between 1.6 to 11.2 feet below the ground surface elevation with groundwater elevations generally ranging from 1.2 to 63.4 feet above mean sea-level. Table 2 presents a summary of the observation wells installed, identifying the boring/observation well number, the ground surface elevation at the boring, the depth to groundwater and the groundwater elevation.

Table 2				
Sur	Summary of Groundwater Observation Measurements			
Boring / OW Number	Approx. Ground Surface Elev. (ft)	Depth to Groundwater (ft) August, 2018	Approx. Groundwater Elevation (ft) August, 2018	
TB-100	37.0	5.6	31.4	
TB-105	37.6	6.7	30.9	
C-2	16.2	9.1	7.1	
C-12	14.9	6.6	8.3	
C-14	20.4	6.8	13.6	
C-17	9.4	4.0	5.4	
C-19	55.7	No Water		
C-20	24.4	3.9	20.5	
C-21	8.6	5.4	3.2	
C-23	5.1	3.9	1.2	
C-43	33.7	5.5	28.2	
C-47	50.5	11.0	39.5	
C-48	12.3	3.2	9.1	
C-59	32.4	6.8	25.6	
C-62	5.3	1.9	3.4	
C-77	18.3	5.2	13.1	
C-81	5.9	1.6	4.3	
C-96	30.5	8.3	22.2	
C-100	54.4	7.4	47.0	
C-112	10.8	4.4	6.4	
C-121	62.2	5.5	56.7	
C-128	56.5	6.2	50.3	
C-134	46.2	No Water		
C-140	37.5	11.2	26.3	
C-146	12.2	2.5	9.7	
C-153	55.5	7.3	48.2	
C-158	36.0	11.1	24.9	
C-161	18.0	8.1	9.9	
C-170	74.6	11.2	63.4	
C-182	55.1	7.3	47.8	
C-183	53.1	7.0	46.1	
C-188	57.6	9.7	47.9	
C-198	53.5	5.1	48.4	
C-200	55.8	10.1	45.7	

Groundwater gauging was performed in August 2018. The NRCS soil descriptions indicate perched groundwater may be present in several of the glacial till soil classification areas. Groundwater fluctuations associated with season, rainfall, temperature, and other factors have the potential to cause groundwater elevation fluctuation subsequent to the well gauging date.

4.0 Geotechnical Evaluation & Recommendations

4.1 Manholes and Utility Lines

Based on the PAL archaeologic study and the boring investigation, the Bayside Sewer System is proposed to be constructed by both horizontal drilling and open-trench excavation. The open-trench excavation is proposed for the up-gradient project areas, where the archaeologic study did not identify findings. Trench excavation will be permitted only at the location designated by the Engineer described in the Contract Documents.

The Contractor shall only excavate from within the designated excavation area as approved by the PAL archeologic study for the down-gradient area of the Project, as described in the Contract Documents. Groundwater levels were recorded at the times the borings were completed as described in Table 2 in Section 3.2.

Shallow groundwater table and bedrock in select locations have the potential to be encountered during the associated construction activities. It is recommended that the boring logs be reviewed while designating the structure locations.

4.2 Earthwork Recommendations

Excavation will be required to install the proposed sewer system. Any asphalt, non-engineered fill or unsuitable material should be removed from the excavation. Unsuitable material should also be removed from below the footprint of the structures prior to their placement. Structures should be supported directly on undisturbed glacial outwash soils in areas where glacial outwash is present at the bottom of the excavation.

Structures should be placed on Gravel Borrow in areas where glacial till is present at the bottom of the excavation. Imported Gravel Borrow fill shall meet the Rhode Island Department of Transportation Standard Specifications for Road and Bridge Construction (State Standards) Gravel Borrow (Section M.01.09, Type 1a) requirements. State Standards Section M.01.09, Type II Crushed stone may be used as an alternative to Gravel Borrow. A non-woven geotextile fabric (such as Mirafi 140N) shall be placed on the glacial till soils to reduce the potential for fines migration into the crushed stone when crushed stone is used. It is recommended that a minimum of 6 inches of compacted Gravel Borrow or crushed stone be placed on the surface of glacial till soils underlying the structures.

Sand bedding is recommended to furnish the presser sewer pipes. Unsuitable fill material should be removed from the area and sand bedding placed as described in the Contract Documents.

The exposed surface of the excavations should be leveled and surface compacted with a suitable plate compactor prior to placement of any structure, Gravel Borrow, or crushed stone. Shallow groundwater may be present in areas where structures will be installed. Surface compaction shall not be performed in areas where the bottom of excavation glacial outwash and glacial till soils are saturated.

4.3 Reuse of Onsite Soil

The NRCS soil classification and the boring logs indicate that existing soils within the project area are likely to contain a high percentage of fines. It is likely that the soils excavated within the project limits will not meet the State Standards Gravel Borrow specifications. Any soils considered for reuse as Gravel Borrow shall first be tested and the test results compared to the State Standards Gravel Borrow gradation requirements to confirm the material is suitable for use as Gravel Borrow.

The Contractor will be required to excavate soils in the Engineer approved areas to install the sewer system, structures, and connecting services through horizontal drilling. Sewer project excavated soils are generally reused to backfill trenches. Excavated material shall be reused as backfill material below the depths where Gravel Borrow is required.

4.4 Backfill & Compaction Requirements

All structural fill should be placed in horizontal lifts a maximum of 12-inches thick and compacted. Filling underneath structures should be accomplished with Gravel Borrow or crushed stone, as defined below. All backfill supporting or adjacent to structures should be compacted to a minimum of 95 percent of the maximum dry density as determined by ASTM D-1557, The Modified Proctor density test. Fills and backfills should be compacted to 90 percent of the maximum material dry density to within two foot of the subgrade layer in all paved areas. The two feet of backfill supporting pavement should consist of Gravel Borrow and should be compacted to 95 percent of the maximum dry density.

4.5 Temporary Excavation Support Consideration

As previously stated, the sewer system will be installed using horizontal drilling and excavation support for the pipe installation is not applicable. At the time of this report, the proposed sewer system is anticipated greater than five (5) feet below grade.

It is anticipated that the sewer system manhole structures will be installed by excavation methods along the project alignment. Additionally, the Contractor will be required to excavate along the system to install the connecting services. The excavation shall not extend past the area approved by PAL for excavation activities in accordance with the Contract Documents.

Excavation support, access and egress shall comply with all OSHA requirements. It is anticipated that trench boxes may be used where adjacent structures or utility lines are not located near the excavation.

The excavation support method shall be determined by the Contractor. It is recommended that the Contractor be required to provide an Earth Support Plan submittal prepared by a Professional Engineer registered in the State of Rhode Island for any location where they intend to use excavation support systems prior to commencing site excavation activities. The Contractor' Professional Engineer shall design and install the required excavation support systems for the structure installation. Excavation support installation and removal shall comply with all applicable OSHA Regulations and with the Contractor's Earth Support Plan.

4.6 Dewatering and Surface Water Diversion

All excavations and backfilling should be conducted in the dry. The observed groundwater levels along the project alignment ranged from approximately 1.6 to 11.2 feet below grade in the August 2018 gauging. It is anticipated that excavation to install manhole structures and sewer lines will extend below the groundwater table within the project limits. Therefore, dewatering within these areas will be required.

There were two wells where groundwater was not present in the August 2018 gauging event. In addition, there were borings that were completed without encountering groundwater. Although groundwater was not encountered in these wells or borings, factors such as season, rainfall, temperature, and other factors that influence the depth to groundwater may create conditions where groundwater may be encountered during construction and require a level of dewatering.

GRA recommends that the Contractor be required by specifications to use a dewatering system which will lower the groundwater elevation to a minimum of two feet below the bottom of the anticipated bottom of excavation elevation. Specifications should also require that the Contractor provide for proper diversion of surface water runoff away from any excavation so that structures, embankments, pipelines and compacted fill are not undermined. During periods of heavy rainfall, diversion of trapped surface water may also be a significant problem. We recommend that the Contractor be required to submit a dewatering plan prepared by a Professional Engineer registered in the State of Rhode Island with calculations indicating the anticipated means and methods to accomplish dewatering prior to commencing site excavation. This submittal will also include considerations of uplift after the system is shut down.

4.7 Other Design Requirements

4.7.1 Preconstruction Survey & Vibration Monitoring

A pre-construction survey is recommended to document property and building conditions within the project area. The pre-construction survey should include, but not be limited to, photographs, video recordings, sketches, and any other documentation that is required to document the pre-construction conditions of buildings and surface areas within 200 feet of the construction activities. The pre-construction survey information can be used to document deficiencies that exist prior to construction. Potential deficiencies include, but are not limited to cracks in building and retaining walls, mis-alignment of fences, walkway and/or driveways cracks and settlement, and any other conditions that could potentially lead to disputes during and after construction. It is recommended that the project specifications require the Contractor to conduct all operations without causing damage to adjacent structures and property.

Vibration associated with construction activities has the potential to cause damage to adjacent structures. Available research provided below provides vibration criteria guidance for various construction activities. Monitoring construction vibrations at the nearest property line during compaction activities is recommended. The specification should also require that if the vibration levels measured at the adjacent structures exceed certain threshold values, then the construction activity creating the vibration should be suspended until the activity has been modified to decrease vibrations.

VIBRATION CRITERIA GUIDANCE

FINAL REPORT - EVALUATION OF VIBRATION LIMITS AND MITIGATION TECHNIQUES FOR URBAN CONSTRUCTION

Authors: Mehmet Emre Bayraktar, Ph.D., Associate Professor, Youngcheol Kang, Ph.D., Assistant Professor, and Farrukh Arif Graduate Research Assistant Florida International University and Mark Svinkin, Ph.D., VIBRACONSULT, Submitted to the Florida Department of Transportation - Research Center dated October 2013

Criteria of Dynamic Settlement

Vibration limits of settlement are **0.04 in/s** in loess and **0.10 in/s** in sands. There are no criteria of settlement in clays. Mitigation measures shall be used to prevent or decrease dynamic settlements in loess, sand and clay soils.

Criteria of Direct Vibration Effects

The vibration limit of **0.75** in/s of ground vibrations is suggested for assessment of direct vibration effects on 1-2 story houses. This criterion can be corrected after accumulation of field data of measured ground vibrations and corresponding structural damage. Meanwhile, the application of **2** in/s limit for measured structural vibrations (at window sills and floors) can help to determine unacceptable vibrations of various structures, especially of structures with more than two stories.

Assessment of the Resonance Condition

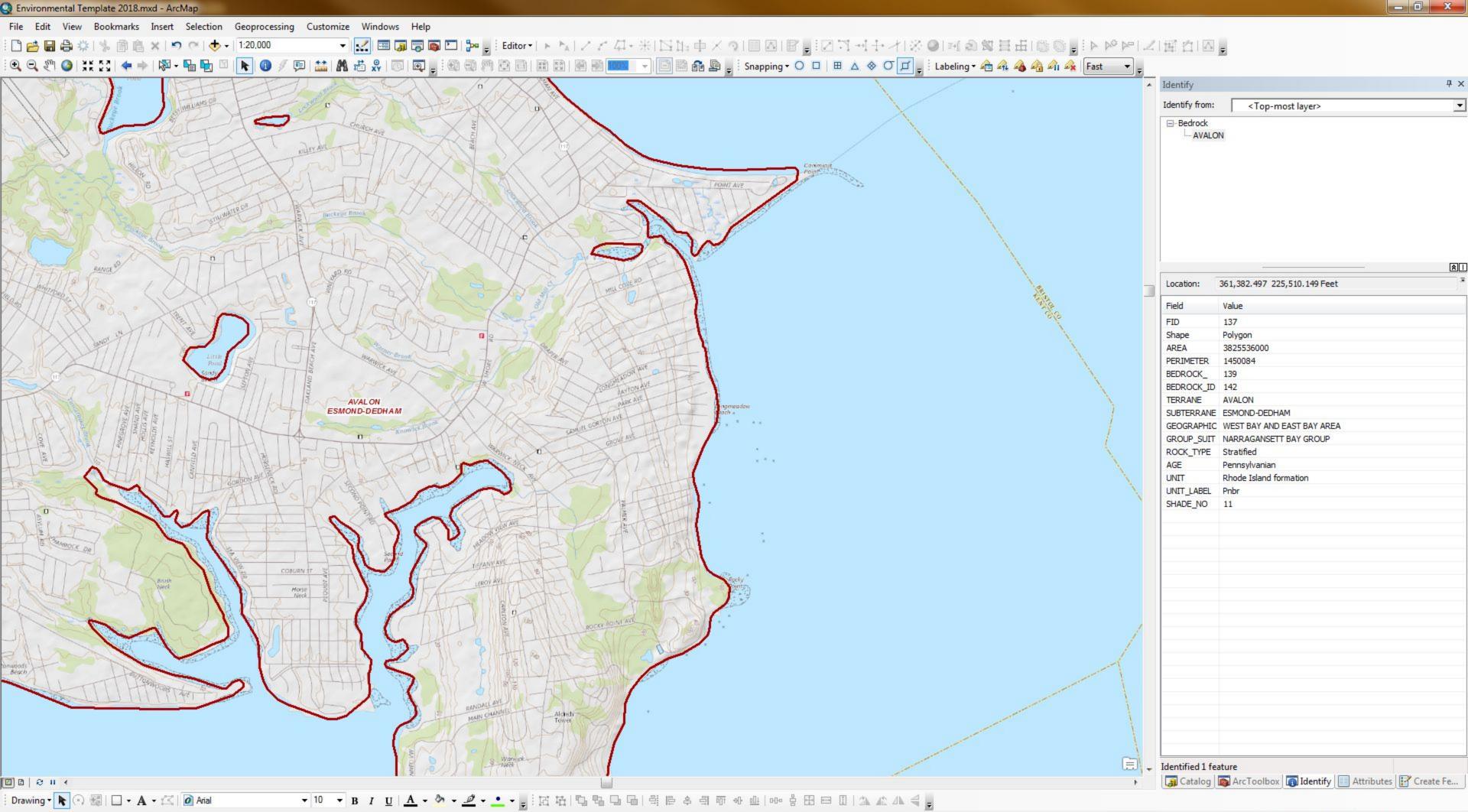
The use of vibratory drivers with variable frequency and force amplitude may minimize damage due to accidental soil layer resonant vibrations and resonant floor vibrations.

Historic and Old Structures

The vibration limit of **0.1 in/s** is an appropriate criterion for at historic structures. In addition to this criterion, daily inspection of structures shall be provided.

APPENDIX A

Supporting Documents





MAP INFORMATION

The soil surveys that comprise your AOI were mapped at

Please rely on the bar scale on each map sheet for map

Source of Map: Natural Resources Conservation Service measurements.

Coordinate System: Web Mercator (EPSG:3857) Web Soil Survey URL:

distance and area. A projection that preserves area, such as the Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required. This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

State of Rhode Island: Bristol, Kent, Newport, Providence, and Washington Counties Soil Survey Area:

Survey Area Data: Version 16, Sep 14, 2017

Soil map units are labeled (as space allows) for map scales

1:50,000 or larger.

Date(s) aerial images were photographed: Data not available.

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Miscellaneous Water

Perennial Water

Rock Outcrop

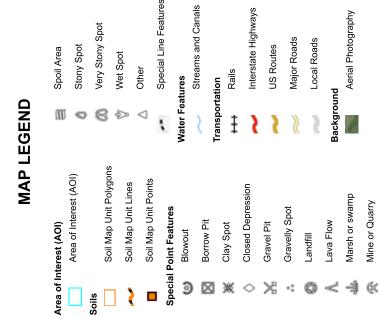
Severely Eroded Spot

Slide or Slip

Sinkhole

Sodic Spot

Sandy Spot Saline Spot



Map Unit Legend

Man Unit Symbol	Man Unit Nama	Acres in AOI	Percent of AO
Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
Ba	Beaches, sandy surface	12.0	0.7%
Bax	Beaches, bouldery surface	3.2	0.2%
Baz	Beaches, cobbly surface	20.5	1.2%
Вс	Birchwood sandy loam	0.1	0.0%
CeC	Canton and Charlton fine sandy loams, 3 to 15 percent slopes, very rocky	16.7	1.0%
Dc	Deerfield loamy fine sand	17.7	1.1%
FeA	Freetown muck, 0 to 1 percent slopes	2.4	0.1%
HkA	Hinckley loamy sand, 0 to 3 percent slopes	6.0	0.4%
HkC	Hinckley loamy sand, 8 to 15 percent slopes	2.6	0.2%
lp	Ipswich mucky peat, 0 to 2 percent slopes, very frequently flooded	30.7	1.9%
Ма	Mansfield mucky silt loam	20.1	1.2%
Mk	Matunuck mucky peat, 0 to 2 percent slopes, very frequently flooded	5.3	0.3%
MmA	Merrimac fine sandy loam, 0 to 3 percent slopes	10.1	0.6%
MU	Merrimac-Urban land complex, 0 to 8 percent slopes	154.9	9.4%
NeA	Newport silt loam, 0 to 3 percent slopes	8.2	0.5%
NeB	Newport silt loam, 3 to 8 percent slopes	44.9	2.7%
NeC	Newport silt loam, 8 to 15 percent slopes	17.3	1.1%
NP	Newport-Urban land complex	446.2	27.2%
PmA	Pittstown silt loam, 0 to 3 percent slopes	38.5	2.3%
PmB	Pittstown silt loam, 3 to 8 percent slopes	87.5	5.3%
Рр	Pootatuck fine sandy loam	2.6	0.2%
PsB	Poquonock loamy fine sand, 3 to 8 percent slopes	0.0	0.0%
Pw	Pawcatuck mucky peat, 0 to 2 percent slopes, very frequently flooded	4.2	0.3%
Rk	Rock outcrop	4.0	0.2%

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
Rp	Rock outcrop-Canton complex, 0 to 35 percent slopes, very stony	14.2	0.9%
Ru	Rippowam fine sandy loam	15.7	1.0%
Sa	Sandyhook mucky fine sand, 0 to 2 percent slopes, very frequently flooded	3.9	0.2%
Se	Stissing silt loam	124.8	7.6%
Ss	Sudbury sandy loam	34.2	2.1%
Udorthents-Urban land complex		37.9	2.3%
Ur	Urban land	28.6	1.7%
W	Water	1.4	0.1%
Wa	Walpole sandy loam, 0 to 3 percent slopes	14.1	0.9%
WgA	Windsor loamy sand, 0 to 3 percent slopes	19.3	1.2%
WgB	Windsor loamy sand, 3 to 8 percent slopes	25.1	1.5%
WMgT	Massapog fine sand, intertidal	4.4	0.3%
WPa0	Pishagqua mucky silt loam, 0 to 1 meter water depth	8.9	0.5%
WPd	Pishagqua mucky silt loam, 2 to 5 meter water depth, dredged	1.6	0.1%
Ws	Water, saline	353.1	21.5%
Totals for Area of Interest		1,642.8	100.0%

State of Rhode Island: Bristol, Kent, Newport, Providence, and Washington Counties

Baz—Beaches, cobbly surface

Map Unit Setting

National map unit symbol: 2phrm

Elevation: 0 to 20 feet

Mean annual precipitation: 41 to 54 inches Mean annual air temperature: 43 to 54 degrees F

Frost-free period: 145 to 240 days

Farmland classification: Not prime farmland

Map Unit Composition

Beaches, cobbly surface: 90 percent *Minor components*: 10 percent

Estimates are based on observations, descriptions, and transects of

the mapunit.

Description of Beaches, Cobbly Surface

Setting

Landform: Shores, back-barrier beaches, barrier beaches,

beaches

Landform position (two-dimensional): Footslope Landform position (three-dimensional): Riser

Down-slope shape: Convex Across-slope shape: Linear

Parent material: Gravelly marine deposits

Typical profile

C1 - 0 to 16 inches: extremely gravelly coarse sand

Properties and qualities

Slope: 0 to 10 percent Runoff class: Negligible

Capacity of the most limiting layer to transmit water (Ksat): Very

high (14.17 to 99.90 in/hr)

Depth to water table: About 0 to 12 inches Frequency of flooding: Very frequent

Salinity, maximum in profile: Moderately saline to strongly saline

(8.0 to 16.0 mmhos/cm)

Available water storage in profile: Very low (about 0.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 8

Hydric soil rating: Unranked

Minor Components

Beaches, sandy surface

Percent of map unit: 5 percent

Landform: Barrier beaches, beaches, shores, back-barrier beaches

Landform position (two-dimensional): Footslope Landform position (three-dimensional): Riser

Down-slope shape: Convex Across-slope shape: Linear Hydric soil rating: Unranked

Beaches, bouldery surface

Percent of map unit: 5 percent

Landform: Barrier beaches, beaches, shores, back-barrier beaches

Landform position (two-dimensional): Footslope Landform position (three-dimensional): Riser

Down-slope shape: Convex Across-slope shape: Linear Hydric soil rating: Unranked

Data Source Information

Soil Survey Area: State of Rhode Island: Bristol, Kent, Newport, Providence,

and Washington Counties

Survey Area Data: Version 16, Sep 14, 2017

HkA—Hinckley loamy sand, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: 2svm7

Elevation: 0 to 1,420 feet

Mean annual precipitation: 36 to 71 inches Mean annual air temperature: 39 to 55 degrees F

Frost-free period: 140 to 240 days

Farmland classification: Farmland of statewide importance

Map Unit Composition

Hinckley and similar soils: 85 percent

Minor components: 15 percent

Estimates are based on observations, descriptions, and transects of

the mapunit.

Description of Hinckley

Setting

Landform: Outwash plains, outwash terraces, outwash deltas,

kame terraces

Landform position (three-dimensional): Tread Down-slope shape: Linear, concave, convex Across-slope shape: Linear, convex, concave

Parent material: Sandy and gravelly glaciofluvial deposits derived

from gneiss and/or granite and/or schist

Typical profile

Oe - 0 to 1 inches: moderately decomposed plant material

A - 1 to 8 inches: loamy sand

Bw1 - 8 to 11 inches: gravelly loamy sand Bw2 - 11 to 16 inches: gravelly loamy sand BC - 16 to 19 inches: very gravelly loamy sand

C - 19 to 65 inches: very gravelly sand

Properties and qualities

Slope: 0 to 3 percent

Depth to restrictive feature: More than 80 inches Natural drainage class: Excessively drained

Runoff class: Negligible

Capacity of the most limiting layer to transmit water (Ksat): Moderately high to very high (1.42 to 99.90 in/hr)

Depth to water table: More than 80 inches

Frequency of flooding: None Frequency of ponding: None

Salinity, maximum in profile: Nonsaline (0.0 to 1.9 mmhos/cm) Available water storage in profile: Low (about 3.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified Land capability classification (nonirrigated): 3s Hydrologic Soil Group: A Hydric soil rating: No

Minor Components

Windsor

Percent of map unit: 5 percent

Landform: Kame terraces, outwash terraces, outwash deltas

Landform position (three-dimensional): Tread Down-slope shape: Convex, concave, linear Across-slope shape: Linear, convex, concave

Hydric soil rating: No

Sudbury

Percent of map unit: 5 percent

Landform: Kame terraces, outwash terraces, outwash deltas

Landform position (three-dimensional): Tread Down-slope shape: Convex, concave, linear Across-slope shape: Linear, convex, concave

Hydric soil rating: No

Merrimac

Percent of map unit: 5 percent

Landform: Kame terraces, outwash terraces, outwash deltas

Landform position (three-dimensional): Tread Down-slope shape: Convex, concave, linear Across-slope shape: Linear, convex, concave

Hydric soil rating: No

Data Source Information

Soil Survey Area: State of Rhode Island: Bristol, Kent, Newport, Providence,

and Washington Counties

Ma-Mansfield mucky silt loam

Map Unit Setting

National map unit symbol: 9lvr

Mean annual precipitation: 44 to 50 inches Mean annual air temperature: 48 to 50 degrees F

Frost-free period: 185 to 211 days

Farmland classification: Not prime farmland

Map Unit Composition

Mansfield and similar soils: 95 percent

Minor components: 5 percent

Estimates are based on observations, descriptions, and transects of

the mapunit.

Description of Mansfield

Setting

Landform: Depressions
Down-slope shape: Concave
Across-slope shape: Concave

Parent material: Loamy lodgment till derived from metamorphic

and sedimentary rock

Typical profile

A - 0 to 8 inches: mucky silt loam Bg - 8 to 15 inches: silt loam

Cd - 15 to 60 inches: channery loam

Properties and qualities

Slope: 0 to 3 percent

Depth to restrictive feature: About 15 inches to densic material

Natural drainage class: Very poorly drained

Runoff class: Low

Capacity of the most limiting layer to transmit water (Ksat): Very

low to moderately high (0.00 to 0.20 in/hr) Depth to water table: About 6 to 12 inches

Frequency of flooding: None Frequency of ponding: Occasional

Available water storage in profile: Low (about 3.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 5w

Hydrologic Soil Group: D Hydric soil rating: Yes

Minor Components

Stissing

Percent of map unit: 5 percent Landform: Depressions Down-slope shape: Concave Across-slope shape: Concave Hydric soil rating: Yes

Data Source Information

Soil Survey Area: State of Rhode Island: Bristol, Kent, Newport, Providence,

and Washington Counties

MU—Merrimac-Urban land complex, 0 to 8 percent slopes

Map Unit Setting

National map unit symbol: 2tyr9

Elevation: 0 to 820 feet

Mean annual precipitation: 36 to 71 inches Mean annual air temperature: 39 to 55 degrees F

Frost-free period: 140 to 250 days

Farmland classification: Not prime farmland

Map Unit Composition

Merrimac and similar soils: 45 percent

Urban land: 40 percent

Minor components: 15 percent

Estimates are based on observations, descriptions, and transects of

the mapunit.

Description of Merrimac

Setting

Landform: Outwash terraces, moraines, eskers, kames, outwash

plains

Landform position (two-dimensional): Backslope, footslope,

summit, shoulder

Landform position (three-dimensional): Side slope, crest, riser,

tread

Down-slope shape: Convex Across-slope shape: Convex

Parent material: Loamy glaciofluvial deposits derived from granite,

schist, and gneiss over sandy and gravelly glaciofluvial deposits derived from granite, schist, and gneiss

Typical profile

Ap - 0 to 10 inches: fine sandy loam Bw1 - 10 to 22 inches: fine sandy loam

Bw2 - 22 to 26 inches: stratified gravel to gravelly loamy sand 2C - 26 to 65 inches: stratified gravel to very gravelly sand

Properties and qualities

Slope: 0 to 8 percent

Depth to restrictive feature: More than 80 inches Natural drainage class: Somewhat excessively drained

Runoff class: Very low

Capacity of the most limiting layer to transmit water (Ksat): Moderately high to very high (1.42 to 99.90 in/hr)

Depth to water table: More than 80 inches

Frequency of flooding: None Frequency of ponding: None Calcium carbonate, maximum in profile: 2 percent

Salinity, maximum in profile: Nonsaline (0.0 to 1.4 mmhos/cm)

Sodium adsorption ratio, maximum in profile: 1.0

Available water storage in profile: Low (about 4.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 2e

Hydrologic Soil Group: A Hydric soil rating: No

Description of Urban Land

Typical profile

M - 0 to 10 inches: cemented material

Properties and qualities

Slope: 0 to 8 percent

Depth to restrictive feature: 0 inches to manufactured layer

Runoff class: Very high

Capacity of the most limiting layer to transmit water (Ksat): Very

low (0.00 to 0.00 in/hr)

Available water storage in profile: Very low (about 0.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 8

Hydrologic Soil Group: D Hydric soil rating: Unranked

Minor Components

Hinckley

Percent of map unit: 5 percent

Landform: Deltas, eskers, kames, outwash plains

Landform position (two-dimensional): Summit, shoulder, backslope Landform position (three-dimensional): Nose slope, crest, head

slope, side slope, rise Down-slope shape: Convex

Across-slope shape: Convex, linear

Hydric soil rating: No

Sudbury

Percent of map unit: 5 percent

Landform: Deltas, outwash plains, terraces
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Tread, dip

Down-slope shape: Concave Across-slope shape: Linear Hydric soil rating: No

Windsor

Percent of map unit: 5 percent

Landform: Outwash terraces, deltas, dunes, outwash plains

Landform position (three-dimensional): Tread, riser

Down-slope shape: Linear, convex Across-slope shape: Linear, convex Hydric soil rating: No

Data Source Information

Soil Survey Area: State of Rhode Island: Bristol, Kent, Newport, Providence,

and Washington Counties

NeA—Newport silt loam, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: 9lw3

Mean annual precipitation: 44 to 50 inches Mean annual air temperature: 48 to 50 degrees F

Frost-free period: 115 to 211 days

Farmland classification: All areas are prime farmland

Map Unit Composition

Newport and similar soils: 90 percent *Minor components:* 10 percent

Estimates are based on observations, descriptions, and transects of

the mapunit.

Description of Newport

Setting

Landform: Drumlins
Down-slope shape: Linear
Across-slope shape: Convex

Parent material: Loamy lodgment till derived from metamorphic

and sedimentary rock

Typical profile

Ap - 0 to 8 inches: silt loam

Bw - 8 to 24 inches: channery silt loam Cd - 24 to 65 inches: channery silt loam

Properties and qualities

Slope: 0 to 3 percent

Depth to restrictive feature: About 24 inches to densic material

Natural drainage class: Well drained

Runoff class: Very low

Capacity of the most limiting layer to transmit water (Ksat): Very

low to moderately high (0.00 to 0.20 in/hr) Depth to water table: About 23 to 24 inches

Frequency of flooding: None Frequency of ponding: None

Available water storage in profile: Low (about 4.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 1

Hydrologic Soil Group: C Hydric soil rating: No

Minor Components

Pittstown

Percent of map unit: 5 percent

Landform: Drumlins
Down-slope shape: Linear
Across-slope shape: Concave

Hydric soil rating: No

Birchwood

Percent of map unit: 3 percent

Landform: Drumlins

Down-slope shape: Linear Across-slope shape: Concave

Hydric soil rating: No

Poquonock

Percent of map unit: 2 percent

Landform: Drumlins, ground moraines

Down-slope shape: Convex Across-slope shape: Convex

Hydric soil rating: No

Data Source Information

Soil Survey Area: State of Rhode Island: Bristol, Kent, Newport, Providence,

and Washington Counties

NeB—Newport silt loam, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: 9lw4

Mean annual precipitation: 44 to 50 inches Mean annual air temperature: 48 to 50 degrees F

Frost-free period: 115 to 211 days

Farmland classification: All areas are prime farmland

Map Unit Composition

Newport and similar soils: 90 percent *Minor components:* 10 percent

Estimates are based on observations, descriptions, and transects of

the mapunit.

Description of Newport

Setting

Landform: Drumlins
Down-slope shape: Linear
Across-slope shape: Convex

Parent material: Loamy lodgment till derived from metamorphic

and sedimentary rock

Typical profile

Ap - 0 to 8 inches: silt loam

Bw - 8 to 24 inches: channery silt loam Cd - 24 to 65 inches: channery silt loam

Properties and qualities

Slope: 3 to 8 percent

Depth to restrictive feature: About 24 inches to densic material

Natural drainage class: Well drained

Runoff class: Low

Capacity of the most limiting layer to transmit water (Ksat): Very

low to moderately high (0.00 to 0.20 in/hr) Depth to water table: About 23 to 24 inches

Frequency of flooding: None Frequency of ponding: None

Available water storage in profile: Low (about 4.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 2e

Hydrologic Soil Group: C Hydric soil rating: No

Minor Components

Pittstown

Percent of map unit: 6 percent

Landform: Drumlins
Down-slope shape: Linear
Across-slope shape: Concave

Hydric soil rating: No

Birchwood

Percent of map unit: 2 percent

Landform: Drumlins

Down-slope shape: Linear Across-slope shape: Concave

Hydric soil rating: No

Poquonock

Percent of map unit: 2 percent

Landform: Ground moraines, drumlins

Down-slope shape: Convex Across-slope shape: Convex

Hydric soil rating: No

Data Source Information

Soil Survey Area: State of Rhode Island: Bristol, Kent, Newport, Providence,

and Washington Counties

NeC—Newport silt loam, 8 to 15 percent slopes

Map Unit Setting

National map unit symbol: 9lw5

Mean annual precipitation: 44 to 50 inches Mean annual air temperature: 48 to 50 degrees F

Frost-free period: 115 to 211 days

Farmland classification: Farmland of statewide importance

Map Unit Composition

Newport and similar soils: 90 percent *Minor components:* 10 percent

Estimates are based on observations, descriptions, and transects of

the mapunit.

Description of Newport

Setting

Landform: Drumlins
Down-slope shape: Linear
Across-slope shape: Convex

Parent material: Loamy lodgment till derived from metamorphic

and sedimentary rock

Typical profile

Ap - 0 to 8 inches: silt loam

Bw - 8 to 24 inches: channery silt loam Cd - 24 to 65 inches: channery silt loam

Properties and qualities

Slope: 8 to 15 percent

Depth to restrictive feature: About 24 inches to densic material

Natural drainage class: Well drained

Runoff class: Low

Capacity of the most limiting layer to transmit water (Ksat): Very

low to moderately high (0.00 to 0.20 in/hr) Depth to water table: About 23 to 24 inches

Frequency of flooding: None Frequency of ponding: None

Available water storage in profile: Low (about 4.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 3e

Hydrologic Soil Group: C Hydric soil rating: No

Minor Components

Pittstown

Percent of map unit: 6 percent

Landform: Drumlins
Down-slope shape: Linear
Across-slope shape: Concave

Hydric soil rating: No

Birchwood

Percent of map unit: 2 percent

Landform: Drumlins

Down-slope shape: Linear Across-slope shape: Concave

Hydric soil rating: No

Poquonock

Percent of map unit: 2 percent

Landform: Drumlins, ground moraines

Down-slope shape: Convex Across-slope shape: Convex

Hydric soil rating: No

Data Source Information

Soil Survey Area: State of Rhode Island: Bristol, Kent, Newport, Providence,

and Washington Counties

NP—Newport-Urban land complex

Map Unit Setting

National map unit symbol: 9lvx

Mean annual precipitation: 44 to 50 inches Mean annual air temperature: 48 to 50 degrees F

Frost-free period: 115 to 211 days

Farmland classification: Not prime farmland

Map Unit Composition

Newport and similar soils: 40 percent

Urban land: 30 percent

Minor components: 30 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Newport

Setting

Landform: Drumlins
Down-slope shape: Linear
Across-slope shape: Convex

Parent material: Loamy lodgment till derived from metamorphic

and sedimentary rock

Typical profile

Ap - 0 to 8 inches: silt loam

Bw - 8 to 24 inches: channery silt loam Cd - 24 to 65 inches: channery silt loam

Properties and qualities

Slope: 1 to 15 percent

Percent of area covered with surface fragments: 1.6 percent Depth to restrictive feature: About 24 inches to densic material

Natural drainage class: Well drained

Runoff class: Low

Capacity of the most limiting layer to transmit water (Ksat): Very

low to moderately high (0.00 to 0.20 in/hr) Depth to water table: About 23 to 24 inches

Frequency of flooding: None Frequency of ponding: None

Available water storage in profile: Low (about 4.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 2e

Hydrologic Soil Group: C Hydric soil rating: No

Description of Urban Land

Setting

Parent material: Human transported material

Typical profile

R - 0 to 6 inches: variable

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 8s

Hydric soil rating: No

Minor Components

Poquonock

Percent of map unit: 10 percent

Landform: Ground moraines, drumlins

Down-slope shape: Convex Across-slope shape: Convex

Hydric soil rating: No

Udorthents

Percent of map unit: 10 percent Down-slope shape: Linear Across-slope shape: Linear Hydric soil rating: No

Birchwood

Percent of map unit: 5 percent

Landform: Drumlins
Down-slope shape: Linear
Across-slope shape: Concave

Hydric soil rating: No

Pittstown

Percent of map unit: 5 percent

Landform: Drumlins
Down-slope shape: Linear
Across-slope shape: Concave

Hydric soil rating: No

Data Source Information

Soil Survey Area: State of Rhode Island: Bristol, Kent, Newport, Providence,

and Washington Counties

PmA—Pittstown silt loam, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: 9lwk

Mean annual precipitation: 44 to 50 inches Mean annual air temperature: 48 to 50 degrees F

Frost-free period: 185 to 211 days

Farmland classification: All areas are prime farmland

Map Unit Composition

Pittstown and similar soils: 90 percent

Minor components: 10 percent

Estimates are based on observations, descriptions, and transects of

the mapunit.

Description of Pittstown

Setting

Landform: Drumlins
Down-slope shape: Linear
Across-slope shape: Concave

Parent material: Loamy lodgment till derived from metamorphic

and sedimentary rock

Typical profile

A - 0 to 8 inches: very stony silt loam

Bw - 8 to 28 inches: silt loam

Cd - 28 to 60 inches: channery silt loam

Properties and qualities

Slope: 0 to 3 percent

Depth to restrictive feature: About 28 inches to densic material

Natural drainage class: Moderately well drained

Runoff class: Low

Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.60 in/hr)

Depth to water table: About 18 to 36 inches

Frequency of flooding: None Frequency of ponding: None

Available water storage in profile: Low (about 5.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 2w

Hydrologic Soil Group: C Hydric soil rating: No

Minor Components

Newport

Percent of map unit: 5 percent Landform: Drumlins Down-slope shape: Linear Across-slope shape: Convex Hydric soil rating: No

Stissing

Percent of map unit: 5 percent Landform: Depressions Down-slope shape: Concave Across-slope shape: Concave Hydric soil rating: Yes

Data Source Information

Soil Survey Area: State of Rhode Island: Bristol, Kent, Newport, Providence,

and Washington Counties

PmB—Pittstown silt loam, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: 9lwl

Mean annual precipitation: 44 to 50 inches Mean annual air temperature: 48 to 50 degrees F

Frost-free period: 185 to 211 days

Farmland classification: All areas are prime farmland

Map Unit Composition

Pittstown and similar soils: 90 percent

Minor components: 10 percent

Estimates are based on observations, descriptions, and transects of

the mapunit.

Description of Pittstown

Setting

Landform: Drumlins
Down-slope shape: Linear
Across-slope shape: Concave

Parent material: Loamy lodgment till derived from metamorphic

and sedimentary rock

Typical profile

A - 0 to 8 inches: very stony silt loam

Bw - 8 to 28 inches: silt loam

Cd - 28 to 60 inches: channery silt loam

Properties and qualities

Slope: 3 to 8 percent

Depth to restrictive feature: About 28 inches to densic material

Natural drainage class: Moderately well drained

Runoff class: Medium

Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.60 in/hr)

Depth to water table: About 18 to 36 inches

Frequency of flooding: None Frequency of ponding: None

Available water storage in profile: Low (about 5.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 2e

Hydrologic Soil Group: C Hydric soil rating: No

Minor Components

Newport

Percent of map unit: 5 percent Landform: Drumlins Down-slope shape: Linear Across-slope shape: Convex Hydric soil rating: No

Stissing

Percent of map unit: 5 percent Landform: Depressions Down-slope shape: Concave Across-slope shape: Concave Hydric soil rating: Yes

Data Source Information

Soil Survey Area: State of Rhode Island: Bristol, Kent, Newport, Providence,

and Washington Counties

Rp—Rock outcrop-Canton complex, 0 to 35 percent slopes, very stony

Map Unit Setting

National map unit symbol: 2wks3

Elevation: 0 to 710 feet

Mean annual precipitation: 36 to 71 inches Mean annual air temperature: 39 to 55 degrees F

Frost-free period: 140 to 240 days

Farmland classification: Not prime farmland

Map Unit Composition

Rock outcrop: 50 percent

Canton, very stony, and similar soils: 30 percent

Minor components: 20 percent

Estimates are based on observations, descriptions, and transects of

the mapunit.

Description of Rock Outcrop

Setting

Landform: Ridges, hills

Parent material: Igneous and metamorphic rock

Typical profile

R - 0 to 79 inches: bedrock

Properties and qualities

Slope: 0 to 35 percent

Depth to restrictive feature: 0 inches to lithic bedrock

Runoff class: Very high

Capacity of the most limiting layer to transmit water (Ksat): Very

low (0.00 to 0.00 in/hr)

Available water storage in profile: Very low (about 0.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 8

Hydric soil rating: No

Description of Canton, Very Stony

Setting

Landform: Hills, moraines, ridges

Landform position (two-dimensional): Backslope Landform position (three-dimensional): Side slope

Down-slope shape: Linear, convex Across-slope shape: Convex

Parent material: Coarse-loamy over sandy melt-out till derived from gneiss, granite, and/or schist

Typical profile

Oi - 0 to 2 inches: slightly decomposed plant material

A - 2 to 5 inches: fine sandy loam Bw1 - 5 to 16 inches: fine sandy loam

Bw2 - 16 to 22 inches: gravelly fine sandy loam 2C - 22 to 67 inches: gravelly loamy sand

Properties and qualities

Slope: 0 to 35 percent

Percent of area covered with surface fragments: 1.6 percent Depth to restrictive feature: 19 to 39 inches to strongly contrasting

textural stratification

Natural drainage class: Well drained

Runoff class: Medium

Capacity of the most limiting layer to transmit water (Ksat):

Moderately low to high (0.14 to 14.17 in/hr) Depth to water table: More than 80 inches

Frequency of flooding: None Frequency of ponding: None

Salinity, maximum in profile: Nonsaline to very slightly saline (0.0

to 2.0 mmhos/cm)

Available water storage in profile: Low (about 3.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 7s

Hydrologic Soil Group: B Hydric soil rating: No

Minor Components

Sutton, very stony

Percent of map unit: 7 percent Landform: Hills, ground moraines

Landform position (two-dimensional): Footslope Landform position (three-dimensional): Base slope

Down-slope shape: Concave Across-slope shape: Linear Hydric soil rating: No

Charlton, very stony

Percent of map unit: 6 percent

Landform: Hills, ground moraines, ridges

Landform position (two-dimensional): Backslope, shoulder, summit

Landform position (three-dimensional): Crest, side slope

Down-slope shape: Linear, convex Across-slope shape: Convex

Hydric soil rating: No

Leicester, very stony

Percent of map unit: 4 percent



Landform: Depressions, ground moraines, drainageways, hills Landform position (two-dimensional): Toeslope, footslope Landform position (three-dimensional): Base slope

Down-slope shape: Linear, concave Across-slope shape: Concave

Hydric soil rating: Yes

Lippitt, very stony

Percent of map unit: 3 percent Landform: Ridges, hills

Landform position (two-dimensional): Summit, backslope, shoulder Landform position (three-dimensional): Crest, nose slope, side

slope

Down-slope shape: Convex Across-slope shape: Convex

Hydric soil rating: No

Data Source Information

Soil Survey Area: State of Rhode Island: Bristol, Kent, Newport, Providence,

and Washington Counties

Sa—Sandyhook mucky fine sand, 0 to 2 percent slopes, very frequently flooded

Map Unit Setting

National map unit symbol: 2tyql

Elevation: 0 to 10 feet

Mean annual precipitation: 36 to 71 inches Mean annual air temperature: 39 to 59 degrees F

Frost-free period: 140 to 250 days

Farmland classification: Not prime farmland

Map Unit Composition

Sandyhook and similar soils: 90 percent

Minor components: 10 percent

Estimates are based on observations, descriptions, and transects of

the mapunit.

Description of Sandyhook

Setting

Landform: Back-barrier beaches, back-barrier flats

Landform position (three-dimensional): Dip

Down-slope shape: Linear Across-slope shape: Linear

Parent material: Sandy marine deposits

Typical profile

Oe - 0 to 4 inches: mucky peat

Cg - 4 to 8 inches: sand

Ab - 8 to 11 inches: mucky coarse sand

C'g - 11 to 51 inches: sand

A'b - 51 to 59 inches: coarse sand

Properties and qualities

Slope: 0 to 2 percent

Depth to restrictive feature: More than 80 inches Natural drainage class: Very poorly drained

Runoff class: Negligible

Capacity of the most limiting layer to transmit water (Ksat):

Moderately low to very high (0.14 to 99.90 in/hr)

Depth to water table: About 0 inches Frequency of flooding: Very frequent

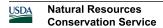
Frequency of ponding: None

Calcium carbonate, maximum in profile: 5 percent

Salinity, maximum in profile: Nonsaline to strongly saline (1.0 to

112.0 mmhos/cm)

Sodium adsorption ratio, maximum in profile: 20.0 Available water storage in profile: Low (about 5.2 inches)



Interpretive groups

Land capability classification (irrigated): None specified Land capability classification (nonirrigated): 8w

Hydrologic Soil Group: A/D

Ecological site: Tidal Salt Low Marsh mesic very frequently flooded (R144AY001CT), Tidal Salt High Marsh mesic very frequently

flooded (R144AY002CT)

Hydric soil rating: Yes

Minor Components

Pawcatuck

Percent of map unit: 5 percent Landform: Tidal marshes

Landform position (three-dimensional): Dip

Down-slope shape: Linear Across-slope shape: Linear

Ecological site: Tidal Salt Low Marsh mesic very frequently flooded (R144AY001CT), Tidal Salt High Marsh mesic very frequently

flooded (R144AY002CT)

Hydric soil rating: Yes

Matunuck

Percent of map unit: 5 percent Landform: Tidal marshes

Landform position (three-dimensional): Dip

Down-slope shape: Linear Across-slope shape: Linear

Ecological site: Tidal Salt Low Marsh mesic very frequently flooded (R144AY001CT), Tidal Salt High Marsh mesic very frequently

flooded (R144AY002CT)

Hydric soil rating: Yes

Data Source Information

Soil Survey Area: State of Rhode Island: Bristol, Kent, Newport, Providence,

and Washington Counties

Se—Stissing silt loam

Map Unit Setting

National map unit symbol: 91x6

Mean annual precipitation: 44 to 50 inches Mean annual air temperature: 48 to 50 degrees F

Frost-free period: 185 to 211 days

Farmland classification: Farmland of statewide importance

Map Unit Composition

Stissing and similar soils: 90 percent *Minor components*: 10 percent

Estimates are based on observations, descriptions, and transects of

the mapunit.

Description of Stissing

Setting

Landform: Depressions
Down-slope shape: Concave
Across-slope shape: Concave

Parent material: Loamy lodgment till derived from metamorphic

and sedimentary rock

Typical profile

A - 0 to 8 inches: very stony silt loam

Bg - 8 to 15 inches: silt loam Cdg - 15 to 60 inches: silt loam

Properties and qualities

Slope: 0 to 3 percent

Depth to restrictive feature: About 15 inches to densic material

Natural drainage class: Poorly drained

Runoff class: Low

Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)

Depth to water table: About 0 to 18 inches

Frequency of flooding: None Frequency of ponding: None

Available water storage in profile: Very low (about 2.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 3w

Hydrologic Soil Group: D Hydric soil rating: Yes

Minor Components

Pittstown

Percent of map unit: 7 percent Landform: Drumlins Down-slope shape: Linear Across-slope shape: Concave Hydric soil rating: No

Mansfield

Percent of map unit: 3 percent Landform: Depressions Down-slope shape: Concave Across-slope shape: Concave Hydric soil rating: Yes

Data Source Information

Soil Survey Area: State of Rhode Island: Bristol, Kent, Newport, Providence,

and Washington Counties

UD—Udorthents-Urban land complex

Map Unit Setting

National map unit symbol: 91xj

Mean annual precipitation: 44 to 50 inches
Mean annual air temperature: 48 to 50 degrees F

Frost-free period: 120 to 211 days

Farmland classification: Not prime farmland

Map Unit Composition

Udorthents and similar soils: 70 percent

Urban land: 20 percent

Minor components: 10 percent

Estimates are based on observations, descriptions, and transects of

the mapunit.

Description of Udorthents

Setting

Down-slope shape: Linear Across-slope shape: Linear

Parent material: Human transported material

Typical profile

A - 0 to 12 inches: sandy loam C1 - 12 to 25 inches: sandy loam

C2 - 25 to 60 inches: stratified sand to very gravelly coarse sand

Properties and qualities

Slope: 0 to 15 percent

Depth to restrictive feature: More than 80 inches

Runoff class: Very low

Capacity of the most limiting layer to transmit water (Ksat): High

(2.00 to 6.00 in/hr)

Depth to water table: About 42 to 54 inches

Frequency of flooding: None Frequency of ponding: None

Available water storage in profile: Low (about 5.5 inches)

Description of Urban Land

Setting

Parent material: Human transported material

Typical profile

R - 0 to 6 inches: variable

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 8s

Hydric soil rating: No

Minor Components

Merrimac

Percent of map unit: 5 percent

Landform: Kames, outwash plains, terraces

Down-slope shape: Linear Across-slope shape: Linear Hydric soil rating: No

Quonset

Percent of map unit: 5 percent

Landform: Eskers, outwash plains, outwash terraces, terraces

Down-slope shape: Convex Across-slope shape: Convex

Hydric soil rating: No

Data Source Information

Soil Survey Area: State of Rhode Island: Bristol, Kent, Newport, Providence,

and Washington Counties

Wa—Walpole sandy loam, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: 2svkl Elevation: 0 to 1,020 feet

Mean annual precipitation: 36 to 71 inches Mean annual air temperature: 39 to 55 degrees F

Frost-free period: 140 to 250 days

Farmland classification: Farmland of statewide importance

Map Unit Composition

Walpole and similar soils: 80 percent Minor components: 20 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Walpole

Setting

Landform: Outwash terraces, deltas, depressions, depressions, outwash plains

Landform position (two-dimensional): Toeslope Landform position (three-dimensional): Tread, talf, dip

Down-slope shape: Concave Across-slope shape: Concave

Parent material: Sandy glaciofluvial deposits derived from igneous, metamorphic and sedimentary rock

Typical profile

Oe - 0 to 1 inches: mucky peat A - 1 to 7 inches: sandy loam Bg - 7 to 21 inches: sandy loam

BC - 21 to 25 inches: gravelly sandy loam C - 25 to 65 inches: very gravelly sand

Properties and qualities

Slope: 0 to 3 percent

Depth to restrictive feature: More than 80 inches

Natural drainage class: Poorly drained

Runoff class: Very high

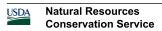
Capacity of the most limiting layer to transmit water (Ksat):

Moderately low to high (0.14 to 14.17 in/hr)

Depth to water table: About 0 to 4 inches

Frequency of flooding: None Frequency of ponding: None

Salinity, maximum in profile: Nonsaline (0.0 to 1.9 mmhos/cm) Available water storage in profile: Moderate (about 6.4 inches)



Interpretive groups

Land capability classification (irrigated): None specified Land capability classification (nonirrigated): 4w Hydrologic Soil Group: B/D Hydric soil rating: Yes

Minor Components

Scarboro

Percent of map unit: 10 percent

Landform: Deltas, outwash plains, outwash terraces Landform position (two-dimensional): Toeslope Landform position (three-dimensional): Tread, dip

Down-slope shape: Concave Across-slope shape: Concave Hydric soil rating: Yes

Sudbury

Percent of map unit: 10 percent

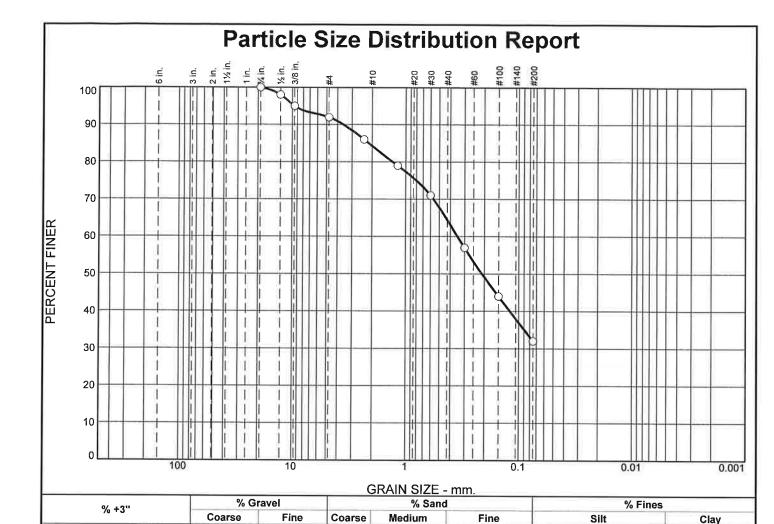
Landform: Terraces, deltas, outwash plains
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Tread, dip

Down-slope shape: Concave Across-slope shape: Linear Hydric soil rating: No

Data Source Information

Soil Survey Area: State of Rhode Island: Bristol, Kent, Newport, Providence,

and Washington Counties



SIEVE	PERCENT	SPEC.*	PASS?
SIZE	FINER	PERCENT	(X=NO)
.75	100.0		
.5	98.0		
.375	95.0)
#4	92.0		
#8	86.0		
#16	79.0	1	
#30	71.0		
#50	57.0		
#100	44.0		
#200	32.0		

_		10010	
		Material Description	
	SAMPLE A, LI CLIENT ON 12	D NO. C-156, SAMPLE //14/18	2, SAMPLED BY
	PL= NP	Atterberg Limits	PI= NP
		Coefficients	
	D ₉₀ = D ₅₀ = D ₁₀ =	D ₈₅ = D ₃₀ = C _u =	D ₆₀ = D ₁₅ = C _c =
	USCS=	<u>Classification</u> AASHTO	=
	SAMPLE A, DA	Remarks AT TESTED 12/21/18	

100.0

(no specification provided)

Burnett Road

Location: Sample Number: A

Depth: 5 TO 7 FEET

Client: GRA ENGINEERING ASSOCIATES

Project: GRADATION OF BORING SAMPLES

Riverside, Rhode Island

Geisser Engineering Corporation

Project No: GEC-3186

Figure

Date: 12/21/18

Tested By: RH

Checked By: GJGIII

GRAIN SIZE DISTRIBUTION TEST DATA

12/21/2018

Client: GRA ENGINEERING ASSOCIATES **Project:** GRADATION OF BORING SAMPLES

Project Number: GEC-3186

Location:

Burnett Road

Depth: 5 TO 7 FEET

Sample Number: A

Material Description: SAMPLE A, LID NO. C-156, SAMPLE 2, SAMPLED BY CLIENT ON 12/14/18

Date: 12/21/18

PL: NP

LL: NV

PI: NP

Testing Remarks: SAMPLE A, DAT TESTED 12/21/18

Tested by: RH

Checked by: GJGIII

Sieve Test Data

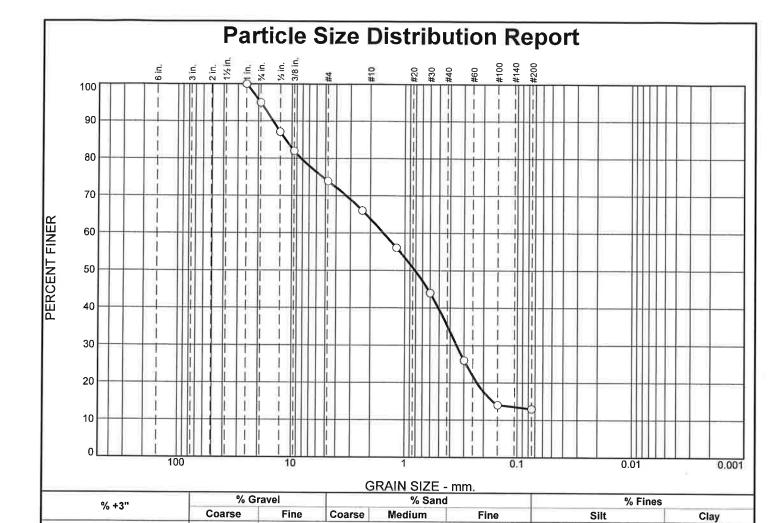
Sieve Opening Size	Percent Finer
4	
3	
2	
1.5	
1.0	
.75	100.0
.5	98.0
.375	95.0
#4	92.0
#8	86.0
#16	79.0
#30	71.0
#50	57.0
#100	44.0
#200	32.0

Fractional Components

Cobbles	Gravel			Sand			Fines			
CODDIES	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total

D ₅	D ₁₀	D ₁₅	D ₂₀	D ₃₀	D ₄₀	D ₅₀	D ₆₀	D ₈₀	D ₈₅	D ₉₀	D ₉₅

Geisser Engineering Corporation ___



SIEVE	PERCENT	SPEC.*	PASS?
SIZE	FINER	PERCENT	(X=NO)
1.0	100.0		
.75	95.0		
.5	87.0		
.375	82.0		
#4	74.0		1
#8	66.0		
#16	56.0		
#30	44.0		
#50	26.0		
#100	14.0		
#200	13.0		
1			
1			
1			

_		95.0	
		Material Descript	ion
	SAMPLE B, L. CLIENT ON 1	ID NO. C-89, SAMPL 2/14/18	LE 1, SAMPLED BY
	PL= NP	Atterberg Limit	s PI= NP
	D ₉₀ = D50= D ₁₀ =	Coefficients D85= D30= Cu=	D ₆₀ = D ₁₅ = C _c =
	USCS=	Classification AASH	то=
	SAMPLE B, D	<u>Remarks</u> ATE TESTED 12/21/	18

(no specification provided)

Location: Sample Number: B Grove Avenue

Depth: 0 TO 2 FEET

Geisser Engineering Corporation

Client: GRA ENGINEERING ASSOCIATES

Project: GRADATION OF BORING SAMPLES

Riverside, Rhode Island

Project No: GEC-3186

Figure

Date: 12/21/18

Tested By: RH

Checked By: GJGIII

GRAIN SIZE DISTRIBUTION TEST DATA

12/21/2018

Client: GRA ENGINEERING ASSOCIATES Project: GRADATION OF BORING SAMPLES

Project Number: GEC-3186

Location:

Grove Avenue

Depth: 0 TO 2 FEET

Sample Number: B

Material Description: SAMPLE B, LID NO. C-89, SAMPLE 1, SAMPLED BY CLIENT ON 12/14/18

Date: 12/21/18

PL: NP

LL: NV

PI: NP

Testing Remarks: SAMPLE B, DATE TESTED 12/21/18

Tested by: RH

Checked by: GJGIII

Sieve Test Data

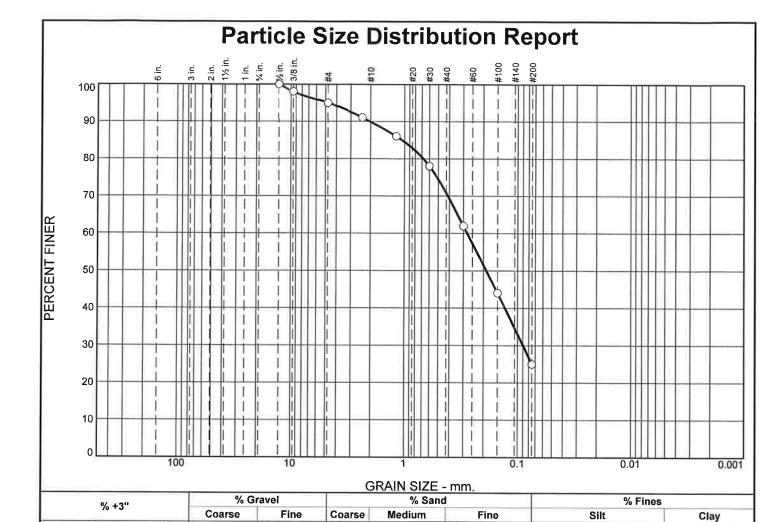
Sieve	D
Opening Size	Percent Finer
	1 11101
4	
3	
2	
1.5	
1.0	100.0
.75	95.0
.5	87.0
.375	82.0
#4	74.0
#8	66.0
#16	56.0
#30	44.0
#50	26.0
#100	14.0
#200	13.0

Fractional Components

Cobbles		Gravel		Sand				Fines		
Copples	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total

D ₅	D ₁₀	D ₁₅	D ₂₀	D ₃₀	D ₄₀	D ₅₀	D ₆₀	D ₈₀	D ₈₅	D ₉₀	D ₉₅

Geisser Engineering Corporation ___



SIEVE	PERCENT	SPEC.*	PASS?
SIZE	FINER	PERCENT	(X=NO)
.5	100.0		
.375	98.0		
#4	95.0		
#8	91.0		
#16	86.0		
#30	78.0		
#50	62.0		
#100	44.0		
#200	25.0		

	95.0	
	Material Description	on
SAMPLE C, CLIENT ON	LID NO. C-129 OFF SS. 12/14/18	A, SAMPLED BY
PL= NP	Atterberg Limits	PI= NP
D ₉₀ = D ₅₀ = D ₁₀ =	Coefficients D ₈₅ = D ₃₀ = C _u =	D ₆₀ = D ₁₅ = C _c =
USCS=	Classification AASH1	ГО=
SAMPLE C,	Remarks DATE TESTED 12/21/1	8

(no specification provided)

Location: Sample Number: C

Priscilla Avenue

Depth: 5 10 10 FEET

Geisser Engineering Corporation

Client: GRA ENGINEERING ASSOCIATES

Project: GRADATION OF BORING SAMPLES

Riverside, Rhode Island

Project No: GEC-3186

Figure

Date: 12/21/18

Tested By: RH

Checked By: GJGIII

GRAIN SIZE DISTRIBUTION TEST DATA

12/21/2018

Client: GRA ENGINEERING ASSOCIATES
Project: GRADATION OF BORING SAMPLES

Project Number: GEC-3186

Location:

Priscilla Avenue

Depth: 5 10 10 FEET

Sample Number: C

Material Description: SAMPLE C, LID NO. C-129 OFF SSA, SAMPLED BY CLIENT ON 12/14/18

Date: 12/21/18

PL: NP

LL: NV

PI: NP

Testing Remarks: SAMPLE C, DATE TESTED 12/21/18

Tested by: RH

Checked by: GJGIII

Sieve Test Data

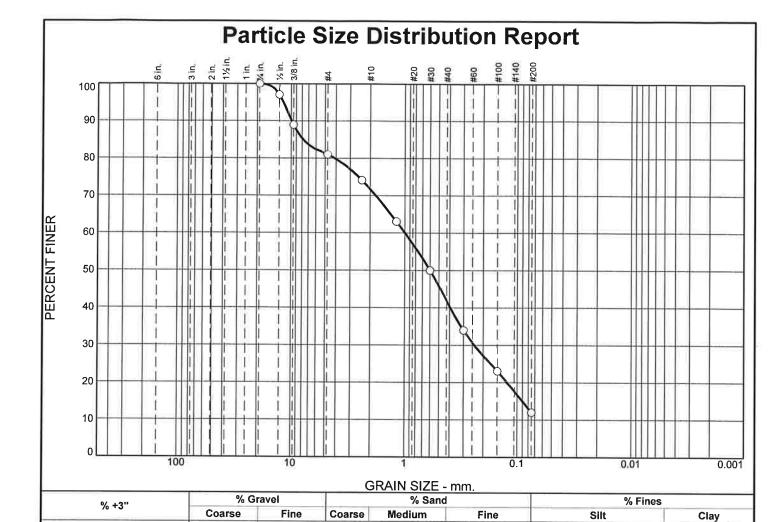
Sieve Opening Size	Percent Finer				
4					
3					
2					
1.5					
1.0					
.75					
.5	100.0				
.375	98.0				
#4	95.0				
#8	91.0				
#16	86.0				
#30	78.0				
#50	62.0				
#100	44.0				
#200	25.0				

Fractional Components

Cobbles	Gravel				Saı	Fines				
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total

D ₅	D ₁₀	D ₁₅	D ₂₀	D ₃₀	D ₄₀	D ₅₀	D ₆₀	D ₈₀	D ₈₅	D ₉₀	D ₉₅

Geisser Engineering Corporation _____



	SIEVE	PERCENT	SPEC.*	PASS?
	SIZE	FINER	PERCENT	(X=NO)
	.75	100.0		
	.5	97.0		
	.375	89.0		
	#4	81.0		
	#8	74.0		
	#16	63.0		
	#30	50.0		
	#50	34.0		
	#100	23.0		
	#200	12.0		
- 1				
1			l i	
П				
- 1				
1				

	Material Descrip	fion
SAMPLE D, LI CLIENT ON 12	D NO. C-12, SAMP	LE NO. 1, SAMPLED BY
PL= NP	Atterberg Limit	ts Pi= NP
D ₉₀ = D ₅₀ = D ₁₀ =	Coefficients D ₈₅ = D ₃₀ = C _u =	D ₆₀ = D ₁₅ = C _c =
USCS=	Classification AASH	· I
SAMPLE D, D.	<u>Remarks</u> ATE TESTED 12/21	/18

* (no specification provided)

Location: Sample Number: D Mill Cove Road

Depth: 0 TO 2 FEET

Geisser Engineering Corporation

Client: GRA ENGINEERING ASSOCIATES

Project: GRADATION OF BORING SAMPLES

Riverside, Rhode Island

Project No: GEC-3186

Figure

Date: 12/21/18

Tested By: RH

12/21/2018

Client: GRA ENGINEERING ASSOCIATES **Project:** GRADATION OF BORING SAMPLES

Project Number: GEC-3186

Location:

Mill Cove Road

Depth: 0 TO 2 FEET

Sample Number: D

Material Description: SAMPLE D, LID NO. C-12, SAMPLE NO. 1, SAMPLED BY CLIENT ON 12/14/18

Date: 12/21/18

PL: NP

LL: NV

PI: NP

Testing Remarks: SAMPLE D, DATE TESTED 12/21/18

Tested by: RH

Checked by: GJGIII

Sieve Test Data

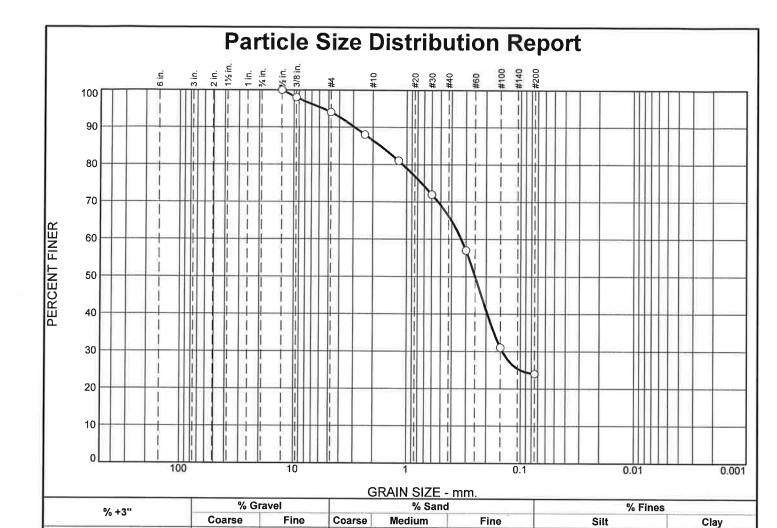
Sieve	Danasut
Opening Size	Percent Finer
4	
3	
2	
1.5	
1.0	
.75	100.0
.5	97.0
.375	89.0
#4	81.0
#8	74.0
#16	63.0
#30	50.0
#50	34.0
#100	23.0
#200	12.0

Fractional Components

Cobbles		Gravel			Sa	nd			Fines	
Copples	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total

D ₅	D ₁₀	D ₁₅	D ₂₀	D ₃₀	D ₄₀	D ₅₀	D ₆₀	D ₈₀	D ₈₅	D ₉₀	D ₉₅

Geisser Engineering Corporation __



SIEVE	PERCENT	SPEC.*	PASS?
SIZE	FINER	PERCENT	(X=NO)
.5	100.0		
.375	98.0		
#4	94.0		
#8	88.0		
#16	81.0		
#30	72.0		
#50	57.0		
#100	31.0		
#200	24.0		
	1		

	Material Descrip	tion
SAMPLE E, LID	NO. C-120, SAM	PLE NO. 1 OFF AUGER,
SAMPLED BY (CLIENT ON 12/14	/18
	Atterberg Limi	ts
PL= NP	LL= NV	PI= NP
	Coefficients	
D ₉₀ =	D ₈₅ =	D ₆₀ =
D ₉₀ = D ₅₀ = D ₁₀ =	D3 <u>0</u> =	D1 <u>5</u> =
D ₁₀ -	Cu-	C _C -
11000-	Classification	
USCS=	AASI	HTO=
	Remarks	
SAMPLE F, DAT	TE TESTED 12/21	/18

(no specification provided)

Alden Avenue

Location: Sample Number: E

Depth: 0 TO 5 FEET

Client: GRA ENGINEERING ASSOCIATES

Project: GRADATION OF BORING SAMPLES

Riverside, Rhode Island

Geisser Engineering Corporation

Project No: GEC-3186

Figure

Date: 12/21/18

Tested By: RH

12/21/2018

Client: GRA ENGINEERING ASSOCIATES **Project:** GRADATION OF BORING SAMPLES

Project Number: GEC-3186

Location:

Alden Avenue

Depth: 0 TO 5 FEET

Sample Number: E

Material Description: SAMPLE E, LID NO. C-120, SAMPLE NO. 1 OFF AUGER, SAMPLED BY CLIENT ON 12/14/18

Date: 12/21/18

PL: NP

LL: NV

PI: NP

Dato: 12/21/10

Testing Remarks: SAMPLE F, DATE TESTED 12/21/18

Tested by: RH

Checked by: GJGIII

Sieve Test Data

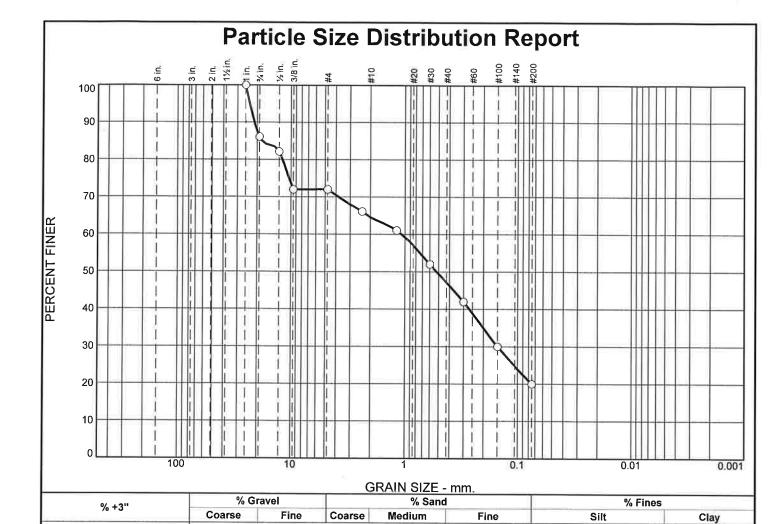
Sieve Opening Size	Percent Finer
4	
3	
2	
1.5	
1.0	
.75	
.5	100.0
.375	98.0
#4	94.0
#8	88.0
#16	81.0
#30	72.0
#50	57.0
#100	31.0
#200	24.0

Fractional Components

Cobbles		Gravel			Sai	nd			Fines	
CODDIES	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total

D ₅	D ₁₀	D ₁₅	D ₂₀	D ₃₀	D ₄₀	D ₅₀	D ₆₀	D ₈₀	D ₈₅	D ₉₀	D ₉₅

Geisser Engineering Corporation ____



PERCENT	SPEC.*	PASS?
FINER	PERCENT	(X=NO)
100.0		
86.0		
82.0		
72.0		
72.0		
66.0		
61.0		
52.0		
42.0		
30.0		
20.0		
	FINER 100.0 86.0 82.0 72.0 72.0 66.0 61.0 52.0 42.0 30.0	FINER PERCENT 100.0 86.0 82.0 72.0 72.0 66.0 61.0 52.0 42.0 30.0

	Material Descripti	ion .
SAMPLE F, L CLIENT ON 1	ID NO. 173 SAMPLE 2/14/18	NO. 3, SAPLED BY
PL= NP	Atterberg Limits	S PI= NP
D ₉₀ = D ₅₀ = D ₁₀ =	Coefficients D85= D30= Cu=	D ₆₀ = D ₁₅ = C _c =
USCS=	Classification AASH	TO=
SAMPLE F, D	Remarks ATE TESTED 12/21/1	8

(no specification provided)

Location: Sample Number: F

Camp Street

Depth: 10 TO 10.5 FEET

Geisser Engineering Corporation

Client: GRA ENGINEERING ASSOCIATES

Project: GRADATION OF BORING SAMPLES

Riverside, Rhode Island

Project No: GEC-3186

Figure

Date: 12/21/18

Tested By: RH

12/21/2018

Client: GRA ENGINEERING ASSOCIATES Project: GRADATION OF BORING SAMPLES

Project Number: GEC-3186

Location:

Camp Street

Depth: 10 TO 10.5 FEET

Sample Number: F

Material Description: SAMPLE F, LID NO. 173 SAMPLE NO. 3, SAPLED BY CLIENT ON 12/14/18

Date: 12/21/18

PL: NP

LL: NV

PI: NP

Testing Remarks: SAMPLE F, DATE TESTED 12/21/18

Tested by: RH

Checked by: GJGIII

Sieve Test Data

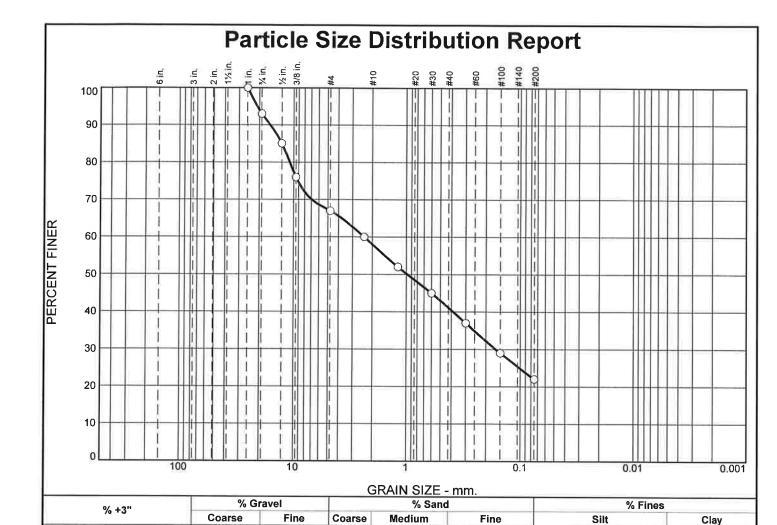
Sieve Opening	Percent
Size	Finer
4	
3	
2	
1.5	
1.0	100.0
.75	86.0
.5	82.0
.375	72.0
#4	72.0
#8	66.0
#16	61.0
#30	52.0
#50	42.0
#100	30.0
#200	20.0

Fractional Components

Cobbles		Gravel			Sa	nd			Fines	
CODDIES	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total

D ₅	D ₁₀	D ₁₅	D ₂₀	D ₃₀	D ₄₀	D ₅₀	D ₆₀	D ₈₀	D ₈₅	D ₉₀	D ₉₅

Geisser Engineering Corporation _



SIEVE	PERCENT	SPEC.*	PASS?
SIZE	FINER	PERCENT	(X=NO)
1.0	100.0		
.75	93.0		
.5	85.0		
.375	76.0		
#4	67.0		
#8	60.0		
#16	52.0		
#30	45.0		
#50	37.0		
#100	29.0		
#200	22.0		

	Material Descript	<u>ion</u>
SAMPLE G, L CLIENT ON 1		NO. 2, SAMPLED BY
	Atterberg Limit	s
PL= NP	LL= NV	PI= NP
Dan=	Coefficients	D -
D ₉₀ = D ₅₀ = D ₁₀ =	D ₈₅ = D ₃₀ =	D ₆₀ = D ₁₅ =
D ₁₀ =	C _u =	C _c =
USCS=	Classification AASH	TO=
	Remarks	
SAMPLE G, D	ATE TESTED 12/21/	18

(no specification provided)

Location: Sample Number: G

Shore Avenue

Depth: 5 TO 7 FEET

Geisser Engineering Corporation

Client: GRA ENGINEERING ASSOCIATES

Project: GRADATION OF BORING SAMPLES

Riverside, Rhode Island

Project No: GEC-3186

Figure

Date: 12/21/18

Clay

Tested By: RH

12/21/2018

Client: GRA ENGINEERING ASSOCIATES Project: GRADATION OF BORING SAMPLES

Project Number: GEC-3186

Location:

River Vue Avenue

Depth: 5 TO 7 FEET

Sample Number: G

Material Description: SAMPLE G, LID NO. 36, SAMPLE NO. 2, SAMPLED BY CLIENT ON 12/14/18

Date: 12/21/18

PL: NP

LL: NV

PI: NP

Testing Remarks: SAMPLE G, DATE TESTED 12/21/18

Tested by: RH

Checked by: GJGIII

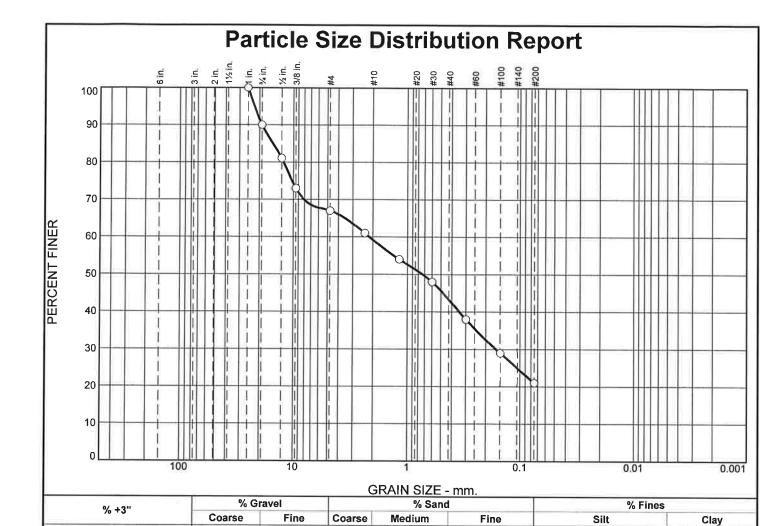
Sieve Test Data

Sieve Opening	Percent
Size	Finer
4	
3	
2	
1.5	
1.0	100.0
.75	93.0
.5	85.0
.375	76.0
#4	67.0
#8	60.0
#16	52.0
#30	45.0
#50	37.0
#100	29.0
#200	22.0

Fractional Components

Cobbles		Gravel			Sar	nd			Fines	
Copples	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total

D ₅	D ₁₀	D ₁₅	D ₂₀	D ₃₀	D ₄₀	D ₅₀	D ₆₀	D ₈₀	D ₈₅	D ₉₀	D ₉₅



SIEVE	PERCENT	SPEC.*	PASS?
SIZE	FINER	PERCENT	(X=NO)
1.0	100.0		
.75	90.0		
.5	81.0		
.375	73.0		
#4	67.0		
#8	61.0		
#16	54.0		
#30	48.0		
#50	38.0		
#100	29.0		
#200	21.0		

	Material Descripti	<u>on</u>
SAMPLE H, LI CLIENT ON 12		E NO. 4, SAMPLED BY
PL= NP	Atterberg Limits	S PI= NP
D ₉₀ = D ₅₀ = D ₁₀ =	Coefficients D ₈₅ = D ₃₀ = C _u =	D ₆₀ = D ₁₅ = C _c =
USCS=	Classification AASH	ТО=
SAMPLE H, DA	Remarks ATE TESTED 12/21/2	18

(no specification provided)

Location: Sample Number: H Longmeadow Avenue

lumber: H Depth: 6 TO 6'-10"

Geisser Engineering Corporation

Client: GRA ENGINEERING ASSOCIATES

Project: GRADATION OF BORING SAMPLES

Riverside, Rhode Island

Project No: GEC-3186

Figure

Date: 12/21/18

Tested By: RH

12/21/2018

Client: GRA ENGINEERING ASSOCIATES
Project: GRADATION OF BORING SAMPLES

Project Number: GEC-3186

Location:

Longmeadow Avenue

Depth: 6 TO 6'-10"

Sample Number: H

Material Description: SAMPLE H, LID NO. C-25, SAMPLE NO. 4, SAMPLED BY CLIENT ON 12/21/18

Date: 12/21/18

PL: NP

LL: NV

PI: NP

Testing Remarks: SAMPLE H, DATE TESTED 12/21/18

Tested by: RH

Checked by: GJGIII

Sieve Test Data

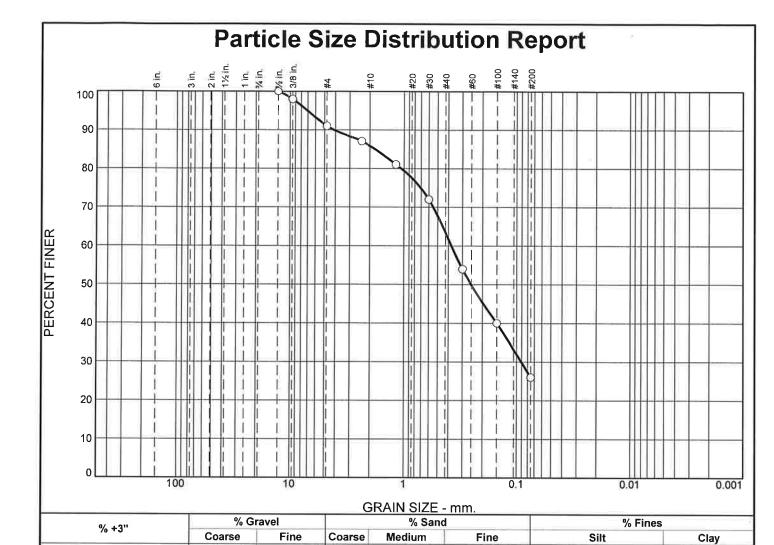
Sieve	
Opening Size	Percent Finer
	illei
4	
3	
2	
1.5	
1.0	100.0
.75	90.0
.5	81.0
.375	73.0
#4	67.0
#8	61.0
#16	54.0
#30	48.0
#50	38.0
#100	29.0
#200	21.0

Fractional Components

Cobbles		Gravel			Sai	nd			Fines	
Copples	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total

D ₅	D ₁₀	D ₁₅	D ₂₀	D ₃₀	D ₄₀	D ₅₀	D ₆₀	D ₈₀	D ₈₅	D ₉₀	D ₉₅

Geisser Engineering Corporation _



SIEVE	PERCENT	SPEC.*	PASS?
SIZE	FINER	PERCENT	(X=NO)
.5	100.0		
.375	98.0		
#4	91.0		
#8	87.0		
#16	81.0		
#30	72.0		
#50	54.0		
#100	40.0		
#200	26.0		

	Material Description NO. 166, SAMPLE N /14/18	2
PL=	Atterberg Limits LL=	PI=
D ₉₀ = D50= D10=	Coefficients D ₈₅ = D ₃₀ = C _u =	D ₆₀ = D ₁₅ = C _c =
USCS=	Classification AASHTO	=
	Remarks	

(no specification provided)

Ogden Avenue

Location: Sample Number: I

Depth: 0 TO 2 FEET,

Date:

Geisser Engineering Corporation

Client: GRA ENGINEERING ASSOCIATES

Project: GRADATION OF BORING SAMPLES

Riverside, Rhode Island

Project No: GEC-3186

Figure

12/21/2018

Client: GRA ENGINEERING ASSOCIATES **Project:** GRADATION OF BORING SAMPLES

Project Number: GEC-3186

Location:

Ogden Avenue

Depth: 0 TO 2 FEET,

Sample Number: I

Material Description: SAMPLE I, LID NO. 166, SAMPLE NO. 1, SAMPLED BY CLIENT ON 12/14/18

Sieve Test Data

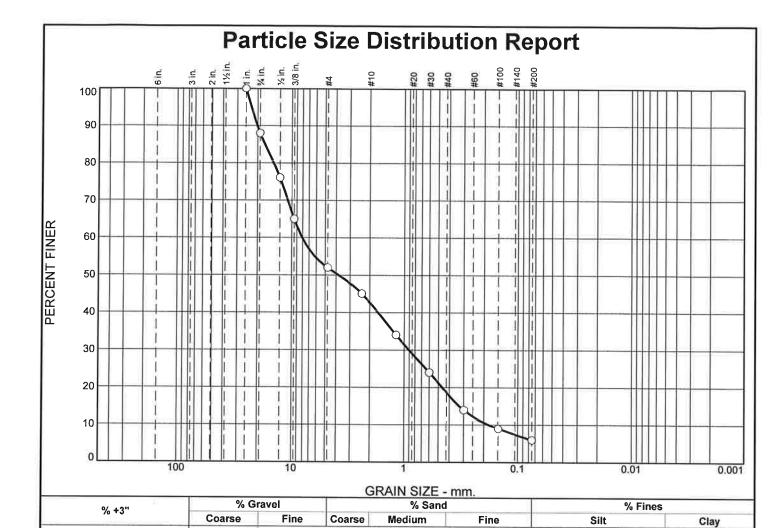
Sieve Opening Size	Percent Finer
4	1 11161
•	
3	
2	
1.5	
1.0	
.75	
.5	100.0
.375	98.0
#4	91.0
#8	87.0
#16	81.0
#30	72.0
#50	54.0
#100	40.0
#200	26.0

Fractional Components

Cobbles	Gravel		Sand				Fines			
Copples	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total

D ₅	D ₁₀	D ₁₅	D ₂₀	D ₃₀	D ₄₀	D ₅₀	D ₆₀	D ₈₀	D ₈₅	D ₉₀	D ₉₅

Geisser Engineering Corporation _____



SIEVE	PERCENT	SPEC.*	PASS?
SIZE	FINER	PERCENT	(X=NO)
1.0	100.0		
.75	88.0		
.5	76.0		
.375	65.0		
#4	52.0		
#8	45.0		
#16	34.0		
#30	24.0		
#50	14.0		
#100	9.0		
#200	6.0		
* ,	aification masside		

	Material Description	on ·
SAMPLE J, LI CLIENT ON 1	ID NO. C-19 SAMPLE 1 2/21/18	NO. 3, SAMPLED BY
PL= NP	Atterberg Limits	PI= NP
D ₉₀ = D ₅₀ = D ₁₀ =	Coefficients D ₈₅ = D ₃₀ = C _u =	D ₆₀ = D ₁₅ = C _c =
USCS=	Classification AASHT	O=
SAMPLE J, D.	Remarks ATE TESTED 12/21/18	

(no specification provided)

Location:

Clara Avenue

Sample Number: J

Depth: 10 TO 12 FEET

Geisser Engineering Corporation

Client: GRA ENGINEERING ASSOCIATES

Project: GRADATION OF BORING SAMPLES

Riverside, Rhode Island

Project No: GEC-3186

Figure

Date: 12/21/18

Tested By: RH

12/21/2018

Client: GRA ENGINEERING ASSOCIATES **Project:** GRADATION OF BORING SAMPLES

Project Number: GEC-3186

Location:

Clara Avenue

Depth: 10 TO 12 FEET

Sample Number: J

Material Description: SAMPLE J, LID NO. C-19 SAMPLE NO. 3, SAMPLED BY CLIENT ON 12/21/18

Date: 12/21/18

PL: NP

LL: NV

PI: NP

Testing Remarks: SAMPLE J, DATE TESTED 12/21/18

Tested by: RH

Checked by: GJGIII

Sieve Test Data

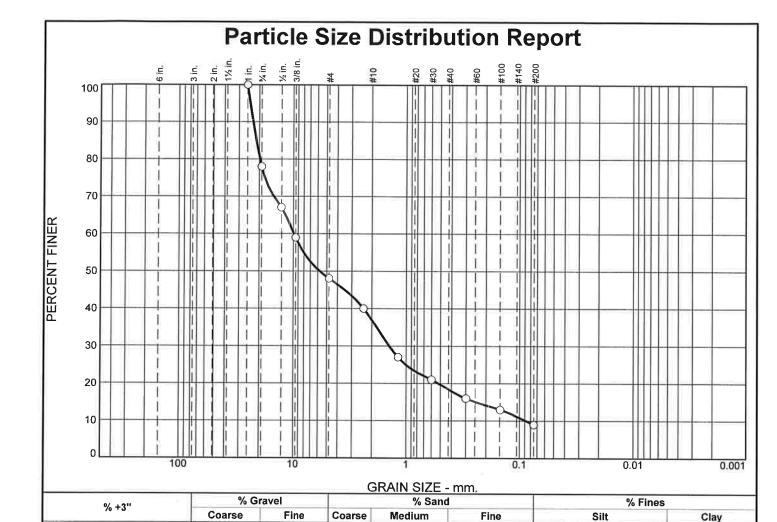
Sieve Opening Size	Percent Finer
4	
3	
2	
1.5	
1.0	100.0
.75	88.0
.5	76.0
.375	65.0
#4	52.0
#8	45.0
#16	34.0
#30	24.0
#50	14.0
#100	9.0
#200	6.0

Fractional Components

Cobbles	Gravel			Sar	Fines					
Coppies	Coarse Fine	Fine	Fine Total	Coarse	Medium Fine	Fine	Total	Silt Clay	Total	
							-			

D ₅	D ₁₀	D ₁₅	D ₂₀	D ₃₀	D ₄₀	D ₅₀	D ₆₀	D ₈₀	D ₈₅	D ₉₀	D ₉₅

Geisser Engineering Corporation _



SIEVE	PERCENT	SPEC.*	PASS?	
SIZE	FINER	PERCENT	(X=NO)	
1.0	100.0			
.75	78.0			
.5	67.0))		
.375	59.0			
#4	48.0			
#8	40.0			
#16	27.0			
#30	21.0	2.0		
#50	16.0			
#100	13.0			
#200	9.0			

SAMPLE K LI CLIENT ON 12		on E NO. 2, SAMPLED BY
PL= NP	Atterberg Limits	PI= NP
D ₉₀ = D ₅₀ = D ₁₀ =	Coefficients D ₈₅ = D ₃₀ = C _u =	D ₆₀ = D ₁₅ = C _c =
USCS=	Classification AASHT	-O=
SAMPLE K, D.	<u>Remarks</u> ATE TESTED 12/21/1	8
		II.

(no specification provided)

Melrose Avenue

Location: Sample Number: K

Depth: 5 TO 7 FEET

Date: 12/21/18

Geisser Engineering Corporation

Client: GRA ENGINEERING ASSOCIATES

Project: GRADATION OF BORING SAMPLES

Riverside, Rhode Island

Project No: GEC-3186

Figure

Tested By: RH

12/21/2018

Client: GRA ENGINEERING ASSOCIATES Project: GRADATION OF BORING SAMPLES

Project Number: GEC-3186

Location:

Melrose Avenue

Depth: 5 TO 7 FEET

Sample Number: K

Material Description: SAMPLE K LID NO. C-196, SAMPLE NO. 2, SAMPLED BY CLIENT ON 12/14/18

Date: 12/21/18

PL: NP

LL: NV

PI: NP

Testing Remarks: SAMPLE K, DATE TESTED 12/21/18

Tested by: RH

Checked by: GJGIII

Sieve Test Data

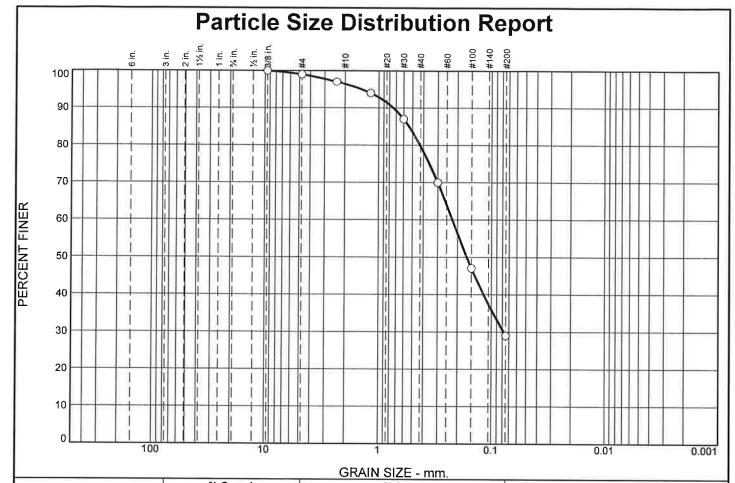
Sieve Opening Size	Percent Finer
4	
3	
2	
1.5	
1.0	100.0
.75	78.0
.5	67.0
.375	59.0
#4	48.0
#8	40.0
#16	27.0
#30	21.0
#50	16.0
#100	13.0
#200	9.0

Fractional Components

Cobbles		Gravel			Sar	nd			Fines	
CODDIES	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total

D ₅	D ₁₀	D ₁₅	D ₂₀	D ₃₀	D ₄₀	D ₅₀	D ₆₀	D ₈₀	D ₈₅	D ₉₀	D ₉₅

Geisser Engineering Corporation _



% +3	ıı.	% Grave	el		% Sand		% Fin	es
70 . 3		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
						99	.0	
SIEVE	PERCENT	SPEC.*	PASS	.		Material	Description	
SIZE	FINER	PERCENT	(X=N(ו ומ	CAMDI	EL LIDNO C 1	72 CAMPLED NO.	O CAMPIED

	SIEVE	PERCENT	SPEC.*	PASS?
	SIZE	FINER	PERCENT	(X=NO)
	.375	100.0		
	#4	99.0		
	#8	97.0		
	#16	94.0		
	#30	87.0		
	#50	70.0		
	#100	47.0		
	#200	29.0		
ч				

	Material Descrip	otion
		PLED NO. 2, SAMPLED
BY CLIENT O	N 12/14/18	
PL= NP	Atterberg Lim	its PI= NP
D ₉₀ =	Coefficients	Den=
D ₉₀ = D ₅₀ = D ₁₀ =	D30=	D15=
D ₁₀ -	Cu-	Cc-
USCS=	<u>Classificatio</u> AAS	<u>n</u> HTO=
	Remarks	
SAMPLE L, DA	ATE TESTED 12/21	1/18

(no specification provided)

Location: Sample Number: L

Camp Street

Depth: 5 TO 7 FEET

Geisser Engineering Corporation

Client: GRA ENGINEERING ASSOCIATES

Project: GRADATION OF BORING SAMPLES

Riverside, Rhode Island

Project No: GEC-3186

Figure

Date: 12/21/18

Tested By: RH

12/21/2018

Client: GRA ENGINEERING ASSOCIATES
Project: GRADATION OF BORING SAMPLES

Project Number: GEC-3186

Location:

Camp Street

Depth: 5 TO 7 FEET

Sample Number: L

Material Description: SAMPLE L, LID NO. C-173, SAMPLED NO. 2, SAMPLED BY CLIENT ON 12/14/18

Date: 12/21/18

PL: NP

LL: NV

PI: NP

Testing Remarks: SAMPLE L, DATE TESTED 12/21/18

Tested by: RH

Checked by: GJGIII

Sieve Test Data

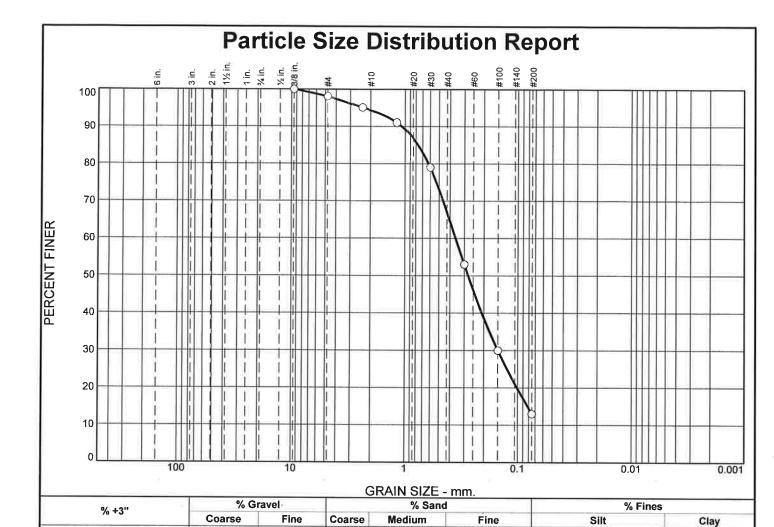
Sieve Opening Size	Percent Finer
4	
3	
2	
1.5	
1.0	
.75	
.5	
.375	100.0
#4	99.0
#8	97.0
#16	94.0
#30	87.0
#50	70.0
#100	47.0
#200	29.0

Fractional Components

Cobbles	Gravel Sand						Fines			
Connies	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total

D ₅	D ₁₀	D ₁₅	D ₂₀	D ₃₀	D ₄₀	D ₅₀	D ₆₀	D ₈₀	D ₈₅	D ₉₀	D ₉₅

Geisser Engineering Corporation _



SIEVE	PERCENT	SPEC.*	PASS?
SIZE	FINER	PERCENT	(X=NO)
.375	100.0		
#4	98.0		
#8	95.0		
#16	91.0		
#30	79.0		
#50	53.0		
#100	30.0		
#200	13.0		
*			

	Material Description	<u>I</u>
SAMPLE W, 1 12/14/18	LID NO. C-145, SAMPLI	ED BY CLIENT ON
PL= NP	Atterberg Limits LL= NV	PI= NP
D ₉₀ = D ₅₀ = D ₁₀ =	Coefficients D ₈₅ = D ₃₀ = C _u =	D ₆₀ = D ₁₅ = C _c =
USCS=	Classification AASHTO)=
SAMPLE W, I	<u>Remarks</u> DATE TESTED 12/21/18	

(no specification provided)

Location: Sample Number: W Burnett Avenue

Depth: 0 TO 5 FEET

Date: 12/26/18

Geisser Engineering Corporation

Client: GRA ENGINEERING ASSOCIATES

Project: GRADATION OF BORING SAMPLES

Riverside, Rhode Island

Project No: GEC-3186

Figure

Tested By: RH

12/26/2018

Client: GRA ENGINEERING ASSOCIATES Project: GRADATION OF BORING SAMPLES

Project Number: GEC-3186

Location:

Burnett Avenue

Depth: 0 TO 5 FEET

Sample Number: W

Material Description: SAMPLE W, LID NO. C-145, SAMPLED BY CLIENT ON 12/14/18

Date: 12/26/18

PL: NP

LL: NV

PI: NP

Testing Remarks: SAMPLE W, DATE TESTED 12/21/18

Tested by: RH

Checked by: GJGIII

Sieve Test Data

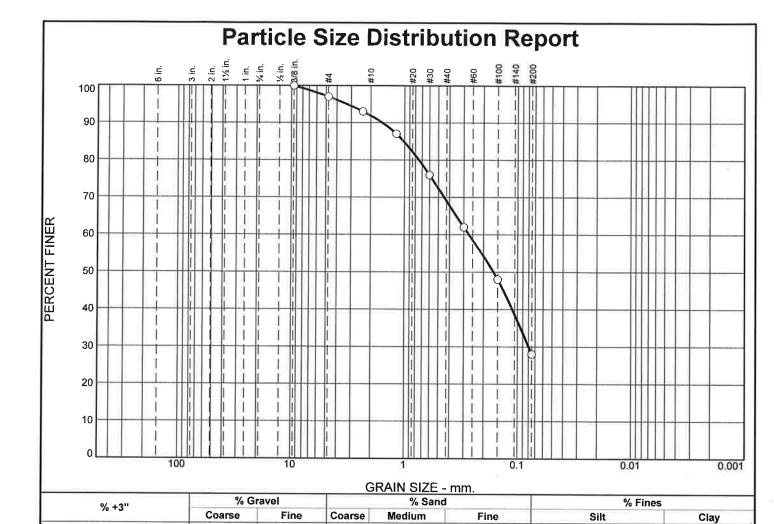
Sieve Opening Size	Percent Finer
4	
3	
2	
1.5	
1.0	
.75	
.5	
.375	100.0
#4	98.0
#8	95.0
#16	91.0
#30	79.0
#50	53.0
#100	30.0
#200	13.0

Fractional Components

Cobbles	Gravel			Gravel Sand						Fines	
Copples	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total	

D ₅	D ₁₀	D ₁₅	D ₂₀	D ₃₀	D ₄₀	D ₅₀	D ₆₀	D ₈₀	D ₈₅	D ₉₀	D ₉₅

Geisser Engineering Corporation _



SIEVE	PERCENT	SPEC.*	PASS?
SIZE	FINER	PERCENT	(X=NO)
.375	100.0		
#4	97.0		
#8	93.0		
#16	87.0		
#30	76.0		
#50	62.0		
#100	48.0		
#200	28.0		
	1		

	Material Descripti	on
SAMPLE U, L	ID NO. C-100 O/W, S.	AMPLE NO. 3,
SAMPLED BY	CLIENT ON 12/14/1	8
PL= NP	Atterberg Limits	B PI= NP
D ₉₀ = D ₅₀ = D ₁₀ =	Coefficients D ₈₅ = D ₃₀ = C _u =	D ₆₀ = D ₁₅ = C _c =
USCS=	Classification AASH	ГО=
SAMPLE U, D	<u>Remarks</u> ATE TESTED 12/21/1	8

(no specification provided)

Location: Sample Number: U Harbor View Drive

Depth: 10 TO 12 FEET

Geisser Engineering Corporation

Client: GRA ENGINEERING ASSOCIATES

Project: GRADATION OF BORING SAMPLES

Riverside, Rhode Island

Project No: GEC-3186

Figure

Date: 12/26/18

Tested By: RH

12/26/2018

Client: GRA ENGINEERING ASSOCIATES **Project:** GRADATION OF BORING SAMPLES

Project Number: GEC-3186

Location:

Harbor View Drive

Depth: 10 TO 12 FEET

Sample Number: U

Material Description: SAMPLE U, LID NO. C-100 O/W, SAMPLE NO. 3, SAMPLED BY CLIENT ON 12/14/18

Date: 12/26/18

PL: NP

LL: NV

PI: NP

Testing Remarks: SAMPLE U, DATE TESTED 12/21/18

Tested by: RH

Checked by: GJGIII

Sieve Test Data

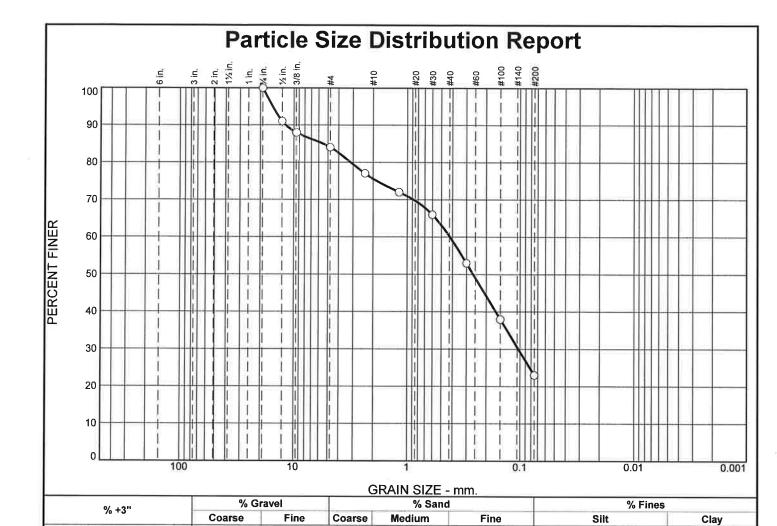
Sieve Opening Size	Percent Finer
4	
3	
2	
1.5	
1.0	
.75	
.5	
.375	100.0
#4	97.0
#8	93.0
#16	87.0
#30	76.0
#50	62.0
#100	48.0
#200	28.0

Fractional Components

Cobbles	Gravel		Gravel Sand					Fines		
Copples	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total

D ₅	D ₁₀	D ₁₅	D ₂₀	D ₃₀	D ₄₀	D ₅₀	D ₆₀	D ₈₀	D ₈₅	D ₉₀	D ₉₅

Geisser Engineering Corporation



SIEVE	PERCENT	SPEC.*	PASS?
SIZE	FINER	PERCENT	(X=NO)
.75	100.0		
.5	91.0		
.375	88.0		
#4	84.0		
#8	77.0		
#16	72.0		
#30	66.0		
#50	53.0		
#100	38.0		
#200	23.0		

SAMPLE S, LI CLIENT	Material Description D NO. C-132, SAMPL	
PL= NP	Atterberg Limits	PI= NP
D ₉₀ = D ₅₀ = D ₁₀ =	Coefficients D ₈₅ = D ₃₀ = C _u =	D ₆₀ = D ₁₅ = C _c =
USCS=	Classification AASHT	O=
SAMPLE S, Da	Remarks ATE TESTED 12/21/18	8

(no specification provided)

Location: Sample Number: S Priscilla Avenue

Depth: 4 TO 6 FEET

Geisser Engineering Corporation

Client: GRA ENGINEERING ASSOCIATES

Project: GRADATION OF BORING SAMPLES

Riverside, Rhode Island

Project No: GEC-3186

Figure

Date: 12/26/18

Tested By: RH

12/26/2018

Client: GRA ENGINEERING ASSOCIATES
Project: GRADATION OF BORING SAMPLES

Project Number: GEC-3186

Location:

Priscilla Avenue

Depth: 4 TO 6 FEET

Sample Number: S

Material Description: SAMPLE S, LID NO. C-132, SAMPLED ON 12/14/18 BY CLIENT

Date: 12/26/18

PL: NP

LL: NV

PI: NP

Testing Remarks: SAMPLE S, DATE TESTED 12/21/18

Tested by: RH

Checked by: GJGIII

Sieve Test Data

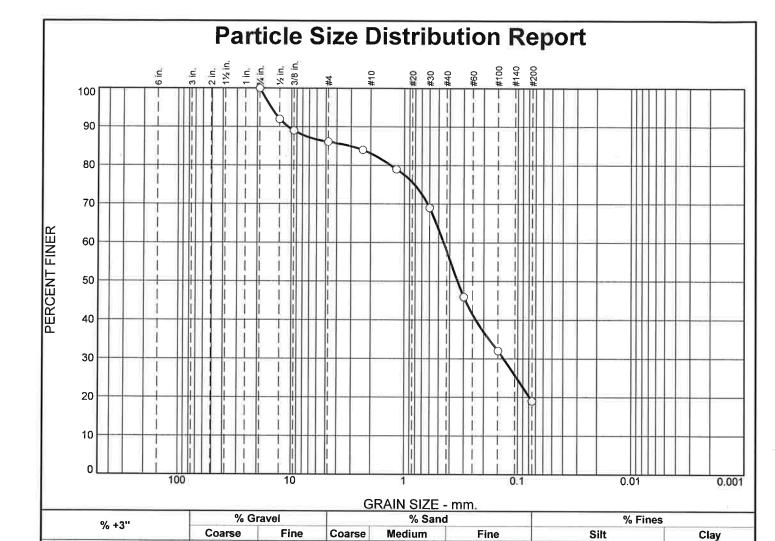
Sieve Opening Size	Percent Finer
4	
3	
2	
1.5	
1.0	
.75	100.0
.5	91.0
.375	88.0
#4	84.0
#8	77.0
#16	72.0
#30	66.0
#50	53.0
#100	38.0
#200	23.0

Fractional Components

Cobbles		Gravel			Saı	nd			Fines	
CODDIES	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
				1	1 1					

D ₅	D ₁₀	D ₁₅	D ₂₀	D ₃₀	D ₄₀	D ₅₀	D ₆₀	D ₈₀	D ₈₅	D ₉₀	D ₉₅

Geisser Engineering Corporation __



	SIEVE	PERCENT	SPEC.*	PASS?
	SIZE	FINER	PERCENT	(X=NO)
	.75	100.0		
	.5	92.0		
П	.375	89.0		
	#4	86.0		
	#8	84.0		
	#16	79.0		
1	#30	69.0		
1	#50	46.0		
1	#100	32.0		
1	#200	19.0		
1				
1				
1				
1				
1				

	Material Description	<u>on</u>
SAMPLE T, I CLIENT	LID NO. C-9, SAMPLE	D ON 12/14/18 BY
PL=	Atterberg Limits	PI=
D ₉₀ = D ₅₀ = D ₁₀ =	Coefficients D ₈₅ = D ₃₀ = C _u =	D ₆₀ = D ₁₅ = C _c =
USCS=	Classification AASHT	O=
	Remarks	

(no specification provided)

Webb Avenue

Location: Sample Number: T

Depth: 0 TO 2 FEET

Date:

Geisser Engineering Corporation

Client: GRA ENGINEERING ASSOCIATES

Project: GRADATION OF BORING SAMPLES

Riverside, Rhode Island

Project No: GEC-3186

Figure

12/26/2018

Client: GRA ENGINEERING ASSOCIATES
Project: GRADATION OF BORING SAMPLES

Project Number: GEC-3186

Location:

Webb Avenue

Depth: 0 TO 2 FEET

Sample Number: T

Material Description: SAMPLE T, LID NO. C-9, SAMPLED ON 12/14/18 BY CLIENT

Sieve Test Data

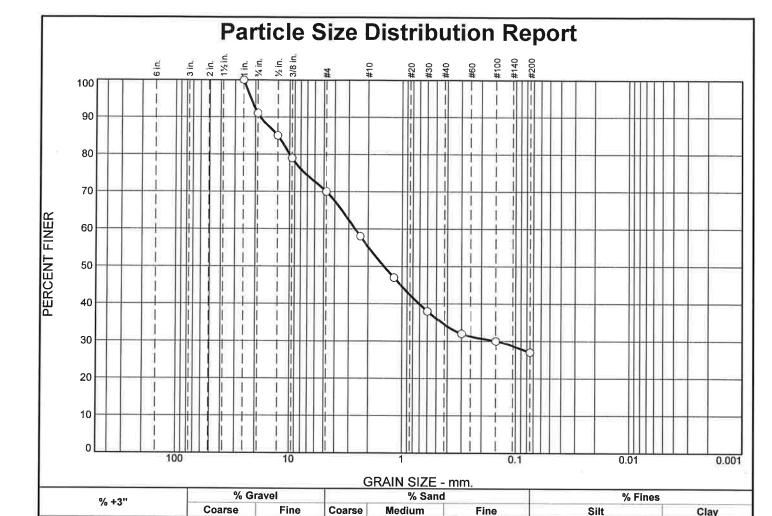
Sieve Opening Size	Percent Finer
4	
3	
2	
1.5	
1.0	
.75	100.0
.5	92.0
.375	89.0
#4	86.0
#8	84.0
#16	79.0
#30	69.0
#50	46.0
#100	32.0
#200	19.0

Fractional Components

Cobbles	Gravel			Sand				Fines		
Copples	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total

D ₅	D ₁₀	D ₁₅	D ₂₀	D ₃₀	D ₄₀	D ₅₀	D ₆₀	D ₈₀	D ₈₅	D ₉₀	D ₉₅

Geisser Engineering Corporation



SIEVE	PERCENT	SPEC.*	PASS?
SIZE	FINER	PERCENT	(X=NO)
1.0	100.0		
.75	91.0		İ
.5	85.0		
.375	79.0		
#4	70.0		
#8	58.0		
#16	47.0		
#30	38.0		
#50	32.0		
#100	30.0		
#200	27.0		

	Material Description	1
SAMPLE R, LI	D NO. C-48, SAMPLE N	NO. 3, DATE TESTED
12/21/18		
	Atterberg Limits	Ψ.
PL= NP	LL= NV	PI= NP
	Coefficients	
D ₉₀ =	D ₈₅ =	D ₆₀ =
D ₉₀ = D ₅₀ = D ₁₀ =	D ₃₀ =	D ₁₅ =
D ₁₀ -	Ou-	CC-
USCS=	<u>Classification</u> AASHTO	=
CAMDIED D	Remarks	
SAMPLE K, DA	ATE TESTED 12/21/18	

Silt

Clay

(no specification provided)

Location: Sample Number: R

Payton Avenue

Depth: 10 TO 12 FEET

Client: GRA ENGINEERING ASSOCIATES **Project:** GRADATION OF BORING SAMPLES

Riverside, Rhode Island

Geisser Engineering Corporation

Project No: GEC-3186

Figure

Date: 12/26/18

Tested By: RH

12/26/2018

Client: GRA ENGINEERING ASSOCIATES **Project:** GRADATION OF BORING SAMPLES

Project Number: GEC-3186

Location:

Payton Avenue

Depth: 10 TO 12 FEET

Sample Number: R

Material Description: SAMPLE R, LID NO. C-48, SAMPLE NO. 3, DATE TESTED 12/21/18

Date: 12/26/18

PL: NP

LL: NV

PI: NP

Testing Remarks: SAMPLE R, DATE TESTED 12/21/18

Tested by: RH

Checked by: GJGIII

Sieve Test Data

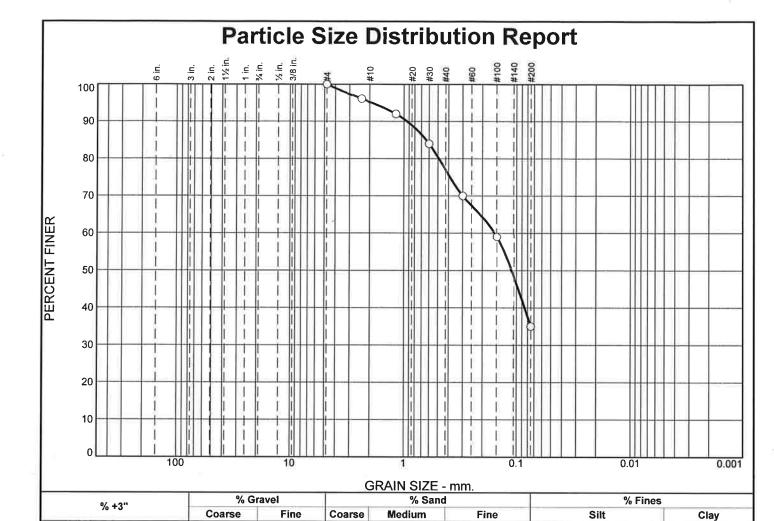
Sieve Opening	Percent
Size	Finer
4	
3	
2	
1.5	
1.0	100.0
.75	91.0
.5	85.0
.375	79.0
#4	70.0
#8	58.0
#16	47.0
#30	38.0
#50	32.0
#100	30.0
#200	27.0

Fractional Components

Cobbles	Gravel			Saı	nd	Fines				
Copples	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
					1 1					

D ₅	D ₁₀	D ₁₅	D ₂₀	D ₃₀	D ₄₀	D ₅₀	D ₆₀	D ₈₀	D ₈₅	D ₉₀	D ₉₅

Geisser Engineering Corporation ____



SIEVE	PERCENT	SPEC.*	PASS?
SIZE	FINER	PERCENT	(X=NO)
#4	100.0		
#8	96.0		
#16	92.0		
#30	84.0		
#50	70.0		
#100	59.0		
#200	35.0		

	100.0					
SAMPLE Q, L 12/21/18	Material Descriptio ID NO. C-11, SAMPLE	NO. 2, DATE TESTED				
PL= NP D90= D50= D10=	Atterberg Limits LL= NV Coefficients D85= D30= Cu=	PI= NP D60= D15= C _c =				
USCS= Classification AASHTO= Remarks SAMPLE Q, DATE TESTED 12/21/18						

* (no specification provided)

Location: Sample Number: Q Mill Cove Road

Depth: 5 TO 7 FEET

Geisser Engineering Corporation

Client: GRA ENGINEERING ASSOCIATES

Project: GRADATION OF BORING SAMPLES

Riverside, Rhode Island

Project No: GEC-3186

Figure

Date: 12/16/18

Tested By: RH Checked By: GJGIII

12/26/2018

Client: GRA ENGINEERING ASSOCIATES Project: GRADATION OF BORING SAMPLES

Project Number: GEC-3186

Location:

Mill Cove Road

Depth: 5 TO 7 FEET

Sample Number: Q

Material Description: SAMPLE Q, LID NO. C-11, SAMPLE NO. 2, DATE TESTED 12/21/18

Date: 12/16/18

PL: NP

LL: NV

PI: NP

Testing Remarks: SAMPLE Q, DATE TESTED 12/21/18

Sieve

Tested by: RH Checked by: GJGIII

Sieve Test Data

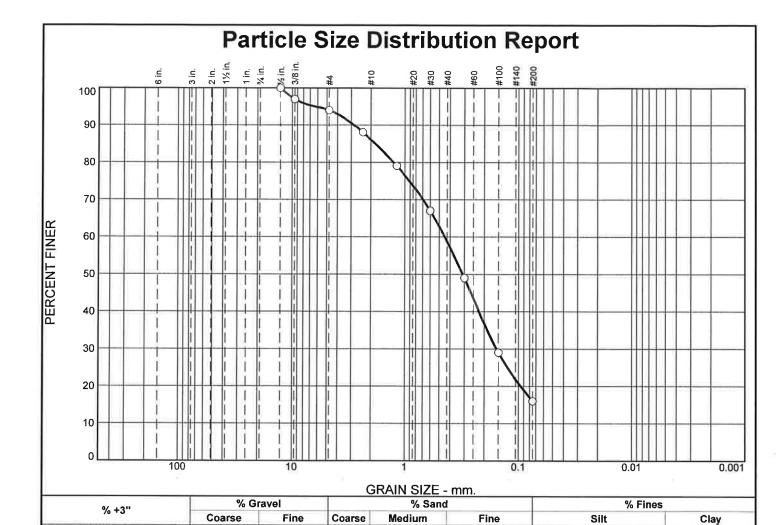
Opening Size	Percent Finer
4	
3	
2	
1.5	
1.0	
.75	
.5	
.375	
#4	100.0
#8	96.0
#16	92.0
#30	84.0
#50	70.0
#100	59.0
#200	35.0

Fractional Components

Cobbles	Gravel		Sand				Fines			
Copples	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
					1					

D ₅	D ₁₀	D ₁₅	D ₂₀	D ₃₀	D ₄₀	D ₅₀	D ₆₀	D ₈₀	D ₈₅	D ₉₀	D ₉₅

Geisser Engineering Corporation ___



SIEVE	PERCENT	SPEC.*	PASS?
SIZE	FINER	PERCENT	(X=NO)
.5	100.0		
.375	97.0		
#4	94.0		
#8	88.0		
#16	79.0		
#30	67.0		
#50	49.0		
#100	29.0		
#200	16.0		
		e .	

	Material Description	on			
	ID NO. C-171, SAMPL 2/14/17 SAMPLE OFF	E NO. 2, SAMPLED BY OF SSA			
PL= NP	Atterberg Limits LL= NV	PI= NP			
D ₉₀ = D ₅₀ = D ₁₀ =	Coefficients D ₈₅ = D ₃₀ = C _u =	D ₆₀ = D1 <u>5</u> = C _c =			
USCS=	USCS= Classification AASHTO=				
Remarks SAMPLE P, DATE TESTED 12/21/18					

(no specification provided)

Location: Sample Number: P

Ogden Avenue

Depth: 5 TO 10 FEET

Client: GRA ENGINEERING ASSOCIATES

Project: GRADATION OF BORING SAMPLES

Riverside, Rhode Island

Geisser Engineering Corporation

Project No: GEC-3186

Figure

Date: 12/26/18

Tested By: RH

12/26/2018

Client: GRA ENGINEERING ASSOCIATES Project: GRADATION OF BORING SAMPLES

Project Number: GEC-3186

Location:

Ogden Avenue

Depth: 5 TO 10 FEET

Sample Number: P

Material Description: SAMPLE P, LID NO. C-171, SAMPLE NO. 2, SAMPLED BY CLIENT ON 12/14/17 SAMPLE OFF OF

SSA

Date: 12/26/18

PL: NP

LL: NV

PI: NP

Testing Remarks: SAMPLE P, DATE TESTED 12/21/18

Tested by: RH

Checked by: GJGIII

Sieve Test Data

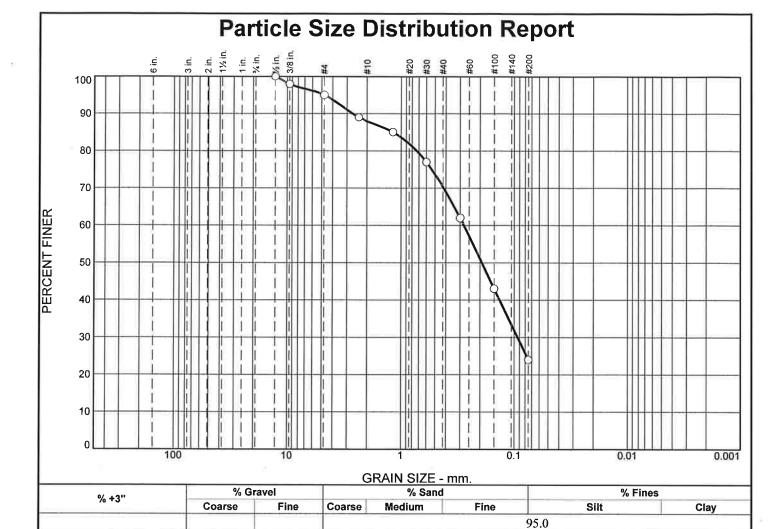
Sieve Opening Size	Percent Finer
4	
3	
2	
1.5	
1.0	
.75	
.5	100.0
.375	97.0
#4	94.0
#8	88.0
#16	79.0
#30	67.0
#50	49.0
#100	29.0
#200	16.0

Fractional Components

Cobbles	Gravel		Sand				Fines			
Copples	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
					1 1					

D ₅	D ₁₀	D ₁₅	D ₂₀	D ₃₀	D ₄₀	D ₅₀	D ₆₀	D ₈₀	D ₈₅	D ₉₀	D ₉₅

Geisser Engineering Corporation _____



SIEVE	PERCENT	SPEC.*	PASS?
SIZE	FINER	PERCENT	(X=NO)
.5	100.0		
.375	98.0		
#4	95.0		
#8	89.0		
#16	85.0		
#30	77.0		
#50	62.0		
#100	43.0		
#200	24.0		
* ,	cification provide		

	Material Descrip					
SAMPLE O, LID NO. C-89, SAMPLE NO. 3, SAMPLED BY CLIENT ON 12/14/18						
PL= NP	Atterberg Limit	PI= NP				
D ₉₀ = D ₅₀ = D ₁₀ =	Coefficients D ₈₅ = D ₃₀ = C _u =	D ₆₀ = D ₁₅ = C _c =				
USCS=	Classification AASH	-				
Remarks SAMPLE O, DATE TESTED 12/21/18						

(no specification provided)

Grove Avenue

Location: Sample Number: 0

Depth: 10 TO 12 FEET

Date: 12/26/18

Geisser Engineering Corporation

Client: GRA ENGINEERING ASSOCIATES

Project: GRADATION OF BORING SAMPLES

Riverside, Rhode Island

Project No: GEC-3186

Figure

Tested By: RH

12/26/2018

Client: GRA ENGINEERING ASSOCIATES Project: GRADATION OF BORING SAMPLES

Project Number: GEC-3186

Location:

Grove Avenue

Depth: 10 TO 12 FEET

Sample Number: 0

Material Description: SAMPLE O, LID NO. C-89, SAMPLE NO. 3, SAMPLED BY CLIENT ON 12/14/18

PL: NP

LL: NV

PI: NP

Testing Remarks: SAMPLE O, DATE TESTED 12/21/18

Tested by: RH

Date: 12/26/18

Checked by: GJGIII

Sieve Test Data

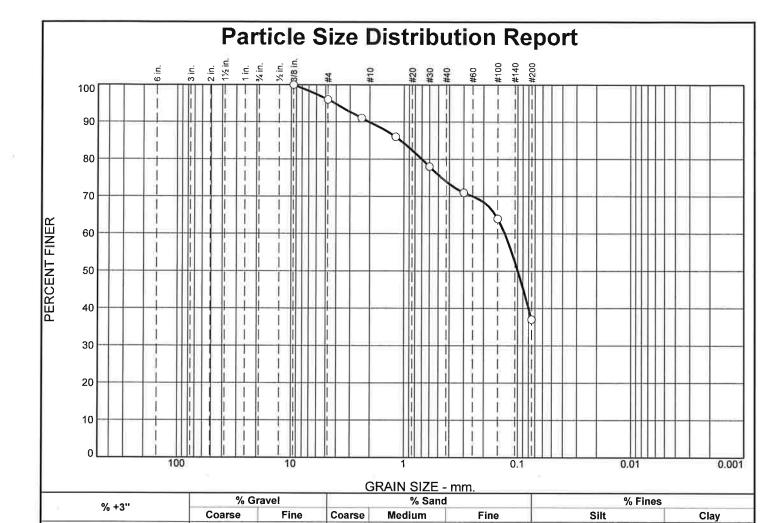
Sieve Opening Size	Percent Finer
4	
3	
2	
1.5	
1.0	
.75	
.5	100.0
.375	98.0
#4	95.0
#8	89.0
#16	85.0
#30	77.0
#50	62.0
#100	43.0
#200	24.0

Fractional Components

Gravel				Sai	Fines				
Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
	Coarse		Gravel	Gravel	Gravel Sa	Gravel Sand	Gravel Sand	Gravel Sand	Gravel Sand Fines

D ₅	D ₁₀	D ₁₅	D ₂₀	D ₃₀	D ₄₀	D ₅₀	D ₆₀	D ₈₀	D ₈₅	D ₉₀	D ₉₅

Geisser Engineering Corporation _____



SIEVE	PERCENT	SPEC.*	PASS?
SIZE	FINER	PERCENT	(X=NO)
.375	100.0		
#4	96.0		
#8	91.0		
#16	86.0		
#30	78.0		
#50	71.0		
#100	64.0		
#200	37.0		
*	noifination manuide.		

	Material Descripti	24/10
SAMPLE N, LI CLIENT ON 12		E NO. 2, SAMPLED BY
	Atterberg Limits	
PL= NP	LL= NV	PI= NP
	Coefficients	
D ₉₀ =	D ₈₅ =	D ₆₀ =
D ₉₀ = D ₅₀ = D ₁₀ =	C''=	D ₆₀ = D ₁₅ = C _c =
10	Classification	
USCS=	Classification AASH	TO=
	Remarks	
SAMPLE N, D	ATED TESTED 12/21	1/18

(no specification provided)

Location: Sample Number: N River Vue Avenue

Depth: 5 TO 7 FEET

Geisser Engineering Corporation

Client: GRA ENGINEERING ASSOCIATES

Project: GRADATION OF BORING SAMPLES

Riverside, Rhode Island

Project No: GEC-3186

Figure

Date: 12/26/17

Tested By: RH

12/26/2018

Client: GRA ENGINEERING ASSOCIATES Project: GRADATION OF BORING SAMPLES

Project Number: GEC-3186

Location:

River Vue Avenue

Depth: 5 TO 7 FEET

Sample Number: N

Material Description: SAMPLE N, LID NO. C-2, SAMPLE NO. 2, SAMPLED BY CLIENT ON 12/14/18

Date: 12/26/17

PL: NP

LL: NV

PI: NP

Testing Remarks: SAMPLE N, DATED TESTED 12/21/18

Tested by: RH

Checked by: GJGIII

Sieve Test Data

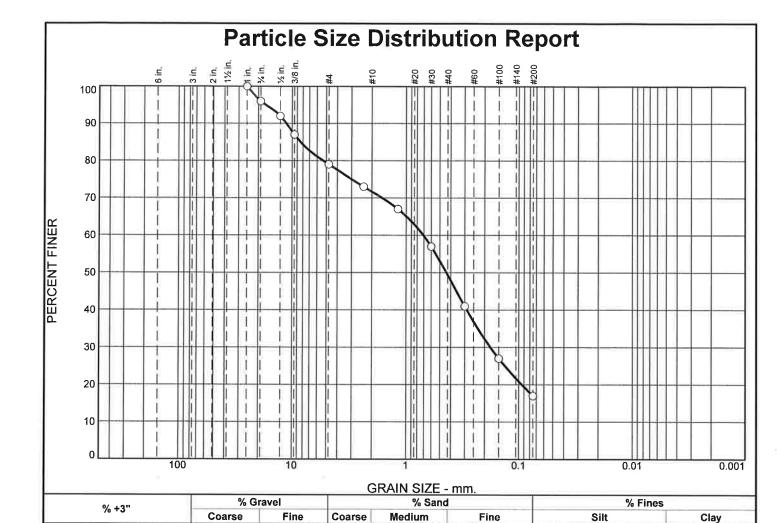
Sieve Opening Size	Percent Finer
4	
3	
2	
1.5	
1.0	
.75	
.5	
.375	100.0
#4	96.0
#8	91.0
#16	86.0
#30	78.0
#50	71.0
#100	64.0
#200	37.0

Fractional Components

Cobbles	Gravel				Sa	nd	Fines			
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total

D ₅	D ₁₀	D ₁₅	D ₂₀	D ₃₀	D ₄₀	D ₅₀	D ₆₀	D ₈₀	D ₈₅	D ₉₀	D ₉₅

Geisser Engineering Corporation _____



PERCENT	SPEC.*	PASS?
FINER	PERCENT	(X=NO)
100.0		
96.0		
92.0	1 1	
87.0		
79.0		
73.0		
67.0		
57.0		
41.0	1	
27.0		
17.0		
	100.0 96.0 92.0 87.0 79.0 73.0 67.0 57.0 41.0 27.0	100.0 96.0 92.0 87.0 79.0 73.0 67.0 57.0 41.0 27.0 17.0

2,65	Material Description	on_
SAMPLE M, I CLIENT ON 1		E NO. 1, SAMPLED BY
PL= NP	Atterberg Limits LL= NV	PI= NP
D ₉₀ = D ₅₀ = D ₁₀ =	Coefficients D ₈₅ = D ₃₀ = C _u =	D ₆₀ = D ₁₅ = C _c =
USCS=	<u>Classification</u> AASHT	·O=
SAMPLE M, I	<u>Remarks</u> DATE TESTED 12/21/1	8

96.0

(no specification provided)

Location: Sample Number: M Longmeadow Avenue **Depth:** 0 TO 2 FEET

Geisser Engineering Corporation

Client: GRA ENGINEERING ASSOCIATES

Project: GRADATION OF BORING SAMPLES

Riverside, Rhode Island

Project No: GEC-3186

Figure

Date: 12/21/18

Tested By: RH

Checked By: GJGIII

GRAIN SIZE DISTRIBUTION TEST DATA

12/26/2018

Client: GRA ENGINEERING ASSOCIATES Project: GRADATION OF BORING SAMPLES

Project Number: GEC-3186

Location:

Longmeadow Avenue

Depth: 0 TO 2 FEET

Sample Number: M

Material Description: SAMPLE M, LID NO. C-27, SAMPLE NO. 1, SAMPLED BY CLIENT ON 12/14/18

Date: 12/21/18

PL: NP

LL: NV

PI: NP

Testing Remarks: SAMPLE M, DATE TESTED 12/21/18

Tested by: RH

Checked by: GJGIII

Sieve Test Data

Sieve Opening Size	Percent Finer
4	
3	
2	
1.5	
1.0	100.0
.75	96.0
.5	92.0
.375	87.0
#4	79.0
#8	73.0
#16	67.0
#30	57.0
#50	41.0
#100	27.0
#200	17.0

Fractional Components

Cobbles		Gravel			Sai		Fines				
Cobbles	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total	
	_										

D ₅	D ₁₀	D ₁₅	D ₂₀	D ₃₀	D ₄₀	D ₅₀	D ₆₀	D ₈₀	D ₈₅	D ₉₀	D ₉₅

Geisser Engineering Corporation

APPENDIX B

Boring Plans, June 2018

INDEX

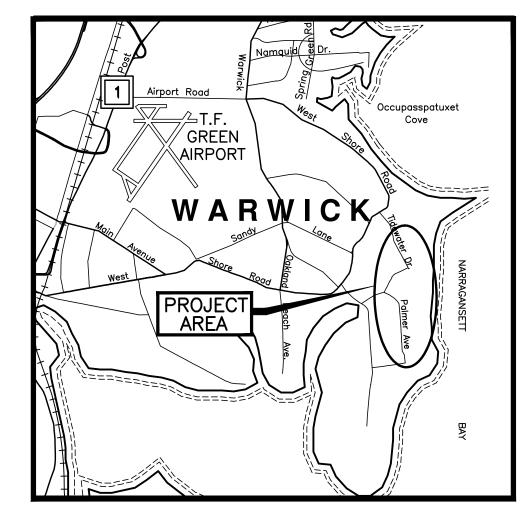
STREETS COVERED

COVER SHEET

CITY OF WARWICK, RHODE ISLAND

SYSTEM OF SEWERS

CONTRACT NO. 86D



LOCATION PLAN

BAYSIDE SEWER SYSTEM SUBSURFACE EXPLORATION CONTRACT PLANS



HONORABLE SCOTT AVEDISIAN, MAYOR

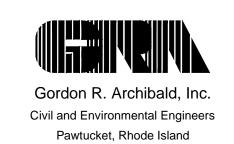
WARWICK SEWER AUTHORITY

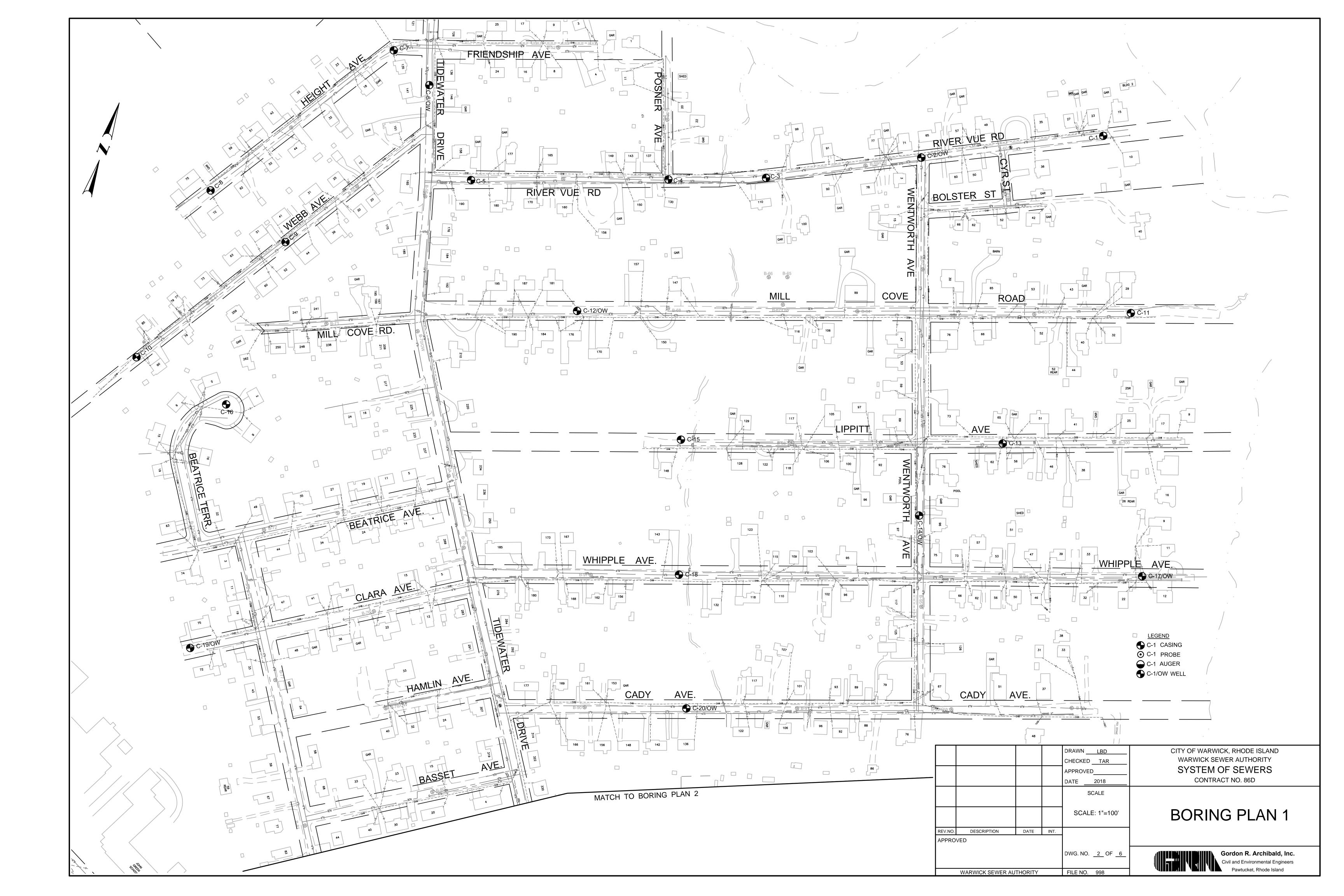
PETER T. GINAITT, CHAIRMAN

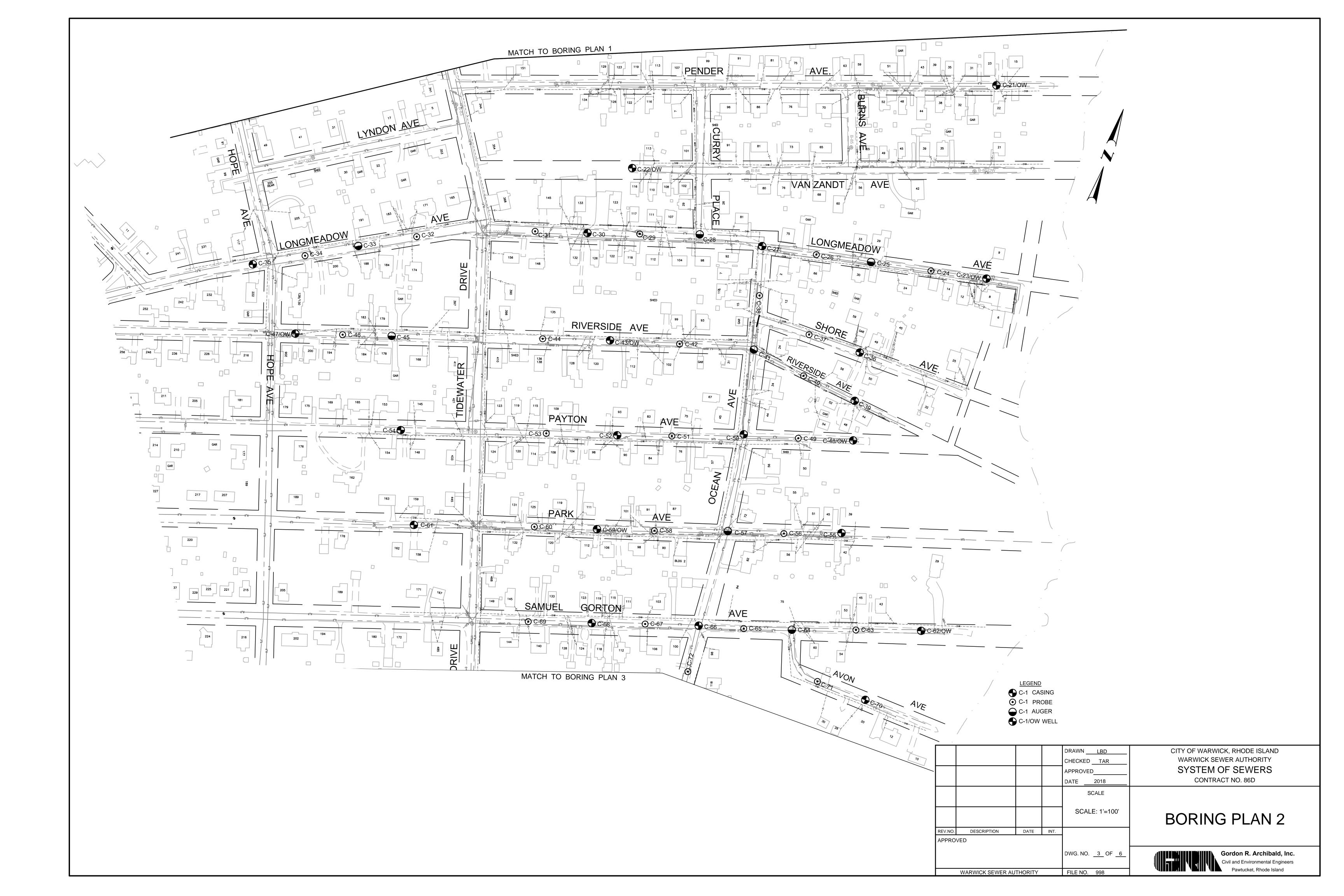
TINA S. MORETTI GARY C. JARVIS

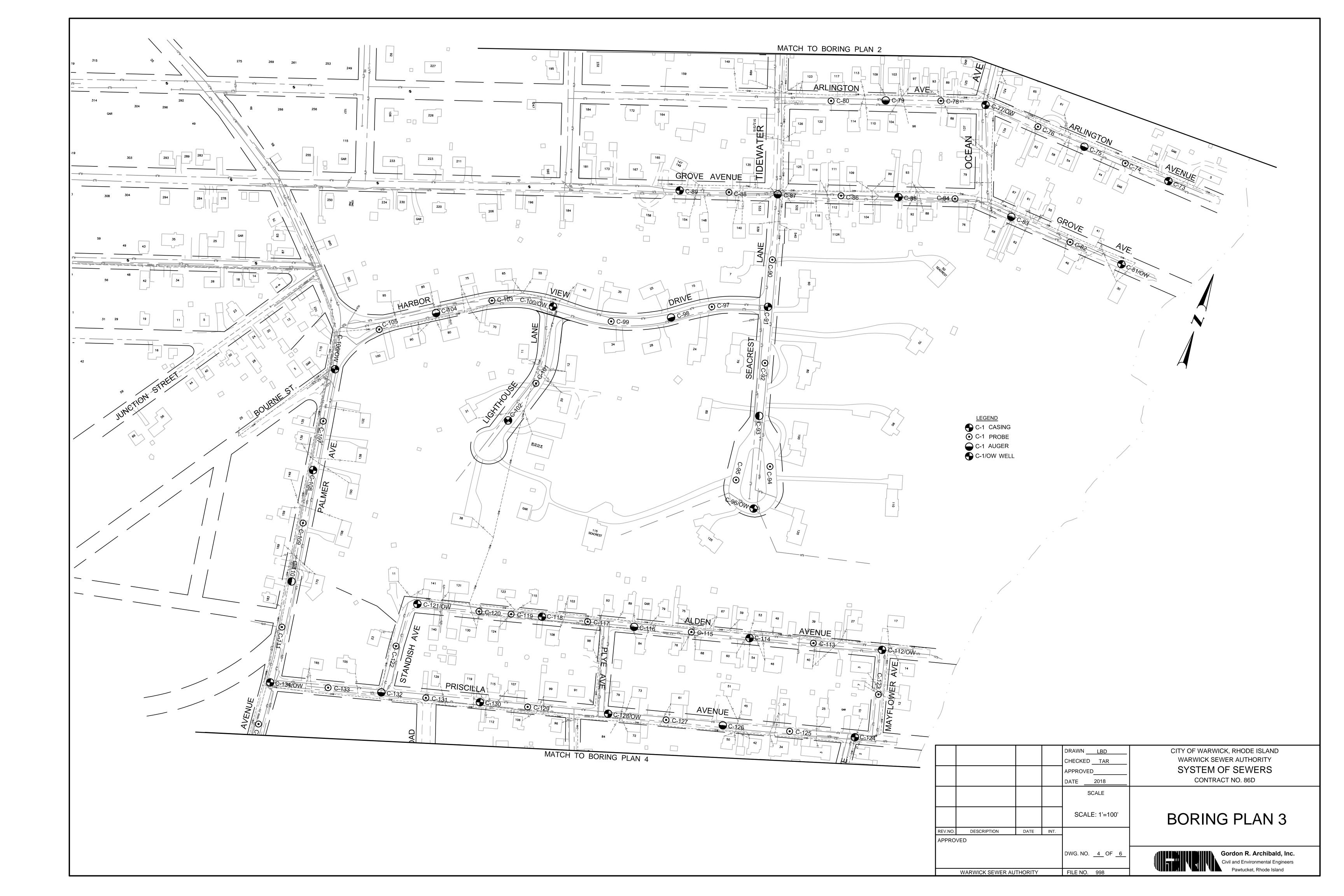
JOHN S. JUSTO GARY P. MARINO

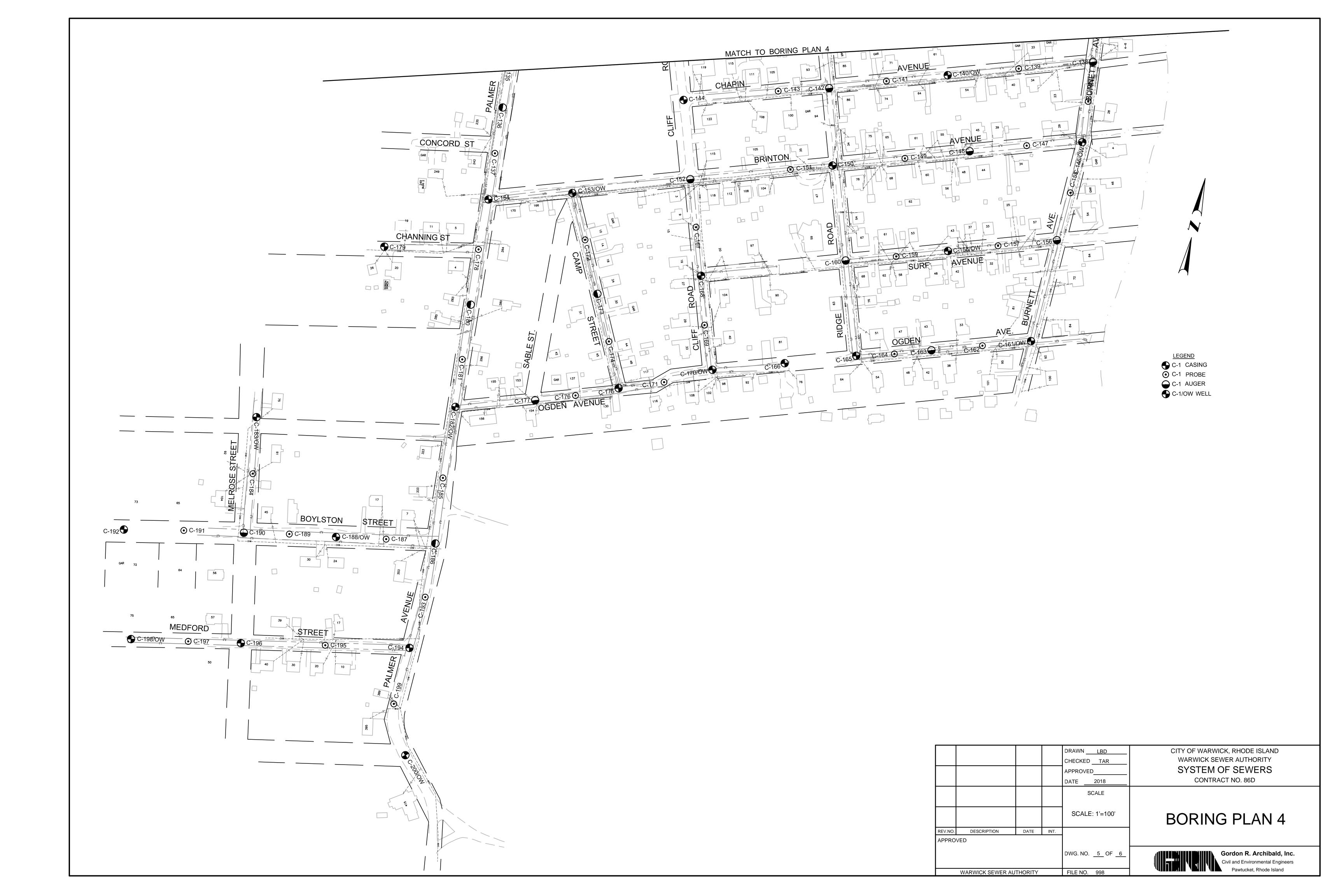
JANUARY 2018







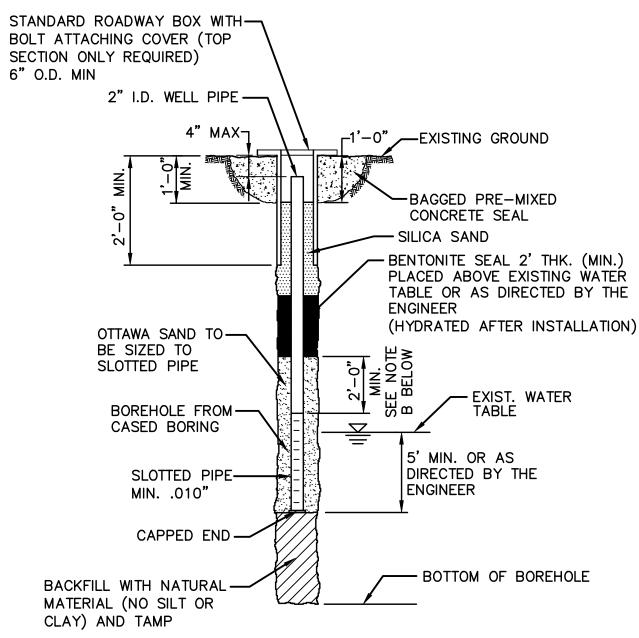




Boring Number	Cased Boring 3-inch Dia.	Cased Boring 4" inch Dia. with Observation Wells	Hollow Stem Auger Continous Sampling	Hollow Stem Auger Interval Sampling	Hollow Stem Auger Probe	Boring Number	Cased Boring 3-inch Dia.	Cased Boring 4" inch Dia. with Observation Wells	Hollow Stem Auger Continous Sampling	Hollow Stem Auger Interval Sampling	Hollow Stem Auger Probe
C-1	12					C-1	12				
C-2/OW		12				C-2/OW		12			
C-3	12					C-3	12				
C-4	12					C-4	12				
C-5	12					C-5	12				
C-6/OW		12				C-6/OW		12			
C-7	12					C-7	12				
C-8	12					C-8	12				
C-9/OW		12				C-9/OW		12			
C-10	12					C-10	12				
C-11	12					C-11	12				
C-12/OW		12				C-12/OW		12			
C-13	12					C-13	12				
C-14/OW		12				C-14/OW		12			
C-15	12					C-15	12	12			
C-16	12					C-16	12				
C-17/OW		12				C-17/OW	12	12			
C-18	12	12				C-17/OVV	40	12			
C-19/OW	12	12				C-19/OW	12	12			
C-20/OW		12									
		12				C-20/OW		12			
C-21/OW						C-21/OW		12			
C-22/OW		12				C-22/OW		12			
C-23/OW		12				C-23/OW		12			
C-24					12	C-24					12
C-25			12			C-25			12		
C-26					12	C-26					12
C-27	12					C-27	12				
C-28				12		C-28				12	
C-29					12	C-29					12
C-30	12					C-30	12				
C-31					12	C-31					12
C-32					12	C-32					12
C-33			12			C-33			12		
C-34					12	C-34					12
C-35	12					C-35	12				
C-36	12					C-36	12				
C-37					12	C-37					12
C-38					12	C-38					12
C-39	12					C-39	12				
C-40					12	C-40					12
C-41			12			C-41			12		
C-42			. –		12	C-42			12		12
C-43/OW		12				C-43/OW		12			12
C-44		12			12	C-44		12			12
C-45				12	12	C-44 C-45				12	12
C-46				12	12					12	40
C-47/OW		12			12	C-46		40			12
						C-47/OW		12			
C-48/OW		12			40	C-48/OW		12			
C-49					12	C-49					12
C-50	12					C-50	12				
C-51					12	C-51					12
C-52	12					C-52	12				
C-53					12	C-53					12
C-54	12					C-54	12				
C-55	12					C-55	12				
C-56					12	C-56					12
C-57				12		C-57				12	
C-58					12	C-58					12
C-59/OW		12				C-59/OW		12			
C-60					12	C-60					12
C-61	12					C-61	12				
C-62/OW		12				C-62/OW		12			
C-63					12	C-63					12
C-64			12			C-64			12		
C-65					12	C-65					12
C-66	12					C-66	12				
C-67					12	C-67					12
C-68	12					C-68	12				
C-69					12	C-69					12
C-70	12					C-70	12				
C-71					12	C-71					12
C-72					12	C-72				_	12
C-73	12					C-73	12				
C-74	_				12	C-74	· -				12
C-75				12		C-74				12	14
C-76				· <u>-</u>	12	C-75				14	12
C-77/OW		12			14	C-76		12		<u> </u>	14
		14			12			12			40
[-/×		-			14	C-78					12
C-78			40		'	^			1~		
C-78 C-79			12		12	C-79 C-80			12		12

Boring Number	Cased Boring 3-inch Dia.	Cased Boring 4" inch Dia. with Observation Wells	Hollow Stem Auger Continous Sampling	Hollow Stem Auger Interval Sampling	Hollow Stem Auger Probe
C-1	12				
C-2/OW		12			
C-3	12				
C-4	12				
C-5	12				
C-6/OW		12			
C-7	12				
C-8	12				
C-9/OW		12			
C-10	12				
C-11	12				
C-12/OW		12			
C-13	12				
C-14/OW		12			
C-15	12				
C-16	12				
C-17/OW		12			
C-18	12				
C-19/OW		12			
C-20/OW		12			
C-21/OW		12			
C-22/OW		12			
C-23/OW		12			
C-24					12
C-25			12		
C-26					12
C-27	12				
C-28				12	
C-29					12
C-30	12				
C-31					12
C-32					12
C-33			12		
C-34					12
C-35	12				
C-36	12				
C-37					12
C-38					12
C-39	12				
C-40					12

NOTE: ALL FIGURES IN TABLE ARE DEPTHS IN FEET.



NOTES

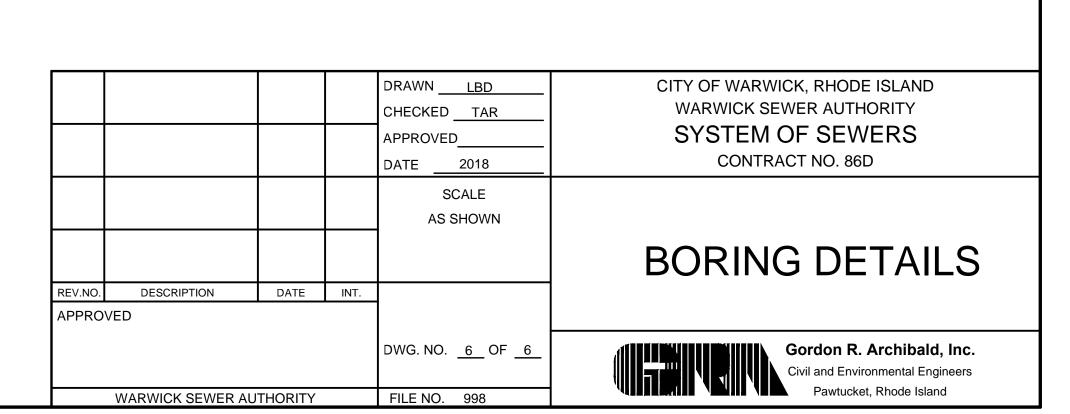
- A. WELL MADE BY DRIVING CASING TO REQ'D DEPTH, CLEANING OUT AND INSERTING 2" I.D. SLOTTED PIPE AND RISER PIPE, OTTAWA SAND AND BENTONITE SEAL WHILE SIMULTANEOUSLY BUMPING BACK CASING (NO GREATER THAN 1') UNTIL HOLE IS COMPLETELY BACKFILLED IN INCREMENTS AND CASING HAS BEEN REMOVED.
- B. IF BOREHOLE DOES NOT REACH THE EXISTING WATER TABLE, THE 2'-0" MIN. DIMENSION SHOULD BE MEASURED FROM THE BOTTOM OF THE BOREHOLE UP TO THE BENTONITE SEAL.

OBSERVATION WELL WITH STANDARD ROADWAY BOX

NOT TO SCALE

GENERAL NOTES

- 1. THE CONTRACTOR SHALL COMPLETE ALL CASED AND AUGER BORINGS TO THE SCHEDULED DEPTH AS SPECIFIED IN THE TABLES ON SHEET NO. 6. IF REFUSAL IS ENCOUNTERED AT LESS THAN THE SCHEDULED DEPTH, THE CONTRACTOR SHALL OBTAIN A ROCK CORE TO THE SCHEDULED DEPTH, UNLESS REFUSAL IS ENCOUNTERED WITHIN 5 FEET OF THE SCHEDULED DEPTH IN WHICH CASE THE CONTRACTOR SHALL OBTAIN A MINIMUM 5 FOOT ROCK CORE. THE ENGINEER MAY ELECT TO ELIMINATE ROCK CORING REQUIREMENTS AT ANY BORING LOCATION.
- 2. THE ENGINEER MAY REQUIRE THAT THE PROPOSED DRILLING LOCATION BE REVISED TO MINIMIZE DISTURBANCE TO PRIVATE PROPERTY. IN SUCH CASE THE CONTRACTOR SHALL MEASURE AND RECORD THE ACTUAL LOCATION WHERE THE DRILLING WAS COMPLETED.
- 3. THE CONTRACTOR'S ATTENTION IS DIRECTED TO THE FACT THAT THE LOCATIONS OF SOME BORINGS MAY BE IN DIFFICULT PLACES AND THAT TEMPORARY RIGGING, CRIBBING, BLOCKING, SHIELDING, ETC., MAY BE NEEDED TO MOBILIZE THE DRILLING EQUIPMENT AND PERFORM THE WORK. NO SEPARATE OR ADDITIONAL PAYMENT WILL BE MADE FOR MOBILIZATION AND ACCESS DIFFICULTIES RELATED TO ANY BORING SHOWN ON THE PLANS. MOBILIZATION AND ACCESS DIFFICULTIES SHOULD BE RECOGNIZED BY THE BIDDER, AND COSTS ASSOCIATED WITH SAME INCLUDED IN THE LUMP SUM BID FOR "MOBILIZATION AND DEMOBILIZATION".
- 4. ROCK CORES, WHERE REQUIRED, SHALL BE 2 INCH MINIMUM DIAMETER CORE SAMPLES. THE CONTRACTOR SHALL USE WHATEVER MEANS NECESSARY, WITHIN THE LIMITATIONS OF THE SPECIFICATIONS, TO ALLOW TAKING OF A ROCK CORE OF AT LEAST THE REQUIRED DIMENSION. SUCH TECHNIQUES MAY INCLUDE THE USE OF AN OVERSIZE CASING AND TELESCOPING TO A SMALLER SIZE, AS REQUIRED, TO ADVANCE CASING AND THE ROCK BIT OF ADEQUATE SIZE TO THE BEDROCK SURFACE.
- 5. THE CONTRACTOR SHALL CHECK AND VERIFY THE EXACT LOCATION OF ALL EXISTING UTILITIES AND SERVICE CONNECTIONS, BOTH UNDERGROUND AND OVERHEAD WITH "DIG-SAFE", AND ANY PUBLIC OR PRIVATE ENTITY RESPONSIBLE FOR OWNERSHIP AND/OR OPERATION OF ANY UTILITIES. ANY DAMAGE TO UTILITIES WHICH ARE SHOWN ON THE PLANS OR DETAILED BY THE AFOREMENTIONED AGENCIES SHALL BE THE CONTRACTORS RESPONSIBILITY.
- 6. BORING LOCATIONS (LINE AND GRADE) FOR THE ENTIRE WORK IS TO BE LAID OUT BY THE ENGINEER.
- 7. THE CONTRACTOR SHALL COMPLETE THE WORK AS TO MINIMIZE DISTURBANCE TO PRIVATE PROPERTY.
- 8. ALL MATERIALS AND PROCEDURES UTILIZED BY THE CONTRACTOR SHALL BE IN ACCORDANCE WITH THE TECHNICAL SPECIFICATIONS AND CONTRACT AGREEMENT FOR SUBSURFACE EXPLORATIONS ACCOMPANYING THESE PLANS AND WITH THE LATEST EDITION OF THE RHODE ISLAND DEPARTMENT OF TRANSPORTATION STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION, WITH LATEST REVISIONS.
- 9. THE CONTRACTOR SHALL NOTIFY THE ENGINEER FIVE WORKING DAYS IN ADVANCE OF THE COMMENCEMENT OF WORK AND ANY CHANGE IN THE NUMBER OF RIGS TO FACILITATE SCHEDULING FOR LAYOUT AND INSPECTION.
- 10. THE CONTRACTOR SHALL RESTRICT HIS ACTIVITIES TO THE DESIGNATED WORK AREAS, AND EXISTING ROADWAY. SHOULD ACCESS TO OTHER AREAS BE REQUIRED, CONTRACTOR SHALL CONTACT THE ENGINEER.



APPENDIX C

Boring Logs: 2006, 2016, and 2018

		_			ORING, INC. ROCKTON, MA 0	2301	PROJECT Interceptor & Lateral Sewers Warwick, RI Gordon Archibald, Inc. BORING LOCATION					ORT OF BOI SHEET FILE No. CHKD, B		B-52 1 OF 1 06217
NSPE	SIFIE	3/7	Paul Wo	i			GROUND SURI DATE START	TION FRIE FACE ELEVATIO - 2/8	N			DATUM 2/8/06		
AMP	LER:				TED, SAMPLER (140 lb. HAMMER					GROU	NDW	ATER READ	NGS	
ASIN	G:	UNI	LESS OTI	HERWISE NOT	ED, CASING DR	IVEN USING A	300 lb.	DATE	TIME	WA	TER	CASING	STABILI	ZATION TIME
			MMER FA	LLING 24 In.				2/8/06					Upon	Completion
ASIN	GSI	ZE:			OTHER:	2 1/4" Augen		()			R			
E	4 L			SAMPLE		4	SAMPLE	DESCRIPTION			E			
	W 9	NO.	PEN./ REC	DEPTH (Ft.)	BLOWS/6"						K	8	RATUM DES	CRIPTION
0		S1	24/16	0-2	6-15	Dense, yel	low brown, fine to	coarse SANI).			3" ASPHA	LT	
					17-14	1					0	1		
ŀ	_					4								
	_	S2	24/14	5-7	5-11	Medium de	nse, brown, fine	to coarse SAN	ID, little fin	e		4'		
5					10-8	gravel.	,,		,					
-						4	-							
H	-	, S3	24/18	10 - 12	9-10	Madium do	nse, wet, brown,	fine to economic	CAND					
0 -		33	24/10	10-12	13-16	little fine gra		IIIIe IO COGISE	SAND,					
t					10-10	Intao into gre	AFGI.							
												14'		
-		S4	18/18	14 - 15'6"	34-38	1	, brown, fine to c	oarse SAND a	ind					
5					69-30/0"	GRAVEL.				- 1				
-		-				Rottom of B	loring @ 15'6"			-	-	16'		
-						DOCCOLL OF D	ound to 100			- 1				
						1				- 1				
۱-										- 1				
-	-					-				1				
H	\dashv	\dashv				1								
-											- 1			
F														
Ľ														
-	_	-												
-	-	\dashv	-											
-	1	\dashv								1				
, [1			
	1													
GE	ANI	II AP	SOILS	!	OHESIVE SO	IIS I								
В	ows	/Ft De	ensity		Blows/Ft Dens	10.5	REMARKS:							
	- 4 -10		V. LOOS		/. SOFt SOFT									
10	-30 -50		M. DENS		M. STIFF STIFF									
	i0			E 15-30 \	/. STIFF									
TES	. 4	STR	ATIFIC	>30	HARD S REPRESEN	T APPROVI	MATE BOUNDA	RY RETWEEN	I SOIL TVI	DES T	RAN	SITIONS	AY BE GD	ADIIAI
	2	WAT	FRIFV	E READIN	GS HAVE BEE	IN MADE AT	TIMES AND UN	IDED CONDI,	TIONE STA	TED	FILK	THATION	S OF GPO	INDWATER

		1	_			BORING, INC. BROCKTON, MA 02	2301	Gori	PROJECT ptor & Lateral S Warwick, Ri don Archibald, li	nc.		· SH FIL	OF BORING NO IEET .E No, IKD. BY		B-53 1 OF 1 06217	
DRIL CLA INSF	SSI	FIE	D 8Y: R:	Paul Word				BORING LOCAT GROUND SURF DATE START		N		DAT(ND 1/20/				
SAM	PLE	ER:				TED, SAMPLER C 140 lb. HAMMER					GROUNI	DWATER	READINGS			
CAS	NG	ì				TED, CASING DRI	IVEN USING A	300 lb.	DATE	TIME	WATE	R CAS	ING ST	'ABILIZA	TION TIME	
CAS	NG	SIZ		MMER FA	LING 24 In.	OTHER:	2 1/4" Augers		1/20/06		14'	-		Upon Co	mpletion	
D E		B			SAMPLE		T		ESCRIPTION		1	R E				
P T H	8 N G	W	NO.	PEN./ REC	DEPTH (Ft.)	BLOWS/6*		M K S						STRATUM DESCRIPTION		
0	L		S1	24/10	6" - 2'6"	9-18	1	ck brown, fine to	coarse SAND	and		5* A	SPHALT			
	H					15-8	GRAVEL.									
							1									
5	H	_	S2	24/12	5-7	10-16	Dense, bro	wn, fine SAND.								
						20-24	1									
	L	_					-				- 1					
10			S3	12/12	10 - 11	7-9	Medium de	nse, gray brown,	silty SAND.			10 ⁻				
	S4 12/12 11 - 12 16-15 Dense							wn, fine to coarse	SAND.	á		11'				
	S4 12/12 11 - 12 16-15 Dense,											1				
			S5	24/20	15 - 17	7-10	Medium de	nse, brown, fine to	coarse SAN	ID with	-					
15		\exists				9-8	fine silt laye		, , , , , , , , , , , , , , , , , , , ,	,						
	_	\dashv					-				1					
Ì			S6	24/24	19 - 21	11-20	Dense, bro	wn, fine to coarse	SAND.							
20		4				15-17	-					041				
							Bottom of B	foring @ 21'			-	21'				
		4														
	-	+									- 1					
25		1														
-	-	+	-	-												
		1														
30	_	+	-													
												1			ļ	
	RA	N	JLAR	SOILS	Т :	COHESIVE SO	ILS									
		WS 4		ensity V. LOOS	E <2	Blows/Ft Dens V. SOFt	ity	REMARKS:								
	4-1 10-	10 30	1	LOOS M. DENS		SOFT M. STIFF										
:		50		DENS	E 8-15 E 15-30	STIFF										
>30 HARD NOTES: 1) STRATIFICATION LINES REPRESENT APPROXIMATE								MATE BOLINDAR	Y BETWEEN	SOII TYE	PES TP	ANSITIC	NS MAY PE	GRAI	ILIAI	
 WATER LEVEL READINGS HAVE BEEN MADE AT TIMES AND UNDER COMMAY OCCUR IDUE TO OTHER FACTORS THAN THOSE PRESENT AT TO. 								DER CONDI	TIONS STA	TED, F	LUCTUA	TIONS OF				
													BORING	No	B-53	

	1	215 W			BORING, INC. PROCKTON, MA 02	301	Interceptor & Lateral Sewers Warwick, RI Gordon Archibald, Inc.				SHEET FILE N	o.	B-54 1 OF 1 06217	
CLA	LER: SSIFIE ECTO		Paul Wo				BORING LOCAT GROUND SURF DATE START	ION WEB!	B APE. On	DATE	END	DATUM 1/20/06	ву	
SAM	PLER:				TED, SAMPLER C					GROU	NDW/	ATER REA	DINGS	
CASI	NG:				TED, CASING DRI	VEN USING A	300 lb.	DATE	TIME	WAT		CASING	p 100 0	ZATION TIME
CASI	NG SI		MMER FA	LLING 24 In.	OTHER:	2 1/4" Augers		1/20/06		1	5'		Upon	Completion
D	СВ	I				Z III. Magain				_	R	-		
E P T	A L 8 O N W	-	PEN./	SAMPLE DEPTH	1	-	SAMPLE D	ESCRIPTION			M K	;	STRATUM DES	CRIPTION
Н	G 9	_	REC	(FL)	BLOWS/6*		Devices when the state is a state of	5 01110			S	011 4 0 0 1		
0	-	S1	24/18	0-2	5-7 10-11	IMEGIUM GE	nse, yellow browi	1, Tine Sand.				3" ASPH	IALI	
]								
		S2	24/20	5-7	44.40	Danas has	um Ara CAND							
5		32	24120	5-7	11-19 29-37	Dense, bro	wn, fine SAND.							
						1								
					ļ	1								
		53	24/22	10 - 12	11-16	Dense, bro	wn, fine to coarse	SAND.						
10					24-22		•							
						-								
		S4	24/18	14 - 16	9-8	Medium de	nse, brown, wet, f	ine to coarse	SAND.	\dashv		14'		
15					8-15		,,,, .							
10												16'		
l						Bottom of B	loring @ 16'							
20														
					-									
Ì														
25	-	_								1	- 1			
ł	\exists										1			
											- 1			
-	-													
30	\dashv													
	RANI	JI AR	SOILS		COHESIVE SO	IIS T					_ [
		/Ft D	ensity V. LOOS		Blows/Ft Densi	2-036	REMARKS:							
	4-10		LOOS	SE 2-4	V. SOFt SOFT									
:	10-30 30-50			SE 8-15	M. STIFF STIFF									
:	>50		V. DENS	SE 15-30 >30	V. STIFF HARD									
NOTES: 1) STRATIFICATION LINES REPRESENT APPROXIM 2) WATER LEVEL READINGS HAVE BEEN MADE AT						MATE BOUNDAR	NER CONDI	N SOIL TYP	PES, T	RAN	SITIONS	MAY BE GR	ADUAL.	
	4)	MA	YOCCU	IR I DUE TO	OTHER FACT	ORS THAN	THOSE PRESEN	IT AT THE TI	ME MEASU	JREME	ENTS	WERE	MADE	UITUTYAT EK
												E	ORING No	B-54

RIPLIER Part Worder CASSIFED PART CA		2			AMPSHIRE BI	ORING, INC. ROCKTON, MA 02	301		PROJECT ptor & Lateral So Warwick, Ri don Archibald, Ir			REP	ORT OF BO SHEET FILE NO CHKD.	o.	B-55 1 OF 1 06217	
SPOOK DRIVEN USING A 40 B. HAMMER FALLING 30 In. DATE	CLAS	SSIFI	R:					GROUND SURF	ACE ELEVATIO	N	DATE	END				
HAMMER FALLING 24 In. OTHER 214" Augers	SAM	PLER									GROU	NDW/	ATER REA	DINGS		
CASING SIZE: OTHER 2 14" Augers 112.00 14" Upon Lampseon 112.00 14" Upo	CAS	NG:				ED, CASING DRI	VEN USING A	300 lb.	DATE	TIME	WAT	TER	CASING	STABILE	ZATION TIME	
SAMPLE SAMPLE SAMPLE SAMPLE SAMPLE SAMPLE DESCRIPTION No. No. Rec. (FL) BLOWSN*	CASI	NG S		MMER FA	LLING 24 In.	OTHER:	2 1/4" Augen	3	1/20/06		14	'6"		Upon	Completion	
To FEN DEPTH BLOWS(8)* STRATUM DESCRIPTION Medium dense, brown, fine to coarse SAND, little STRATUM DESCRIPTION STRA		C B	1		SAMPLE		<u> </u>		ESCRIPTION		_					
S1 24/10 0 - 2 7-12 Medium dense, brown, fine to coarse SAND, little gravel. 3" ASPHALT 3" ASPHALT 5 5 - 6"5" 12-43 100/3" 100/3" 100/3" 100/3" 100/3" 14/6" 176-70 14/6" 15/6" 12/12 14/6" - 15/6" 42-38 12/12 14/6" - 15/6" 42-38 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6" 15/6"	P T	S O			DEPTH	DI OLUOMI	1	DAMI EL D	LOGICI TIDA			M K		STRATUM DESCRIPTION		
S2 15/16 5 - 6/5" 12-43 Very dense, brown, fine to coarse SAND. Boulder 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3"	$\overline{}$	_	1				Medium de	ense, brown, fine t	o coarse SAN	VD, little		8	3" ASPH	ASPHALT		
10 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3"							1	• • • • • • • • • • • • • • • • • • • •		•						
10 S3 12/12 10 - 11 36-115 Very dense, brown, fine to coarse SAND and GRAVEL. 14'6" S4 12/12 13'6" - 14'6" 76-70 Very dense, gray, sility SAND. 15'6" 42-36 15'6" 42-36		_	-				-						-			
10 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3" 100/3"		\vdash	S2	15/15	5 - 615"	12-43	Very dense	e. brown, fine to co	parse SAND.	Boulder						
15 S4 12/12 13'6" - 14'6" 78-70 Very dense, gray, slity SAND. 15 S4A 12/12 14'6" - 15'6" 42-36 Bottom of Borling @ 15'6" 20 SRANULAR SOILS Blows/Ft Density Blows/Ft Density Density C-4 V. LOOSE 24 SOFT 4-10 LOOSE 24 SOFT 10-30 M. DENSE 4-8 M. STIFF 30-50 DENSE 8-15 STIFF S-50 V. DENSE 16-30 V. STIFF	5			75/10	0 00			.,, ,								
15 S4 12/12 13'6" - 14'6" 78-70 Very dense, gray, slity SAND. 15 S4A 12/12 14'6" - 15'6" 42-36 Bottom of Borling @ 15'6" 20 SRANULAR SOILS Blows/Ft Density Blows/Ft Density Density C-4 V. LOOSE 24 SOFT 4-10 LOOSE 24 SOFT 10-30 M. DENSE 4-8 M. STIFF 30-50 DENSE 8-15 STIFF S-50 V. DENSE 16-30 V. STIFF																
15 S4 12/12 13'6" - 14'6" 78-70 Very dense, gray, slity SAND. 15 S4A 12/12 14'6" - 15'6" 42-36 Bottom of Borling @ 15'6" 20 SRANULAR SOILS Blows/Ft Density Blows/Ft Density Density C-4 V. LOOSE 24 SOFT 4-10 LOOSE 24 SOFT 10-30 M. DENSE 4-8 M. STIFF 30-50 DENSE 8-15 STIFF S-50 V. DENSE 16-30 V. STIFF											ı					
14/6"	S3 12/12 10 - 11 36-115 Very dense, brown, fine to coarse SAND and GRAV															
S4 12/12 13/6" - 14/6" 78-70 Very dense, gray, slity SAND. 15/6"	10															
S4A 12/12 14/5" - 15/5" 42-36 15/6"		_	21	10110	101011 1 1101			W 0410			\dashv		14'6"			
156" Bottom of Boring @ 15'6" 20 25 GRANULAR SOILS Blows/Ft Density 0 - 4 V. LOOSE < 2 V. SOFt 4-10 LOOSE < 2-4 SOFT 10-30 M. DENSE 4-8 M. STIFF 30-50 V. DENSE 18-15 STIFF >-50 V. DENSE 18-15 STIFF >-50 V. DENSE 18-15 STIFF 15'6" Bottom of Boring @ 15'6" REMARKS:			-				very dense	, gray, silty SAND	.							
20 25 30 GRANULAR SOILS Blows/Ft Density 0 - 4 V. LOOSE 4-9 M. STIFF 10-30 M. DENSE 4-8 M. STIFF 30-50 V. DENSE 4-8 M. STIFF 8-15 STIFF 15-30 V. STIFF 16-30 V. STIFF	4.5		UTA	12712	140 - 100	42-30							15'6"			
25 GRANULAR SOILS Blows/Ft Density 0 - 4	15						Bottom of E	Boring @ 15'6"								
25 GRANULAR SOILS Blows/Ft Density 0 - 4							Č.									
25 GRANULAR SOILS Blows/Ft Density 0 - 4																
25 GRANULAR SOILS Blows/Ft Density 0 - 4	20										- 1					
GRANULAR SOILS Blows/Ft Density 0 - 4	20															
GRANULAR SOILS Blows/Ft Density 0 - 4			\vdash													
GRANULAR SOILS Blows/Ft Density 0 - 4	1															
GRANULAR SOILS Blows/Ft Density 0 - 4	25															
GRANULAR SOILS COHESIVE SOILS Blows/Ft Density Blows/Ft Density 0 -,4 V. LOOSE <2 V. SOF1 4-10 LOOSE 2-4 SOFT 10-30 M. DENSE 4-8 M. STIFF 30-50 DENSE 8-15 STIFF >50 V. DENSE 15-30 V. STIFF												- 1				
GRANULAR SOILS COHESIVE SOILS Blows/Ft Density Blows/Ft Density 0 -,4 V. LOOSE <2 V. SOF1 4-10 LOOSE 2-4 SOFT 10-30 M. DENSE 4-8 M. STIFF 30-50 DENSE 8-15 STIFF >50 V. DENSE 15-30 V. STIFF	1		\vdash	-												
GRANULAR SOILS COHESIVE SOILS Blows/Ft Density Blows/Ft Density 0 -,4 V. LOOSE <2 V. SOF1 4-10 LOOSE 2-4 SOFT 10-30 M. DENSE 4-8 M. STIFF 30-50 DENSE 8-15 STIFF >50 V. DENSE 15-30 V. STIFF	[- 1					
Blows/Ft Density Blows/Ft Density REMARKS:	30															
Blows/Ft Density Blows/Ft Density REMARKS:	-														1	
Blows/Ft Density Blows/Ft Density REMARKS:													4-1	<u>V</u>		
04 V. LOOSE <2 V. SOFt 4-10 LOOSE 2-4 SOFT 10-30 M. DÉNSE 4-8 M. STIFF 30-50 DENSE 8-15 STIFF >50 V. DENSE 15-30 V. STIFF																
10-30 M. DÉNSE 4-8 M. STIFF 30-50 DENSE 8-15 STIFF >50 V. DENSE 15-30 V. STIFF		0 -,4		V. LOO	SE <2	V. SOFt		i smininti								
>50 V. DENSE 15-30 V. STIFF	19	10-30) [M. DEN	SE 4-8	M. STIFF										
>30 HARD																
NOTES: 1) STRATIFICATION LINES REPRESENT APPROXIMATE BOUNDARY BETWEEN SOIL TYPES, TRANSITIONS MAY BE GRADUAL.	TOL	· .			>30	HARD	T ADDDOV	MATE BOI INDA	O BETWEEN	USON TVE	ES T	RAN	SITIONS	MAY RE CP	ADLIAI	
2) WATER LEVEL READINGS HAVE BEEN MADE AT TIMES AND UNDER CONDITIONS STATED, FLUCTUATIONS OF GROUNDWATER MAY OCCUR; DUE TO OTHER FACTORS THAN THOSE PRESENT AT THE TIME MEASUREMENTS WERE MADE	1011	2)	WAT	ER LE	EL READIN	IGS HAVE BEE	N MADE A	TIMES AND UN	DER CONDI	TIONS STA	TED.	FLU	CTUATIC	NS OF GRO	UNDWATER	
MAY OCCUR TOUR TACTORS THAN THOSE PRESENT AT THE TIME MEASUREMENTS WERE MADE BORING No B-55			IVIA	الالالال	AN IDUC IT	OTHER PACT	ONO ITAN	HOSE FRESEN	u ALIME II	MIL MILMOU	i CEIVII	-141¢	Γ		P. 55	

		1218				ORING, INC. ROCKTON, MA 07	2301		PROJECT ptor & Lateral So Warwick, Ri don Archibald, Ir			REP	ORT OF B SHEET FILE N CHKD.	io.	B-56 1 OF 1 06217	
INSF	EC	IED E	BY: J	Paul Word				BORING LOCAT GROUND SURF, DATE START	ION TIDES	n N		END	DATUM 2/2/06			
SAM	PLE					TED, SAMPLER O 140 lb. HAMMER					GROU	NDW/	ATER REA	DINGS		
CAS	NG:	. 1	UNLE	SS OTH	ERWISE NO	TED, CASING DR	IVEN USING A	300 lb.	DATE	TIME	WA:	TER	CASING	STABILI	ZATION TIME	
CAS	NG	i Size:		MER FAL	LING 24 In.	OTHER:	2 1/4" Augen		2/2/06		7'	6"		Upon	Completion	
D	a	В			-	Official	Z I/4 Auges					R				
E P T	A S N	0	Т	PEN./	SAMPLE	T	-	SAMPLE D	ESCRIPTION			E M K		STRATUM DESCRIPTION		
Н	G	8 N	0.	REC	(Ft)	BLOWS/6"						8				
0	-	- 8	31	24/18	6" - 2'6"	12-16 8-11	7	nse, yellow browi	n, fine to coar	se SAND,			4" ASPI	HALT		
	-	+	+	-		0-11	little gravel									
]									
5	L	8	2 2	24/22	5-7	6-16	Dense, bro	wn, fine to coarse	SAND.							
	-	+	+	-		14-26	-						7'			
		士														
		1	1													
10	_	S	3 2	24/15	10 - 12	30-50	Very dense	, gray, fine to coa	rse SAND.			1				
	_	+	+	_		28-34	-									
			\top				1									
15	_	S	-	12/6	15 - 16	28-24	Same as S				_	_	16'			
	-	S	IA	12/8	16 - 17	8-8	Medium de	nse, brown, fine s	ilty SAND.		1					
		\dagger	1				1				1					
		S	5 2	4/22	19-21	15-36							19'			
20	_	+	+	-		27-24	Till				1		041			
1	_	+	+	-			Bottom of B	oring @ 21'			-		21'			
			T					orning (g. a.)			1					
			1													
25	-	+	+	-			1									
ł	_	+	+	\dashv												
Ì												-				
			T													
30	_	+	+	-												
ł		+	+	-+												
			1													
		NUL ws/F		OILS		COHESIVE SO Blows/Ft Dens		REMARKS:								
	0 - 4-1	4		LÓOS	E <2 E 2-4	V. SOFt SOFT										
	0-	30	M	DENS	E 4-8	M. STIFF										
	30-4 -50		V.	DENS	E 8-15 E 15-30	STIFF V. STIFF										
IOTE	·Q.	1) 6			>30	HARD	IT ADDDOV	MATE BOUNDAR	OV RETAICE	I SOIL TVE	т одс	PAN	SITIONS	MAY RE CD	ADUAL	
.016	, ی	2) W	ATE	R LEVE	EL READIN	IGS HAVE BE	EN MADE AT	TIMES AND UN THOSE PRESEN	DER CONDI	TIONS STA	TED.	FLU	CTUATIO	ONS OF GRO	UNDWATER	
		N	VIP'N T		(IDUE IC	OTHER PACI	ORG IRAN	THOSE FRESEN	ויאי ומב 11	INC MEAS	24/EIVI	THE S	Г	BORING No	B-56	
														POLINA IND	טיים	

		1215 14			ORING, INC.	2204	luterne	PROJECT ptor & Lateral Se			REPO	ORT OF E	ORING No.	B-57
		1210 4	COI ONE	.511901 51. 0	KOOKTON, WIA U	2301	interce	Warwick, RI	SWG12	- 1		FILEN		1 OF 1 06217
								don Archibaid, Ir				CHKD.	BY	
	LER:	ED BY:	Paul Wo	ordell			BORING LOCAT GROUND SURF			0.		DATUM		
1	ECT		J. Rivan	d			DATE START	1/26		DATE I	END	1/26/06		
SAM	PLEF				TED, SAMPLER (140 lb. HAMMER					GROUN	NDWA	TER REA	ADINGS	
CAS	NG:				TED, CASING DR	IVEN USING A	300 lb.	DATE	TIME	WAT	ER	CASING	STABIL	IZATION TIME
CAS	NG S		MMER FA	LLING 24 In.	OTHER:	2 1/4" Augen		1/26/06		6'			Upor	Completion
D	C	3			OTTEN	T // / Kagon				<u> </u>	R			
P	8 0		PEN./	SAMPLE		4	SAMPLE D	ESCRIPTION		-	E M		CTDATUM DE	CODIDATION
H	N V	NO.	REC	(Ft)	BLOWS/6*						K S		STRATUM DE	SCRIPTION
0	_	S1	24/17	0-2	6-12	Medium de	nse, yellow brown	, fine SAND.				2 1/2" A	SPHALT	
	-	+			12-12	-						3'		
5		S2	24/24	5-7	16-23	7	, brown, fine to co	oarse SAND,	little fine					
					32-39	gravel.								
		-								1				
10		S3	18/0	10 - 11'6"	63-71	Boulder, No	Recovery.							
,,,					101	-								
	_	\vdash				1				1				
15		S4	24/22	15 - 17	71-23		wn, fine to coarse			_	4	15'6"		
	-	\vdash			22-35	Dense, gray Glacial Till	y, fine to coarse S	AND.						
						Sidolai (III								
		S5	18/13	19 - 20'6"	26-28	TIH								
20	_		-		75	Pottom of B	oring @ 20'6"			-	-1	20'6"		
						DOLLOW OF D	oring @ 200							
]								
-	_		-								1			
25	_										-			
1	_													
30														
G	RAN	JULAR	SOILS		COHESIVE SO	ILS						_		
		s/Ft D	ensity V. LOOS	SE <2	Blows/Ft Dens V. SOFt	ity	REMARKS:							
	4-10	}	LOO	SE 2-4	SOFT	i								
	10-31 30-51		M. DEN DEN	SE 4-8 SE 8-15	M. STIFF STIFF	ľ								
	>50			SE 15-30 >30										
NOTE	S:	1) STE	RATIFIC	ATION LINE	S REPRESEN	T APPROXI	MATE BOUNDAR	RY BETWEEN	SOIL TYP	ES, TF	RAN	SITIONS	MAY BE G	RADUAL.
	2	MA'	Y OCCL	/EL READIN JR I DUE T(OTHER FACT	ORS THAN	TIMES AND UN THOSE PRESEN	DER CONDIT IT AT THE TII	HONS STA ME MEASU	IREME	NTS	WERE	INS OF GRO MADE	DUNDWATER
													BORING No	B-57

		1215 V			BORING, INC. BROCKTON, MA 02	2301		PROJECT ptor & Laterat So Warwick, RI don Archibald, Ir			REP	ORT OF BO SHEET FILE NO CHKD.	Э.	B-58 1 OF 1 06217
DRII CLA INSF	SSIF	IED BY:	Paul Wo				BORING LOCAT GROUND SURF DATE START	ION POSA	ier ave N		END	DATUM 1/19/06		
SAM	PLE				OTED, SAMPLER OF 140 lb. HAMMER					GROU	NDW/	ATER REA	DINGS	
CAS	ING:				TED, CASING DR	IVEN USING A	300 lb.	DATE	TIME	WA ⁻	TER	CASING	STAB	ILIZATION TIME
CAS	MG (MMER FAI	LLING 24 In.	OTHER:	2 1/4" Augers	,	1/19/06		3	3'		Upe	on Completion
D	С	В				Z IIT Augus				_	R			
E P T	A S N	۰ 🖳	PEN./	SAMPLE DEPTH		1	SAMPLE D	ESCRIPTION			E M K		STRATUM D	ESCRIPTION
H	G	8 NO.	REC	(Ft)	BLOWS/6*						8			
0	-	S1	24/18	6" - 2'6"	9-9	Medium de	nse, yellow browi	n, fine SAND.				5" ASPH	IALT	
	-	+	-		7-10	1								
	H	+				1								
5		S2	24/18	5-7	5-9	Medium de	nse, brown, fine S	SAND.						
3					12-11	1								
	-	+				-								
	-	+				1								1
		S3	24/24	10 - 12	7-9	Medium de	nse, brown, fine S	SAND, trace of	of silt.					
10					9-6									
١,		-				1				- 1				
	_	S4	24/24	14 - 16	6-8	Modhum do	nse, gray, fine to	nama CAND	troop of		_	13'		
	-	54	24124	14-10	9-13	silt.	nse, gray, nne to	CURISE SAIND	, trace or					
15												16'		
						Bottom of E	Boring @ 16'		***					
	_	-				1				- 1				
	_	+	\vdash			1								
20		+												
														1
	-	-									- 1			
25	-	-				l				- 1	- 1			
											}			
ļ				-										
30	-		-							- 1				
1	-									- 1				- 1
G			SOILS ensity		COHESIVE SO Blows/Ft Dens		REMARKS:							
	0 -	4	V. LOOS		V. SOFt	n.j	I YEIVININO,							
	4-10 10-3			SE 2-4 SE 4-8	SOFT M. STIFF		E.							
1	30-5	0	DENS	SE 8-15 SE 15-30	STIFF									
	>50			>30	HARD									
ITO							MATE BOUNDAR T TIMES AND UN							
	•						THOSE PRESEN							
												E	ORING No	B-58

			No.	MARKET THE REAL PROPERTY OF THE PARKET	BORING, INC.	_		PROJECT			REP	ORT OF B	ORING No.	B-590W
		1215	WEST CHE	STNUT ST. E	ROCKTON, MA 02	2301	Interce	ptor & Lateral Se	ewers			SHEET		1 OF 1
							Cox	Warwick, Ri don Archibald, Ir				FILE N		06217
DRIL	LER		Paul Wo	ordell			BORING LOCAT				_	GHIND.	ום	
	SSIF	ED BY					GROUND SURF		N	DATE	END	DATUM 1/30/06		
SAM	PLEI				OTED, SAMPLER O 140 lb. HAMMER					GROU	NDW/	ATER REA	DINGS	
CAS	NG:	U	VLESS OT	HERWISE NO	TED, CASING DR	IVEN USING A	. 300 lb.	DATE	TIME	WAT	TER	CASING	STABIL	LIZATION TIME
		H	AMMER FA	LLING 24 In.									None en	countered here.
CAS			4"		OTHER:									
E	A	L		SAMPLE			SAMPLE D	ESCRIPTION			R			
P T	S N	W	PEN./	DEPTH		1					K		STRATUM DE	SCRIPTION
Н	g			(Ft.)	BLOWS/6"	1 d = 42 d =		- f DAND			8	48 A ODI	LATE	
U	\vdash	81	24/18	6" - 2'6"	5-9 9-8	Issiedium de	ense, yellow browi	n, tine SAND.				4" ASPI	1AL I	
	\vdash	1-	1			1				ĺ				
5		S2	24/24	5-7	6-7	Medium de	nse, brown, fine S	SAND, trace o	of silt.	1				
J	_	1_			10-11	4								
	_	-				4								
	_	-	-			-								
		S3	24/14	10 - 12	19-18	Dense bro	wn, fine SAND, tr	ace of allt				11'6"		
10					22-38		y, fine to coarse S		sllt, some	\neg				
						gravel.	•	•						- 1
		S4	24/19	13 - 15	21-27	Very dense	, gray, fine to coa	rse SAND, sc	me silt, son	ne				
		-			34-35	gravel.				- 1				1
15		+			-					-	_	15'		
	_	+-	+		-	Bottom of E	Boring @ 15'							1
		+-				1				1				1
						1				- 1				1
20]				- 1	1			1
20														1
		-	-			-				- 1	- 1			Į.
	_	+	\vdash		-	1								
		+				1				- 1				
25	_					1					- 1			
						1								
]								
ļ]								
30		-	-			1				- 1	- [
-	_					1								1
ŀ	-													
			SOILS		COHESIVE SO	E009-0								
	Blov 0 - 4		Density V. LOOS	SE <2	Blows/Ft Dens V. SOFt	sity	REMARKS:	5' screen 10' solid						1
	4-10)	LOO	SE 2-4	SOFT			Road box						į.
	10-3 30-5			SE 8-15	M. STIFF STIFF									
	>50			SE 15-30	V. STIFF	1								
OTE	S:	1) ST	RATIFIC	>30 ATION LIN	HARD ES REPRESEN	NT APPROX	MATE BOUNDAR	RY BETWEEN	N SOIL TYP	ES, T	RAN	SITIONS	MAY BE GI	RADUAL,
	2	WA C	TER LEV	EL READI	NGS HAVE BEI	EN MADE A'	T TIMES AND UN THOSE PRESEN	DER CONDI	TIONS STA	TED.	FLUC	CTUATIO	NS OF GRO	OUNDWATER
		IVI/	11 UUUU	KIDUE K	OTHER PACE	UNO IMAN	INUSE PRESEN	NI ALLINE III	WE WEASU	17/CIVIL	TIA 1 C	Г		
												E	ORING No	B-59OW

		_			BORING, INC. PROCKTON, MA 02	2301		PROJECT ptor & Lateral So Warwick, RI don Archibald, Ir			REP	ORT OF B SHEET FILE N CHKD.	0.	B-60 1 OF 1 06217
CLA	LER: SSIFIE ECTO	ED BY: OR:	Paul Wo				BORING LOCAT GROUND SURF, DATE START	ION RIVER	VUE R		END	DATUM 1/25/06	DI	
SAM	PLER				TED, SAMPLER C 140 lb. HAMMER					GROU	INDW/	ATER REA	DINGS	
CAS	NG:				TED, CASING DR	VEN USING A	300 lb.	DATE	TIME	WA	TER	CASING	STAB	ILIZATION TIME
CAS	NG SI		MMER FA	LLING 24 In.	OTHER:	2 1/4" Augers		1/25/06		4	4'		Up	on Completion
D	C B	T		044515		_ ,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,		FACRIPTION		_	R			
E P T	8 O	\vdash	PEN./	SAMPLE DEPTH	T	1	SAMPLED	ESCRIPTION			M K		STRATUM D	ESCRIPTION
H	G 8	NO.	REC	(Ft.)	BLOWS/6*	Danner verl	b 5 C	AND trans of	fine manual		9	DII A ODI	IALT	
0	\vdash	81	24/16	0-2	10-25	Dense, yen	low brown, fine S/	AND, trace of	tine gravei.			3" ASPI	IAL I	
]								
	_	S2	24/18	5-7	5-14	Donos wa	Luallaur brown fir	n to compa	SAND					
5		32	24/10	5-7		Dense, we	i, yellow brown, la	ic to coarse c	SAND.					
	5 S2 24/18 5 - 7 5-14 Dense, wet, yellow brown, fine to coarse SAND. 31-24													
	31-24													
		S3	24/18	10 - 12	9-17	Dense, gra	y brown, fine to co	parse SAND,	little fine					
10					19-35	gravel.								
					-	-						13'		
		84	24/14	14 - 16	14-17	Dense, gra	y, fine slity SAND.		-			10		
15					17-24									
	_	_				Bettem of E	Boring @ 16'					16'		
						BOROIII OI E	onling @ 10							
]								
20	_	-			-	1								
						1			÷					
]								
						-				- 1				
25														
30										- 1				
1	-	\dashv												
			SOILS	T	COHESIVE SO		DE1412110							
_	0-4		ensity V. LOOS		V. SOFt	iity	REMARKS:							
	4-10 10-30		M. DEN		SOFT M. STIFF	-								
	30-50 >50			SE 8-15 SE 15-30	STIFF V. STIFF									
				>30	HARD	IT APPROYI	IMATE BOUNDAR	RY BETWEE	N SOIL TYP	PES T	TRAN	SITIONS	MAY RE C	RADUAL
,011	2)	WAT	TER LEV	EL READII	NGS HAVE BEI	EN MADE A	T TIMES AND UN THOSE PRESEN	DER CONDI	TIONS STA	TED,	FLU	CTUATIC	NS OF GF	ROUNDWATER
		1101	. 5500		2mis (NO)	5.13 H H						Г	ORING N	B-60

		1215 W			BORING, INC. BROCKTON, MA 02	2301		PROJECT ptor & Lateral S Warwick, RI don Archibald, II			REP	ORT OF BO SHEET FILE NO CHKD.).	B-61 1 OF 1 06217
DRIL CLA: INSF	SSIF	ED BY:	Paul Word	deli			BORING LOCAT GROUND SURF DATE START		N	DATE	END	DATUM 1/19/06		
SAM	PLEI				TED, SAMPLER C					GROU	INDW/	ATER REA	DINGS	
CAS	NG:	UN	LESS OTH	ERWISE NO	TED, CASING DR	IVEN USING A	300 lb.	DATE	TIME	T	TER	CASING		ILIZATION TIME
		HA		LING 24 in.				1/19/06			3'			on Completion
CAS					OTHER:	2 1/4" Auger	S							
D E P	C A 8	L		SAMPLE			SAMPLE D	ESCRIPTION			E			
T		N	PEN./ REC	DEPTH (FL)	BLOWS/6"						K	:	STRATUMD	ESCRIPTION
0	-	81		6" - 2'6"	6-21	Dense, bro	wn, fine to coarse	SAND.			Ť	5" ASPI-	IALT	
					17-18									
						1								
S2 24/18 5 - 7 5-21 Very dense, brown, fine to coarse SAND, little gravel, trace of silt.														
5	\vdash	52	24/10	5-7	-	1	• • • • • • • • • • • • • • • • • • • •	Daise SAND,	iillie giave	,				
30-24 trace of silt.														
	SO 24 BUGG ST SIND													
S3 12/12 10 - 11 12-13 Medium dense, same as S2.														
10	_	S3A	12/12	10 - 11	12-13 47-48		nse, same as 62. e, gray, fine to coa		a araval			11'		
		100/	ILITE	11-12	47-90	Very derise	, gray, into to coa	rse samu, mu	a Alasei.					
]								
15		S4	24/24	15 - 17	16-24	Same as S	3A.							
	_	+	\rightarrow		42-34	1								
	_	1		-		1						18'		
		85	24/24	19-21	20-35	Very dense	, gray, fine to coa	rse SAND, so	me silt,					
20					44-38									4
		-								-	_	21'		
	_	+	-			Bottom of E	loring @ 21'							
				***		ĺ								
25	- 2]								
25														
- }														
}	-	\vdash	-											
30														
-														
[RAI	JULAR	SOILS	1	COHESIVE SO	ILS I								-
	Blov	vs/Ft D	ensity		Blows/Ft Dens		REMARKS:							
	0 - 4 4-1		V. LOOS	E <2 E 2-4	V. SOFt SOFT									
	10-3 30-5		M. DENS	E 4-8 E 8-15	M. STIFF STIFF	1								-
	>50		V. DENS	E 15-30	V. STIFF	1								
NOTE	S:	1) STF	RATIFICA	>30 TION LIN	HARD ES REPRESEN	IT APPROX	MATE BOUNDAR	RY BETWEE	N SOIL TY	PES. T	RAN	SITIONS	MAY BE G	GRADUAL.
nound is a		NAT	ER LEVE	EL READI	NGS HAVE BEI	EN MADE A	T TIMES AND UN THOSE PRESEN	DER CONDI	TIONS ST	ATED,	FLU	CTUATIC	NS OF GF	
		IVE	. 0000	TIDOL II	OTHER INC.	CHO HIMN	,, IOOE I NEOLIY	·, · · · · · · · · · · · · · · · · · ·	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	-1 1 to 171			ORING N	B-61

		1215 V		AMPSHIRE B ESTNUT ST. B	ORING, INC. ROCKTON, MA 0	2301		PROJECT ptor & Lateral So Warwick, Ri don Archibald, Ir			REP	ORT OF B SHEET FILE N CHKD,	0.	B-62 1 OF 1 06217
DRIL CLA INSF	SSIF	ED BY:	Paul Wo				BORING LOCAT GROUND SURF DATE START	ION WENT	worth a		END	DATUM 1/31/06		
SAM	PLE				TED, SAMPLER (140 lb. HAMMER					GROU	NDW	ATER REA	DINGS	
CAS	ING:				TED, CASING DR	IVEN USING A	300 lb.	DATE	TIME	WA	TER	CASING	STABIL	LIZATION TIME
CAR	MC (HA Size:	MMER FA	LLING 24 In.	OTHER:	2 1/4" Augen	401	1/31/06		4	t,		Upo	n Completion
D	C	8	1444 1-4		OTTER.	Z I/4 Augen	9 12		-	_	R			
E P	A B N	0	PEN.J	SAMPLE	т	-	SAMPLE D	ESCRIPTION			M K		STRATUM DE	SCRIPTION
н	G	8 NO.	REC	(Ft.)	BLOWS/6*						8 8		0110110111011101	OUTH TION
0	H	.51	24/15	6" - 2'6"	8-7	Medium de	nse, yellow brown	n, fine SAND.				5" ASPI	ALT	
	\vdash	+			6-5	1	4					3'		

5	_	S2	24/13	5-7	20-32	-	, brown, fine to m	edium SAND	and					
	-	+	-		41-37	GRAVEL.								
]								19
	_	-	-	40, 401011	4001011		BM							
10	_	+	0	10 - 10'2"	100/2"	No Recove	ry, Boulder							
	_	S3	76"	14 - 16	18-25 54-52	1	, brown, fine to co vel, trace of silt.	arse SAND,	some silt,	j				
15	-	1			34-02	trace of gra	ver, trace or sin.							
						1								
	_	S4	18/16	40 20161	24-60	Same as S	•							
		34	10/10	19 - 20'6"	98	Same as S.	J.			1		20'6"		
20						Bottom of B	oring @ 20'6"							
	_	-				-				-	- 1			
1	_	1				1								
25						1					1			
-0		-												
+	-	-				1								51
İ						1								
30														
-		-									- 1			
t														
			SOILS Density		COHESIVE SO Blows/Ft Dens		REMARKS:							
	0 - 4	4	V. LOO	SE <2 SE 2-4	V. SOFt		TEN WITE							
•	10-3	10	M. DEN	SE 4-8	SOFT M. STIFF		•							
	30-5 >50			SE 8-15 SE 15-30										
OTE	S:	1) ST	RATIFIC	>30 ATION LINE	HARD S REPRESEN	T APPROXI	MATE BOUNDAR	RY BETWEEN	N SOIL TYP	PES. T	RAN	SITIONS	MAY BE G	RADUAL.
) WA	TER LE	EL READIN	IGS HAVE BEI	EN MADE AT	TIMES AND UN	DER CONDI	TIONS STA	TED,	FLUC	CTUATIC	NS OF GRO	
		1417	5000			-110 110111	.,		ITTEL TOTAL				SORING No	B-62

		7				ORING, INC.			PROJECT			REP	ORT OF B	ORING No.	B-63OW
		121	5 W	EST CHE	STNUT ST. B	ROCKTON, MA 02	2301	Interce	ptor & Lateral Se	Stewe			SHEET		1 OF 1
								_	Warwick, RI				FILE N		06217
									don Archibald, Ir				CHKD.	BY	
DRIL			DV.	Paul Wo	ordell			BORING LOCAT					DATINA		
		IED I	51:	J. Rivan	d			GRÖUND SURF. DATE START	1/31		DATE	END	DATUM 1/31/08		
SAM	oi E	D.	HAII	EGG OT	HEDWISE NO.	TED, SAMPLER C	ONGIGTS OF	A 2º QDI IT			_	_		-	
J/ 1181						140 lb. HAMMER					GROU	NDW/	TER REA	DINGS	
CAS	NG:		UNL	ESS OT	HERWISE NO	TED, CASING DR	VEN USING A	300 lb.	DATE	TIME	WAT	ER	CASING	STA	BILIZATION TIME
			HAN	MER FA	LLING 24 In.				1/31/06		5			Uı	pon Completion
AS	NG:	SIZE		4"		OTHER:									
D	C.				SAMPLE		1	CAMBIED	ESCRIPTION			R E			
P	8	o -	-	PEN./	DEPTH	Τ	1	SAWIFIE D	LOCKIT HOM			M		STRATIM	DESCRIPTION
H	N G		10.	REC	(Ft.)	BLOWS/6"		76.7				8 8		0110110111	occorn from
0			S1	13"	6" - 2	7-8	Very dense	e, brown black, fin	e to coarse S	AND and		7	5" ASPI	IALT	
						82	GRAVEL, I	ooulder.							
										34			3'		
5	_	1	52	24/13	5-7	12-31	Very dense	, brown, fine to co	parse SAND,	little fine	1				
•	_	+				26-29	gravel.				- 1				
	_	+					-	•			- 1				
	-	+	-				1								
	_	+.	20	0440	40.40	40.04	Danes we	hanna fina to sa	DAND -		_	-	10'		
10	-	+	33	24/16	10 - 12	16-21 32-46	Dense, we	t, brown, fine to co	BIRE SAIND	IIIO GRAVE	L.				
	-	+	\dashv			32-40	1				- 1				
		+	-				1				- 1				1
		+													4
	_	1 8	34	9/3	15 - 15'9"	70-85/3"	Bouiders								
5		+			15 15 5										
- 1												- 1			
							1				1				
											- 1	- 1			
0		8	35	16/3	20 - 21'3"	18-30	Till and Bou	ulders							
						100/3"							21'8"		
			1				Bottom of E	Boring @ 21'8"							
-	_	\perp	-												
-	_	+	4									- 1			
5	_	+	+												
1	_	+	+	-								1			
1	_	+	+	_	_							1			
1	-	+	+				II.				1				
t		+	+												1
1		+	+	-											1
1		1	+												1
1			+	$\neg \uparrow$											
				SOILS		COHESIVE SO									
	3lo1			ensity /. LOOS		Blows/Ft Dens V. SOFt	ity	REMARKS: 5	5' screen 15' solid						
	4-1	0		LOO	SE 2-4	SOFT	1		Road Box						
	0-3		N			M. STIFF	1		loter mound i	urica 48 ka	uldam				
	50-c		١		SE 8-15 SE 15-30	STIFF V. STIFF		r	Note: moved t	WICE, 4IL DO	มเนยเร	•			1
-	_	43	A. 1874	A 807	>30	HARD				LBOK T			OFFICE	14417 85	OD A DULL
TE								MATE BOUNDAR							GRADUAL. ROUNDWATER
	•	1	MAY	OCCL	IR IDUE TO	OTHER FACT	ORS THAN	THOSE PRESEN	IT AT THE TI	ME MEASU	REME	NTS	WERE	MADE	
													E	BORING N	lo B-63OW

		1				ORING, INC. ROCKTON, MA 02	2301		PROJECT ptor & Lateral So Warwick, Ri don Archibald, Ir			REP	ORT OF B SHEET FILE N CHKD.	0.	B-64 1 OF 1 06217
DRIL CLA INSF	SSI	FIE	D BY: R:	Paul Wo J. Rivard				BORING LOCAT GROUND SURF DATE START		N		END	DATUM 1/30/06		
SAM	PU	ER:				TED, SAMPLER C					GROU	NDW/	ATER REA	DINGS	
CAS	NG	i:	UNI	ESS OTH	ERWISE NO	TED, CASING DR	VEN USING A	300 lb.	DATE	TIME	WAT	TER	CASING	STABIL	ZATION TIME
040	M	AP-		MER FA	LLING 24 In.	OTHER.	0 4 44 5 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4		1/30/06		4	,		Upon	Completion
CAS	NU		ze:			OTHER:	2 1/4" Augen					R			
E P	8	L	_	PEN./	SAMPLE		-	SAMPLE D	ESCRIPTION			M		STRATUM DES	CODIDTION
,T H		8	NO.	REC	(Ft.)	BLOWS/6"						K S		3170ATOMIDES	SCRIF HON
0	L	_	S1	24/20	6" - 2'6"	14-12	Medium de	nse, yellow browi	n, fine SAND.				4" ASPI	HALT	
	H	-				6-7	-								
	H						1				- 1				
5			S2	24/22	5-7	8-14	Dense, we	, brown, fine SAN	ID.		- 1				
Ů	L	_				18-23	-				- 1				
	H	_	_			<u> </u>	1						8'		
10	L		S3	24/23	10 - 12	24-35	Very dense	, brown, fine to co	parse SAND,	TIII.	- 1				
, -	L	-				49-43					- 1				
	-	+					1								
]				- 1				
15		_	\$4	24/22	15 - 17	39-44	Glacial Till				- 1				
	_	-			-	51-69	ł								
	_	7					1							*	
			S5	18/18	19 - 20'6"	41-68	Till								
20	_	_				91	`				-	_	20'6"		
	_	\dashv	-				Bottom of E	oring @ 20'6"			- 1	- 1			
											- 1				
25	_	4		_							- 1				
		+	-												
		1													
		1													
30	-	+	-	_		-	Į.					1			
ł	-	+	\neg												
		1													
				SOILS	1 '	COHESIVE SO Blows/Ft Dens		REMARKS:							
	0	10		V. LOOS		V. SOFt SOFT									
	10	-30		M. DEN	SE 4-8	M. STIFF									
	30· >5	-50 0			SE 8-15 SE 15-30										
IOTI	ES	1	STE	RATIFIC	>30 ATION LINE	HARD ES REPRESEN	T APPROX	MATE BOUNDA	RY BETWEF	N SOIL TY	PES. T	RAN	SITIONS	MAY BE GF	RADUAL.
. • . 1			WAT	ER LEV	EL READIN	NGS HAVE BE	EN MADE A	TIMES AND UN	IDER CONDI	TIONS STA	ATED,	FLU	CTUATIO	ONS OF GRO	
			HVI/1	. 5556	ALIBOE IL	OTHER FAUL	ONO HUNK	THOSE CIMORI	en us n	TAIL TAIL	~ 2 40-141E	-, 7 1 0	Γ	BORING No	B-64
1														-2171140140	

		1215 V			BORING, INC. BROCKTON, MA	2301		PROJECT eptor & Lateral Se Wanwick, RI wdon Archibald, In	¥		REP	ORT OF BO SHEET FILE No. CHKD. B	1 OF 2 06217
CLA	ECTO	ED BY: OR:	J. Riva	erd			GROUND SUR DATE START	TION 17164 FACE ELEVATIO 2/23	N		END	DATUM 2/24/06	
SAM	PLER				OTED, SAMPLER (140 lb. HAMMER					GROL	JNDW	ATER READ	INGS
CAS	ING:	UN	LESS O	THERWISE NO	OTED, CASING DR	RIVEN USING A	300 lb.	DATE	TIME	WA	TER	CASING	STABILIZATION TIME
			MMER F	ALLING 24 in.	A.T.		180	2/24/06		_	3'		Upon Completion
	NG S		4"		OTHER:								
E	A L			SAMPLE			SAMPLE	DESCRIPTION			E		
TH	N W	1	PEN./		BLOWS/6*						M K B	S	TRATUM DESCRIPTION
0	_	81	24/8	- tour	3-4	Loose, bro	wn, fine to coars	e SAND, top s	oil.				
Ĭ			1	· · ·	3-2	-	TITLE TO GOOD	o or true; top o	-F41k				
]							
		_				1						5'.	
5	_	82	24/18	5-7	4-6	Medium de	nse, gray, fine si	lity SAND.					
	_	-	-		7-7	-					24		
	-		-	1		1							
		S3	18/15	9 - 10'6"	10-10-13	Same as S	2.					10'6"	
40		S3A	6/4	10'6" - 11	6	Brown SILT	Г.						
10													
		,				1							
		_										14'6"	
		S4	24/8	14-16	7-17		y, fine SAND, tra	ce of silt, fine t	o coarse				•
15				-	18-25	sand. TILL							
1		_			ii.	1"							
						1							
		S 5	24/16	19-21	14-9	Medium de	nse, gray, fine S/	AND, trace of s	ilt, fine to	- 1			
20					20-60	coarse san	d,						
						TILL							
ŀ		_		<u> </u>		-	ĭ		₩.	- 1			
ŀ		S6	24/20	24 - 26	35-127	GLACIAL T	rii i						
		00	2020	2, 20	41-40		· Charles				-		
25]							
]				- 1			
					and the second						_	29'	
-	_	87	18/16	29 - 30'6"	77-98	Weathered	Shale.						
30		C1	60/34	30'6" - 35'6"	109-100/1"	1							
+		U	00/34	30 8" - 30'6"	2 min 2 min	1							
t				10	2 min								
			SOILS		COHESIVE SC		DESTABLE	-					
	0 - 4		ensity V. LOC	SE <2	V. SOFt	яку	REMARKS:						,
	4-10			SE 2-4	SOFT								
3	10-30 30-50	i	DEN	ISE 4-8 ISE 8-15	M. STIFF STIFF								
>	-50		V. DEN	SE 15-30 >30	V. STIFF HARD								
OTE	S: 1) STF	RATIFIC	CATION LIN	ES REPRESEN	IT APPROXI	MATE BOUNDA	RY BETWEEN	SOIL TYP	ES, T	RAN	SITIONS N	AY BE GRADUAL.
	2)	TAW 'AM	ER LE	VEL READI	NGS HAVE BE	EN MADE AT	TIMES AND UN THOSE PRESE	NDER CONDIT NT AT THE TIM	TONS STA	TED,	FLUC	CTUATION WERE MA	8 OF GROUNDWATER
					J.,,,,,,,,								PING No. 8.670W

		1215		AMPSHIRE BO	ORING, INC. OCKTON, MA 023	<u>0</u> 1	<u>PROJECT</u> Interceptor & Lateral Sewers Warwick, RI Gordon Archibald, Inc.		ORT OF BORING No. B-670W SHEET 2 OF 2 FILE No. 06217 CHKD, BY
E	A I		PEN./	SAMPLE			SAMPLE DESCRIPTION	R E M	CTDATING DEPOCIONAL
T H	G E	NO.	REC	(Ft)	BLOWS/6"			K	STRATUM DESCRIPTION
	_				2 mln	Weathered	i shale.		33.5'
35	_	-		-	2 mln				
-	-	C2	60/56	35'6" - 40'6"	3 mln	Gray Sand	stone		-
	_	-			3 min	-			
	-	\vdash	-		3 min	1			
	-	-		-	3 min 3 min	1			
40	-	C3	60/60	40'6" - 45'6"	2 min	Gray Sand	olone .		
		103	00/00	400 - 400	2 min	Gray Sand	storia	1	
	_				· 2 min	1			
					2 mln	1			
					2 mln	1			
45		C4	60/59	45'6" - 50'6"	3 min	Gray Sand	stone		
					3 min	1			
					3 min]			
					3 min				
50		_			3 min				50'6"
						Bottom of E	Boring @ 50'6"		
		_				1			
-		-							
1						1			
55	-								
ŀ	_						U.S.		
Ì									
ı							*		
60									
1				,					N. T.
65									
1							^		
+		\vdash							
1	_	-	-	-			1		
1	_		-				- 1		
70	-				•		1		
1		-					1		
h							1	5	
							1		
75									
F	REM	ARKS:	. 1	5' screen F 10' solid F	Roadbox PVC @ 15'				d
									BORING No B-670W

		1	_			BORING, INC. BROCKTON, MA 0	2301	Go	PROJECT eptor & Lateral So Warwick, RI rdon Archibald, In	nc.		REP	ORT OF 800 SHEET FILE No. CHKD. B		B-68 1 OF 1 06217
INSF	SSI	FIE		Paul Wo J. Rivard	1			GROUND SURI DATE START	TION MILL FACE ELEVATIO 217	N		END	DATUM 2/7/06		71-311
SAM	PLE	ER:				OTED, SAMPLER (140 lb. HAMMER					GROU	NDW/	ATER READ	INGS	
CAS	ING	:	UNI	LESS OTH	IERWISE NO	TED, CASING DR	IVEN USING A	300 lb.	DATE	TIME	WAT	TER	CASING	STABI	LIZATION TIME
		- 013		MMER FA	LLING 24 In.	OT ICE	0.440		2/7/06		5'6	B"		Upo	on Completion
CAS			ZE:			OTHER:	2 1/4" Auger	8				R			
E	A	Ĺ			SAMPLE			SAMPLE	DESCRIPTION			E			
T H	N	W	NO.	PEN./ REC	DEPTH (FL)	BLOWS/6"						K	S.	TRATUM DE	ESCRIPTION
0			S1	24/18	0-2	10-25	Dense, yel	low brown, fine to	coarse SANI) and			3" ASPHA	ALT	
						22-20	GRAVEL.								
	-	-				-	-						4'		
	\vdash	-	82	24/16	5-7	5-5	Medlum de	ense, wet, brown,	fine SAND.				4		
5						6-9		,,,							
	_	-					-								
	-	-	83	24/22	10 - 12	7-14	Medium de	nse, wet, brown,	fine SAND tr	ace of silt					
10			- Ju	2022	10 12	8-15		moo, won brown,	IIIO 07 11 4D, 111	add or one.					
													12'		
	_	4													
	-	-	S4	24/22	14 - 16	14-13 15-17	Medium de	nse, brown, fine	to coarse SAN	ID.					
15		+				10-17							16'		
							Bottom of I	Boring @ 16'	17			1			
		4					4								
	_	+	-				-				.				
20		+					1				1				
		7					1				- 1				
		1													
	-	+	_	-		-	-					- 1			
25		+					1				- 1				
		1]								
		1					1								
1		+	\dashv				-								
30		+	\neg	$\neg \neg$											
İ		Ī										- 1			
_[D.	I	# A D	0011.0		001501/2 00									
				SOILS ensity		COHESIVE SC Blows/Ft Dens	777.4	REMARKS:							
	0 - 4-1			V. LOOS	SE <2 SE 2-4	V. SOFt SOFT									
0	10-	30	1	M. DENS	SE 4-8	M. STIFF									
	30- >50		,		SE 8-15 SE 15-30										
OTE	S.	1\	STE	RATIFICA	>30	HARD ES REPRESEN	IT APPROY	IMATE BOUNDA	RY BETWEE	SOII TY	PES T	RAN	SITIONS	MAY RE G	RADUAL
			TAW	ER LEV	EL READI	NGS HAVE BE	EN MADE A	T TIMES AND UP	VDER CONDI	TIONS STA	ATED,	FLU	CTUATION	IS OF GR	
			IVIA	1 0000	KIDUE II	OTHER PAUL	UNO ITAN	I HOSE FRESEI	MINI INE II	WIE WIEAS		-1415		DRING No	R-6R

,

		_			BORING, INC. BROCKTON, MA 02	2301		PROJECT ptor & Lateral So Warwick, RI			REP	ORT OF BO SHEET FILE NO	.	B-69 1 OF 1 06217
		ED BY: OR:	Paul Woo				BORING LOCAT GROUND SURF DATE START		COVE RO		END	DATUM 2/7/08	ВҮ	
SAM	PLER				TED, SAMPLER C					GROU	NDW/	ATER REA	DINGS	
CASI	NG:				TED, CASING DRI	VEN USING A	300 lb.	DATE	TIME		TER	CASING		ILIZATION TIME
CASI	NG SI		MMER FAI	LING 24 In.	OTHER:	2 1/4" Augera		2/7/06		_ 4	ľ		Upo	on Completion
D	C B	Т		A1101 #		Z I/4 //agoid		ma an in milat			R			
P	8 O		PEN./	DEPTH		1	SAMPLED	ESCRIPTION			M		STRATUM DI	ESCRIPTION
Н	G 8	NO.	24/14	(Ft.) 6" - 2'6"	BLOWS/6* 10-14	Medium de	ense, brown, fine t	o coarse SAN	ND and		8	5" ASPH	IALT	
					10-6	GRAVEL.								
	_	-				-								
_		S2	24/24	5-7	7-9	Medium de	nse, brown, fine t	o coarse SAN	ID and					
5					11-11	GRAVEL.								
				-	1	1								
												10'		
10		83	24/24	10 - 12	20-28	1	e, brown, fine to co	arse SAND,	little fine					
					30-38	gravel.								
]								
		C4	04/00	45 47	04.44		b 6ma te	DAN	ID Itual - A					
15		54	24/20	15 - 17	21-14 15-20	gravel.	nse, brown, fine to	coarse SAN	iD, little fine					
-		S5	24/16	19 - 21	16-18	Dance bro	wn, fine to coarse	CAND little 6	ino arount					
		33	24/10	18-21	24-28	Delise, Dio	WII, IIIIO LO COBISO	SAND, IIIIO I	ille graver.	- 1				
20										_	_	21'		
1						Bottom of B	loring @ 21'							
25														
ŀ											- 1			
-	_	\vdash												
30														
										1				
G	RAN	ULAR	SOILS		COHESIVE SO	ILS				1	1			
	Blow 0 - 4		ensity V. LOOS	E <2	Blows/Ft Dens V. SOFt	ity	REMARKS:							
	4-10 10-30			SE 2-4	SOFT M. STIFF									
	30-50 >50)	DENS	SE 8-15 E 15-30	STIFF									
				>30	HARD				1881			ALM AT		D. I. D. L. L. L. L. L. L. L. L. L. L. L. L. L.
NOTE		WAT	ER LEV	EL READII	NGS HAVE BEE	EN MADE AT	MATE BOUNDAR T TIMES AND UN	DER CONDI	TIONS STA	TED,	FLUC	CTUATIO	NS OF GR	
		MA	YOCCU	KIDUETO	OTHER FACT	ORS THAN	THOSE PRESEN	I AT THE TI	ME MEASU	KEM	ENTS	Г	MADE ORING No	B-69

		1215 V			BORING, INC. PROCKTON, MA 02	2301		PROJECT ptor & Lateral Se Warwick, RI don Archibald, Ir			REP	ORT OF B SHEET FILE NO CHKD.	D.	B-700W 1 OF 1 06217
DRIL CLAS INSP	SIF	ED BY:	Paul Woo				BORING LOCAT GROUND SURF DATE START	ION TIDEN	ATER 1		END	DATUM 2/2/06		
SAM	PLEF				TED, SAMPLER O					GROUN	NDWA	TER REA	DINGS	
CASI	NG:				TED, CASING DR			DATE	TIME	WAT		CASING		ILIZATION TIME
				LING 24 in.				2/2/06		5'			Upo	on Completion
CASI	NG S		4"		OTHER:						R			
E	A	L	PEN./	SAMPLE DEPTH		-	SAMPLE D	ESCRIPTION			E		CTDATINA D	ECODIDITION
H	N I	H	REC	(Ft.)	BLOWS/6"						K 8		STRATUMU	ESCRIPTION
0	_	S1	24/19	6" - 2'6"	19-22	Dense, yel	low brown, fine to	coarse SANI	D .			4" ASPI	IALT	
	-	+	\vdash		15-19	1				- 1				
						1					1	5'		
5		S2	24/22	5-7	26-32	Very dense	, brown, fine to c	oarse SAND a	and					
	_	+	\vdash		40-33	GRAVEL,	race of silt.			- 1				
		+				1				1				
]				- 1				
10		83	24/18	10 - 12	25-12	7	nse, brown, fine t	o coarse SAN	ID and	- 1				
	_	+-	-		15-25	GRAVEL, t	race of silt.			- 1				
	-	S4	24/12	13 - 15	16-21	Very dense	ery dense, brown, fine to coarse SAND and							
		-		10 10	35-52	GRAVEL, t								
15	35-52 GRA						m of Paring @ 45							
		+-				Bottom of E	Boring @ 15'							
	_	+				1								
						1					- 1			
20	_	-				-								
	_	-	\vdash		-	1								
1						1								
[
25		-				1				1				
-	_	-				1				1				
İ]				1				
0		-	-							1				
1	_													
			SOILS ensity		COHESIVE SO Blows/Ft Dens		REMARKS:	5' screen						
	0 - 4 4-10	1	V. LOOS	E <2 SE 2-4	V. SOFt SOFT	10' solid Roadbox								
1	10-3 30-5	0	M. DENS		M. STIFF STIFF	Noadbox								
	•50 •50			E 15-30	V. STIFF									
TE	S:	1) ST	RATIFICA	>30 ATION LIN	HARD ES REPRESEN	IT APPROX	IMATE BOUNDA	RY BETWEE	V SOIL TY	PES, T	RAN	SITIONS	MAY BE G	BRADUAL.
	2) WA	TER LEV	EL READII	NGS HAVE BE	EN MADE A	T TIMES AND UN	IDER CONDI	TIONS STA	ATED, I	FLU (CTUATIO	NS OF GF	ROUNDWATER

BORING No B-700W

			215 W			ORING, INC. ROCKTON, MA 0	2301		PROJECT ptor & Lateral So Warwick, RI don Archibald, I			REP	ORT OF BO SHEET FILE NO CHKD.	э.	B-70A 1 OF 1 06217
INSI	SS PE(FIE	-	Paul Wo	I			BORING LOCAT GROUND SURF DATE START		N		END	DATUM 2/14/06		
SAM	IPL	ER:				TED, SAMPLER (140 lb. HAMMER					GROL	INDW/	ATER REA	DINGS	
CAS	INC	à :				TED, CASING DR			DATE	TIME	T	TER	CASING		ILIZATION TIME
			HA		LLING 24 In.	■ 10.1 CC+ 1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (1000 (100) (1000 (1000 (100) (1000 (1000 (1000 (100) (1000 (1000 (100) (1000 (1000 (100) (1000 (1000 (100) (1000 (1000 (100) (1000 (1000 (100) (1000 (100) (1000 (100) (1000 (100) (1000 (100) (1000 (100) (1000 (100) (1000 (100) (1000 (100) (1000 (100) (1000 (100) (100) (1000 (100) (100) (1000 (100) (100) (100) (100) (100) (1000 (100) (100) (100) (100) (100) (100) (100) (100) (100) (100) (100) (100) (100) (100) (100) (100) (100) (100) (100) (100) (100) (100) (100) (100) (100) (100) (100) (100) (100) (100) (100) (100) (100) (100) (100) (100) (100) (100) (100) (100) (100) (100) (100) (100) (100) (100) (100) (100) (100) (100) (100) (2/14/06		-	7'			on Completion
CAS			ZE:			OTHER:	2 1/4" Augen	3							
E	A	B L O			SAMPLE			SAMPLE D	ESCRIPTION			E			
T	N	W	NO.	PEN./ REC	DEPTH (Ft)	BLOWS/6"						K	;	STRATUM D	ESCRIPTION
0	+		\$1	24/15	6" - 2'6"	10-25	Dense, yel	low brown, fine S	AND.	- 1/2		Ů	5" ASPH	IALT	
						17-13]								
	L														
	H	_	S2	24/13	E 7	40.47	NA ned troop at an	was collect beauty	- A CAND						
5	H	-	32	24/13	5-7	16-17	Medium de	nse, yellow browi	I, line SAND.						
	r					11.10	1								
		_					1						10'		
10			S3	24/24	10 - 12	13-28	Very dense	, brown, fine to co	oarse SAND,	little fine					
10	L					40-55	gravel.								
	L	_	_				-								
	H	-		\vdash			-								
	r		S4	24/24	15 - 17	27-29	Same as S	3.							
15						30-43]								
					4.00										
	L	\dashv	00	40440	40 00100	44.04	-	Till							
	-	\dashv	S5	18/18	19 - 20'6"	41-61 63	Same as S	3.					20'6"		
20						- 55	Bottom of B	oring @ 20'6"					200		
		_													
	_	\dashv	-				-								
25	_	\dashv					1								
		_					j								
							}								
		-					-								
30	_	+	-	-			-					- 1			
-		+	\dashv				1		*		- 1				
							1								
				SOILS ensity	(COHESIVE SC Blows/Ft Dens	A COLUMN TO THE PARTY OF THE PA	REMARKS:							
	0	- 4		V. LÓOS	E <2	V. SOFt	aty	I CLIPB BILLO.							
		10 -30	1	LOOS M. DENS		SOFT M. STIFF									
3		-50		DENS	SE 8-15 E 15-30	STIFF									
					>30	HARD									
ITO	3	2)	STF WA1	RATIFICA ER LEV	ATION LINI EL READIN	ES REPRESEN NGS HAVE BE	NT APPROXI	MATE BOUNDAI TTIMES AND UN	RY BETWEET	N SOIL TY TIONS ST	PES, T	RAN	SITIONS	MAY BE G	RADUAL. ROUNDWATER
		-1	MA	Y OCCU	RIDUETO	OTHER FACT	ORS THAN	THOSE PRESEN	IT AT THE TI	ME MEAS	UREM	ENT	WERE	MADE	
													l _c	ODING N	B-704

				-	BORING, INC.	_		PROJECT			REP		ORING No.	B-71
	1	1215 W	EST CHE	STNUT ST. B	ROCKTON, MA 02	2301	Interce	ptor & Lateral Se	ewers			SHEET		1 OF 1
							Con	Warwick, RI don Archibald, Ir	10			FILE No CHKD. I		06217
DRIL) ED:		'Paul Wo	rdall		_	BORING LOCAT			0		CHIND, I	31	
		D BY:	raul 110	10011			GROUND SURF			•		DATUM		
INSP	ECTO	R:	J. Rivard				DATE START	1/19	/06	DATE	END	1/19/06		
SAM	PLER:	UN	LESS OTH	ERWISE NO	TED, SAMPLER C	ONSISTS OF	A 2" SPLIT				eve to			
		SP	OON DRIV	EN USING A	140 lb. HAMMER	FALLING 30 In				GROU	NDWA	TER REAL	DINGS	
CASI	NG:	UN	LESS OTH	ERWISE NO	TED, CASING DR	VEN USING A	300 lb.	DATE	TIME	WAT	ER	CASING	STABIL	LIZATION TIME
		HA	MMER FAI	LING 24 In.				1/19/06		8			Upor	n Completion
CASI	NG SI	ZE:			OTHER:	2 1/4" Augers	3							
	C B										R	<u> </u>		
E P	8 D	-	PEN./	SAMPLE DEPTH		+	SAMPLE D	ESCRIPTION			M	١,	TOATIM DE	CONTON
H	N W		REC	(Ft.)	BLOWS/6*					- 1	K	١ '	STRATUM DE	SURPTION
0		S1	24/14	6" - 2'6"	13-21	Dense, yell	ow brown, fine SA	AND.				5" ASPH	ALT	
					13-17		- 603						~	
	-					1				1		ì		
]								
ا ۽		S2	24/20	5-7	12-17	Dense, gra	y, fine SAND.							
5					34-32									
]								
										- 1				
10		S3	24/24	10 - 12	16-22	Same as S	2.			- 1				
10					27-36						- 1			
				-1311-1-12-2]				- 1				
										- 1	- 1			
15		S4	24/24	15 - 17	15-17	Same as Sa	2.			- 1				
					15-21									
										- 1				
-										- 1	- 1			
1		S5	24/24	19 - 21	7-9	Medium der	nse, gray, fine SA	ND.		- 1				
20		_	-		20-38	1						<u>.</u>		
}										-	-	21'		
1	_	_				Bottom of B	oring @ 21'			1				
-										- 1				
ŀ		_												
25	_	_	-			-								
1			-											
1		-	-											
+			-											
1		-												1
30										1				
-			-											l
-			-											
G	RAN	ULAR	SOILS	T	COHESIVE SO	ILS								
			ensity		Blows/Ft Dens	ity	REMARKS:							
	0 - 4 4-10		V. LOOS	E <2 E 2-4	V. SOFt SOFT									
	10-30		M. DENS	SE 4-8	M. STIFF									1
	30-50 >50		DENS	E 15-30	STIFF									
,	-00		v. DENS	>30	V. STIFF HARD									
OTE				ATION LIN	ES REPRESEN		MATE BOUNDA							
	2)	WA	ER LEV	EL READIN	NGS HAVE BEE	ORS THAN	TTIMES AND UN THOSE PRESEN	IDER CONDI	TIONS STA	TED,	FLUC	CTUATIO	NS OF GRO	OUNDWATER
		IVIC	, 0000	KIDUE IC	OTHER PAUL	OUR THEIR	THOUL I REOCK	OLAN LUIE U	HIL MILMOL	er smill	_1416			
											_]B	ORING No	B-71

į

1

!

GRANULAR SOILS COHESIVE SOILS Blows/Ft Density Blows/Ft Density 0 - 4 V. LOOSE <2 V. SOFt 4-10 LOOSE 2-4 SOFT			121				ORING, INC. ROCKTON, MA 02	2301		PROJECT ptor & Lateral So Warwick, RI			REP	ORT OF B	D.		B-72 1 OF 1 3217
SPOON DRIVEN USING A 140 Ib. HAWMER FALLING 90 Ib. CASING: WALESS OTHERWISE NOTED, CASING DRIVEN USING A 300 ib. WALESS OTHERWISE NOTED, CASING DRIVEN USING A 300 ib. WALESS OTHERWISE NOTED, CASING DRIVEN USING A 300 ib. 29/906 15' Upon Completion Walter Casing Statistical Control of the coarse SAND, cobbles. STRATUM DESCRIPTION STRATUM DESCRIPTION STRATUM DESCRIPTION STRATUM DESCRIPTION STRATUM DESCRIPTION STRATUM DESCRIPTION STRATUM DESCRIPTION Walter Casing Stratum Description Walter Casing Stratum Description Walter Casing Stratum Description STRATUM DESCRIPTION STRATUM DESCRIPTION STRATUM DESCRIPTION STRATUM DESCRIPTION STRATUM DESCRIPTION Walter Casing Stratum Description Walter Casing Stratum Description STRATUM DESCRIPTION	CLA	SSIF	IED I	3Y:	2 222 2	dell			BORING LOCAT GROUND SURF	ION BEAT ACE ELEVATIO	RICK TO		END	DATUM	Dī		
HAMMER FALLING 24 in. OTHER: 2 1/4" Augers 2/6/06 15" Upon Completion	SAM	PLE									31	GROU	NDW	ATER REA	DINGS		
CASING SIZE: OTHER: 2 1/4* Augers OTHER: 2 1/4* Augers SAMPLE SAMPLE DESCRIPTION REC (FL) BLOWS/8* STRATUM DESCRIPTION STRATUM DE	CAS	NG:		UNL	ESS OTH	ERWISE NO	TED, CASING DR	IVEN USING A	300 lb.	DATE	TIME	WA	TER	CASING	81	TABILIZATI	ION TIME
SAMPLE SAMPLE SAMPLE SAMPLE SAMPLE SAMPLE SAMPLE DESCRIPTION	CAS	NG			MER FAL	LING 24 In.	OTHER:	2 1/A" Augus		2/9/06		1	5'			Upon Com	pletion
T N N N NO PEN DEPTH BLOWSe* NO NO NO NO NO NO NO N	0	0	В					Z I/4 /Jugoti		L		L.,					
I	P	8	0		PEN./		T	1	SAMPLE D	ESCRIPTION			M		STRATUI	M DESCRIF	PTION
16-21 16-21 17-30 Very dense, brown, fine to coarse SAND and GRAVEL, cobbles. 8'	H	G	8 1		REC			<u></u>					В				
S2 24/10 5-7 17-30 Very dense, brown, fine to coarse SAND and GRAVEL, cobbles. 8'	0	-	+	51	24/15	0-2		Dense, bro	wn, fine to coarse	SAND, cobb	ies.			2" ASPI	ALT		
GRAVEL, cobbles. 8' 10			I]									
10		_	1		2442		45.55			0445							
8' 8' 10 83 24/20 10-12 7-8 10-14 10-14 14-16 28-28 Very dense, wet, brown, fine to medium SAND and GRAVEL. 18' Bottom of Boring @ 16' 26 GRANULAR SOILS Blows/Ft Density 0-4 V. LOOSE 27 Very dense, wet, brown, fine to medium SAND and GRAVES. 18' REMARKS: REMARKS:	5	-	+	52	24/10	5-7	1	4 '		oarse SAND	and						
S3 24/20 10 - 12 7-8								1									1
10-14 10-14			+	-										8'			
10-14 10-14		-	+	33	24/20	10 - 12	7-8	Medium de	nse, brown, SAN	D.							
S4 24/12 14 - 16 28-28 Very dense, wet, brown, fine to medium SAND and GRAVEL. 16'	10]	,								
S4 24/12 14 - 16 28-28 Very dense, wet, brown, fine to medium SAND and GRAVEL. 16'			+	-				-						401			
38-42 GRAVEL. Bottom of Boring @ 16' 20 25 GRANULAR SOILS Blows/Ft Density 0 - 4 V. LOOSE		_	-	34	24/12	14 - 16	28-28	Very dense	. wet. brown, fine	to medium S	AND and	-	_	13'			
20 25 30 GRANULAR SOILS Blows/Ft Density 0 - 4 V. LOOSE	45		Ť			17 10		1	, troci aromi, mio	to modium o							
20	10		1	_								_		16'			
25 GRANULAR SOILS Blows/Ft Density 0 - 4 V. LOOSE <2 V. SOFt 4-10 LOOSE 2-4 SOFT REMARKS:		_	+	\dashv	-		-	Bottom of E	Boring @ 16'								
25 GRANULAR SOILS Blows/Ft Density 0 - 4 V. LOOSE <2 V. SOFt 4-10			İ]									
GRANULAR SOILS COHESIVE SOILS Blows/Ft Density Blows/Ft Density 0 - 4 V. LOOSE <2 V. SOFt 4-10 LOOSE 2-4 SOFT	20			4													
GRANULAR SOILS COHESIVE SOILS Blows/Ft Density Blows/Ft Density 0 - 4 V. LOOSE <2 V. SOFt 4-10 LOOSE 2-4 SOFT			+	+	-		-										- 1
GRANULAR SOILS COHESIVE SOILS Blows/Ft Density Blows/Ft Density 0 - 4 V. LOOSE <2 V. SOFt 4-10 LOOSE 2-4 SOFT			I														
GRANULAR SOILS COHESIVE SOILS Blows/Ft Density Blows/Ft Density 0 - 4 V. LOOSE <2 V. SOFt 4-10 LOOSE 2-4 SOFT		_	+	4	_							1					
GRANULAR SOILS COHESIVE SOILS Blows/Ft Density Blows/Ft Density 0 - 4 V. LOOSE <2 V. SOFt 4-10 LOOSE 2-4 SOFT	25	-	+	+	-							1					- 1
GRANULAR SOILS COHESIVE SOILS Blows/Ft Density Blows/Ft Density 0 - 4 V. LOOSE <2 V. SOFt 4-10 LOOSE 2-4 SOFT	l										,						
GRANULAR SOILS COHESIVE SOILS Blows/Ft Density Blows/Ft Density 0 - 4 V. LOOSE <2 V. SOFt 4-10 LOOSE 2-4 SOFT			1	-													
GRANULAR SOILS COHESIVE SOILS Blows/Ft Density Blows/Ft Density 0 - 4 V. LOOSE <2 V. SOFt 4-10 LOOSE 2-4 SOFT			+	+	-	-											-
Blows/Ft Density Blows/Ft Density REMARKS:	30		I	1													1
Blows/Ft Density Blows/Ft Density REMARKS:	-		-	1	_												
0-4 V. LOOSE <2 V. SOFt 4-10 LOOSE 2-4 SOFT														-			
4-10 LOOSE 2-4 SOFT					/. LOOS			ity	REMARKS:								
10-00 W. DENGE 4-0 W. STITE		-					SOFT M. STIFF	1									
30-50 DENSE 8-15 STIFF >50 V. DENSE 15-30 V. STIFF	;	30-4	50		DENS	E 8-15	STIFF	1									
>30 HARD		>30 HARD							MATE DOUBLE	OV DETIMES	N COU TY	DEC T	OAL	CITIONIO	MAVE	E ODAD!	IAI
IOTES: 1) STRATIFICATION LINES REPRESENT APPROXIMATE BOUNDARY BETWEEN SOIL TYPES, TRANSITIONS MAY BE GRADUAL. 2) WATER LEVEL READINGS HAVE BEEN MADE AT TIMES AND UNDER CONDITIONS STATED, FLUCTUATIONS OF GROUNDWATER	WO I E		2) W	/AT	ER LEV	EL READIN	NGS HAVE BEI	EN MADE A	T TIMES AND UN	IDER CONDI	TIONS STA	ATED,	FLU	CTUATIO	NS OF		
MAY OCCUR I DUE TO OTHER FACTORS THAN THOSE PRESENT AT THE TIME MEASUREMENTS WERE MADE BORING No B-72			1	VIA)	r OCCU	KIDUE T(UTHER FACT	ORS THAN	HUSE PRESEN	II AL IHE TI	ME MEASI	UKEM	ENIS	Г		. Ne	B-72

		1				ORING, INC. ROCKTON, MA 02	2301		PROJECT ptor & Lateral So Warwick, Ri don Archibald, In			REP	ORT OF B SHEET FILE N CHKD.	D.	B-73 1 OF 1 06217
DRIL CLA INSF	SSI	FIE	D BY: R:	Paul Wor J. Rivard	dell			BORING LOCAT GROUND SURF DATE START				END	DATUM 2/9/06	,	
SAM	PLI	ER:				TED, SAMPLER C 140 lb. HAMMER					GROU	NDW/	TER REA	DINGS	
CAS	NG	:				TED, CASING DRI	VEN USING A	300 lb.	DATE	TIME	WA:	TER	CASING	STABIL	IZATION TIME
CAS	NO	OI.	,	MER FAL	LING 24 In.	OTHER:	O 4/All Augus		2/9/06		_ ()		Upon	Completion
D		В	 T			OINER:	2 1/4" Augen				_	R			
E	8	O		PEN./	SAMPLE DEPTH		-	SAMPLE D	ESCRIPTION			E M		STRATUM DE	SCOIDTION
H	B	8	NO.	REC	(Ft.)	BLOWS/6"						K 8		OTRATOM DE	SURIF HUN
0	L		81	24/12	0-2	10-14	4	ense, brown, fine t	o coarse SAN	ID and			1" ASPI	HALT	
	H					15-14	GRAVEL.						3'		
5			S2	24/22	5-7	2-3	Loose, bro	wn, fine SAND.							
	-					3-4	1								
	-												8'6"		
					inter the										
10	H	-	S3	24/18	10 - 12	46-17	Dense, bro	wn, fine to coarse	SAND, cobb	les.					
	_				-	14-15	1								
]								
		_						Andrews Arms Are and	0.110						
15	_	-	S4	24/20	15 - 17	28-32 41-43	Very dense	, brown, fine to co	oarse SAND,	cobbles.					
		1				41-43									
]								
		4	85	24/21	19 - 21	47-39	Same as S	4.			-				
20	-	+				27-23					- 1		21'		
							Bottom of E	Boring @ 21'	-				<u>~ '</u>		
		4													
	-	+	\dashv												
25		1										- 1			
		1													
	_	+				-									
	_	+													
30		1													Í
-		4	_												
_	R/	ANI	JLAR	SOILS	7	COHESIVE SO	ILS								
		- 4		ensity V. LOOS	E <2	Blows/Ft Dens V. SOFt	lty	REMARKS:							
	4-	10		LOOS	E 2-4	SOFT									
	30-	30 50			E 8-15	M. STIFF STIFF									
	>5(0	,	v. DENS	E 15-30 >30	V. STIFF HARD									
IOT	S	1)	STF	RATIFICA	TION LIN	ES REPRESEN	T APPROX	IMATE BOUNDAI T TIMES AND UN	RY BETWEEN	N SOIL TYP	PES, T	RAN	SITIONS	MAY BE GI	RADUAL.
		4)	MA	Y OCCU	RIDUE TO	OTHER FACT	ORS THAN	THOSE PRESEN	NT AT THE T	ME MEAS	JREM	ENTS	WERE	MADE	NONDIVINIER
													E	ORING No	B-73

		1215 V			ORING, INC. ROCKTON, MA 02	2301	Gon	PROJECT plor & Lateral S Warwick, Ri don Archibald, I	IC.		REP	ORT OF B SHEET FILE N CHKD.	0.	B-74 1 OF 1 06217
INSF	SSIF PECT	IED BY: OR:	J. Rivard				BORING LOCAT GROUND SURF DATE START		N		END	DATUM 2/10/06		
SAM	PLE				TED, SAMPLER C 140 lb. HAMMER					GROU	INDW/	ATER REA	DINGS	
CAS	NG:				TED, CASING DR	IVEN USING A	300 lb.	DATE	TIME	WA.	TER	CASING	STABILI	ZATION TIME
CAS	NG S		MMER FAL	LING 24 In.	OTHER:	2 1/4" Auger	,	2/10/06		1.	3'		Upon	Completion
D	C	В				Z IV / August					R			
E P T	A S N		PEN./	DEPTH	Ι	1	SAMPLE D	ESCRIPTION			E M K		STRATUM DES	CRIPTION
H	G	NO.	REC	(Ft.)	BLOWS/6"	Danie bu	0 1	OAND Put-	£		8	(II A DDI		
0		S1	24/18	6" - 2'6"	21-23 20-12	Dense, pro	wn, fine to coarse	SAND, IITIE	iine gravei.			4" ASPI	TALI	
]								
	_	S2	24/20	5-7	10-10	Medium de	nse, brown, fine S	CIMAS						
5			L-VIZU	0-7	12-15]	iloc, blown, mic (JAIV.						
												7'6"	-	
		-				1								
10		S3	24/20	10 - 12	18-16	Dense, bro	wn, fine to coarse	SAND, little	fine gravel.					
	_	-		-	32-25	-								
		S4	24/22	14 - 16	8-10	1	nse, brown, wet, i	fine to coarse	SAND, little	e				
15	_	-	\vdash		10-9	fine gravel.				- }		16'		
						Bottom of E	oring @ 16'					10		
		-				-				- 1				
20]				- 1				
25						1								
_	-													
30														
						8. (1) (5)								
<u>_</u>	RAN	JULAR	SOILS	$\overline{}$	COHESIVE SO	ILS T								
		/s/Ft D			Blows/Ft Dens		REMARKS:							
	4-1(10-3)	LOOS	E 2-4	SOFT	1								
	30-5	0	DENS	E 8-15	M. STIFF STIFF	12								
	-50			E 15-30 >30	HARD									
TOI	S: 2) WAT	TER LEVI	EL READIN	IGS HAVE BEI	EN MADE AT	MATE BOUNDAR TIMES AND UN	DER CONDI	TIONS STA	ATED.	FLU	CTUATIO	INS OF GRO	ADUAL. UNDWATER
		MA	Y OCCU	R I DUE TO	OTHER FACT	ORS THAN	THOSE PRESEN	IT AT THE TI	ME MEAS	JREM	ENTS	WERE T	MADE	
												E	BORING No	B-74

		1				BORING, INC. BROCKTON, MA 02	2301		PROJECT ptor & Lateral Se Warwick, RI don Archibald, ir			REP	ORT OF BO SHEET FILE NO CHKD.),	B-75 1 OF 1 06217
DRIL CLA INSF	SSI	FIE	D BY: R:	Paul Wo				BORING LOCAT GROUND SURF DATE START		N	DR .	END	DATUM 2/2/06		
SAM	PLE	R:				TED, SAMPLER C					GROL	INDW/	ATER REA	DINGS	
CAS	ING	i;	UNL	ESS OTI	IERWISE NO	TED, CASING DRI	IVEN USING A	300 lb.	DATE	TIME	WA	TER	CASING	STABI	LIZATION TIME
	W.O	017		MER FA	LLING 24 in.	OTHER.	0.4149 have an	_	2/2/06			6'		Upor	n Completion
CAS		B	E;			OTHER:	2 1/4" Augen	3				R			
E P	A	L	_	PEN./	SAMPLE DEPTH		-	SAMPLE D	ESCRIPTION			M		STRATUM DE	CODIDTION
H	G	8	NO.	REC	(FL)	BLOWS/6*						K 8		31 NATUW DE	SOMETION
0	L		81	24/14	6" - 2'6"	15-24	-	e, brown, fine to c	oarse SAND	and			6" ASPH	IALT	
	H	-				32-27	GRAVEL.								
	L]								
5	L		S2	24/22	5 - 7	8-10	Medium de	nse, gray, fine SA	ND, some sil	t.					
	H	-				11-10	-								
													10'		
	-	1	S3	24/22	10 - 12	8-11	Medium de	nse, wet, brown,	fine to coarse	SAND, littl	e		10		
10						12-29	fine gravel,								
	_	4					-								
	-	+					1								
	Т	1	S4	24/24	15 - 17	25-30	Very dense	, wet, brown, fine	to coarse SA	ND, little					
15		_				42-46	fine gravel,	some slit.							
		4				ļ	e.								
		+	S5	24/24	19 - 21	56-63	Very dense	, brown, fine to co	arse SAND a	ınd					
20						52-56	GRAVEL.								
20		1									_	-	21'		
	_	+	-			 	Bottom of E	Boring @ 21'							·
		1			-]								
25		I													
	_	+	\dashv												
	-	+													
		1					İ								
30	_	+	\dashv					T.							
1	-	+	\dashv		-		1								
		1													
	0.00			SOILS ensity		COHESIVE SO Blows/Ft Dens		REMARKS:							
		- 4		V. LOO		V. SOFt SOFT		* ****** ** 5° ************************							
	10-	30		M. DEN	SE 4-8	M. STIFF									
	30- >5(50)			SE 8-15 SE 15-30										
VOTI	ES:	11	STF	RATIFIC	>30 ATION LIN	HARD ES REPRESEN	T APPROX	IMATE BOUNDA	RY BETWEE	N SOIL TY	PES.	FRAN	ISITIONS	MAY BE G	RADUAL.
117.15		2)	WAT	ER LEV	EL READII	NGS HAVE BEI	EN MADE A	T TIMES AND UN THOSE PRESEN	IDER CONDI	TIONS STA	ATED,	FLU	CTUATIC	INS OF GR	OUNDWATER
			.717 (. 5556		. <i></i>							- 1	ORING No	B-75

		1215 W			BORING, INC. BROCKTON, MA 02	2301	Gor	<u>PROJECT</u> ptor & Lateral S Warwick, Ri don Archibald, I	nc.		REP	ORT OF BO SHEET FILE NO CHKD.).	B-76 1 OF 1 06217
CLA	LER: SSIFI PECTO	ED BY:	Paul Wo J. Rivard	estatus			BORING LOCAT GROUND SURF DATE START		N	DATE	END	DATUM 2/7/06		
SAM	PLEF				TED, SAMPLER (140 lb. HAMMER					GROU	NDW/	ATER REAL	DINGS	
CAS	ING:				TED, CASING DR			DATE	TIME	Г	TER	CASING		LIZATION TIME
				LLING 24 In.	•			2/7/06			1'			n Completion
	NG S	-			OTHER:	2 1/4" Augers	(3)							
E	AL	1		SAMPLE			SAMPLE D	ESCRIPTION			E			
T H	8 C N V G 8	1	PEN./ REC	DEPTH (FL)	BLOWS/6"	1					M K 8	!	STRATUM DI	ESCRIPTION
<u>"</u>		S1	24/19	0-2	4-8	Medium de	nse, yellow brow	n, fine SAND.			-	3" ASPH	IALT	
					7-7]		•						
		-				-								
	-	S2	24/22	5-7	9-12	Madium da	nse, brown, fine (CAMP						
5		32	24122	5-7	15-40	- Wedidin de	י פוווו ,וואסוע ,ספוזו	SAND.						
						1						7'		
	-	-	04/00	40.40	10		b 6 1	DANID HILL A	94					
10	_	S3	24/23	10 - 12	9-10	Mealum de	nse, brown, fine (SAND, IIII SI	IC.					
					5-10	1								
						1								
15	_	84	24/20	15 - 17	11-10	1	nse, brown, fine t	o coarse SAN	ID, trace of					
		\vdash			9-11	silt.								2
						1						19'		
		S5	24/22	19 - 21	15-15	Dense, brow	wn, fine to coarse	SAND, little I	fine gravel,					
20					32-25	trace of silt.								
			-		-	Pottom of D	loring @ 21'			-		21'		
						Bolloin of E	ionig @ z i							
]								
25						1					- 1			
	_									1				
Ì														
30]								
00														
			SOILS	T	COHESIVE SC									
	Blow 0 - 4		ensity V. LOOS	SE <2	V. SOFt	sity	REMARKS:							
	4-10 10-3			SE 2-4 SE 4-8	SOFT M. STIFF									
	30-5)	DENS	SE 8-15	STIFF									
:	>50		v. DENS	SE 15-30 >30	V. STIFF HARD									
TOV				ATION LIN	ES REPRESEN		MATE BOUNDA							
	2	MA	Y OCCU	IR I DUE TO	OTHER FACT	ORS THAN	T TIMES AND UN THOSE PRESEN	NT AT THE TI	ME MEAS	IREM	ENTS	WERE	MADE	CONDIVIER
												B	ORING No	B-76

		1:	_			ORING, INC. ROCKTON, MA 03	2301		PROJECT eptor & Lateral So Warwick, Ri rdon Archibald, Ir			REP	ORT OF BO SHEET FILE No CHKD. E		B-77 1 OF 1 06217
ORILL CLAS NSPI	SII	FIE	D BY: R:	Paul Word	dell			The Control of the Co	TION HOPE FACE ELEVATIO 2/9/	N	DATE E	ND	DATUM 2/9/08		
AMP	LE	R				TED, SAMPLER O 140 Ib. HAMMER					GROUN	DW.	ATER READ	DINGS	
ASI	١G	:	UN	LESS OTH	ERWISE NO	TED, CASING DR	IVEN USING A	300 lb.	DATE	TIME	WATI	ER	CASING	STABILIZ	ATION TIME
ASIN	IG	SIZ		MMER FAL	LING 24 In.	OTHER:	2 1/4" Auger	S	2/9/06		0	_		Upon (Completion
1	C	B	_		SAMPLE		T		DESCRIPTION		1	R			
P T	8	O W 8	NO.	PEN./ REC	DEPTH (FL)	DI CONTO/OI		OAMIFEE I	DESCRIPTION			M K	s	TRATUM DES	CRIPTION
0	-		S1	24/18	0-2	8LOWS/6" 6-12	Medium de	ense, yellow brow	n, fine SAND.		_	•	3" ASPH	ALT	
F						8-10		, ,	•						
I													4'		
1	_		S2	24/22	5-7	9-19	7	wn, fine to coars	e SAND, Ilttle	fine gravel,	.				
-	_					30-28	_cobbles.								
-			-		40.40				2115						
0		-	S3	24/18	10 - 12	46-47 29-40	gravel, cob	e, brown, fine to c bles.	carse SAND,	little fine					
I															
H	_	1	S4	24/17	14 - 16	21-18	Dense, bro	wn, fine to coarse	e SAND, little i	fine gravel.	1				
5						20-23	1		,	,					
1	_	-		-			Dettom of F	Podpa @ 16!			-	-	16'		
1	_						Bottom of E	Boring @ 16'							
F		4													
아	-	+		-											
Ī		7]								
-	_	+		-											
5		1					Í								
-	-	+	-												
F		+	\neg												
F		1												•	
-	_	+													
		1													
GI	R.S	NI	JLAR	SOILS		COHESIVE SO	ILS I								
E	Blo		/Ft D	ensity V. LOOSI		Blows/Ft Dens		REMARKS:							
2	I-1	-			E 2-4	SOFT M. STIFF									
3	0-	50		DENS	E 8-15	STIFF									
	50				15-30 >30	HARD									
TE	S:	1)	STE	ER LEVE	TION LINE	S REPRESEN	IT APPROX	IMATE BOUNDA T TIMES AND U	RY BETWEEN	N SOIL TY	PES, TR	LUC	SITIONS	MAY BE GRA	ADUAL. JNDWATEF
		-,	MA	Y OCCUP	RIDUETO	OTHER FACT	ORS THAN	THOSE PRESE	NT AT THE TI	ME MEAS	UREME	NTS	WERE N	IADE	
													В	ORING No	B-77

	NEW HAMPSHIRE BORING, INC. 1215 WEST CHESTNUT ST. BROCKTON, MA 02301 RILLER: Paul Wordeli								PROJECT sptor & Lateral So Warwick, RI rdon Archibald, ir			REP	ORT OF BO SHEET FILE NO CHKD,	ο,	8-780W 1 OF 1 06217
	SSIF	IEC	BY:	Paul Wo				BORING LOCA	TION Hama FACE ELEVATIO	LIN AVE N		END	DATUM 2/9/06	<u> </u>	
SAN	PLE	R:				OTED, SAMPLER C A 140 lb. HAMMER					GROU	NDW/	ATER REA	DINGS	
CAS	ING:					OTED, CASING DR	IVEN USING A	300 lb.	DATE	TIME	WA:	TER	CASING	STAB	ILIZATION TIME
CAS	ING	SIZI		MMER FA 4"	LLING 24 In.	OTHER:			2/9/06		1	0'		Upo	on Completion
D	C	BT			CAMPLE		T	OAMBLE	PECODIDITION	- 7	_	R			
P	S	W		PEN./	SAMPLE DEPTH	T	1	SAMPLE	DESCRIPTION			M K	,	STRATUM DI	ESCRIPTION
H	в	8	NO.	REC	(Ft)	BLOWS/6*	Madium de	maa sallassa baassa	m fine DAND			8	Oll ACIDI	IAL T	
0		+	S1	24/20	0-2	3-5 7-11	Ivieaium ae	nse, yellow brow	n, tine SAND.				3" ASPH	IAL I	
							1								
	L	4													
5	⊢	+	S2	24/12	5-7	68-77	gravel, cob	, brown, fine to n	nedium SAND	, little fine					4
		+				00-11	graver, con	Dica,					,		
S3 24/20 10 - 12 12-30 Same as S3.															
10	_	+	83	24120	10-12	27-42	Same as S	3,							
		Ī					j								
		1	S4	24/18	13 - 15	17-23	1	, brown, fine to m	redium SAND	, little fine					
	-	+	_			18-15	gravel, cob	bles.					15'		
15	\vdash	†					Bottom of E	loring @ 15'			\neg		10		
		1									- 1				
	_	+									-				
	_	+	\dashv			1	1				1				
20		1					1								
		Ţ	\Box												
	_	+	-	-											1
	-	+	\dashv			-									- 1
25		T													1
		T													
	_	+	\dashv												
		+	+												
30		I									- 1				
ŀ		+	-												
_	RA	NU	LAR	SOILS	1	COHESIVE SO	ILS								
	Blo			ensity V. LOOS	SE <2	Blows/Ft Dens V. SOFt	ity	REMARKS:	5' screen 10' solid						
	4-1	0		LOO	SE 2-4	SOFT			Road box						- 1
1	10-3 30-4	50		DEN	SE 4-8 SE 8-15	M. STIFF STIFF	1		PVC @ 15 ¹						
	>50		١	v. DENS	SE 15-30 >30	V. STIFF HARD									
ITOV	ES:	1)	STR	ATIFIC	ATION LIN	IES REPRESEN	T APPROXI	MATE BOUNDA TIMES AND UN	RY BETWEEN	N SOIL TYP	ES, T	RAN	SITIONS	MAY BE G	RADUAL.
	•	-)	MA	YOCCU	IR IDUE T	OTHER FACT	ORS THAN	THOSE PRESE	NT AT THE TI	ME MEASU	REM	ENTS	WERE	MADE	CONDIVATER
				.8									B	ORING No	B-78OW

...

i

		1215 V			BORING, INC. PROCKTON, MA 02	301		PROJECT ptor & Lateral Se Warwick, RI don Archibald, In		R	EPORT OF SHE FILE CHK	ET	No.	B-79 1 OF 1 06217
INSF	SSIF	IED BY: 'OR:	Paul Wo J. Rivard				BORING LOCAT GROUND SURF DATE START				DATUI ND 2/13/00			100
SAM	PLE				TED, SAMPLER C 140 lb. HAMMER					GROUND	WATER R	EADINGS		
CAS	ING:	UN	LESS OTH	HERWISE NO	TED, CASING DRI	VEN USING A	300 lb.	DATE	TIME	WATE	R CASIN	iG	STABILIZ	ATION TIME
			MMER FA	LLING 24 in.	ATI 150			2/13/06		81			Upon C	completion
CAS	NG :				OTHER:	2 1/4" Augen					R			
E	A	L	I mmile	SAMPLE		1	SAMPLE D	ESCRIPTION			M E			
H	N		PEN./ REC	DEPTH (FL)	BLOWS/6"						K 8	SIRAI	'UM DESC	RIPTION
0	L	S1	24/19	6" - 2'6"	25-20	Dense, bro	wn, fine to coarse	SAND.			6" AS	PHALT		
	\vdash	+	-		13-21	-								
	\vdash					1								
5		\$2	24/22	5-7	11-23	Dense, bro	wn, fine to coarse	SAND.						
ľ	L	+			18-17	-								6
	\vdash	+	+			1								15
]								
10	_	S3	24/22	10 - 12	15-19	Dense, bro	wn, fine to coarse	SAND.						
	H	+	\vdash		28-27	1				- 1				
		+				1								
15	_	S4	24/22	15 - 17	18-24	1	, brown, fine to co	parse SAND,	trace of					
	_	+-			29-35	silt, cobbles	i.							
						1								
		85	18/18	19 - 20'6"	-	Very dense	, brown, fine to co	arse SAND.						
20	_	+			85	Dallam of D	laring @ 2010!			-	20'6"			
		+			-	Bottom of E	oring @ 20'6"							
		-			-									
25		+	-											
		1												
		I												
	_	-												
30	-	+												
	RA.	NI II AE	RSOILS		COHESIVE SO	lis I	·							
	Blo	ws/Ft D	ensity		Blows/Ft Dens	4	REMARKS:							
	0 - 4-1	0		SE 2-4	V. SOFt SOFT									
	10-3 30-8			SE 4-8 SE 8-15	M. STIFF STIFF									
	>50			SE 15-30	V. STIFF									
NOT	ES:	1) ST	RATIFIC	>30 ATION LIN	HARD ES REPRESEN	IT APPROXI	MATE BOUNDA	RY BETWEE	N SOIL TY	PES, TR	ANSITIO	NS MAY	BE GRA	DUAL.
	2	2) WA	TER LEV	EL READII	NGS HAVE BEE	EN MADE A'	T TIMES AND UN THOSE PRESEN	IDER CONDI NT AT THE TI	TIONS STA	ATED, FI UREMEN	LUCTUAT	TIONS O	F GROU	INDWATER
												BORIN		B-79

		1	215 W			BORING, INC. ROCKTON, MA 03	2301		PROJECT ptor & Lateral S Warwick, Rt don Archibald, I			REP	ORT OF B SHEET FILE N CHKD.	0.	B-80 1 OF 1 06217
DRII CLA INSI	SSI	FIE	D BY: R:	Paul Wo				BORING LOCAT GROUND SURF DATE START	ION BASS	ET AND		END	DATUM 2/13/06		
SAN	PLI	ER:				TED, SAMPLER O 140 lb. HAMMER					GROUI	NDWA	TER REA	DINGS	
CAS	ING	:				TED, CASING DR	IVEN USING A	300 lb.	DATE	TIME	WAT	TER	CASING	STA	BILIZATION TIME
CAS	IMG	2 (21)		MMER FA	LLING 24 in.	OTHER:	2 1/4" Auger:		2/13/06		7	•		U	pon Completion
D	C	В	<u>. </u>				2 1/4 Augen		l		<u> </u>	R			
E P T	S	O	_	PEN./	SAMPLE DEPTH		1	SAMPLE D	ESCRIPTION			E M K		STRATUM	DESCRIPTION
H	G	9	NO.	REC	(FL)	BLOWS/6°	24-41		- F DAND			8	49 A OPI	141 =	
0	-	_	S1	24/12	6" - 216"	12-13	Medium de	nse, yellow brow	n, fine SAND.				4" ASPI	IALT	
													3'		
	-	_	S2	24/20	5 - 7	14-18	Donne bro	wn, fine silty SAN	ID.						
5	H		02	24/20	0-7	21-26	Dense, pro	WIT, III to SIRLY CAN	U.				8		
]								
	8'														
10	S3 24/19 10 - 12 13-16 Dense, brown, wet, fine to coarse SAND, little fine														
10	_					14-17	gravel.								
	-						-								
			S4	24/22	14 - 16	27-26	Very dense	, brown, wet, fine	to coarse SA	ND, little					
15	L	_				28-32	fine gravel.						401		
	-	-	-				Bottom of B	Boring @ 16'			-		16'		
							1								
	_	-		-			-								1
20		1					1								
]								1
	_	\dashv					1								
25															1
20	_	4													ĺ
		+	-				1					- 1			
							1				- 1	- 1			
30	_	4													
		+		\dashv											
				2011.0											
	Blo)WE	/Ft D	SOILS ensity		COHESIVE SO Blows/Ft Dens		REMARKS:							
	4-	- 4 10			SE 2-4	V. SOFt SOFT									
		-30 -50		DEN	SE 8-15	M. STIFF STIFF									
	>50				SE 15-30 >30										
TO	:8:	2)	STF	RATIFIC	ATION LIN	ES REPRESEN	T APPROX	MATE BOUNDAR	RY BETWEE	N SOIL TYP	PES, T	RAN	SITIONS	MAY BE	GRADUAL. ROUNDWATER
		-1	MA	YOCCU	R DUE TO	OTHER FACT	ORS THAN	THOSE PRESEN	IT AT THE TI	ME MEASU	JREME	ENTS	WERE	MADE	
													F	ORING N	io B-80

		12	-			ORING, INC. ROCKTON, MA 0	2301		PROJECT eptor & Lateral So Warwick, RI rdon Archibald, Ir			REP	ORT OF BO SHEET FILE NO CHKD.	D.	B-81 1 OF 1 06217
INSP	EC	FIEL		Paul Wor J. Rivard				GROUND SURF DATE START	TION HOPE FACE ELEVATIO 2/7/	N	DATE	END	DATUM 2/7/06		
SAM	PLE	R:				TED, SAMPLER (140 lb. HAMMER					GROU	NDW	ATER REA	DINGS	
CASI	NG	i:				TED, CASING DR			DATE	TIME	T	TER	CASING		ILIZATION TIME
					LING 24 in.				2/7/06			0			on Completion
CASI			E:			OTHER:	2 1/4" Augers	3							
E	A	B L			SAMPLE			SAMPLE	DESCRIPTION			R E			
	N	0 W 8	NO.	PEN./ REC	DEPTH (Ft.)	BLOWS/6"	1					M K S		STRATUM DI	ESCRIPTION
0	$\overline{}$	٦	S1	24/14	6" - 2'6"	6-11	Medium de	nse, yellow brow	n. fine SAND.	77-32-3-3		-	5" ASPH	IALT	
Ĩ						9-7								,	
		_									_		3,		
	_	-	S2	24/22	5-7	9-20	Vanu danas	, brown, fine to n	nadium CAND	little fine					
5		7	32	24122	5-7	34-41	gravel.	, brown, line to i	Hedrilli SVIAD	, iittie iirie					
	gravo.														
	-	4	S3	24/19	40.40	40.45		b O		ID and					
10		+	33	24/19	10 - 12	12-15 11-14	GRAVEL.	nse, brown, fine	to coarse SAN	ID and					
		1				17-14	JOIN WELL								
		+	84	24/20	14 - 16	9-11	Same as S	3.							
15	-	+	_			12-14	-						16'		
ŀ	_	+					Bottom of B	Soring @ 16'					10		
-											1				
-	_	4													
20		+	_		_		-								
1		+					1								
l		I]				- 1				
-	_	4													
25	_	+	-				1								
1	-	+							*1						
1		1													
}	_	1		_											
30	_	+	-	-							1				
t		+													
		T													
				SOILS ensity		COHESIVE SC Blows/Ft Dens		REMARKS:							
	0 -	4		V. LOOS	E <2	V. SOFt	,	, carrier at the	я						
	0-	10 30		LOOS M. DENS	E 4-8	SOFT M. STIFF									- 1
	10- -50	50)	,		E 8-15 E 15-30	STIFF V. STIFF									
					>30	HARD	T ADDOC	E & A SUPPLE DE ANT 15 I'M 4	DV DET .	100" "	nra =	'23 A S '	OITION	MANGE	PADUAL
OTE	S:	1) 2)	WAT	ER LEV	EL READIN	IGS HAVE BE	EN MADE A	MATE BOUNDA T TIMES AND U	NDER CONDI	TIONS ST	ATED,	FLU	CTUATIO	NS OF GR	OUNDWATER
			MA	Y OCCU	RIDUETO	OTHER FACT	ORS THAN	THOSE PRESE	NT AT THE T	ME MEAS	UREM	ENTS	WERE	MADE	

	NEW HAMPSHIRE BORING, INC. 1215 WEST CHESTNUT ST. BROCKTON, MA 02301 ILLER: Paul Wordell							Gor	PROJECT plor & Lateral Se Warwick, RI don Archibald, In	c.		REP	ORT OF B SHEET FILE N CHKD.	0.	B-82OW 1 OF 1 06217
CLA	SSI EC	FIE		J. Rivard				GROUND SURF DATE START	TION LYND ACE ELEVATION 2/14	N		END	DATUM 2/14/06		
SAM	PLI	ER:				TED, SAMPLER O 140 lb. HAMMER					GROU	NDW/	ATER REA	DINGS	
CAS	ING	3:	UNI	ESS OTH	ERWISE NO	TED, CASING DR	VEN USING A	300 lb.	DATE	TIME	WA	TER	CASING	STAB	ILIZATION TIME
CAS	MO	er.		MER FAL	LING 24 In.	OTHER:			2/14/06		1	1'		Upi	on Completion
D E		8 L	LE.	4"		OTHER:					_	R			
P T	S	0		PEN./	SAMPLE	T	-	SAMPLE D	ESCRIPTION			E M K		STRATUM D	ESCRIPTION
н	G	5	NO.	REC	(FL)	BLOWS/6*						8			
0	H		81	24/14	6" - 2'6"	12-9 7-5	Medium de	nse,yellow brown	, fine SAND.				4" ASPI	HALT	
						7-5	1								
													5'		
5	H	-	S2	24/20	5-7	14-26 43-28	gravel, cob	, brown, fine to o	oarse SAND,	little fine					
						40-20	graver, con	Dica.							,
	-	-	S3	24/22	10 - 12	16-22	Dense hro	wn, fine to coarse	SAND little f	ine gravel					
10	Г		00	E-WELL	10 12	19-16	trace silt.	Will into to obtain) () () () () () () () () () () () () ()	nio giavon					
]								φ.
	-	-	S4	24/20	13 - 15	14-21 21-22	Same as S	3.							
						21-22							15'		
15							Bottom of B	Boring @ 15'							
	_	+	_				-								
							1								
20				1]								
	-	+		-											
		1		$\overline{}$											
		1													
25		+	-	-+											
	_	+		-		127									
												- 1			
1	_	+	-	-											
30		+													
		1								æ		- 1			
	R/	- IN	JLAR	SOILS		COHESIVE SO	ILS T								
	Blo		/Ft De	ensity V. LOOS		Blows/Ft Dens V. SOFt		REMARKS:	5' screen 10' solid						
	4-	10		LOOS	E 2-4	SOFT	1	1	Roadbox						
	30-	30 50			E 8-15	M. STIFF STIFF		1	PVC @ 15'						
	>50				>30	V. STIFF HARD.									
IOTE			WAT	ER LEVI	EL READIN	NGS HAVE BE	EN MADE A	MATE BOUNDAI THMES AND UN	IDER CONDI	TIONS STA	TED,	FLU	CTUATIO	INS OF GF	
		•						THOSE PRESEN							
													E	BORING N	B-82OW

						BORING, INC.			PROJECT			REP		ORING No.	B-83
		121	5 WE	EST CHE	STNUT ST. E	BROCKTON, MA 02	2301	Interce	ptor & Lateral Se	wers			SHEET		1 OF 1
								Gora	Warwick, RI don Archibald, In	10			FILE NO		06217
DRIL	LEG).		Paul Wo	rdell			BORING LOCAT		EWATER	De.		CHIND.	DI	
CLA	SSIF	IED I		J. Rivard				GROUND SURF		N	DATE	END	DATUM 2/2/06		
SAM	PLE					OTED, SAMPLER C				18.0	GROU	NDWA	ATER REA	DINGS	
CAS	NG:		UNL	ESS OTH	ERWISE NO	TED, CASING DRI	VEN USING A	300 lb.	DATE	TIME	WA:	TER	CASING	STABI	LIZATION TIME
					LLING 24 In.				2/2/06		8	_			n Completion
CAS	NG	SIZE	:			OTHER:	2 1/4" Augen	3						-	
D	G A	L			SAMPLE			SAMPLE D	ESCRIPTION			R			
P	S	o l		PEN./	DEPTH		1	2				M K		STRATUM DE	SCRIPTION
H	G		10.	REC	(Ft.)	BLOWS/6"					_	8			
0	H	+	81	24/12	6" - 2'6"	1	Dense, bro	wn, fine to coarse	SAND.				4" ASPH	ALT	
	-	+	-			16-11	-								
	-	+	\neg			†	1								
			S2	24/10	5-7	5-10	Medium de	nse, wet, brown,	fine to coarse	SAND, little	е				
5						19-22	fine gravel.								
j		-													
	_	+	\dashv				-								
	S3 24/1 10 - 12 9-10 Medium dense, brown, fine to coarse SAND.														
10	_	+	33	24/1	10 - 12		Jiviedidi ii de	iise, Drown, litte t	o coarse san	טו.					
15-16													1		
		\top					1								- 1
		- (54	24/22	14 - 16	14-15	Medium de	nse, brown, fine t	o coarse SAN	ID.	- 1				- 1
15						13-10									
,,,		_	_		-	-			vii———			_	16'		
	_	+	\dashv				Bottom of E	Boring @ 16'			- 1				1
	-	+	\dashv			+	-								
	_	+	1				1				- 1				
20		\top					1								
]				- 1				- 1
			1								- 1				
		+	\dashv	-											
25	_	+	+	-		-									
1	-	+	+												1
Ì		1	1												
1															
30															
30			1								- 1				
ŀ	_	+	+	-								- 1			
_	RA	NUL	AR	SOILS	1	COHESIVE SO	ILS I								
	Blo	ws/F	t De	ensity		Blows/Ft Dens	100	REMARKS:							Į,
	0 - 4-1		1	V. LOOS	SE <2 SE 2-4	V. SOFt SOFT									
	10-3	30	ħ	M. DEN	SE 4-8	M. STIFF STIFF									
	30-(>50		١		SE 8-15 SE 15-30	V. STIFF									
MOT	>30 HARD TES: 1) STRATIFICATION LINES REPRESENT APPROXIMATE BOUNDARY BETWEEN SOIL TYPES, TRANSITIONS MAY BE GRADUAL.														
4011	.o:	2) V	VAT	ER LEV	EL READI	NGS HAVE BEI	EN MADE A	T TIMES AND UN	IDER CONDI	TIONS STA	TED,	FLUC	CTUATIO	NS OF GR	OUNDWATER
			MAY	y occu	IR I DUE TO	OTHER FACT	ORS THAN	THOSE PRESEN	IT AT THE TI	ME MEAS	JREM	ENTS	WERE F	MADE	
													E	ORING No	B-83

					ORING, INC.	2004	1-1	PROJECT			REP		ORING No.	B-84
		1215 W	EST CHE	เราพบา ธา. ย	ROCKTON, MA 02	2301	Interce	ptor & Lateral Si Warwick, Ri	ewers			SHEET FILE N		1 OF 1 06217
							Gord	don Archibaid, ir	ic.			CHKD.		00211
	LER:		Paul Wo	ordell			BORING LOCAT		ZANDT	- 40	E.			
	SSIFIE	ED BY;)R:	J. Rivar	ď			GROUND SURFA	ACE ELEVATIO 1/25		DATE	END	DATUM 1/25/08		
SAM	PLER	· UN	ESS OT	HERWISE NO	TED, SAMPLER C	ONSISTS OF	A 2º SPLIT							
0, 11,					140 lb. HAMMER					GROU	NDW/	TER REA	DINGS	
CAS	NG:				TED, CASING DR	IVEN USING A	300 lb,	DATE	TIME	WAT	ER	CASING	STABILI	ZATION TIME
040	NO O			LLING 24 in.	OTHER.	D 4449 A	44.61	1/25/06		12	21		Upon	Completion
D	NG S	market a	NW		OTHER:	2 1/4" Augers	14.0			_	R			
E	A 1.	1		SAMPLE			SAMPLE D	ESCRIPTION			E			
T H	N W		PEN./ REC	DEPTH (FL)	BLOWS/6"						K 8		STRATUM DES	CRIPTION
0		S1	24/19	6" - 2'6"	8-12	Medium de	nse, yellow brown	n, fine SAND.				5" ASPI	ALT	
					6-6	1				1		j.		
	_	-	_			-				-		3'		
	_	S2	24/15	5-7	39-75	Very dense	, brown, fine to co	narse SAND	little aravel	- 1				
5		-	24710	3-1	69-50	cobbles.	, Diowii, mio to oc	Jaigo Orii (D)	iitilo gravor,					
	•					1								
		S3	24/24	10 - 12	20-17	Weathered	Rock, Shale.			\dashv	-	10'		
10		-		75 12	12-7	1				- 1				
						1								
		-			00.000	-				- 1		4.4.51		
	_	S4	5/5 30"	14 - 14.5 14.5 - 17	92/5" 4 min	Cored 14.5 Gray Shale				\dashv	\dashv	14.5'	-	
15	-		30"	17 - 19.5	4 min	Joray Griaio								
				11 1010	4 min									
					4min]	•							
					4min					\dashv	-	19.5'		
20						Bottom of B	oring @ 19,5'				- 1			
1						1								
1						1								
25														
	_					1					.			
ŀ	-					1								
İ											- 1			
30														
30														- 1
-	_													
G	RAN	ULAR	SOILS		COHESIVE SO	ILS						_		
	Blow 0 - 4		ensity V. LOOS	SE <2	Blows/Ft Dens V. SOFt	lty	REMARKS:							l
	4-10		LOO	SE 2-4	SOFT									- 1
	10-30 30-50			SE 4-8 SE 8-15	M. STIFF STIFF									
	-50			SE 15-30	V. STIFF									2.0
NOTE	S: 1) STF	RATIFIC	>30 ATION LINE	HARD ES REPRESEN	IT APPROXI	MATE BOUNDAR	RY BETWEEN	SOIL TYPE	ES, TI	RAN	SITIONS	MAY BE GR	ADUAL.
	2)	WAT	ER LEV	EL READIN	IGS HAVE BEE	EN MADE AT	TIMES AND UN THOSE PRESEN	DER CONDI	TIONS STAT	TED, I	FLUC	CTUATIO	NS OF GRO	UNDWATER
		-101	. 2000									Г	ORING No	B-84
													J 10	2 37

!!!!

:

		1215			BORING, INC. BROCKTON, MA 0	2301	Gor	PROJECT ptor & Lateral So Warwick, Ri don Archibald, Ir	ıc.		REP	ORT OF B SHEET FILE N CHKD.	D.	8-85 1 OF 1 06217
INSI	SSIF	FIED B TOR:	J. Rivar	d			BORING LOCAT GROUND SURF DATE START		N	DATE	END	DATUM 1/26/06		
SAN	IPLE		INLESS OT	HERWISE N	OTED, SAMPLER (A 140 lb. HAMMER	CONSISTS OF	A 2" SPLIT			GRO	INDW	ATER REA	DINGS	
CAS	ING				OTED, CASING DR			DATE	TIME	T	TER	CASING		ZATION TIME
0,,0				LLING 24 In			. 000 15.	1/26/06	7,100.	_	21	Orionto		Completion
CAS	ING	SIZE:	NW 7'		OTHER:	2 1/4" 5'								
D E	A	L		SAMPLI		1	SAMPLE D	ESCRIPTION			R			
Ţ	S	w	PEN./	DEPTH	and the observation of the contract of the con			energe energy			M K		STRATUM DES	CRIPTION
Н	G	8 NO		(Ft.) 6" - 2'6"	BLOWS/6" 8-14	Madium de	ense, brown, fine (CAND loamu			8	5" ASPI	IALT	
	\vdash	+	24/12	0 - 20	9-8	- Iviedium de	anse, prown, tine s	SAND, Warny.				D AGP	IAL I	
	Г	\top				1								
		I				TILL						5'		
5		S	2 24/24	5-7	18-25	Weathered	Rock							
٠	_	+			36-72							7'		
	-	C	1 60/55	7-12	3 min	Started co								
	H	+	+	· -	3 min 3 min	Possible S	andstone bedrock	ζ.						
	Н	+			3 min	1								
10	Г	1			3 min	1								
												12'		
		\perp				Bottom of B	Boring @ 12'							4
		_				5' of Rock				1				
15	_	+	-		-	4								
	-	+	-			-								
	-	+	-			1								
		+				1								
20]								
20														
		+								1				
	_	+	-			-				- 1				
	_	+	+			1								
25	_	+	+			1					ı			
		T				1								
]								
30	_	-								1				1
-	_	+	+			{								
ł	_	+	1											
			R SOILS	T	COHESIVE SC	ILS					0			
_	Blo		Density V. LOO	SE <2	Blows/Ft Dens V. SOFt	sity	REMARKS:							
	4-1	0	LOO	SE 2-4	SOFT			- 2						
	10-3 30-4			SE 4-8 SE 8-15	M. STIFF STIFF									
	>50			SE 15-30	V. STIFF									
ITO	ES:	1) S	TRATIFIC	>30 ATION LIN	HARD IES REPRESEN	NT APPROX	IMATE BOUNDAR	RY BETWEEN	SOIL TY	PES. 1	RAN	SITIONS	MAY BE GR	ADUAL.
	:	2) W	ATER LE	VEL READ	NGS HAVE BE	EN MADE A	T TIMES AND UN	IDER CONDI	TIONS STA	ATED,	FLU	CTUATIO	NS OF GRO	UNDWATER
		N	MT UUUL	NK IDUE I	COMERTAGI	URO IMAN	THOSE PRESEN	TI AL IME II	INE INEAS	UREIVI	EN 15	Г		
												18	ORING No	B-85

.

		1	-			BORING, INC. ROCKTON, MA 02	301		PROJECT eptor & Lateral So Warwick, RI rdon Archibald, In			REP	ORT OF B SHEET FILE NO CHKD.	D.	B-86OW 1 OF 1 06217
DRIL CLAS	381	FIE	D BY: R:	Paul Wor	deli			BORING LOCA	TION VA~ FACE ELEVATIO 1/17	ZANOT N			DATUM 1/17/06	<u> </u>	
SAM	PL	ER:				TED, SAMPLER C					GROU	NDW/	TER REA	DINGS	
CAS	NG	3 :				TED, CASING DRI	VEN USING A	300 lb.	DATE	TIME	WA*	TER	CASING	STA	BILIZATION TIME
CAS	NG	SIZ		AMER FAL 4"	LING 24 In.	OTHER:			1/17/06		4	ľ		U	pon Completion
D	CA	B			SAMPLE			SAMPLE	DESCRIPTION			R			
P T H	S N	0 ₩ 8	NO.	PEN./ REC	DEPTH (Ft.)	BLOWS/6*						N K S		STRATUM	DESCRIPTION
0	L		S1	24/17	6" - 2'6"	7-9 11-15	Medium de	nse, brown yello	w, fine to coar	se SAND.			4" ASPH	ALT	
	F												4'		
5	L		S2	24/18	5-7	15-21	1	y, fine to coarse	SAND, little fir	ne gravel,					
						23-25	trace of silt	•							
10		_	S 3	24/19	10 - 12	20-17	Same as S	2.							
						16-17									
		-	84	24/22	13 - 15	14-14	Dense, gra	y, fine SAND, tra	ce of silt.						
15						11-20							15'		
		\exists					Bottom of E	Boring @ 15'							
	_	4													
20															
	-	1													
		-													
25				二											
	-	+													
		7													
30		#													
		+													
_[R	ANI	JLAR	SOILS		COHESIVE SO	LS								
	0.	- 4		ensity V. LOOS		Blows/Ft Dens V. SOFt	lty	REMARKS:	10' solid						
}	10	10 -30 -50 0		M. DENS	E 8-15 E 15-30	702 (70.000 10)			30# bentonite 3 bags sand Road box Cement	chips					
ITO	S	2)	WAT	ER LEV	EL READI	NGS HAVE BEE	N MADE A	MATE BOUNDA T TIMES AND UI THOSE PRESE	NDER CONDI	TIONS STA	TED.	FLUC	CTUATIC	INS OF G	GRADUAL. ROUNDWATER
			WA	. 0000	KIDUE I	OTHER PACE	ORG THAN	THOSE PRESE	NI AU INC II	IVIE IVIEMOL	ACIVII	=141 €	Γ		No B-860W

	NEW HAMPSHIRE BORING, INC. 1215 WEST CHESTNUT ST. BROCKTON, MA 02301 ILLER: Paul Wordell						Gon	PROJECT ptor & Lateral So Warwick, Ri don Archibald, Ir	1C.		REPO	ORT OF BO SHEET FILE NO CHKD. I).	8-87 1 OF 1 06217
CLA	SSIFIE	ED BY;)R:	J. Rivaro				BORING LOCAT GROUND SURF DATE START				END	DATUM 1/17/06		
SAM	PLER				TED, SAMPLER O 140 lb. HAMMER					GROUN	₹DWA	TER REAL	DINGS	
CAS	ING:	UNI	ESS OTI	HERWISE NO	TED, CASING DR	IVEN USING A	300 lb.	DATE	TIME	WAT	ER	CASING	STABIL	IZATION TIME
210	NO 01		MMER FA	LLING 24 In.	OTHER.	0.4/48.5		1/17/06		9'			Upor	Completion
D	NG SI				OTHER:	2 1/4" Augen				<u> </u>	R			
E	A L 8 O	-	DEN/	SAMPLE		4	SAMPLE D	ESCRIPTION			E M	١.	TD 4 TI U 4 DP	CODUCTION
T H	N W	NO.	PEN./ REC	DEPTH (Ft.)	BLOWS/6"						K 8		STRATUM DE	SCRIPTION
0		S1	24/12	6" - 2'6"	57-33		e, brown yellow, fi	ne to coarse	SAND and			5" ASPH	ALT	
	-				18-20	GRAVEL;	cobbles.			- 1				
						1								
5		S2	24/22	5-7	19-40	1	, gray, fine to coa	irse SAND an	d GRAVEL	.	- 1			
	-	-		-	62-55	little silt.				- 1	- 1			
							_				- 1			
10	-	S3	6/6	10 - 10'6"	100/6"	Weathered	Rock.			-	-	10'		
						1								
		84	6/6	13 - 13'6"	100/6"	Weathered						13'6"		
	-	-	- 1		-	Auger Refu	sal @ 13'6"					Possible	bedrock	
15						1					- 1			
						1				1				
	_			-		ļ					-			
	_					1					1			
20						j				- 1				
						-				1				
05										1				
25														
					-									B
30														
		-									1			
			SOILS ensity		COHESIVE SO Blows/Ft Dens	000 00	REMARKS:							
	0-4		V. LOOS	SE <2 SE 2-4	V. SOFt SOFT		TIMITH II II II							
	4-10 10-30)	M. DEN	SE 4-8	M. STIFF	1								
	30-50 >50			SE 8-15 SE 15-30										
TOP	ES: 1) STF	RATIFIC	>30 ATION LINE	HARD ES REPRESEN	T APPROXI	MATE BOUNDAR	RY BETWEE	N SOIL TY	PES. TF	RANS	SITIONS	MAY BE GE	RADUAL.
, ,	2)	WAT	ER LEV	EL READIN	IGS HAVE BEI	EN MADE A	TIMES AND UN	IDER CONDI	TIONS STA	ATED, F	FLUC	OITAUTS	NS OF GRO	DUNDWATER
		1717	. 5566		J. HARTAOI	ono nimi		11 No. 11				Г	ORING No	B-87

		4				ORING, INC. ROCKTON, MA 02	201	Interne	PROJECT ptor & Lateral Sc	PANIOTO		REP	ORT OF B	ORING No.	B-87A 1 OF 1
		ı	2 10 VV	EOI UNE	311101 31. 0	ROUNTON, IVIA 02	1 06:	interce	Warwick, Ri	EWOLS			FILE N		06217
						100			don Archibald, Ir				CHKD.	BY	
DRIL CLA INSF	SSI	FIE	D BY: R:	Paul Wo				BORING LOCAT GROUND SURF DATE START		N		END	DATUM 2/10/06		
SAM	PLE	R:				TED, SAMPLER C 140 lb. HAMMER I					GROUI	NDWA	ATER REA	DINGS	
CAS	NG	:	UNI	ESS OTI	ERWISE NO	TED, CASING DRI	VEN USING A	300 lb.	DATE	TIME	WAT	ER	CASING	STABIL	IZATION TIME
040	u a	015		/IMER FA	LLING 24 In.	OTHER:	0.4349.4		2/10/06		9'	1		Upon	Completion
CAS			E:			UIHER:	2 1/4" Augen				L	R		L	
E	S	L O		I mest (SAMPLE		1	SAMPLE D	ESCRIPTION			E M			DADIDTION
T H	N G	W	NO.	PEN./ REC	DEPTH (Ft.)	BLOWS/6"						K S		STRATUM DES	SCRIPTION
0			S1	24/15	6" - 216"	11-9	Medium de	nse, brown, fine t	o coarse SAN	ND.			4" ASPI	ALT	
	L	_			-1000-0011	7-6	-								
	H	_					1						4'		
_			S2	24/20	5-7	20-26	Weathered	Shale						_	
5						32-44									
	H	-	_				-								
10 S3 18/19 10 - 11'6" 20-34 Same as S2.												8			
10	L	_				63					_	_	12'		
	_	+	C1	60/60	12 - 17	3 mln	Gray fractu	red shale.		*		.			
		7				3 min	1				1				
15						3 min									
10		4				3 min							4=1		
	-	\dashv	-				Bottom of F	loring @ 17'			-+	-	17'		
		1					DOMONTO E	ioning @ 17	3			- 1			
20												. 2			
		4	_												- 1
		+	-									1			
		1										1			
25												1			1
	-	4		_											
	-	+										- 1			
		1										- 1			
30		1													
		+	\dashv												
ł		+	\neg												
				SOILS		COHESIVE SO		REMARKS:					-		
-	0 -	4		ensity V. LOOS		Blows/Ft Dens V. SOFt	ity	UTINIUUVO!							
	4-1 10-	10 30			SE 2-4 SE 4-8	SOFT M. STIFF	1								
	30-50 DENSE 8-15 STIFF >50 V. DENSE 15-30 V. STIFF														
				2000	>30	HARD	T ADDDOY	MATE DOUBLE A	DV DETAICH	N COLL TYP	EQ T	DANI	CITIONS	MAVEC	· ·
TUV	ES: 1) STRATIFICATION LINES REPRESENT APPROXIMATE BOUNDARY BETWEEN SOIL TYPES, TRANSITIONS MAY BE GRADUAL. 2) WATER LEVEL READINGS HAVE BEEN MADE AT TIMES AND UNDER CONDITIONS STATED, FLUCTUATIONS OF GROUNDWATER MAY OCCUR I DUE TO OTHER FACTORS THAN THOSE PRESENT AT THE TIME MEASUREMENTS WERE MADE														
			MA	Y OCCL	IR IDUE TO	OTHER FACT	ORS THAN	THOSE PRESEN	NT AT THE T	ME MEASL	IREME	±NT8			2021 2022 2027
													[6	BORING No	B-87A

.

		1215 W			ORING, INC. ROCKTON, MA 02	2301		PROJECT ptor & Lateral So Warwick, RI			REP	ORT OF B SHEET FILE N		B-88 1 OF 1 06217
				per_				don Archibald, Ir				CHKD,	BY	
	LER:		Paul W	ordell			BORING LOCAT		oon 10	URR	7 "			
INSF	ECT		J. Riva	rd			GROUND SURF	ACE ELEVATIO 1/25		DATE	END	DATUM 1/25/06		
SAM	PLER				TED, SAMPLER C 140 lb. HAMMER					GROU	NDW/	TER REA	DINGS	
CAS	NG:	UN	LESS OT	HERWISE NO	TED, CASING DR	IVEN USING A	300 lb.	DATE	TIME	WAT	rer	CASING	STABILIZ	ZATION TIME
		HA	MMER F	ALLING 24 In.				1/25/06		8	!		Upon	Completion
CASI	NG S	IZE:	NW		OTHER:	*								• • • • • • • • • • • • • • • • • • • •
	C E	T				T					R			
E P	S C	-	DEM /	SAMPLE	1	-	SAMPLE D	ESCRIPTION			W		OTDATUM DEG	ODIDTION
H	N Y		PEN./ REC	DEPTH (FL)	BLOWS/6*	1					K		STRATUM DES	CRIPTION
0		S1	24/16	1	8-6	Medium de	ense, brown, fine t	o coarse SAN	ND.			3" ASPI	IALT	
					6-6	1								
5		82	24/22	5-7	46-50	Very dense	, brown, fine to co	oarse SAND,	cobbles.					
9					47-40					- 1				
										- 1				
		_												
		-								_		10'		
10		\$3	1/1	10 - 10'1"	100/1"		ock fragments.			_	_	10'1"		
		C1	60/24	10'1" - 15'1'		7	ing @ 10'1" to 15'							
	_	-			4 min	Possible be	drock or boulder.							
		-	-	_	4 min	-								
	_	-			4 min	1					- 1	15'1"		
15		-			4 min	Dettem of F	loring @ 15'1"			-	\dashv	16.1		
	-	1				Portou o E	nound (6, 19.1			- 1				
						1				- 1	- 1			
						1					- 1			
						1				- 1				
20]					- 1			
					-]				- 1				
]				- 1				
ļ														
25														1
1	_		_			1					- 1			1
}						-								
ŀ	_					1				1				
1	-													
30						1				1				
1														1
1														
			SOILS		COHESIVE SO						-			
	Blow 0 - 4		ensity V. LOO	SE <2	Blows/Ft Dens V. SOFt	sity	REMARKS:							- 1
	4-10		LOC	SE 2-4	SOFT									
	10-30				M. STIFF STIFF									- 1
	30-50 >50			SE 8-15 SE 15-30		1								
10-	-			>30	HARD		144 WW P. C. II. II		1001	-	D41.	OUTLOS		A DUIAN
NOTE	:S: ′) ST	RATIFIC	ATION LINE	:S REPRESEN IGS HAVF RFI	NT APPROXI	MATE BOUNDAR	RY BETWEEN DER CONDI	N SOIL TYP TIONS STA	YES, T	KAN: FLUC	SITIONS	MAY BE GR	ADUAL, UNDWATER
	2) WATER LEVEL READINGS HAVE BEEN MADE AT TIMES AND UNDER CONDITIONS STATED, FLUCTUATIONS OF GROUNDWATER MAY OCCUR I DUE TO OTHER FACTORS THAN THOSE PRESENT AT THE TIME MEASUREMENTS WERE MADE													
												E	IORING No	B-88

			_			ORING, INC.	-		PROJECT			REP		ORING No.	B-88A
Ì		1	215 W	EST CHES	STNUT ST. B	ROCKTON, MA 02	2301	Interce	ptor & Lateral Se Warwick, RI	wers			SHEET FILE N		1 OF 1 06217
								Gon	don Archibaid, in	iC.			CHKD.		00217
DRIL	LE	R:		Paul Wor	dell	100		BORING LOCAT		DETE AVE	g.				
	SSI	FIE	D BY: R:	J. Rivard				GROUND SURF			DATE	END	DATUM 2/10/06		
SAM	PLI	ER:				TED, SAMPLER C 140 lb. HAMMER					GROU	NDW/	NTER REA	DINGS	
CAS	NG	:	UNI	LESS OTH	ERWISE NO	TED, CASING DRI	IVEN USING A	300 lb.	DATE	TIME	WAT	ER	CASING	STABILI	ZATION TIME
			HA	WMER FAL	LING 24 In.		17		2/10/06		12	2*		Upon	Completion
CAS			ZE:			OTHER:	2 1/4" Augen	3							
E	A	B L.			SAMPLE			SAMPLE D	ESCRIPTION			R			
P T H	N	o W S	NO.	PEN./ REC	DEPTH (FL)	BLOWS/6"						M K S		STRATUM DES	CRIPTION
0			S1	24/12	6" - 2'6"	9-6	Medium de	nse, brown, fine (SAND.				4" ASPI	HALT	
						6-4]								
	L												31		
	H	-		04/00	F 7	00.40		. h	adlus CAND	IIIIa Con					
5	H	-	S2	24/22	5 - 7	23-40 42-29	gravel.	, brown, fine to m	legium SAND	, nue nne					
						42-23	graver.								
							1						8'		
10			83	24/22	10 - 12	12-17	Weathered	Shale - Started C	Coring @ 12'		- 1				
	_	_				30-70					-		12'		
		-	C1	60/60	12 - 17	4 min	Gray Shale								
	_	\dashv				4 min	1				- 1				1
	-					4 min	1								
15		7				4 min	1				- 1				1)
			C2	60/60	17 - 22	4 min	Gray Shale								1
						4 min	1				- 1				1
		4				4 min					- 1				
20	_	\dashv				4 min	1				1				
	_	\dashv	-			4 min							22'		
		7					Bottom of E	oring @ 22'			\neg				
										•	- 1				i
25											- 1				
20		4									- 1				
	-	4	-												
1	-	\dashv	\dashv	-											
		+		-											
30		1													
		J		000 4		0011500 55 65									
				SOILS ensity		COHESIVE SO Blows/Ft Dens		REMARKS:							1
	0 -	- 4		V. LOOS		V. SOFt									
4-10 LOOSE 2-4 SOFT 10-30 M. DENSE 4-8 M. STIFF												-			
	30- >5(-50 0	,	DENS	E 8-15 E 15-30	STIFF V. STIFF	1								
					>30	HARD									ADULE:
TOP	S:	2)	WAT	FRIFV	FI READIN	NGS HAVE BE	EN MADE A	MATE BOUNDA T TIMES AND UN	IDER CONDI	TIONS STA	TED.	FLUC	CTUATIO	ONS OF GRO	ADUAL. UNDWATER
		4)	MA	YOCCU	RIDUETO	OTHER FACT	ORS THAN	THOSE PRESEN	T AT THE TI	ME MEASL	REME	ENTS	WERE	MADE	
													E	BORING No	B-88A

NEW HAMPSHIRE BORING, INC. 1215 WEST CHESTNUT ST. BROCKTON, MA 02301									PROJECT			REP	ORT OF B	ORING No.	B-890W
		1215	WE:	ST CHES	TNUT ST. B	ROCKTON, MA 02	301	Interce	ptor & Lateral Se	ewers			SHEET		1 OF 1
								Gar	Warwick, RI don Archibald, Ir	10			FILE N		06217
DRIL	LER).		Paul Word	fell			BORING LOCAT					OHIND.	Di	
	SSIF	IED B	r:	J. Riverd				GROUND SURF		N		END	DATUM 1/26/08		
SAM	PLE					TED, SAMPLER C					GROU	NDW/	ATER REA	DINGS	
CASI	NG:					TED, CASING DRI			DATE	TIME	WA	TER	CASING	STABI	LIZATION TIME
					LING 24 In.	,			1/26/06	7	7				n Completion
		SIZE:	_	4" 15'		OTHER:	2 1/4" Augen	s 15'							
E	A	Ł			SAMPLE			SAMPLE D	ESCRIPTION			R			
P T	8 N	W		PEN./	DEPTH		1					M K		STRATUM DE	SCRIPTION
Н	G	-	_	REC	(Ft)	BLOWS/6"			244	ID 1		8			
0	H	S	1	24/16	6" - 2'6"	6-7 6-9	roots.	ense, brown, fine t	to coarse SAN	ND, trace of			5" ASPI	TALI	
	\vdash	+	+			0-a	roois.								
		+	\dagger				1								
		S	2	24/15	5-7	9-13	Dense, bro	wn, wet, fine to c	oarse SAND.				1		
5			1			20-25									1
]								1
			1]								
S2 42/42 40 44 25 42 Samp on S2															
10	_	S	_	12/12	10 - 11	35-43	Same as S				-		10'		
	_	S3	4	12/12	11 - 12	27-29	Weathered	Rock			- 1				
	_	+-	+	-+			1				- 1		ľ		I
	-	+	+	\rightarrow		 	1				- 1				
	_	S		24/20	15 - 17	9-28	Weathered	Rock			1				
15		Ť	Ť	-		25-26									
		T	1										17'		
							Bottom of E	Boring @ 17'							
20		-	1												
-		_	+	_											
	-	+	+												
-	_	+	+	-				,			- 1				
ŀ	۰	+	$^{+}$	-+											
25		+	+												
Ì			1												
İ			I												1
															1
30															
	_	_	1								1				
ŀ	_	_	+	-											I
	RA	NULA	R S	SOILS	1	COHESIVE SO	us T								
	Blows/Ft Density Blows/Ft Density REMARKS: 5' solid														
	0 - 4 V. LOOSE <2 V. SOFt 5' screen 4-10 LOOSE 2-4 SOFT PVC @ 10'														
	10-3	30	М	. DENS	E 4-8	M. STIFF			Road box						1
	30-6 >50		V	DENS	E 8-15 E 15-30	STIFF V. STIFF									1
					>30	HARD									
TO	S:	1) S	TR/	ATIFICA	TION LINE	ES REPRESEN	T APPROX	IMATE BOUNDAI T TIMES AND UN	RY BETWEEN	N SOIL TYP	ES, T	RAN	SITIONS	MAY BE G	RADUAL.
		2) VV.	AY	OCCU	RIDUETO	OTHER FACT	ORS THAN	THOSE PRESEN	NT AT THE TI	ME MEASU	REM	ENTS	WERE	MADE	COMPANIEN
													E	BORING No	B-890W

	8	1215 W			BORING, INC. BROCKTON, MA 02	2301		PROJECT ptor & Lateral So Warwick, RI don Archibald, in			REP	ORT OF B SHEET FILE N CHKD.	0.	8-90 1 OF 1 06217
CLA	LER: SSIFIE ECTO	ED BY: XR;	Paul Word				BORING LOCAT GROUND SURF DATE START			DATE	END	DATUM 1/25/06	=======================================	
SAM	PLER				OTED, SAMPLER O 140 lb. HAMMER					GROU	NDW	ATER REA	DINGS	
CAS	NG:				TED, CASING DR	IVEN USING A	300 lb.	DATE	TIME	WAT	ER	CASING	STABIL	ZATION TIME
CAS	NG S	8.7.8	MMER FAL	.LING 24 In.	OTHER:	2 1/4" Augers		1/25/06		4			Upon	Completion
D	G B	1		CAMPIE		1		reophrion			Ř			
P	S O		PEN./	SAMPLE DEPTH		1	SAMPLED	ESCRIPTION			K		STRATUM DES	CRIPTION
H	G 8	NO.	24/12	(Ft.) 0 - 2	BLOWS/6* 8-41	Von dono	e, brown, fine to c	norma SAND	little ground	\rightarrow	8	3" ASPI	JAI T	
ľ		101	24/12	0-2	25-15	Very delise	s, arown, and to c	Daise SAND,	attle graver.	`		2 MOLI	JALI	
	-	82	18/12	5 - 6'6"	52-79	Very dense	e, brown, fine to c	parse SAND a	and GRAVE	. I				
5					49	Boulders.	,,			,				
	_	-				-							•	
												9'		
10		S3	24/19	10 - 12	9-9	Medium de	nse, wet, brown,	fine to coarse	SAND.					
		-			11-16	-								
						1						13'		
		S4	24/24	14 - 16	44-49	Very dense	, brown, fine to co	oarse SAND.						
15					35-36	TILL				1		16'		
						+	loring @ 16'							
						1								
						1								
20]				1				
						-								
						1								
25						1								
	-	-				ĺ								
					-									
30										1				
	RAN	ULAR	SOILS	_	COHESIVE SO	ILS T								
		s/Ft D	ensity V. LOOS		Blows/Ft Dens		REMARKS:							
	4-10		LOOS	SE 2-4	SOFT									
8	10-30 30-50)		SE 8-15	M. STIFF									
	>50			E 15-30 >30	HARD									
NOT	DTES: 1) STRATIFICATION LINES REPRESENT APPROXIMATE BOUNDARY BETWEEN SOIL TYPES, TRANSITIONS MAY BE GRADUAL. 2) WATER LEVEL READINGS HAVE BEEN MADE AT TIMES AND UNDER CONDITIONS STATED, FLUCTUATIONS OF GROUNDWATER MAY OCCUR I DUE TO OTHER FACTORS THAN THOSE PRESENT AT THE TIME MEASUREMENTS WERE MADE													
		MA	Y OCCU	RIDUETO	OTHER FACT	ORS THAN	THOSE PRESEN	NT AT THE TI	ME MEASL	JREME	ENTS	Г		
												E	BORING No	B-90

		1215 V			ORING, INC. ROCKTON, MA 02	2301	interce	PROJECT ptor & Lateral Se Warwick, RI	awers	F		T OF BO SHEET FILE NO		B-91 1 OF 1 06217
								don Archibaid, Ir				CHKD.	вү	
DRIL CLA INSF	SSIF	ED BY:	Paul Wo				BORING LOCAT GROUND SURF DATE START		N	DATE E		ATUM /24/06		
SAM	PLE				TED, SAMPLER C 140 lb. HAMMER					GROUNI	DWATE	ER REA	DINGS	
CAS	NG:				TED, CASING DR	IVEN USING A	300 lb.	DATE	TIME	WATE	R C	ASING	STABI	LIZATION TIME
CAS	NC S	HA SIZE:	MMER FA	ALLING 24 In.	OTHER:	2 1/4" Augen	,	1/24/06		.5'	4		Upo	n Completion
D	C	8			OTILIC	Z I/4 Augen		L		Ь_	R			
P	A B N	٠ 	PEN./	SAMPLE DEPTH		-	SAMPLED	ESCRIPTION			M	1	CTDATI IM DE	CODIDTION
H	N G		REC	(Ft)	BLOWS/6*						K S		STRATUM DE	SURFTION
0		S1	24/19	6" - 2'6"	7-16	Medium de	nse, brown, fine l	to coarse SAN	ID.		5"	'ASPI	IALT	
	_				13-19	1								
	_	4	-	 		-								
	-	S2	24/24	5-7	27-28	Vone donne	, brown gray, fine	to coomo SA	ND					6
5	H	102	ZHIZH	5-7	47-46	Very deliac	, brown gray, inic	to coarse or	MD.					
		1			47.40	1								
											1			
10		83	22/18	10 - 11'8"	14-30	Same as S	2.							
	_	1			60-80/4"						11			
	-	C1	60/60	11'8" - 16'8"		Weathered	Shale			-	111	1'8"		
	-	+	_			1								
	_	1-				1				- 1	1			
15		C2	60/60	18.8" - 21.8"		Gray Shale								
						-					1			-
). 	_	+				-								
20		+			 	-					21	1'8"		
	_	+-	-			Bottom of E	loring @ 21'8"			-				
											1			1
25										1				
	_	-												
	_	+							60					
	-	+				1						4		
				2										ļ
30														
_ļ	D A	MIIIAF	SOILS		COHESIVE SO	II S		-			\perp			
	Blo	ws/Ft C	ensity		Blows/Ft Dens	C176 School	REMARKS:							
	0 - 4 V. LOOSE <2 V. SOFt 4-10 LOOSE 2-4 SOFT													
	10-3	30	M. DEN	ISE 4-8	M. STIFF									
	30-6 >50			ISE 8-15 SE 15-30	STIFF V. STIFF									
				>30	HARD	IT ADDROV	MATE DOLLER	DV OFTINE	100" T.		ARIO	TIONS	MAYBES	DADUAL
TON	:S:	2) WA	TER LE	VEL READII	NGS HAVE BEI	EN MADE A	IMATE BOUNDAI T TIMES AND UN	IDER CONDI	TIONS STA	ATED, F	LUCT	UATIC	NS OF GR	OUNDWATER
		MA	YOCCI	UR I DUE TO	OTHER FACT	ORS THAN	THOSE PRESEN	NT AT THE TI	ME MEAS	JREME	NTS V	VERE	MADE	5
												E	BORING No	B-91

			_		AMPSHIRE B				PROJECT			REPO	ORT OF B	ORING No.	B-92OW
		1	215 W	EST CHE	STNUT ST. BI	ROCKTON, MA 02	2301	Interce	ptor & Lateral Se	ewers			SHEET		1 OF 1
								Core	Warwick, Ri don Archibald, Ir	10	1		FILE N		06217
DRII	IF	R:		Paul W	ordell			BORING LOCAT					UNIND	01	
	SS	IFIE	DBY: R:	J. Rivar				GROUND SURF		N	DATE	END	DATUM 1/24/08		
SAN	PL	ER:				TED, SAMPLER C 140 lb. HAMMER					GROUN	NDWA	TER REA	DINGS	
CAS	ING	3:	UNI	ESS OT	HERWISE NOT	TED, CASING DRI	IVEN USING A	300 lb.	DATE	TIME	WAT	ER	CASING	STABI	LIZATION TIME
					LLING 24 In.				1/24/06		5'	_			n Completion
CAS	ING	SIZ	ZE:	HW		OTHER:									
D E	C	B			SAMPLE			SAMPLE D	ESCRIPTION			R			
P	18	0 W		PEN./	DEPTH		1	Orara EE D	LOOK HON		1	M		STRATUM DE	SCRIPTION
Н	G	8	NO.	REC	(FL)	BLOWS/6°					_	8			
0	-		S1	24/14	6" - 2'6"	5-7	Medium de	ense, yellow brown	n, fine to coar	se SAND.	1		5" ASPH	IALT	
	H	_		-		6-8	-			121	1				
	H	_					1				1				
	H		S2	24/22	5-7	24-23	Very dense	e, brown, fine to co	narse SAND.	little gravel	-	- 1			i e i
5	r		-	- 1/		38-118	7	ock fragments.	24.00 07 1115,	intio gravo.	.	1			
							1						7'		
							Gray Schis	t or Sandstone.					1.		
10	L		S3	6/6	10 - 10'6"	145/6"	-								
	L		C1	60/60	10'6" - 15'6"	3 min	-					- 1			i
	-	-	_			3 min	-								1
	-					3 min 3 min	1				- 1	- 1			1
	-					3 min	1						15'6"		1
15							Bottom of E	Boring @ 15'6"							
]				1				1
											1	1			j
	L	-	_									- 1			
20	-	\dashv	-				1				1				1
	-	\dashv					ł					- 1			
	_	7													ł
							1					- 1			İ
25												- 1		:	1
20															1
	s	-	_									- 1			
	_	-	-				li .				1	- 1]
	-	\dashv	\dashv												
30		+	\dashv												Į.
	_	7									1				
	-														
C				SOILS		COHESIVE SO Blows/Ft Dens	5.50.000	REMARKS: 5	S' earnen						
_	0 .	- 4		ensity V. LOO:	SE <2	V. SOFt	ny .		5' solid						
		10			SE 2-4 SE 4-8	SOFT M. STIFF		F	PVC @ 10'						
	30-50 DENSE 8-15 STIFF														
	>5	υ	1	v. DEN	SE 15-30 1 >30	V. STIFF HARD									
TOP	ES	: 1	STF	RATIFIC	ATION LINE	S REPRESEN	T APPROX	MATE BOUNDAR	RY BETWEEN	N SOIL TYP	ES, T	RAN	SITIONS	MAY BE G	RADUAL.
		2)	TAW 'AM	Y OCCI	/EL READIN JR I DUE T(IGS HAVE BE! OTHER FACT	EN MADE A' ORS THAN	T TIMES AND UN THOSE PRESEN	IT AT THE TI	HONS STA ME MEASL	ATED, P JREME	LUC NTS	WERE	INS OF GR MADE	OUNDWATER
				+									Г	SORING No	B-920W

					SORING, INC. PROCKTON, MA 02	2301		PROJECT ptor & Lateral Se Warwick, RI don Archibald, In		RE	PORT OF B SHEET FILE N CHKD.	o.	B-93 1 OF 1 06217	
CLA	LER: SSIFIE ECTO	ED BY:)R:	Paul Wo				BORING LOCAT GROUND SURF DATE START			DATE EN	DATUM D 1/17/06			
SAM	PLER				TED, SAMPLER C 140 lb. HAMMER					GROUND	WATER REA	DINGS		
CAS	NG:				TED, CASING DR	IVEN USING A	300 lb.	DATE	TIME	WATER	CASING	STABILI	ZATION TIME	
CAS	NG SI		VIMER FA	LLING 24 In.	OTHER:	2 1/4" Augers		1/17/06		4'		Upon	Completion	
D E	C B	T		DAMBLE		1		FOODIDTION						
P T H	8 0 N W G 8		PEN./ REC	SAMPLE DEPTH (Ft.)	BLOWS/6"		SAMPLE U	ESCRIPTION		A P		STRATUM DES	CRIPTION	
0		S1	24/18	8" - 2'6"	7-12	Medium de	nse, yellow brown	n, fine to coars	se SAND.		4" ASPI	HALT		
		-			5-6									
										_	4'			
5		S2	24/16	5-7	7-14 18-15	Dense, bro	wn gray, fine to co	oarse silty SA	ND.					
					10 10	1								
		-				-		*			9'			
83 24/10 10 - 12 47-84 Very dense, brown gray, fine to coarse SAND,														
10	_				64-48	possible Til	LL.							
		S4	9/9	14 - 14'9"	44-125/3"	TILL					14'9"			
15						Bottom of E	loring @ 14'9"							
20														
		\vdash											1	
25														
1	_													
	-													
30	_													
1														
	DAN	I II AD	SOILS		COHESIVE SO	He					L			
		s/Ft D	ensity V. LOOS		Blows/Ft Dens V. SOFt		REMARKS:							
	4-10 10-30		LOO	SE 2-4	SOFT M. STIFF									
	30-50 -50)	DEN	SE 8-15 SE 15-30	STIFF									
				>30	HARD	T ADDROY	MATE BOLD IN	W DETAILE.	LOOU TO) TO TO 1	NOITION	MAVEFOR	ADUA	
NOIL		WAT	ER LEV	EL READIN	NGS HAVE BEE	EN MADE AT	MATE BOUNDAR TTIMES AND UN THOSE PRESEN	DER CONDIT	TIONS STA	TED, FL	UCTUATIO	INS OF GRO		
		IVIA	, 0000	UUE 1(OTHER PACE	ONO IMAN	HIOSE FRESEN	u vi iue ()	AIT MEYOR	ALCIVICIA	Γ	BORING No	B-93	

			_			ORING, INC.			PROJECT		F			RING No.	B-94
		1	215 W	EST CHE	STNUT ST. B	ROCKTON, MA 02	2301	Interce	ptor & Lateral Se	ewers			SHEET		1 OF 1
								Gore	Warwick, Ri don Archibald, In	10	- 1		FILE No. CHKD. 8		06217
DRIL	IF	R,		Paul Wo	rdell			BORING LOCAT			e .		UNNU. D	1	
	SSI	FIE	D BY: R:	J. Rivard				GROUND SURF		N		DA ND 1/1	NTUM 17/08		
SAM	PLI	ER:				TED, SAMPLER C					GROUN	DWATE	r read	INGS	
CASI	NG	2:	UNI	ESS OTH	IERWISE NO	TED, CASING DRI	IVEN USING A	300 lb.	DATE	TIME	WATE	R CA	ASING	STABILI	ZATION TIME
		-			LING 24 in.				1/17/06		4'				Completion
CASI	NG	SIZ	Œ:			OTHER:	2 1/4" Augen	3				1	1		
D E	CA				SAMPLE			SAMPLED	ESCRIPTION		T	R			
P	8	O W		PEN./	DEPTH		1	CANN LL D	LOOKE HOM			M K	S	TRATUM DES	CRIPTION
н		8	-	REC	(FL)	BLOWS/6*					\rightarrow	8			
0	L		S1	24/11	6" - 2'6"	9-18	Dense, yell	ow brown, fine to	coarse SAND).		4"	ASPH/	ALT	
	H	_	_			14-11	-								
	H					-	-				- 1	4'			
	-		S2	24/16	5-7	7-5	Medium de	nse, brown, fine t	o coarse SAN	ID and SILT	.	7			
5						5-12	1								1
														1	
9'															
10	-	-	53	24/24	10-12	36-39	gravel.	, brown, line to co	BISE SAND, I	liffie tine					- 1
						30-39	gravei.								
			S4	24/24	13 - 15	45-47	Same as S	3.			- 1				
						42-63]				1				1
15												15'			
		4					Bottom of E	loring @ 15'							
	_	-	_				-								
	-	\dashv	-				1					Į			
	_	7		$\overline{}$			1								
20							1					1			
															1
		4	_												- 1
ŀ	H	+	\dashv	-			-								1
25	-	+	\dashv	-			ł				- 1				1
1		1									- 1				1
- 1		1													1
[1			1
30		1										1			
-	_	+	-									1			
ŀ	_	+	-	-		-									- 1
G	R/	NI	JLAR	SOILS	T	COHESIVE SO	ILS								
		ws 4		ensity V. LOOS	E <2	Blows/Ft Dens V. SOFt	lty	REMARKS:							
	4-	10		LOOS	SE 2-4	SOFT									
		30 50		M. DENS	SE 4-8 SE 8-15	M. STIFF STIFF									
	-50			/. DENS	E 15-30	V. STIFF									
OTF	S	11	STR	ATIFICA	>30 ATION LINE	HARD ES REPRESEN	IT APPROXI	MATE BOUNDAR	Y BETWEEN	SOIL TYP	ES. TR	ANSIT	IONS I	MAY BE GR	ADUAL.
- 1 6			WAT	ER LEV	EL READIN	NGS HAVE BEE	EN MADE AT	TIMES AND UN	DER CONDIT	TIONS STA	TED, F	LUCTL	JATION	NS OF GRO	
			MA'	TUCCU	KIDUE I(OTHER FACT	UKS IHAN	THOSE PRESEN	HALIHE N	WE MEASU	KEME	MID W			
													BC	ORING No	B-94

		1215 W	Sec. 000000000000000000000000000000000000	views cities defendables	BORING, INC. BROCKTON, MA 02	2301		PROJECT plor & Lateral S Warwick, Ri don Archibald, I	-		REP	ORT OF B SHEET FILE N CHKD.	lo.	B-95 1 OF 1 06217
CLA	ECTO		Paul Wor	300000			BORING LOCAT GROUND SURF DATE START	ACE ELEVATIO				DATUM 1/27/06		
SAM	PLER				TED, SAMPLER C 140 lb. HAMMER					GROU	NDW.	ATER REA	ADINGS	
CAS	NG:	UN	LESS OTH	ERWISE NO	TED, CASING DR	VEN USING A	300 lb.	DATE	TIME	T .	TER	CASING	T	IZATION TIME
				LING 24 In.				1/27/06		1	3			Completion
	NG S		NW 15'		OTHER:	2 1/4" Augen	s 14'							
E	A L			SAMPLE			SAMPLE D	ESCRIPTION			E	-		
T	8 0 N W G 8		PEN./ REC	DEPTH (FL)	BLOWS/6"						M K B		STRATUM DE	SCRIPTION
<u>"</u>	_	S1		6" - 2'6"	12-36	Verv dense	e, brown black, fin	e to coarse S	SAND.		q	4" ASPI	HALT	
					24-11									
			- 0											
	_	-	40/0	5.0	00.400									
5	-	S2	12/9	5-6	28-100	Boulder	e, wet, brown, fine	IO COARSE SA	AND.			6'		
						Dodiaci								
]								
	_	-				ļ								
10	-	S3	12/9	10 - 11	41-45	Glacial Till	Deale					11'		
		S3A	12/3	11 - 12	30-33	Weathered	KOCK							
4						1								
						Started cor	ing @ 15'					15'		
15		C1	60/60	15 - 20	4 min	Shale								
					4 min					1				
				-,	4 min									
	_				4 min									
20												20'		
20						Bottom of B	loring @ 20'							
	_													
			-							- 1				
			-							1	- 1			
25										- 1				
										- 1				
						1								
										1				
30										Į	-			
į														
GRANULAR SOILS COHESIVE SOILS														
		Views N. House	ensity		COHESIVE SO Blows/Ft Dens	(1	REMARKS:							
	0 - 4 4-10		V. LOOS	E <2 E 2-4	V. SOFt SOFT									
	10-30)	M. DENS	E 4-8	M. STIFF									
	30-50 >50			E 8-15 E 15-30	STIFF V. STIFF									
				>30	HARD	TANDESIT	MATE BALLING	N DETA "==	1 BOI)FO =	D4**	OLT: AL IA	MAVER	DADILLA
WU E	:o;] 2)	WAT	TER LEVE	EL READIN	VGS HAVE BEE	EN MADE A	MATE BOUNDAR TIMES AND UN	DER CONDI	TIONS STA	ATED,	FLUC	CTUATIO	INS OF GRO	CUNDWATER
	•	MA	Y OCCU	RIDUETO	OTHER FACT	ORS THAN	THOSE PRESEN	T AT THE TI	ME MEAS	JREM	ENTS	WERE	MADE	
												E	BORING No	B-95

		•	_	A 2 - / 2 20 1		BORING, INC. BROCKTON, MA 02	2301		PROJECT splor & Lateral Se Warwick, RI don Archibald, Ir			REP	ORT OF B SHEET FILE N CHKD.),	B-98OW 1 OF 1 06217
DRI CLA INSI	SS	IFIE	D BY: R:	Paul Word				BORING LOCAT GROUND SURF DATE START	TION WHOP	N		END	DATUM 1/30/06		
SAN	PL	ER:				TED, SAMPLER C 140 lb. HAMMER					GROU	NDW/	ATER REA	DINGS	
CAS	INC) :				TED, CASING DR	VEN USING A	300 lb.	DATE	TIME	WA	TER	CASING	STAB	LIZATION TIME
CAS	ING	SI		VIMER FAL 4"	.LING 24 In.	OTHER:	*		1/30/06		4	ľ		Upo	on Completion
D	C	B	Г		OALUDI E			CAMP F	FOODINGIAL			R			
E P	8	0		PEN/	SAMPLE DEPTH		-	SAMPLE	ESCRIPTION			M		STRATUM DE	ESCRIPTION
н		8	NO.	REC	(Ft)	BLOWS/8"						s			
(L	_	S1	24/20	6" - 2'6"	8-12	Medium de	inse, yellow brow	n, fine SAND.	100			4" ASPI	IALT	
	H	-				. 8-9	-						3'		
	L														
5	L	_	S2	24/22	5-7	16-23	Very dense	, brown, fine to c	oarse SAND a	and					
Ů	L					31-58	GRAVEL.								
	H					-	1								
]								
10	L		S3	12/12	10 - 11	25-28	TILL						11'	1	
,	L		S3A	12/12	11 - 12	22-64	Weathered								
	L	_	C1	60/60	12 - 17	4 min	Started cor								
	-	-		-		4 min	Gray Shale								
	H		_			4 min	1				- 1			9	
15	H					4 min	i							•	
						1							17'		
							Bottom of E	oring @ 17'							
	_	-									- 1				
20				$\neg \uparrow$											
	_	-	_	-											
25	_	+	\dashv	-											
		1													
		4													
30	_	+	\dashv	-							1				
	_	+	\dashv	\rightarrow		-					1			×	
	_	\forall	\dashv	_							- 1				
(SOILS	T	COHESIVE SO									
_		- 4		ensity V. LOOS	E <2	Blows/Ft Dens V. SOFt	ity	REMARKS:	5' screen 10' solid						- 1
	4-	10		LOOS	E 2-4	SOFT			PVC @ 15'						- 1
		-30 -50		M, DENS DENS	E 8-15	M. STIFF STIFF									1
	>5				E 15-30	V. STIFF									- 1
OT	S	: 1) STF	RATIFICA	>30 ATION LIN	HARD ES REPRESEN	T APPROX	MATE BOUNDAR	RY BETWEEN	SOIL TYP	PES, T	RAN	SITIONS	MAY BE G	RADUAL.
			WAT	ER LEV	EL READII	NGS HAVE BEE	EN MADE A	T TIMES AND UN THOSE PRESEN	IDER CONDI	TIONS STA	TED.	FLU	CTUATIO	NS OF GR	
			1411-4	. 0000	KIPOL I	JIILKIAGI	CITO ITIAN	THOOL FILLDER	TALUE D	IIIL IIILAGO	~1 ZIm1V[-1416	Г	ORING No	B 080M
													10	ON ONLINO	D-90OAA

			_			BORING, INC.			PROJECT			REP		ORING No.	B-97
		1	215 W	EST CHE	STNUT ST. B	ROCKTON, MA 02	2301	Interce	ptor & Lateral Se	ewers			SHEET		1 OF 1
								Gon	Warwick, RI don Archibald, Ir	ic.			FILE NO		06217
DRIL	LE	R:		Paul Wo	rdell			BORING LOCAT		PLE AVE			Office		
	SSI	FIE	D BY: R:	J. Rivard				GROUND SURF DATE START		N		END	DATUM 2/13/06		
SAM	PL	ER:				TED, SAMPLER C					GROU	NDWA	ATER REA	DINGS	
CAS	NG	3:	UNI	LESS OTH	IERWISE NO	TED, CASING DR	IVEN USING A	300 lb.	DATE	TIME	WA	TER	CASING	STAB	ILIZATION TIME
					LLING 24 in.				2/13/06		7'	6"		Upo	on Completion
CAS		77 776,000	ZE:			OTHER:	2 1/4" Augen	5							
0	A	B			SAMPLE			SAMPLE D	ESCRIPTION			R			
	8 N	W 8	1	PEN/ REC	DEPTH (Ft.)	BLOWS/6*						M K S		STRATUM DI	ESCRIPTION
0			S1	18/15	6" - 2'	22-38	Very dense	e, brown, fine to c	parse SAND,	little fine			4" ASPI	IALT	
	L					38	gravel.								
	L		_				4								
	-	_	S2	24/8	5-7	7-6	Mandiana da	nee brown fire t	DAN	ID been of	_	_	4'		
5	8-20 sllt.							nse, brown, fine t	o coarse SAN	ID, trace or					
	H					0-20	oik.								
	Г						1								
10			S3	24/22	10 - 12	6-8	1	nse, brown, wet,	fine to coarse	SAND,					
	L	_	-			7-9	trace of silt							•	
	_	-					-								
	-	-	_				1								1
			S4	24/23	15 - 17	7-8	Same as S	3.				- 1			- 1
15						9-9]								1
															- 1
	_	4	-								_	\dashv	19'		
-	-	\dashv	S5	24/19	19 - 21	8-15 20-19	of gravel.	wn, fine to coarse	SAND, some	silt, trace					- 1
20		-				20-18	oi graver.						21'		
- 1		1					Bottom of B	oring @ 21'			\neg	\neg			
Ì															1
											- 1				- 1
25	_	4	_								- 1				- 1
	-	\dashv	-	-											
ł	-	+	-	-+											
ŀ		\forall		_								1			
30															
-		1													
	D	ΔAIR	II AD	SOILS		COHESIVE SO	11 2 1								
	Blo	SWC	/Ft D	ensity		Blows/Ft Dens		REMARKS:							1
		- 4 10		V. LOOS	E <2 E 2-4	V. SOFt SOFT									1
	10-	-30		M. DENS	SE 4-8	M. STIFF	1								1
	30. >5(-50 0			E 15-30	STIFF V. STIFF	1								
					>30	HARD					nc :		A 1081 A		- A B.1411
IOTE	:\$:		WAT	ER LEV	EL READIN	NGS HAVE BEE	EN MADE AT	MATE BOUNDAF TIMES AND UN	DER CONDIT	TIONS STA	TED.	FLUC	CTUATIO	NS OF GR	
		/	MA	Y OCCU	RIDUETO	OTHER FACT	ORS THAN	THOSE PRESEN	IT AT THE TI	ME MEASU	REMI	ENTS	WERE	MADE	
													В	ORING No	B-97

		1				BORING, INC. PROCKTON, MA 02	2301		<u>PROJECT</u> ptor & Lateral So Warwick, Rl don Archibald, Ir			REP	ORT OF B SHEET FILE N CHKD,	0.	B-98 1 OF 1 06217
INSF	EC	FIE		Paul Wo	d			BORING LOCAT GROUND SURF DATE START				END	DATUM 1/20/06		
SAM	PLI	ER:				TED, SAMPLER C 140 lb. HAMMER					GROL	INDW	ATER REA	DINGS	
CAS	NG):	UNI	ESS OT	HERWISE NO	TED, CASING DR	IVEN USING A	300 lb.	DATE	TIME	WA	TER	CASING	STAB	ILIZATION TIME
				MER FA	LLING 24 In.				1/20/06			5'		Up	on Completion
CAS		SIZ	E:			OTHER:	2 1/4" Augen	3				R			
E	A	r		,	SAMPLE			SAMPLE D	ESCRIPTION			E			
T	N		NO.	PEN./ REC	DEPTH (Ft.)	BLOWS/6"						K		STRATUM D	ESCRIPTION
0	_		S1	24/18	0-2	3-11	Medium de	nse, yellow brow	n, fine SAND.				3" ASPI	†ALT	
	L					10-12]								
	H	_				-					_	_	3'		
	H		S2	24/10	5-7	13-13	Dense, gra	y brown, fine to c	oarse SAND.	little fine					
5	Г					31-49	gravel.	,							
	L						1								
	H	-					1								
	H		S3	24/18	10 - 12	36-41	Verv dense	, gray, fine to coa	rse SAND an	d GRAVEL					
10						28-23		,,,							
	_	-					BOULDER	S							
	-	-	54	9/9	15 - 15'9"	123	Same as S	3.							
15			-	0,0	10 100	130/3"									
							BOULDER	S							
		_													
	_	-	S5	13/13	19 - 20'2"	92-82 50/1"	Same as S	3.					20'2"		
20		7				30/1		loring @ 20'2"					LUZ		
														*	
	_	-					-								
25		1					1								
]								
		1					1								
	_	+	-												
30		+													
1															
لِـــ	-		HAD	SOILS		0011508/5 00									
			/Ft D	ensity		COHESIVE SO Blows/Ft Dens	4000000	REMARKS:		30					
		- 4 10		V. LOO	SE <2 SE 2-4	V. SOFt SOFT							010		1
	10	-30		M. DEN	SE 4-8	M. STIFF									1
	3U >5	-50 0				STIFF V. STIFF									
(OTI	2.5	: 1	STE	RATIFIC	>30 ATION LIN	HARD ES REPRESEN	T APPROX	MATE BOUNDA	RY BETWEF	N SOIL TY	PES. T	RAN	SITIONS	MAY BE	GRADUAL.
		2)	WAT	ER LE	/EL READI	NGS HAVE BE	EN MADE A	TIMES AND UN	IDER CONDI	TIONS STA	ATED.	FLU	CTUATIC	ONS OF GR	ROUNDWATER
			IVI/A	, 000	AN IDOE IC	OTHER PAUL	UNG I FIMN	HIVUE FREGER	ALDE H	WILL WILLAGO	الااشاء د د	-1416	Г	BORING N	B-98

	A	404514			BORING, INC.	0004		PROJECT			REPO		ORING No.	B-990W
1		1215 W	IEST CHE	SINUI SI. B	BROCKTON, MA 0	2301	Interce	eptor & Lateral Se Warwick, Ri	ewers			SHEET FILE No		1 OF 1 06217
							Gar	don Archibald, in	ıç.			CHKD.		00217
DRII	LER:		Paul Wo	ordell			BORING LOCAT	TION WE	STWORM	AVE	•			
	SSIFI	ED BY: OR:	J. Rivaro	d			GROUND SURF DATE START	ACE ELEVATIO 2/3/	N 106	DATE E		DATUM 2/3/06		
SAN	PLER				TED, SAMPLER (140 lb. HAMMER					GROUN	IDWA1	TER REA	DINGS	
CAS	ING:				TED, CASING DR	IVÈN USING A	300 lb.	DATE	TIME	WATI	ER	CASING	STABI	LIZATION TIME
040	INO O		MMER FA 4"	LLING 24 In.	OT IED			2/3/06		5'			Upo	n Completion
D	ING S		4"	•	OTHER:	_				L	R			
E	A L	-1		SAMPLE			SAMPLE	DESCRIPTION			E M			
T H	N V	7	PEN./ REC	DEPTH (Ft.)	BLOWS/6"						K S		STRATUM DE	ESCRIPTION
0		81	24/18	6" - 2'6"	11-6	Medium de	nse, yellow, fine	SAND, little fir	ne gravel.		5	5" ASPH	ALT	
	_	-	-		6-5	4								
	-	+	 			-								
		S2	24/13	5-7	9-4	Loose, fine	to coarse SAND	and SILT.		- 1				
5					4-7						- 1			
	_		-			-				1	- 1	æ		. 1
		-	100			1								
		83	21/9	10 - 11'9"	17-49	Very dense	, fine to coarse S	AND and GR	AVEL.					
10					55-52/3"]								
											1			
	_	_	_		-	-								
		S4	24/22	15 - 17	40-45	TILL								
15		07	Lance	10-17	51-72	1								
											1	7'		
	_	S5	1/1	18 - 18'1"	75/1"		ale fragment in s	ample spoon t	ip.	_	1	8'1"		
	_					Bottom of B	Boring @ 18'1"				1			
20						1					-			
						j								
										1				
25	_										1			
						1								- 1
						-								
30						1								
	210 00000		SOILS		COHESIVE SO Blows/Ft Dens		REMARKS:	5' screen						
	0-4		V. LOO		V. SOFt	y		13' solid						
	4-10			SE 2-4 SE 4-8	SOFT M. STIFF	1		Roadbox						
	30-50 >50	0	DEN	SE 8-15 SE 15-30	STIFF									
		*		>30	HARD									
NOT	ES:	WAT	TER LE	/EL READII	NGS HAVE BE	EN MADE AT	MATE BOUNDA T TIMES AND UN	IDER CONDI	TIONS STA	TED. F	FLUC	TUATIO	NS OF GR	RADUAL. OUNDWATER
		MA	YOCCI	JR IDUE TO	OTHER FACT	ORS THAN	THOSE PRESEN	NT AT THE TI	ME MEASU	REME	NTS	WERE	MADE	
												В	ORING No	B-99OW

	NEW HAMPSHIRE BORING, INC. 1215 WEST CHESTNUT ST. BROCKTON, MA 02301 RILLER: Paul Wordell						2301		PROJECT optor & Lateral S Warwick, Rl don Archibald, I			REP	ORT OF BO SHEET FILE NO CHKD.	D.	B-100 1 OF 1 06217		
CLA	SSI	FIE		Paul Wo				BORING LOCAT GROUND SURF DATE START		N		END	DATUM 2/3/06				
SAM	PLE	R:				OTED, SAMPLER (140 lb. HAMMER					GROU	GROUNDWATER READINGS					
CAS	ING	i;				OTED, CASING DR			DATE	TIME	WA	TER	CASING	STAB	ILIZATION TIME		
				MER FA	LLING 24 in.				2/3/06			j'		Upi	on Completion		
CAS		SIZ	<u>/E:</u>			OTHER:	2 1/4" Augen	I R									
E	A	L		DEM /	SAMPLE DEPTH		4	SAMPLE D	ESCRIPTION			E		CTDATINAD	ECODIDIION		
H	N	W S	NO.	PEN./ REC	(Ft)	BLOWS/6"						K 8		STRATUMD	ESCRIPTION		
0	_		\$1	24/20	0-2	8-5	Medium de	ense, yellow, fine	SAND, little g	ravel.			5" ASPH	IALT			
	-	-			_	16-14	-										
							1						5'				
5								wn, fine to coarse	SAND, cobb	oles.							
	-	-	-			21-18	-										
	_																
10	H	\dashv	S3	24/22	10 - 12	20-25 39-43	1	e, brown, fine to co	oarse SAND	and							
	_	1				35-43	GRAVEL.	GRAVEL.									
	_	-	S4	24/19	14 - 16	29-42	TILL										
15	H	+				33-44	1						16'				
		1					Bottom of E	Boring @ 16'					10				
	_	+					1										
20		7					1										
		\Box]										
	-	+				-	-										
		+									1						
25		I]					- 1					
	_	+	_				-										
		+															
30																	
30	_	4															
	_	+	-	-	-												
				SOILS	T	COHESIVE SO	2.0	DEMARKS									
	Blows/Ft Density Blows/Ft Density REMARKS: 0 - 4 V. LOOSE <2 V. SOFt																
	4-10 LOOSE 2-4 SOFT 10-30 M, DENSE 4-8 M, STIFF																
	30- >5(50		DEN	SE 8-15	STIFF V. STIFF											
					>30	HARD	YOUGGA TI	IMATE DOUBLE	DV DETMER	N SOIL TV	DE0 7	DAKI	RITIONIC	MAVRE	DADUAL		
NO H	±&:	2)	WAT	ER LEV	EL READI	NGS HAVE BE	EN MADE A	IMATE BOUNDA T TIMES AND UN	IDER COND	TIONS ST	ATED,	FLU	CTUATIC	INS OF GR	OUNDWATER		
			WA	1 0000	KIDUE I	COIHERFACT	UKO IHAN	THOSE PRESEN	NI AL INE II	IIVIE IVIEASI	UKEM	ENIC	Γ		B-100		

New England Boring Contractors P.O. Box 165

Derry, NH 03038

Boring # TB-100/OW

Project: Gordon R. Archibald, Inc.

Project # 33597 Tidewater Drive Interceptor Contract No. 86-A2

Project Address: Tidewater Drive

City: Warwick

State: RI Zip:

Fax: (603) 437-0034

Date Start: 01/29/16

Date End: 01/29/16

Location: See Plan

Casing: HW

Sampler:

140lbs

Sampler:

Size: 4"

S/S

Fall: 30"

1-3/8 in. I.D.

Hammer: 300lbs

30 in.

Date: 1/29/16		Depth: 5'			Casing			Stabilization Period				
DP	S./#	DEPTH	PEN	REC	BLOWS/6"	S/C		SAMPLE DESCRIPTION				
-						3"	ASPHALT					
-	S-1	0' – 2'	24"	3"	17-8-7-5		Dry, medium dense, brown FINE TO MEDIUM SAND AND GRAVEL.					
-	S-2	4' - 6'	24"	15"	13-10-8-17		Wet, medium dense, brown FINE TO MEDIUM SAND AND					
5'0"	5-2	4-0		10	13-10-3-17			EL, trace inorganic silt.				
50							GRAVE	LL, trace morganic sit.				
-												
-												
-												
-	S-3	9' – 11'	24"	15"	21-18-15-13			ense, brown FINE TO MEDIUM SAND AND				
10'0"							GRAVE	EL.				
-												
-												
_												
_	S-4	14' – 16'	24"	20"	20-30-32-45		Wet, very dense, brown FINE SAND AND GRAVEL,					
15'0"							possible weathered bedrock.					
-												
_												
-	S-5	19' – 20'	12"	7"	91-109/6"	20'	Wet ve	ery dense, brown FINE SAND AND GRAVEL,				
20'0"		10 20			0110070			le weathered bedrock.				
200							2.0	of Exploration = 20'				
-							DOMOIII	i di Exploration – 20				
-												
-												
_												
25'0"												
-												
-												
-												
-												
30'0"												
-												
rillere	Normano	d Studdard	Helper	elper: Robert Smith				Inspector: Brett				

Remarks: Installed 15' PVC monitoring well, 5' screen, 2.5' riser, 1-road box.

S/#: Sample **PEN:** Penetration S/C: Strata Change **REC**: Recovery

New England Boring Contractors

P.O. Box 165 Derry, NH 03038

Boring # TB-101

Project: Gordon R. Archibald, Inc.

Project # 33597

Tidewater Drive Interceptor Contract No. 86-A2 Project Address: Tidewater Drive

City: Warwick

State: RI Zip:

Date Start: 02/01/16

Date End: 02/01/16

Location: See Plan

Casing: HW

Sampler:

140lbs

Sampler:

Size: 4"

Fall:30"

1-3/8 in. I.D.

S/S

30 in.

Hammer: 300lbs

Fax: (603) 437-0034

Date: 2/1/16		Depth: 5'	Casing:				Stabilization Period					
DP	S./#	DEPTH	PEN	REC	BLOWS/6"	S/C		SAMPLE DESCRIPTION				
-						3"	ASPHALT					
-	S-1	0' - 2'	24"	15"	10-8-10-10		Dry, medium dense, brown FINE TO MEDIUM SAND, trad					
-							fine gravel.					
-	S-2	4' - 6'	24"	5"	18-20-12-10		Wet, dense, gray FINE SAND, some fine gravel, trace					
5'0"							inorgar	nic silt.				
-												
-												
-												
- 1	S-3	9' - 11'	24"	14"	18-15-17-20		Wet, de	ense, gray FINE SAND, trace inorganic silt.				
10'0"												
-												
_												
-												
-	S-4	14' - 16'	24"	17"	36-33-37-74		Wet, ve	ery dense, gray FINE SAND, some inorganic silt,				
15'0"							trace fi	ne gravel.				
-												
-												
-												
- 1	S-5	19' – 21'	24"	18"	40-36-35-50		Wet, ve	ery dense, gray FINE SAND, some inorganic silt,				
20'0"						21'	trace fi	ne gravel.				
- 1							Bottom	of Exploration = 21'				
_												
_												
_												
25'0"												
_												
_												
_												
_												
30'0"												
_												
		ombly Jr.	Helper		Smith		Inspector: Brett					

Remarks: CME-75 rig

S/#: Sample PEN: Penetration

REC: Recovery

S/C: Strata Change

New England Boring Contractors P.O. Box 165

Derry, NH 03038

Boring # TB-102

Project: Gordon R. Archibald, Inc.

Project # 33597

Project Address: Tidewater Drive

City: Warwick

State: RI

Date Start: 01/29/16

Date End: 01/29/16

Tidewater Drive Interceptor Contract No. 86-A2

Location: See Plan

Casing: HW

Sampler:

S/S

PEN: Penetration

140lbs

Sampler: 1-3/8 in. I.D.

S/C: Strata Change

Size: 4" Hammer: 300lbs

Remarks: S/#: Sample

Fall: 30"

30 in.

Zip:

Fax: (603) 437-0034

Date: 1/29/16		Depth:	GRO		Casing:			Stabilization Period					
DP	S./#	DEPTH	PEN	REC	BLOWS/6"	S/C		SAMPLE DESCRIPTION					
-						3"	ASPHALT						
-	S-1	0' - 2'	24"	12"	12-8-5-5			edium dense, brown FINE TO MEDIUM SAND, trace					
-							fine gravel.						
-	S-2	4' - 6'	24"	6"	7-3-3-2		Wet, loose, brown FINE TO MEDIUM SAND, trace fine						
5'0"							gravel.						
-													
-													
-													
-	S-3	9' – 11'	24"	21"	18-20-21-27		Wet, de	ense, brown FINE TO MEDIUM SAND, some fine					
10'0"							gravel.						
-													
-													
-													
-	S-4	14' – 16'	24"	18"	35-48-55-61		Wet, very dense, brown-gray FINE SAND, some fine to						
15'0"							medium gravel, possible weathered bedrock.						
-													
-													
-													
-	S-5	19' – 19'1"	1"	1"	100/1"	20'	Wet, ve	ery dense, gray FINE TO MEDIUM GRAVEL,					
20'0"							possibl	e weathered bedrock.					
-							Roller b	bit to 20'					
-							Bottom	of Exploration = 20'					
-													
-													
25'0"													
-													
-													
-													
-													
30'0"													
-													
rillers.	Norman	d Studdard	Helper	: Robe	ert Smith		Inspector: Brett						

REC: Recovery

New England Boring Contractors P.O. Box 165

Derry, NH 03038

Boring # TB-103

Project: Gordon R. Archibald, Inc.

Project # 33597

Project Address: Tidewater Drive

City: Warwick

State: RI Zip:

Fax: (603) 437-0034

Date Start: 01/28/16

Date End: 01/28/16

Tidewater Drive Interceptor Contract No. 86-A2

Location: See Plan

Casing: HW

Sampler:

Size: 4"

140lbs

Sampler: 1-3/8 in. I.D.

S/S

Fall: 30"

30 in.

Hammer: 300lbs

OBSERVATION

	-		GRO	UND	WATER		BSE	RVATION				
Date: 1/28/16		Depth: 6'			Casing			Stabilization Period				
DP	S./#	DEPTH	PEN	REC	BLOWS/6"	S/C		SAMPLE DESCRIPTION				
-						3"	ASPHA					
-	S-1	0' – 2'	24"	10"	18-11-10-9		Dry, medium dense, brown FINE SAND, some fine gravel.					
-												
-	S-2	4' – 6'	24"	8"	22-39-48-27		Dry, very dense, brown FINE SAND, some fine gravel, trace					
5'0"							inorgar	nic silt.				
-												
-												
-												
-	S-3	9' – 11'	24"	17"	30-30-22-20			ery dense, gray FINE SAND, some fine gravel, some				
10'0"							inorgar	nic silt, (glacial till.)				
-												
-												
-												
-	S-4	14' – 15'4	16"	14"	29-27-120/4"		Wet, ve	ery dense, brown FINE SAND, some inorganic silt.				
15'0"												
-												
-												
-												
-	S-5	19' – 19'9"	9"	8"	85-100/3"	20'		ery dense, gray FINE SAND and fine to medium				
20'0"								some inorganic silt, possible weathered bedrock.				
-							× 2000000000000000000000000000000000000	pit to 21'				
-			17				Bottom	of Exploration = 21'				
-												
-												
25'0"												
-												
-												
-												
20'0"												
30'0"												
-												
Orillers.	Norman	d Studdard	Helper	: Robe	ert Smith		Inspector: Brett					

Remarks:

S/#: Sample **PEN:** Penetration **REC**: Recovery

S/C: Strata Change

New England Boring Contractors P.O. Box 165

Derry, NH 03038

Boring # TB-104

Gordon R. Archibald, Inc. Project:

Project # 33597

Project Address: Tidewater Drive

City: Warwick

State: RI Zip:

Date Start: 01/28/16

Date End: 01/28/16

Tidewater Drive Interceptor Contract No. 86-A2

Location: See Plan

Casing: HW

Sampler:

140lbs

Sampler: 1-3/8 in. I.D.

S/C: Strata Change

Size: 4"

Remarks: S/#: Sample S/S

PEN: Penetration

Fall: 30"

Hammer: 300lbs

30 in.

Fax: (603) 437-0034

Date: 1/28/16		Depth:			Casing	:		Stabilization Period				
DP	S./#	DEPTH	PEN	REC	BLOWS/6"	S/C		SAMPLE DESCRIPTION				
-						3"	ASPH/	ALT				
-	S-1	0' - 2'	24"	12"	11-12-11-9		Dry, medium dense, brown FINE SAND, some fine gravel.					
-												
-	S-2	4' - 6'	24"	3"	17-13-7-6		Dry, ve	ery dense, brown FINE SAND, some fine gravel, trace				
5'0"							inorgar	nic silt.				
-												
-												
-												
-	S-3	9' – 11'	24"	8"	7-5-9-24		Wet, ve	ery dense, gray FINE SAND, some fine gravel, some				
10'0"							inorgar	nic silt, (glacial till.)				
-												
-												
_												
_	S-4	14' – 16'	24"	23"	19-26-80-97		Wet, very dense, brown FINE SAND, some inorganic s					
15'0"						16'						
_							Bottom	of Exploration = 16'				
_												
_												
_												
20'0"												
_												
_												
_												
-					1							
25'0"												
-												
_												
_												
_												
30'0"												
_												
rillers.	Continu	omalalı . I-	Helper	er: Mark Smith				ctor: Brett				

REC: Recovery

New England Boring Contractors P.O. Box 165

Derry, NH 03038

Boring # TB-105/OW

Project: Gordon R. Archibald, Inc.

Project # 33597

Project Address: Tidewater Drive

Tidewater Drive Interceptor Contract No. 86-A2

City: Warwick

State: RI Zip:

Fax: (603) 437-0034

Date Start: 02/01/16

Date End: 02/01/16

Location: See Plan

Casing: HW

Sampler:

140lbs

Sampler:

Size: 4"

S/S

Fall: 30"

1-3/8 in. I.D. 30 in.

Hammer: 300lbs

GROUNDWATER OBSERVATION													
Date: 1/29/16		Depth: 5'			Casing	:		Stabilization Period					
DP	S./#	DEPTH	PEN	REC	BLOWS/6"	S/C		SAMPLE DESCRIPTION					
-				400		3"	ASPHALT						
-	S-1	0' – 2'	24"	12"	3-3-3-4		Dry, loose, brown FINE TO MEDIUM SAND, some fine						
-				40"			gravel.						
-	S-2	4' - 6'	24"	12"	13-8-15-19			nedium dense, brown FINE TO MEDIUM SAND, trace					
5'0"							fine gra	avel.					
-													
-													
-													
-	S-3	9' – 11'	24"	15"	12-15-19-28			ense, gray FINE SAND, some inorganic silt, trace					
10'0"							fine gra	avel.					
-													
-													
-													
-	S-4	14' – 16'	24"	10"	45-67-66-56		Wet, very dense, gray FINE SAND, some fine gravel, som						
15'0"						16'	inorganic silt, (Glacial Till)						
-							Bottom	of					
							Evnlors	ation = 16'					
-							LAPIOIC						
-													
-													
20'0"													
-													
-													
-													
-													
25'0"													
-													
-													
-													
-													
30'0"													
-													
Drillers	Drillers. Normand Studdard			: Rohe	ert Smith		Inspector: Brett						
	· · · · · · · · · · · · · · · · · · · ·	- 5.000010	Helper	. 11000	a samul								

Remarks: Installed 10' PVC monitoring well, 5' screen, 5' riser, 1-road box.

S/#: Sample **PEN:** Penetration **REC**: Recovery S/C: Strata Change

Loc RIC Bri Des Geo	C#: dge/Ro sign Co otech C	OG E (C/T): 00000 oad #: onsult (Consult Name/	Bayside Co.: Go	ordon Archiba New England		BORING#: C-1 Sheet 2 of NEBC Database ID #: Date Start: 4/4/18 Date End: 4/4/18 N Coord.: 0 Ft. E Coord.: 0 Ft. Ground Surface Elev., Ft.: 0.0 Elevation Datum NGVD29						
Des	criptic		er View A									
Casi	dr ng: Unl falli	iven usin ess other ng 24 in.	g a 140 lb h wise noted, o	ammer, 30" fall. casing is driven	nsists of a 2 in. split spoon using 300 lb hammer,	Date 04/04/18	Groundy Time 00:00	water Obse Depth 5		Stab. Tim 0.25 hr		
D E P T H Ft.	CB AL SO IW NS G/Ft.	3 in Type & Number	SAMPLER Pen/ Dept Rcy. Core Rcy. & RQD	Riowe	SOIL AND ROCK SAMP Burmister Soil Classi	PLE DESCRIPTION fication System	Depth of Stratum Change		STRATUM. ESCRIPTION	R E M A R R K S		
	12 12 15 45	SS-1	24/12 1.0 3.0	8-13-10-7	Dry, medium dense, dark b some coarse sand, trace gra		0.4	ASPHALT/I	ROADWAY			
5_	47 12 22 45	SS-2	5.0 24/15 7.0	13-12-16-29	Dry, medium dense, gray F. silt.	INE SAND, trace						
10_	50 57	SS-3	10.0 24/16 12.0	37-30-25-40	Wet, very dense, gray FINE sand, trace gravel.	SAND, little coarse	12,0	D. (1)				
15_								BOROM OF EX	xploration = 12'			
20_												
25_												
30 0 t	o <u>12</u> Soil	Driven (Casing									
	IARKS:							1				
trace little	0 to 10 10 to 2 20 to 3 35 to 5	% :0% :5% [Sampler T SS - Split S UT - Shelby JP - Fixed P C - Rock C	poon 0 - Tube 10 - osition 30 -	30 Medium Dense 4-5 50 Dense 8-1	sive Consistency 4 Soft 8 Firm 15 Stiff 30 Very Stiff	RIC#: Boring No. Date Comp Database I	oleted: 4/4	/18			

					~			~		
	ayside Sewer Sy			BORING		C-2		Sheet 2 of 2		
Location (C/T):	Kent / WAR			NEBC D Date Sta		ase 11) # 4/6/18		e End : 4/6	5/18	
RIC#: 00000		FAP#:		- Date Sta N Coord		0	Date	Ft.	3/10	
Bridge/Road #:	Bayside Gordon	Archibald,	Ino	E Coord		0		— Ft.		
Design Consult C Geotech Consult			ing Contractors	Ground			., Ft. : 0.			
Inspector Name/			on Archibald	Elevation			GVD29			
Inspector Name/	Co Tomit	alit / Goldo	M Aromond							
Borehole Location Description: Riv		e								
Sampler: Unless othe	rwise noted, soil sa	ampler consist	ts of a 2 in. split spoon				vater Obse		O4 1 70°	
driven using Casing: Unless other	g a 140 lb hammer	', 30" fall. is driven usin	a 300 th hammer.	Date 04/06/18		ime 0:00	Depth	Casing at	Stab. Time 0.25 hr	
falling 24 in.	wise noted, casing i	D GELLOTT MOTH	5 000 1.5 111111111111,	04/00/10	, o.	0.00	,	′	0,25 III	
Casing Size: 3 in		Auger			L					
D CB E AL P SO Type & T I W Number H NS	Pen/ Depth p	Blows er 6 in.	SOIL AND ROCK SAMPL Burmister Soil Classifi		ON	Depth of	D	STRATUM ESCRIPTION	R E M	
T I W Number H NS Ft. G/Ft.	Core Rcy. (Cori	ring min/ft) vnpress psi]				Stratum Change			A R K S	
9 SS-1 15	24/15 0.0 21- 2.0	-16-10-8 D	Ory, medium dense, brown loarse sand and gravel.	FINE SAND, trae	ce	0.3/	ASPHALT/			
27 40										
5 52 19 SS-2	5.0	14-14-21 V	Vet, medium dense, brown	FINE SAND, litt	tle					
28	7.0	CI	oarse sand, trace silt.							
45 69										
10 101 SS-3	1	33-39-58 V	Vet, very dense, gray FINE oarse sand, trace silt.	SAND, some		10.0				
60	12.0				-	12.0	Borrom of E	xploration = 12'	1	
15_										
1										
20_										
25_										
-										
-										
0 to 12 Soil Driven	Casing									
		II ot 101	2//							
REMARKS: 1. Inst	alled monitoring we	aratiz.								
	s : ~		40# Wt x 30" fall on 2" O			-				
race 0 to 10% little 10 to 20% some 20 to 35% and 35 to 50%	Sampler Type SS - Split Spoon UT - Shelby Tube UP - Fixed Position C - Rock Core	0 - 10 10 - 30	Medium Dense 4 -	4 Soft 8 Firm 15 Stiff 30 Very St	tiff	RIC#: Boring No Date Com Database	pleted: 4/	76/18		

Loc RIC Bric Desi Geo	#: lge/Ro gn Co tech C	CC/T): 00000 oad #: onsult (Consult	Bayside Co.: Go Co.: 1	ordon Archiba lew England		BORING #: C-3 Sheet 2 of 2 NEBC Database ID #: Date Start: 4/4/18 Date End: 4/4/18 N Coord.: 0 Ft. E Coord.: 0 Ft. Ground Surface Elev., Ft.: 0.0 Elevation Datum NGVD29						
Bor	ehole l	Locatio	on .		11-11-11-11-11-11-11-11-11-11-11-11-11-							
			er View A		nsists of a 2 in. split spoon		Ground	water Obse	ervations			
-	dri ng: Unle	iven usin	g a 140 lb h wise noted,	ammer, 30" fall		Date 04/04/18	Time 00:00	Depth 5		Stab. Time 0.25 hr		
Casir	g Size:	3 in		HS Auger								
D E P T H	CB AL SO IW	Type & Number	SAMPLER Pen/ Dept Rcy. Core Rcy.	h per 6 in.	SOIL AND ROCK SAMPL Burmister Soil Classifi		N Depth of Stratum	Е	STRATUM ESCRIPTION	R E M A		
H Ft.	NS G/FL	11001	& RQD	(Coring min/ft) [Downpress psi			Change			A R K		
5_	20 15 10 25 25 7	SS-1	24/12 0.0 2.0 24/12 5.0		Dry, dense, brown FINE SA sand and gravel. Wet, medium dense, light br			ASPHALT/	ROADWAY	S		
10_	15 22 29 37	SS-3	7.0 10.0 24/18	17-18-21-22	Wet, dense, light brown FIN coarse sand, trace silt.	E SAND, trace						
15_												
25_												
30												
_	o <u>12 Soi</u>	I Driven	Casing		MOLEY BY R. 120 P.							
Proportions Used trace 0 to 10% SS - Split Spoon UT - Shelby Tube Some 20 to 35% and 35 to 50% Sampler Type CS - Split Spoon UT - Shelby Tube UP - Fixed Position C - Rock Core				Spoon 0 Tube 10 Position 30	140# Wt x 30" fall on 2" Orionless Density Cohes 10 Loose 0 - 0 - 30 Medium Dense 4 - 0 - 50 Dense 8 - 1 0 + Very Dense 15 - 0 - 30 - 0 - 30 - 0	sive Consister Soft Firm Stiff Very Sti	RIC#: Boring N	npleted: 4/	4/18			

a,

NEBC LOG Bayside Sewer System BORING #: C-4 Sheet 2 of 2 Location (C/T): Kent / WARWICK **NEBC Database ID#:** 00000 FAP#: RIC#: Date Start: 4/4/18 Date End: 4/4/18 Bridge/Road #: Bayside N Coord.: 0 Design Consult Co. : Gordon Archibald, Inc. E Coord.: Ft. Ground Surface Elev., Ft.: Geotech Consult Co.: **New England Boring Contractors** 0.0 Tom Plant / Gordon Archibald Inspector Name/Co.: **Elevation Datum** NGVD29 **Borehole Location** Description: River View Avenuie Sampler: Unless otherwise noted, soil sampler consists of a 2 in. split spoon **Groundwater Observations** driven using a 140 lb hammer, 30" fall, Date Time Depth Casing at Stab. Time Casing: Unless otherwise noted, casing is driven using 300 lb hammer, 04/04/18 00:00 0.25 hr falling 24 in. Casing Size: 3 in **HS Auger** SAMPLER REMARKS CB DEPTHA. Blows Depth of SOIL AND ROCK SAMPLE DESCRIPTION AL SO IW STRATUM Pen/ Depth per 6 in. Burmister Soil Classification System DESCRIPTION Type & Number Rcy. Core Rcy. & RQD Stratum (Coring min/ft) [Downpress psi] NS G/FL Change SS-1 24/15 0.0 15-9-7-5 Dry, medium dense, brown FINE SAND, trace ASPHALT/ROADWAY 16 coarse sand, trace silt. 30 2.0 33 35 27 5 5.0 SS-2 24/12 15-10-10-9 Wet, medium dense, brown FINE SAND, some 8 coarse sand, trace gravel. 18 7.0 20 25 31 10 10.0 SS-3 24/14 9-8-10-14 Wet, medium dense, brown FINE SAND, little coarse sand, trace silt. 12.0 12.0 Bottom of Exploration = 12' 15 20 25 0 to 12 Soil Driven Casing REMARKS: 140# Wt x 30" fall on 2" OD SS Sampler **Proportions Used** Cohesionless Density Sampler Type Cohesive Consistency Soft trace 0 to 10% SS - Split Spoon 0 - 100 - 4Loose RIC#: 00000 UT - Shelby Tube UP - Fixed Position 10 - 30 30 - 50 10 to 20% 4-8 little Medium Dense Firm Boring No.: C-4 some 20 to 35% Dense 8 - 15 Stiff Date Completed: 4/4/18 35 to 50% C - Rock Core 50 +15 - 30Very Stiff Very Dense Database ID No.: 30 +Hard

B.DET	DC I C	VC T)	C		DODDIO	7.4			OI	2 6 2			
1	BC LC	(C/T):	Bayside Sew	ARWICK		BORING NEBC D			<i>t</i> .	Sheet _	2 of 2			
1	::::::::::::::::::::::::::::::::::::::	00000	-	FAP#:		Date Sta			****	e End : 4/4	4/18			
1			Bayside	EZE W			N Coord.: 0 Ft.							
1	_	nsult (don Archiba	ld Inc.	E Coord.: 0 Ft.								
	_	consult			Boring Contractors	Ground Surface Elev., Ft.: 0.0								
		Name/	_		rdon Archibald	Elevation Datum NGVD29								
						=: =								
		Locatio	on ver View Av	enue										
					nsists of a 2 in. split spoon			Groundy	water Obse	rvations				
	dr	iven usir	ng a 140 lb hai	nmer, 30" fall.		Date	,	Time	Depth	Casing at	Stab. Time			
Casi		ess other ng 24 in,		sing is driven t	ising 300 lb hammer,	04/04/18	(00:00	8		0.25 hr			
Casi	ng Size:	3 in		HS Auger										
D E P	CB AL		SAMPLER Pen/ Depth	Blows	SOIL AND ROCK SAMPL	E DESCRIPTIO	N	Depth		STRATUM	R E M			
P	SÕ IW	Type & Number	Rcy.	per 6 in.	Burmister Soil Classific			of Stratum	D	ESCRIPTION	M A			
T H Ft.	NS	Hanner	Core Rcy. & RQD	(Coring min/ft) [Downpress psi]				Change			A R K S			
Pt.	G/Ft.	SS-1	24/12 0.0	15-9-7-15	Dry, medium dense, brown F	TINE SAND, son	ne	0.3/	ASPHALT/	ROADWAY	S			
·	8		2.0	10 0 7 10	coarse sand, trace silt.			14.10	(10112					
	11		1 7.0											
	23				1.5									
5_	44	SS-2	24/16	25-30-35-35	Dry, very dense, gray FINE S	RANID little coo	rca.							
-	25 35	33-2	- " - "	23-30-33-33	sand and gravel, trace silt.	SAND, IIIUC COM	150							
1	43		7.0											
Ī	70							9.0						
10_	100		10.0						COARSE SA	AND				
_		SS-3	24/12	23-53-50-28	Wet, very dense, gray COAR gravel, some fine sand, trace	SE SAND and silt, trace rock								
			12.0		fragments.	,	ŀ	12.0	Bottom of Fr	cploration = 12				
İ									201101110121	pioranon 12				
15_														
-														
-							1							
20				ĺ										
								1						
-														
-														
25														
											1 1			
-														
30											1 1			
	to 12 Soi	l Driven	Casing				_							
	ARKS:				13.13.77.77.11									
KEN	/IAKKS	•												
					140# Wt x 30" fall on 2" Ol	D SS Sampler	1							
	ortions l		Sampler T	•	onless Density Cohes	ive Consisten	ncy							
trace	0 to 1		SS - Split Sp UT - Shelby	oon 0 - Tube 10 -	10 Loose 0 - 4 30 Medium Dense 4 - 8			RIC#:	00000					
some	e 20 to	35%	UP - Fixed Po	sition 30 -	50 Dense 8 - 1:	5 Stiff	on I	Boring No		1/18				
and	35 to	30%	C - Rock C	ore 50	+ Very Dense 15 - 3 30 +		ın	Date Completed: 4/4/18 Database ID No.:						
						30 + Hard		Database 1D No. :						

1		roject (C/T) :			Sewer Warw VARWICK	ick RI - Various location		G#: <u>C-6</u> Database ID)#•	She	et <u>2</u> of	
1		00000		107 1	FAP # :		Date Star		-	e End :	6/22/18	
1		ad #:	Bay	reide			N Coord		Dati	Ft.	0/22/10	
4	_	nsult (don Archiba	ld Inc	E Coord.			Ft. Ft.		
	0	Consult				Boring Contractors		Surface Ele	v 16+ 0	.0		
		Name/				GZA GeoEnvironmental,			NGVD29	.0		
IIIS	,cetor	1 (and)	Cu		ily i offici / C	JEH GEODHVII OIIII EIRAI,	inc.Elevation	Datum _	ING VD29			
Des	criptio	Location: Tid	ewater				1					
Sam					soil sampler coi mmer, 30" fall.	nsists of a 2 in. split spoon	Date		water Obse			m•
Casi						ısing 300 lb hammer,	06/15/18	Time 00:00	Depth 7.5	Casing	at Stab. 0.25	
		ng 24 in.		,	•	,	00,15,10	00.00	7.5		0.23	111
Casi	ng Size:				HS Auger	<u>X</u>						
D	СB		SAMF		Blows	SOIL AND ROCK SAMPL	E DESCRIPTIO	N Depth		STRATUM	1	R E
P	A L S O	Type &	Pen/ Rcy.	Depth	per 6 in.	Burmister Soil Classifi		of		ESCRIPTION		M
D E P T H Ft.	I W N S G /Ft.	Number	Rcy. Core Ro & RQD	ey.	(Coring min/ft) [Downpress psi]			Stratum Change				A R K S
-		SS-1	24/12	0.0	24-9-10-7	Dry, medium dense, dark bro some coarse sand and gravel		0.1	ASPHALT/ FINE SANI	ROADWAY	Y ,	
-		SS-2	24/16		6-4-7-10	Dry, medium dense, brown l coarse sand, trace gravel, tra	FINE SAND, son	ne				
5_		SS-3	24/16	4.0	9-12-26-43	Dry, dense, brown FINE SA sand, trace gravel, trace silt.	ND, some coarse					
-		SS-4	4/2	6.0	100/4"	Wet, very dense, brown FIN trace coarse sand and cobble	E SAND, some s s.	ilt,				
		SS-5	24/18	8.0	13-15-19-15	Wet, dense, dark brown FIN some coarse sand, trace grav	E SAND, some s el.	ilt,				
10_		SS-6	24/14	10.0	13-16-18-21	Wet, dense, dark brown FIN coarse sand, trace gravel, tra-	E SAND, some					
				12.0				12.0	Bottom of E	vnloration =	: 12'	-
-									Doctor of E	Apioration	12	
15												
"												
20_								·				
-												
-												
25												
1												
]												
30												
<u>0</u> 1	to <u>12 Soi</u>	l Augerin	ıg									
REN	IARKS:											
						140# Wt x 30" fall on 2" O						
	ortions l	i i	-	ler T		ionless Density Cohes		icy				
trace little	0 to 1 10 to		SS - S _I UT - SI			10 Loose 0		RIC#:	00000			
some	20 to	35%	UP - Fix	ced Po	sition 30 -	- 50 Dense 8 - 1	5 Stiff	Boring N ff Date Con		22/18		
and	35 to	50%	C-R	ock C	ore 50	+ Very Dense 15 - 30 -		ff Date Con		44/10		
							. maru	1 = ======				

Location (C/T): Kent / WARWICK RIC #: 00000 FAP #: Date Start: 4/2/18 Date End: 4/2/18 Bridge/Road #: Bayside N Coord.: 0 Ft. Design Consult Co.: Gordon Archibald, Inc. Geotech Consult Co.: New England Boring Contractors Inspector Name/Co.: Tom Plant / Gordon Archibald Borehole Location Description: Heights Avenue Sampler: Unless otherwise noted, soil sampler consists of a 2 in. split spoon Groundwater Observations	NE	BC LC	G B	avside Sew	er System		BORING	#: C-7		Sheet	2 of 2
Bridge/Road #: Baysside								***************************************		Sheet _	<u> </u>
Design Consult Co. : Gordon Archibold Inc. E. Coord. : Description September Consult Co. : New England Boring Contractors Ground Surface Elev., Ft. : 0.0	RIC	:#:	00000		FAP#:		Date Star	rt: 4/2/1	8 Dat	e End : 4/	2/18
Secretor Name/Co. : New England Boring Contractors Convertible C		_		_							
Borchole Location Description: Heights Avenue		_									
Description: Heights Avenue				-					_	0.0	
Description: Heights Avenue	Insp	ector	Name/	Co.: To	m Plant / Go	rdon Archibald	Elevation	Datum	NGVD29		
Sampler Unless otherwise noted, using 1s 40 lb hammer, 30 lf fall.					e						
Cassing Store was noted, cassing is driven using 300 lb hammer, falling 24 in. Cassing Store: 3 in		oler: Un	less othe	rwise noted,	soil sampler cor	sists of a 2 in. split spoon	D-4-				G. 1 701
Casing Size: 3 SAMPLER Server Depth Server Server Depth Server Ser	Casi	ig: Unk	ss other			sing 300 lb hammer,				Casing at	
C	C		-		110 4						
Continue Continue Continue Continue Continue Continue Continue Continue Continue Continue Continue Continue Continue Continue Continue Continue Continue Continue Continue Continue Continue Continue Continue Continue Continue Continue Continue Continue Continue Continue Continue Continue Continue Continue Continue Continue Continue Continue Continue Continue Continue Continue Continue Continue Continue Continue Continue Continue Continue Continue Continue Continue Continue Continue Continue Continue Continue Continue Continue Continue Continue Continue Continue Continue Continue Continue Continue Continue Continue Continue Continue Continue Continue Continue Continue Continue Continue Continue Continue Continue Continue Continue Continue Continue Continue Continue Continue Continue Continue Continue Continue Continue Continue Continue Continue Continue Continue Continue Continue Continue Continue Continue Continue Continue Continue Continue Continue Continue Continue Continue Continue Continue Continue Continue Continue Continue Continue Continue Continue Continue Continue Continue Continue Continue Continue Continue Continue Continue Continue Continue Continue Continue Continue Continue Continue Continue Continue Continue Continue Continue Continue Continue Continue Continue Continue Continue Continue Continue Continue Continue Continue Continue Continue Continue Continue Continue Continue Continue Continue Continue Continue Continue Continue Continue Continue Continue Continue Continue Continue Continue Continue Continue Continue Continue Continue Continue Continue Continue Continue Continue Continue Continue Continue Continue Continue Continue			3 10	SAMPLER	ns Auger	AND THE PROPERTY OF THE PROPER				1	R
T W No. No	E	AL	Tama Pa	Pen/ Depth							E
11 30 38-1 18/14 0.5 12-10-19 Dry, medium dense, brown FINE SAND, little coarse sand, trace silt. 0.3 ASPHALT//ROADWAY 0.3 42 38 85 22 18/15 5.5 22-20-45 7.0 10.5 32-28-25 Wet, dense, gray COARSE SAND, some gravel, trace fine sand. 10.0 SAND AND GRAVEL. 12.0 11.5 11.5 10.5 32-28-25 Wet, dense, gray COARSE SAND and gravel, trace fine sand. 10.0 SAND AND GRAVEL. 12.0 10.0 SAND AND GRAVEL. 12.0 10.0 SAND AND GRAVEL. 12.0 10.0 SAND AND GRAVEL. 12.0 10.0 SAND AND GRAVEL. 12.0 10.0 SAND AND GRAVEL. 12.0 10.0 SAND AND GRAVEL. 12.0 10.0 SAND AND GRAVEL. 12.0 10.0 SAND AND GRAVEL. 12.0 10.0 SAND AND GRAVEL. 12.0 10.0 SAND AND GRAVEL. 12.0 10.0 SAND AND GRAVEL. 12.0 10.0 SAND AND GRAVEL. 12.0 10.0 SAND AND GRAVEL. 12.0 10.0 SAND AND GRAVEL. 12.0 10.0 SAND AND GRAVEL. 12.0 10.0 SAND AND GRAVEL. 12.0 10.0 SAND AND GRAVEL. 12.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 1	Ť	IW	Number	Core Rcy.		Bullinster 30tt Classiff	catton System	Stratum		ESCRIPTION	Ā
11 SS-T 18/14 0.5 12-10-19 Dry, medium dense, brown FINE SAND, little coarse sand, trace silt. 0.3 ASPHALT/ROADWAY 0.5 12-10-19 Dry, very dense, gray COARSE SAND, some gravel, trace fine sand. 0.1 0.0 SAND AND GRAVEL. 12.0 11.5	Ft.	G/FL		& RQD	[Downpress psi]			Change			K
30			SS-1	18/14 0.5	12-10-19	Dry, medium dense, brown l	FINE SAND, little	0.	ASPHALT/	ROADWAY	
Sampler Type Sampler Type Sampler Type Sampler Type Sampler Type Sampler Type Sampler Type Sampler Type Sampler Type Sampler Type Sampler Type Sampler Type Sampler Type Sampler Type Sampler Type Sampler Type Sampler Type Sampler Type Sampler Type Sampler Type Sampler Type Sampler Type Sampler Type Sampler Type Sampler Type Sampler Type Sampler Type Sampler Type Sampler Type Sampler Type Sampler Type Sampler Type Sampler Type Sampler Type Sampler Type Sampler Type Sampler Type Sampler Type Sampler Type Sampler Type Sampler Type Sampler Type Sampler Type Sampler Type Sampler Type Sampler Type Sampler Type Sampler Type Sampler Type Sampler Type Sampler Type Sampler Type Sampler Type Sampler Type Sampler Type Sampler Type Sampler Type Sampler Type Sampler Type Sampler Type Sampler Type Sampler Type Sampler Type Sampler Type Sampler Type Sampler Type Sampler Type Sampler Type Sampler Type Sampler Type Sampler Type Sampler Type Sampler Type Sampler Type Sampler Type Sampler Type Sampler Type Sampler Type Sampler Type Sampler Type Sampler Type Sampler Type Sampler Type Sampler Type Sampler Type Sampler Type Sampler Type Sampler Type Sampler Type Sampler Type Sampler Type Sampler Type Sampler Type Sampler Type Sampler Type Sampler Type Sampler Type Sampler Type Sampler Type Sampler Type Sampler Type Sampler Type Sampler Type Sampler Type Sampler Type Sampler Type Sampler Type Sampler Type Sampler Type Sampler Type Sampler Type Sampler Type Sampler Type Sampler Type Sampler Type Sampler Type Sampler Type Sampler Type Sampler Type Sampler Type Sampler Type Sampler Type Sampler Type Sampler Type Sampler Type Sampler Type Sampler Type Sampler Type Sampler Type Sampler Type Sampler Type Sampler Type Sampler Type Sampler Type Sampler Type Sampler Type Samp						coarse sand, trace silt.	,				
5	-										
22 SS-2 18/15 7.0 10 115	5										
48		22	SS-2	18/15 5.5	22-20-45	Drv. very dense, gray COAR	SE SAND, some				
10						gravel, trace fine sand.					
10	4										
SS-3 18/12 10.5 32-28-25 Wet, dense, gray COARSE SAND and gravel, trace fine sand. SAND AND GRAVEL. 12.0 Bottom of Exploration = 12	10							10 (
12.0 trace fine sand. 12.0 Bottom of Exploration = 12		}	SS-3	18/12	32-28-25	Wet, dense, gray COARSE S	SAND and pravel			GRAVEL.	
20			55.5		22 20 20	trace fine sand.	,, g.u., e.,)	1 1 10	
20	-								Bottom of E	xploration = 12	
20	15										
25	1.5										- 1
25	-										
25	-										
25	20										
Q to 12 Soil Driven Casing REMARKS: Proportions Used trace 0 to 10% SS - Split Spoon UT - Shelby Tube Some 20 to 35% UP - Fixed Position Soil and 35 to 50% C - Rock Core Soil and											
Q to 12 Soil Driven Casing REMARKS: Proportions Used trace 0 to 10% SS - Split Spoon UT - Shelby Tube Some 20 to 35% UP - Fixed Position Soil and 35 to 50% C - Rock Core Soil and 35 to 50% C - Rock Core Soil and 35 to 50% C - Rock Core Soil and 35 to 50% C - Rock Core Soil and 35 to 50% C - Rock Core Soil and 35 to 50% C - Rock Core Soil and 35 to 50% C - Rock Core Soil and 35 to 50% C - Rock Core Soil and 35 to 50% C - Rock Core Soil and 35 to 50% C - Rock Core Soil and 35 to 50% C - Rock Core Soil and 35 to 50% C - Rock Core Soil and 35 to 50% C - Rock Core Soil and 35 to 50% C - Rock Core Soil and 35 to 50% C - Rock Core Soil and 35 to 50% C - Rock Core Soil and 35 to 50% C - Rock Core Soil and 35 to 50% C - Rock Core Soil and 35 to 50% C - Rock Core Soil and 35 to 50% C - Rock Core Soil and 35 to 50% C - Rock Core Soil and 35 to 50% C - Rock Core Soil and 35 to 50% C - Rock Core Soil and 35 to 50% C - Rock Core Soil and 35 to 50% C - Rock Core Soil and 35 to 50% C - Rock Core Soil and 35 to 50% C - Rock Core Soil and 35 to 50% C - Rock Core Soil and 35 to 50% C - Rock Core Soil and 35 to 50% C - Rock Core Soil and 35 to 50% C - Rock Core Soil and 35 to 50% C - Rock Core Soil and 35 to 50% C - Rock Core Soil and 35 to 50% C - Rock Core Soil and 35 to 50% C - Rock Core Soil and 35 to 50% C - Rock Core Soil and 35 to 50% C - Rock Core Soil and 35 to 50% C - Rock Core Soil and 35 to 50% C - Rock Core Soil and 35 to 50% C - Rock Core Soil and 35 to 50% C - Rock Core Soil and 35 to 50% C - Rock Core Soil and 35 to 50% C - Rock Core Soil and 35 to 50% C - Rock Core Soil and 35 to 50% C - Rock Core Soil and 35 to 50% C - Rock Core Soil and 35 to 50% C - Rock Core Soil and 35 to 50% C - Rock Core Soil and 35 to 50% C - Rock Core Soil and 35 to 50% C - Rock Core Soil and 35 to 50% C - Rock Core Soil and	4										
Q to 12 Soil Driven Casing REMARKS: Proportions Used trace 0 to 10% SS - Split Spoon UT - Shelby Tube Some 20 to 35% UP - Fixed Position Soil and 35 to 50% C - Rock Core Soil and 35 to 50% C - Rock Core Soil and 35 to 50% C - Rock Core Soil and 35 to 50% C - Rock Core Soil and 35 to 50% C - Rock Core Soil and 35 to 50% C - Rock Core Soil and 35 to 50% C - Rock Core Soil and 35 to 50% C - Rock Core Soil and 35 to 50% C - Rock Core Soil and 35 to 50% C - Rock Core Soil and 35 to 50% C - Rock Core Soil and 35 to 50% C - Rock Core Soil and 35 to 50% C - Rock Core Soil and 35 to 50% C - Rock Core Soil and 35 to 50% C - Rock Core Soil and 35 to 50% C - Rock Core Soil and 35 to 50% C - Rock Core Soil and 35 to 50% C - Rock Core Soil and 35 to 50% C - Rock Core Soil and 35 to 50% C - Rock Core Soil and 35 to 50% C - Rock Core Soil and 35 to 50% C - Rock Core Soil and 35 to 50% C - Rock Core Soil and 35 to 50% C - Rock Core Soil and 35 to 50% C - Rock Core Soil and 35 to 50% C - Rock Core Soil and 35 to 50% C - Rock Core Soil and 35 to 50% C - Rock Core Soil and 35 to 50% C - Rock Core Soil and 35 to 50% C - Rock Core Soil and 35 to 50% C - Rock Core Soil and 35 to 50% C - Rock Core Soil and 35 to 50% C - Rock Core Soil and 35 to 50% C - Rock Core Soil and 35 to 50% C - Rock Core Soil and 35 to 50% C - Rock Core Soil and 35 to 50% C - Rock Core Soil and 35 to 50% C - Rock Core Soil and 35 to 50% C - Rock Core Soil and 35 to 50% C - Rock Core Soil and 35 to 50% C - Rock Core Soil and 35 to 50% C - Rock Core Soil and 35 to 50% C - Rock Core Soil and 35 to 50% C - Rock Core Soil and 35 to 50% C - Rock Core Soil and 35 to 50% C - Rock Core Soil and 35 to 50% C - Rock Core Soil and 35 to 50% C - Rock Core Soil and 35 to 50% C - Rock Core Soil and 35 to 50% C - Rock Core Soil and 35 to 50% C - Rock Core Soil and	-										1
Q to 12 Soil Driven Casing REMARKS: Proportions Used trace 0 to 10% SS - Split Spoon UT - Shelby Tube Some 20 to 35% UP - Fixed Position Soil and 35 to 50% C - Rock Core Soil and 35 to 50% C - Rock Core Soil and 35 to 50% C - Rock Core Soil and 35 to 50% C - Rock Core Soil and 35 to 50% C - Rock Core Soil and 35 to 50% C - Rock Core Soil and 35 to 50% C - Rock Core Soil and 35 to 50% C - Rock Core Soil and 35 to 50% C - Rock Core Soil and 35 to 50% C - Rock Core Soil and 35 to 50% C - Rock Core Soil and 35 to 50% C - Rock Core Soil and 35 to 50% C - Rock Core Soil and 35 to 50% C - Rock Core Soil and 35 to 50% C - Rock Core Soil and 35 to 50% C - Rock Core Soil and 35 to 50% C - Rock Core Soil and 35 to 50% C - Rock Core Soil and 35 to 50% C - Rock Core Soil and 35 to 50% C - Rock Core Soil and 35 to 50% C - Rock Core Soil and 35 to 50% C - Rock Core Soil and 35 to 50% C - Rock Core Soil and 35 to 50% C - Rock Core Soil and 35 to 50% C - Rock Core Soil and 35 to 50% C - Rock Core Soil and 35 to 50% C - Rock Core Soil and 35 to 50% C - Rock Core Soil and 35 to 50% C - Rock Core Soil and 35 to 50% C - Rock Core Soil and 35 to 50% C - Rock Core Soil and 35 to 50% C - Rock Core Soil and 35 to 50% C - Rock Core Soil and 35 to 50% C - Rock Core Soil and 35 to 50% C - Rock Core Soil and 35 to 50% C - Rock Core Soil and 35 to 50% C - Rock Core Soil and 35 to 50% C - Rock Core Soil and 35 to 50% C - Rock Core Soil and 35 to 50% C - Rock Core Soil and 35 to 50% C - Rock Core Soil and 35 to 50% C - Rock Core Soil and 35 to 50% C - Rock Core Soil and 35 to 50% C - Rock Core Soil and 35 to 50% C - Rock Core Soil and 35 to 50% C - Rock Core Soil and 35 to 50% C - Rock Core Soil and 35 to 50% C - Rock Core Soil and 35 to 50% C - Rock Core Soil and 35 to 50% C - Rock Core Soil and 35 to 50% C - Rock Core Soil and	25										
	4										
	-										
	30										
Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Tabl		o <u>12 Soi</u>	Driven (Casing							
Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Table Tabl	REN	IARKS:		=======================================							
Proportions Used Sampler Type Cohesionless Density Cohesive Consistency trace 0 to 10% SS - Split Spoon little 10 to 20% UT - Shelby Tube some 20 to 35% UP - Fixed Position and 35 to 50% C - Rock Core Cohesionless Density Cohesive Consistency 0 - 10 Loose 0 - 4 Soft 10 - 30 Medium Dense 4 - 8 Firm 30 - 50 Dense 8 - 15 Stiff One C - Rock Core 50 + Very Dense 15 - 30 Very Stiff Date Completed: 4/2/18											
Proportions Used Sampler Type Cohesionless Density Cohesive Consistency trace 0 to 10% SS - Split Spoon little 10 to 20% UT - Shelby Tube some 20 to 35% UP - Fixed Position and 35 to 50% C - Rock Core Cohesionless Density Cohesive Consistency 0 - 10 Loose 0 - 4 Soft 10 - 30 Medium Dense 4 - 8 Firm 30 - 50 Dense 8 - 15 Stiff One C - Rock Core 50 + Very Dense 15 - 30 Very Stiff Date Completed: 4/2/18	_					140# Wt x 30" fall on 2" OI	D SS Sampler	T			
little 10 to 20% UT - Shelby Tube 10 - 30 Medium Dense 4 - 8 Firm some 20 to 35% UP - Fixed Position 30 - 50 Dense 8 - 15 Stiff and 35 to 50% C - Rock Core 50 + Very Dense 15 - 30 Very Stiff	_					onless Density Cohes	ive Consistent	су			
some 20 to 35% UP - Fixed Position and 35 to 50% C - Rock Core 50 + Very Dense 15 - 30 Very Stiff Date Completed: 4/2/18			0% 20%	SS - Split Sp UT - Shelby							
The state of the s	some	20 to 3	35% 1	UP - Fixed Po	sition 30 -	50 Dense 8 - 1	5 Stiff	D 4 Ö		2/18	
	anu	J3 (0)	JU /0	C - NUCK C	50 30						

	BC LO	_	Bayside Sev			BORING	#: <u>C-8</u>		Sheet	2 of 2
		(C/T):		VARWICK			atabase ID			
		00000		FAP#:		Date Star	t: 4/2/1	8 Dat	e End: 4	2/18
		oad#:				N Coord.	: 0		Ft.	
Des	ign Co	onsult (Co.: Go	rdon Archiba	ld, Inc.	E Coord.	: 0		Ft.	
		Consult		ew England I	Boring Contractors		Surface Ele	v. Ft. : 0	.0	
		Name			rdon Archibald	Elevation		NGVD29	.0	
		Locatio					Dutum	1101025		-
Des	criptic	on: He	ights Avenu							
Sam	pler: U	nless oth	erwise noted,	soil sampier cor mmer, 30" fail.	nsists of a 2 in. split spoon	Date	Ground	water Obse		[O. 1 mr
Casi	ng: Uni		wise noted, c		ising 300 lb hammer,	04/02/18	Time 00:00	Depth 10	Casing at	Stab. Tim 0.25 hr
Casi	ng Size:			HS Auger						
D E P T H	CB AL SO IW NS	Type & Number	SAMPLER Pen/ Depth Rcy. Core Rcy. & RQD	(Coring min/ft)	SOIL AND ROCK SAMP Burmister Soil Classif		of Stratum	D	STRATUM ESCRIPTION	R E M A
FL	. G/Ft. [Downpress pst]						Change			R K S
e e	26 34 38	SS-1	18/16 0.5 2.0	15-11-14	Dry, medium dense, light br trace coarse sand,	rown FINE SAND,	0.3	ASPHALTA	ROADWAY	
5	88 74									
9	15 SS-2 18/14 7.0 31-37-48 Dry, dense, brown FINE sand and gravel.					ND, some coarse				
1	57 80		7.0		sand and graver.					
10_	82	SS-3	18/12	19-23-31	West and the state of the state	OARGE GAND	10.0	SAND AND	GRAVEL	
		33-3	12.0	19-23-31	Wet, medium dense, gray Cogravel, trace fine sand.	UAKSE SAND and	12.0		xploration = 12'	
15						,			protation 12	
-										
20										
25_										
-										
30										
	to <u>12 S</u>	oil Drive	n Casing							
REM	IARKS:	:								
Dw	4! - "	/In- 1	6 1 7		140# Wt x 30" fall on 2" Ol					
_	rtions l 0 to 10		Sampler Ty SS - Split Sp	•	onless Density Cohes Loose 0 - 4		'			
	10 to 2	20% 35% 1	UT - Shelby T UP - Fixed Po C - Rock C	Tube 10 - : sition 30 - :	30 Medium Dense 4 - 8 50 Dense 8 - 1	Firm Stiff	RIC#: Boring No Date Com		/18	
					30 +		Database			

	BC LC	_		ver System		BORING		C-9		Sheet	2 of 2	
		(C/T):		VARWICK		_ NEBC D						_
	C#:	00000		FAP#		_ Date Sta		4/3/18	Dat		/3/18	
	_	ad #:	Bayside	1 4 12		N Coord		0		Ft.		
	_	nsult (rdon Archiba		_ E Coord		0		Ft.		
		Consult	_		Boring Contractors	Ground				.0		_
Insj	pector	Name/	Co.: 10	om Plant / Go	rdon Archibald	Elevation	n Da	tum _1	NGVD29			_
		Location: We	on ebb Avenue									
	pler: Uı	iless oth	erwise noted,	soil sampler co	nsists of a 2 in. split spoon				water Obse			
Casi				mmer, 30" fall.	using 300 lb hammer,	Date		ime	Depth	Casing at	Stab. Tim	e
Casi		ng 24 in.		ising is driven (ising soo in nammer,	04/03/18	U	0:00	9		0.25 hr	
Casi	ng Size:	3 in		HS Auger								
Ď	СB		SAMPLER	Blows	SOIL AND ROCK SAMPL	E DESCRIBLIC	NI I	Depth		CYPD ATT IN A	R E M	Ī
P	A L S O	Type &	Pen/ Depth Rcy.	per 6 in.	Burmister Soil Classifi)N	of	D	STRATUM ESCRIPTION	M	ŧ
DEPTH.	IW NS G/Ft.	Number	Core Rcy. & RQD	(Coring min/ft) [Downpress psi]				Stratum Change			A R K S	
rı,	10	SS-1	24/15 0.0	14-10-11-8	Dry, medium dense, brown l	FINE SAND tra	ce	0.3/	- ACDLIAI T/	ROADWAY	Š	
-	16		2.0	1.1 19 11 0	gravel, trace silt.	in in E or in E, a a		U.3/	ASITALIA	NOADWAI		ı
-	18		2.0									Ŋ
	62						1					
5_	90		5.0					1				
_	23	SS-2	24/16	15-24-23-37	Dry, dense, light brown FIN coarse sand.	E SAND, trace						1
-	55 47		7.0									1
-	125											1
10	172		10.0									1
	47	SS-3	24/16	43-27-22-24	Wet, dense, brown/gray CO/	ARSE SAND, so	me					1
	62		12.0		fine sand, trace gravel.			12.0				1
									Bottom of Ex	cploration = 12'	1	1
10/												1
15′_												
ं												
								190				
20_								Ī				
-							- 1	i				
+												1
-												
25												
												-
-												
30												
	n 12 Sol	l Driven	Casina									-
_		****										-
REN	IARKS:	1. Insta	alled a monitor	ing well at 12'								
			_		140# Wt x 30" fall on 2" Ol						- 35	
_	ortions (Sampler Ty		onless Density Cohes	ive Consister	iey					
trace	0 to 10		SS - Split Sp UT - Shelby	0 - Tube 10 -	10 Loose 0 - 4 30 Medium Dense 4 - 8			RIC#:	00000			
some	20 to 3	35%	UP - Fixed Po	sition 30 -	50 Dense 8 - 1	5 Stiff	11.4	Boring No. Date Com		V18		
and	35 to 5	3U70	C - Rock C	ore 50	+ Very Dense 15 - 3 30 +			Date Comp Database I		W 10		
							_					E

MIE	DC I C)C 1		Ct		DODBIO	0.10		<u> </u>			
		(C/T) :	Bayside Sew	VARWICK	414		#: <u>C-10</u>		Sheet _	2 of 2		
		00000		FAP#:		Date Star			e End: 4/	3/18		
		ad # :				N Coord.			Ft.	5/10		
	_	nsult (don Archiba	ld, Inc.	E Coord.			Ft.			
Geo	tech (Consul	t Co.: N	ew England l	Boring Contractors	Ground S	Surface Ele	v., Ft.: 0	0.0			
Insp	ector	Name	/Co.: To	m Plant / Go	rdon Archibald	Elevation	Datum _	NGVD29				
Bor	ehole '	Locati	nn									
			ebb Avenue									
Sam					nsists of a 2 in. split spoon		Ground	water Obse				
Casin				mmer, 30" fall. Ising is driven u	sing 300 lb hammer,	Date 04/03/18	Time 00:00	Depth	Casing at	Stab. Time 0.25 hr		
	falli	ng 24 in		_	,	0 11 051 10	00.00			0.23 111		
	ng Size:	3 in	SAMPLER	HS Auger						D		
D E P T H	CB AL		Pen/ Depth	Blows per 6 in.	SOIL AND ROCK SAMPL			_	STRATUM	R E M		
PT	O S W I	Type & Number	Rcy. Core Rcy.	(Coring min/ft)	Burmister Soil Classifi	cation System	of Stratum		ESCRIPTION	A		
Ft.	NS G/Ft.		& RQD	[Downpress psi]			Change			A R K S		
	12	SS-1	24/14 0.0	6-6-5-6	Dry, medium dense, brown l	FINE SAND, trace	0.3	ASPHALT/	ROADWAY	7 3		
]	22		2.0		coarse sand, trace silt.		1.0	FINE SANI)			
	27											
5	59 60		5.0									
3-	7	SS-2	24/16	20-31-28-33	Moist, very dense, brown-gr	ay COARSE						
1	34		7.0		SAND, some fine sand, trace	e gravel.				1		
	59						8.0	COARGEG	AND AND GRA	C2174		
10	97 111		100					COARSE S	AND AND GRA	VEL		
10_	111	SS-3	24/10	44-61-75-69	Wet, very dense, brown COA	ARSE SAND and						
- 1			12.0		gravel, trace fine sand.		12.0					
1.52								Bottom of E	xploration = 12			
, -												
15_												
1												
20												
20-												
1												
-												
25												
25_								li e				
1												
-												
30												
	o 12 Soi	I Driven	Casino									
			Cabaig									
REM	MARKS:											
					140# Wt x 30" fall on 2" Oi							
_	ortions l		Sampler Ty		onless Density Cohes	ive Consistenc	:y					
trace little	0 to 10	20%	SS - Split Sp UT - Shelby	Гube 10-		Firm	RIC#:	00000				
some and			UP - Fixed Po	sition 30 -			Boring N Date Con		3/18			
V	and 35 to 50% C-Rock Core 50+ Very Dense 15-30 Very Stiff Date Completed: 4/3/18 Database ID No.:											

	3C LC	_			er Syste				BORING		-		Sheet	2 of 2
	ation			nt / V	VARWIC			_			base ID #	#:		
RIC		00000			FA) #:			ate Sta		4/5/18	Dat	e End : 4/	5/18
	lge/Ro			yside				_ N	l Coord	.:	0		Ft.	
	gn Co				don Arc		-		Coord.		0		Ft.	
Geo	tech (Consul	t Co.:				Boring Contractors	_ G	Fround :	Sur	face Elev	., Ft.: 0	.0	
Insp	ector	Name	/Co.:	To	m Plant	Go	rdon Archibald	E	levation	n Da	atum 📑	NGVD29		
D	ehole l	r 4!				_				-				
			ill Cov	e Ros	d									
						r con	sists of a 2 in. split spoon	1			Groundy	water Obse	ervations	
-	dr	iven usi	ng a 140	lb ha	mmer, 30"	fall.		r	Date	7	Time	Depth	Casing at	Stab. Tim
Casin				ted, ca	ısing is dri	/en u	sing 300 lb hammer,	04/	05/18	(00:00	5		0.25 hr
Casin	ram g Size:	ng <mark>24 i</mark> n 3 in			HS Auge				i					
	CB	J 111	SAM	PI.FR	Alb Auge			1		-				I R
D E P T H	AL		Pen/	Depth	Blows per 6 in		SOIL AND ROCK SAMPI			N	Depth	_	STRATUM	R E
PT	S O I W	Type & Numbe	Rcy.	cv	l '	- 1	Burmister Soil Classifi	cation	System		of Stratum	ט	ESCRIPTION	Ä
Ĥ Ft.	IW NS G/Ft.		& RQI	Σ.	(Coring mi [Downpres	psi]					Change			R K S
16	11 SS-1 24/14 0.0 7-10-8-5 Dry, medium dense, br						Dry medium dense brown	FINE S	AND true	۰,۵	0.32	A SPILALT	ROADWAY	S
-	15 2.0 coarse sand, trace silt.								7 11 1D, auc	~	\U.3/	ASTIALIT	KOADWAT	
13 2.0														
1	20													
5	30			5.0										
	15	SS-2	24/14		16-22-31	27	Moist, dense, brown/gray FI	NE SA	ND, trace					
	36			7.0			silt, trace shells.							
	51													
4	55										i			
10_	67	SS-3	24/12	10.0	25-47-77	. Ω 1	Wet, very dense, gray COARSE SAND, some				10.0	COARSE SA	AND	
-		20-2	24/12		25-41-11	01	fine sand, little gravel, trace	rock fra	agments.	•	10.0	COMOE SA	AND	
-1			-	12.0						-	12.0	Bottom of Ex	ploraiton = 12	
1						- 1								
15						- 1				- 1				
1														
4														
+				.										
20_														
+											1			
1				- 1							1			
1														
25										1				
]														
-										İ				
- 1	i													
30		-												
<u>0</u> to	12 <u>Soi</u>	Driven	Casing						- 2					
REM	ARKS:													
							140# Wt x 30" fall on 2" Ol	9 22 0	amnler				_	-
Propo	rtions l	Jsed	Samı	oler Ty	pe Co	hesio	nless Density Cohes		ampier Consisten	cy				
	0 to 10		SS - S	plit Sp	oon	0 - 1			Soft		RIC#:	00000		
little some	10 to 2		UT - Si UP - Fix			10 - 3 30 - 3	30 Medium Dense 4 - 8 50 Dense 8 - 1:		Firm Stiff		Boring No.	.: C-11		
and								10	Very Stif	n	Date Comp		5/18	
									Hard		Database I	: יווע:		

	BC LC	_	Bayside Sev			BORING	G#:	C-12		Sheet	2 of	2
1.5		(C/T):		WARWIC		_ NEBC D			#:			
4		00000		FAP	#:	Date Sta		4/6/18	BDate	e End: 4/	6/18	
		ad #:				_ N Coord		_0		Ft.		
			Co.: <u>Go</u>			_ E Coord		0		Ft.		
		Consult			d Boring Contractors	_ Ground				.0		
Ins	pector	Name	Co.: <u>To</u>	om Plant /	Gordon Archibald	Elevation	n Da	etum 🔃	NGVD29			
		Location	on Il Cove Roa	nd.								
					consists of a 2 in. split spoon	T		Ground	water Obse	mations		
	dr	iven usir	ig a 140 lb ha	mmer, 30" i	all.	Date		Cime	Depth	Casing at	Stab.	Time
Casi				asing is driv	en using 300 lb hammer,	04/06/18	0	00:00	7		0.25	
Casi	iaiii ig Size:	ng 24 in. 3 in	ı	HS Auger								
		2 111	SAMPLER	113 Auger								D
D E P T	CB AL		Pen/ Denth	Blows per 6 in.	SOIL AND ROCK SAMPI		N	Depth		STRATUM		R E M
T	S O I W	Type & Number	Rev.	Par 0	Burmister Soil Classif	ication System		of Stratum	Di	ESCRIPTION		A
Ĥ Ft.	Ft. NS & RQD (Downpress psi)							Change				A R K S
1	10	SS-I	24/14 0.0	19-6-4-4	Dry, loose, dark brown FIN	F SAND some		0.3/	ASPHALT/F	CADWAV		Š
-	12	55 .	2.0		coarse sand, trace slt, trace s	hells.		U.3/	ASPHALIT	COADWAT	/	1
	18		2.0				- 1					
Ī	15											
5	25		5.0									
	35	SS-2	24/14	12-13-15-2		FINE SAND, son	ne					
1	55		7.0		coarse sand, trace gravel, tra	ce siit.						
1	64											
4	68						-	9.0	604000.04	. 10]
10_	92 59	SS-3	24/12	20-22-25-3	Wet, dense, gray COARSE S	EAMD come fine			COARSE SA	ND		
2.7	60	55-5		20-22-23-3	sand, trace gravel.	SAIND, Some time						
-1	00		12.0				-	12.0	Bottom of Ev	ploration = 12'		1
-									Dottom of LA	proration 12		١ . ١
15	1						- 1					
	i							1				
1												
-							- 1	1				
-												
20_												
-												
+												
1							-					
25												
7	- 1											
							Ì					
4	1											
20								1				
30	10.5	D.:	01									
ñ fe	1 <u>2 Soil</u>	Driven	casing									
REM	ARKS:	1. Insta	lled a monitor	ing well at 12	1							
					140# Wt x 30" fall on 2" OI) SS Samplar						_
Propo	rtions L	sed	Sampler Ty	ype Coh	esionless Density Cohes		cy					
	0 to 10		SS - Split Sp	oon	- 10 Loose 0 - 4	Soft	-	RIC#:	00000			
little some	10 to 2 20 to 3	5% I	UT - Shelby JP - Fixed Po		0 - 30 Medium Dense 4 - 8 0 - 50 Dense 8 - 1		- 1	Boring No	.: C-12		_	-
and	35 to 5		C - Rock C		50 + Very Dense 15 - 3	0 Very Stiff	nr 📗	Date Com	pleted: 4/6/	18		
					30+	Hard		Database I	D No. :]

	BC LC		Bayside Sev			BORING		C-13		Sheet	2 of 2
	ation			VARWICK		NEBC D					
	C#:	00000		FAP#		_ Date Sta		4/5/18	Dat	e End: 4/	5/18
	dge/Ro					_ N Coord		0		Ft.	
	ign Co			rdon Archiba		E Coord	_	0		Ft.	
	tecn C pector				Boring Contractors ordon Archibald	Ground			_	.0	
rust	bector	паше	/Co.: 10	om Plant/ Go	ordon Archibaid	Elevation	n Dat	um <u>r</u>	NGVD29		
	ehole l criptio		on ppet Avenue)							
	oler: Ur	nless oth	erwise noted,	soil sampler co	nsists of a 2 in. split spoon				vater Obse		
Casia				mmer, 30" fall. asing is driven	using 300 lb hammer,	Date 04/05/18		me 0:00	Depth	Casing at	Stab. Time 0.25 hr
	falli	ng 24 in			,	04/03/10	00	.00	,		0.23 111
	ng Size:	3 in		HS Auger	Ī		L				
D E P T H	CB AL SO	Type &	SAMPLER Pen/ Depth Rcy.	Blows per 6 in.	SOIL AND ROCK SAMPI Burmister Soil Classifi			Depth of		STRATUM ESCRIPTION	R E M A R
H Ft.	NS G/Ft.	Number	Core Rcy. & RQD	(Coring min/ft) [Downpress psi]				Stratum Change			R K S
	5 10	SS-1	24/15 0.0 2.0	5-6-5-8	Dry, medium dense, brown coarse sand, trace silt.	FINE SAND, trad	ce	0.3/	ASPHALT/I	ROADWAY	
1	12										
5	21 24		5.0					5.0			
_	25	SS-2	24/15	16-12-8-9	Wet, medium dense, gray FI coarse sand and gravel, trace	NE SAND, some		5.0	Sand and Gra	avel.	
-	19 31		7.0		Coarse saile and graver, trace	SIII.					
1	51 79			6							
10_	19	SS-3	24/12	19-41-37-59	Wet, very dense, gray COAI	RSE SAND and	-	10.0	COARSE SA	ND, trace rock	
			12.0		gravel, trace fine sand, trace fragments.	silt, rock	-	12.0	fragments.	ploration = 12	
1									Dottom of Ex	pioration – 12	
15_								- 1			
1											1. 3
-											
20_											
+	1										
2											
25											
7											
-											
30											
	o <u>12 Soi</u>	l Driven	Casing								
REM	IARKS:										
D	49		6		140# Wt x 30" fall on 2" Ol						
-	ortions (0 to 10		Sampler Ty SS - Split Sp	- 1	onless Density Cohes 10 Loose 0 - 4		1		00000		
little	10 to 2	20%	UT - Shelby	Tube 10 -	30 Medium Dense 4 - 8	Firm		LIC # : foring No.	00000 : C-13		
some and	20 to 3 35 to 3		UP - Fixed Po C - Rock C				ff D	ate Comp	oleted: 4/5	/18	
					30+			atabase I			

at U

NUC	DCIO)C I)id- 0	C		BODTIL	~				
1	BC LC	(C/T) :	Bayside Sew	VARWICK		BORING				Sheet _	2 of 2
		00000		FAP#		Date Sta		base ID #	-	373 3 4	11110
1		ad # :		Krai ir		N Coord		0	o Dat	e End: 4/	11/18
	-	nsult (don Archiba	ld. Inc.	E Coord		0		Ft.	
	_	Consult			Boring Contractors			face Elev	/ Ft. • 0	.0	
Ins	pector	Name			Gordon Archibald	Elevation			NGVD29		
_											
		Locatio	on entworth Av	enue							
					nsists of a 2 in. split spoon			Groundy	water Obse	rvations	
	dr	iven usir	ig a 140 lb hai	mmer, 30" fall.		Date		Time	Depth		Stab. Time
Casi	ng: Uni falli	ess other ng 24 in.	wise noted, ca	sing is driven t	using 300 lb hammer,	04/11/18	(00:00	5	***	0.25 hr
Casi	ng Size:	4 in		HS Auger							
D	СВ		SAMPLER	Blows	COIL AND DOOK CAND	E DECCRIPCIO	22.1			00000 . 100 00 4	R
D E P T H	SO	Type &	Pen/ Depth Rcy.	per 6 in.	SOIL AND ROCK SAMPI Burmister Soil Classifi		N	Depth of	ם	STRATUM ESCRIPTION	R E M
T H	I W NS	Number	Core Rcy. & RQD	(Coring min/ft)				Stratum Change			A R
Ft.	G/Ft.			[Downpress psi]				Change			A R K S
5.9	44	SS-1	24/17 0.0	17-15-10-10	Dry, medium dense, brown coarse sand and gravel, trace	FINE SAND, tra e silt.	ce	0.3/	ASPHALT	ROADWAY	
2.5	28 25		2.0		,,						
(e	77										
5_	60		5.0								
	18	SS-2	24/12	44-40-16-18	Moist, very dense, gray/brov little coarse sand, trace grave	vn FINE SAND,					
2.7	26 35		7.0		mue vom se smid, date grave	n, dace snc.					
-	33 47										
10	59		10.0								-
	21	SS-3	24/16	23-25-28-26	Wet, very dense, gray/brown	FINE SAND, to	ace				
	25		12.0		coarse sand and gravel, trace	SILT.		12.0			
-									Bottom of Ex	cploration = 12	1
15											
13								1			
]							- 1				
14											
20											
20											
Ī								i i			
25_											
1											
]							-				
30	10.0										
<u>Q</u> t	o <u>12 Soi</u>	Driven (Casing								
REM	IARKS:	1. Insta	lled monitoring	g well at 12'.							
Dear	untine - T	land.	Operation of		140# Wt x 30" fall on 2" Ol						
	ortions L 0 to 10		Sampler Ty SS - Split Spe	" II	onless Density Cohes 10 Loose 0-4		су				
little	10 to 2	20%	UT - Shelby T	`ube 10 -	30 Medium Dense 4 - 8	Firm		RIC#: Boring No.	00000 : C-14		
some and	20 to 3 35 to 5		UP - Fixed Pos C - Rock Co				er	Date Comp		1/18	
,					30 +		-	Database I			

NE	BC LC)G F	Bayside Sew	ver System		BORING	C#.	C-15		Shoot	2 of 2
		(C/T):		VARWICK		NEBC D			:	Sheet _	<u>Z</u> 01 <u>Z</u>
		00000		FAP#		Date Sta		4/5/18		e End: 4/	5/18
		ad # :				N Coord		0		Ft.	
	_	nsult (-	don Archiba		_ E Coord		0		Ft.	
1		Consult			Boring Contractors	Ground				.0	
Ins	pector	Name/	Co.: To	m Plant / Go	rdon Archibald	Elevation	n Da	itum N	IGVD29		
		Locatio	on opet Avenue								
					nsists of a 2 in. split spoon		-	Groundy	vater Obse	rvations	
'	dr	iven usir	ig a 140 lb hai	nmer, 30" fall.		Date	1	Cime	Depth		Stab. Time
Cash		ess otner ng 24 in.		ising is driven	ising 300 lb hammer,	04/05/18	U	0:00	5		0.25 hr
Casi	ng Size:	3 in		HS Auger					4		
DE	CB AL		SAMPLER Pen/ Depth	Blows	SOIL AND ROCK SAMPI		N	Depth		STRATUM	R E M A R K
D E P T	SO IW	Type & Number	Rcv.	per 6 in.	Burmister Soil Classif	cation System		of Stratum	D	ESCRIPTION	M A
Ĥ	RQD [Downpress psi]							Change			R
	17	SS-1	24/12 0.0	11-7-7-6	Dry, medium dense, brown	FINE SAND, son	ne	0.3	\ASPHALT/I	ROADWAY	S
	13		2.0		coarse sand, trace silt.						
	21										
-	33										
5_	50 10	SS-2	24/18 5.0	14-16-14-22	Wet, dense, brown FINE SA	ND, trace coarse		-			
22	19	002	7.0		sand, trace silt.	,					
22	25		/.0								
	41							1			
10_	58	SS-3	10.0 24/18	8-5-6-8	Wet, medium dense, gray FI	NE SAND some	.	- 1			
-		33*3	12.0	0-0-0-0	coarse sand, trace silt.	INE SAIND, SOINC		12.0			
			12.0				ŀ	12.0	Bottom of Ex	ploration = 12	
]											
15_											
4											
-											
20_								1			
-											
-								i			
j								ľ			
25_											
-								l.			
-											1
1											
30											
0	o <u>12 Soi</u>	l Driven	Casing								
REN	1ARKS:										
					140# Wt x 30" fall on 2" O	D SS Sametar					
Prop	ortions (Jsed	Sampler Ty	pe Cohesi	onless Density Cohes		icy				
trace	0 to 1		SS - Split Sp UT - Shelby	oon 0 -	10 Loose 0 - 4 - 30 Medium Dense 4 - 4		- 11	RIC#:	00000		
some	20 to	35%	UP - Fixed Po	sition 30 -	50 Dense 8 - 1	5 Stiff	- 11	Boring No. Date Comp		710	
and	35 to :	50%	C - Rock C	ore 50	+ Very Dense 15 - 30 -			Database I		5/18	——

)G <u>H</u> (C/T) :		ver System VARWICK		BORING NEBC D		: C-16		Sheet	2 of 2	2
		00000		FAP#		Date Sta	rt:	4/11/1	8 Dat	e End: 4/	11/18	
1	_	oad #:				N Coord		0		Ft.		
	_	nsult (_	rdon Archiba		E Coord		0		Ft.		
		Consult	-		Boring Contractors			face Elev	_	0.0		_
Tusk	ector	Name/	Co.: Da	ivid INacci / C	Gordon Archibald	Elevation	n D	atum _	NGVD29			_
Des	criptic		atrice Terra									
Samp				soil sampler co mmer, 30" fall.	nsists of a 2 in. split spoon	Date		Ground Time	water Obse		O4 1 70°	_
Casir	ig: Unl	ess other	wise noted, c		using 300 lb hammer,	04/11/18		00:00	Depth 9	Casing at	Stab. Tin 0.25 hr	
Casir	falli 1g Size:	n g 24 i n. 3 in		HS Auger	-				,		0,23 11	
D E P T H Ft	CB AL SO IW	Type & Number	SAMPLER Pen/ Depth Rcy.	Blows per 6 in.	SOIL AND ROCK SAMPI Burmister Soil Classifi	LE DESCRIPTIC ication System	N	Depth of	D	STRATUM DESCRIPTION	1	R E M
H Ft.	NS G/Ft	Number	Core Rcy. & RQD	(Coring min/ft) [Downpress psi]				Stratum Change				A R K S
87	9 28	SS-1	24/10 0.0 2.0	9-11-18-18	Dry, medium dense, brown coarse sand, trace gravel, tra		ne	0.3/	ASPHALTA	ROADWAY		3
5_	33 73 24 12 21 29 35	SS-2	5.0 24/15 7.0	20-32-37-35	Dry, very dense, brown/gray coarse sand, trace silt.							
10_	41	SS-3	10.0 24/14 12.0	12-13-28-33	Moist, dense, brown/gray FINE SAND, some coarse sand, trace gravel, trace silt.			12.0	Bottom of E	xploration = 12'		
15_												
20_												
25_												
30												
	12 Soi	Driven	Casing				1					\forall
	ARKS:			1180-5	,							
					140# Wt x 30" fall on 2" O	D SS Sampler	7					+
trace little	roportions Used race 0 to 10% ttle 10 to 20% ome 20 to 35% ond 35 to 50% Sampler Type SS - Split Spoon UT - Shelby Tube UP - Fixed Position C - Rock Core			Fube 10 - 30 - 30 -	onless Density Cohes 10 Loose 0 - 4 30 Medium Dense 4 - 8 50 Dense 8 - 1	ive Consisten Soft Firm Stiff Very Stif	1	RIC#: Boring No Date Com Database J	pleted: 4/	11/18		

		_	Bayside Sew			BORING			Sheet _	2 of 2
li i		(C/T):		ARWICK			tabase ID	_		
RIC		00000		FAP#	:	_ Date Star		8 Dat		11/18
	~	ad #:	Bayside	J. A. 1 9	11.1	N Coord.			Ft.	
	_	nsult (Consult		don Archib	Boring Contractors	E Coord.		. ID	Ft.	
		onsuit Name/			Gordon Archibald	Elevation	urface Ele	v., Ft. : _0 NGVD29	0.0	
rnsf	iecto:	1vaille/	Co. Da	VIU IVACCI7	Cordon Archivald	Elevation	Datum	NG VD29		
		Locatio								
			ipple Aveni		onsists of a 2 in. split spoon		Cwaund	water Obse	· · · · · · · · · · · · · · · · · · ·	
•	dr.	iven usin	g a 140 lb har	nmer, 30" fai	i.	Date	Time	Depth	Casing at	Stab. Time
Casir				sing is driver	using 300 lb hammer,	04/11/18	00:00	4		0.25 hr
Casir	rann 1 g Size :	ng 24 in. 4 in		HS Auger						
-	СВ		SAMPLER	Blows	COLL AND DOOK CANADA	E DECORISMON			COD A DI IN A	R
D E P T H	AL SO	Type &	Pen/ Depth Rcy.	per 6 in.	SOIL AND ROCK SAMPI Burmister Soil Classifi		N Depth of	r	STRATUM DESCRIPTION	R E M
T	I W N S	Number	Core Rcy. & RQD	(Coring min/fl		•	Stratum Change			A R K
Ft.	G/Ft.			(Downpress ps			Change			S
-	15	SS-1	24/12 0.0	17-19-24-21	Dry, dense, brown FINE SA sand, trace gravel, trace silt.	ND, little coarse	0.3	ASPHALT/	ROADWAY	
-	31 25		2.0		J					
-	37									
5	35		5.0							
	24	SS-2	24/16	11-14-17-22	Wet, dense, brwon/gray, FIN coase sand, trace silt.	IE SAND, trace				
4	42		7.0		coase sain, trace site.					
1-	51 91									
10	87		10.0							2
10-		SS-3	24/18	29-21-20-23		SAND, little coars	ie			
			12.0		sand, trace gravel, trace silt.		12.0			
-								Bottom of E	xploration = 12'	1
,,										
15_										
1										
]										
-										
20_										
=							3			
							i i			
25_										
-										
i										
1										
30										
<u>0</u> t	o <u>12 So</u>	l Driven	Casing							
REM	IARKS:	l. Insta	alled monitorin	g well at 12'						
	40				140# Wt x 30" fall on 2" O					
Prope	ortions ortions		Sampler Ty SS - Split Sp	-	sionless Density Cohes - 10 Loose 0 - 4		*	****		
little	10 to	20%	UT - Shelby	Tube 16	- 30 Medium Dense 4 - 4	8 Firm	RIC#: Boring N	00000 D.: C-17		
some and	20 to 35 to		UP - Fixed Po C - Rock C		0 - 50 Dense 8 - 1 0 + Very Dense 15 - 3		Date Con	pleted: 4/	11/18	
					30 -		Database	ID No.:		

	BC LC)G <u>E</u> (C/T) :			ver System VARWICK		BORIN		: <u>C-18</u>		Sheet	2 of 2
		00000		111. / V	FAP#:		Date St				End: 4	/6/18
	ση: dge/Ro			side	PAX #		N Coord		0	Date	-	/0/18
	_					1.3 5					Ft.	
	-	nsult (don Archiba		E Coord		0		Ft.	
		Consult				Boring Contractors			face Elev		0	
Ins	pector	Name/	'Co. :	To	m Plant / Go	rdon Archibald	Elevatio	on D	atum <u>N</u>	NGVD29		
Des	criptic	Location: Wh	ipple .									
Sam	pler: U	iless othe	erwise n	oted,	soil sampler co	nsists of a 2 in. split spoon	***			vater Obse		12
	ng: Unl falli		wise no		mmer, 30" fall. ising is driven i	ising 300 lb hammer,	Date: 04/06/18	-	Time 00:00	Depth 6	Casing at	O.25 hr
Casi	ng Size:	3 in	Lave	-	HS Auger				,,			
DEPTH	CB AL SO IW NS	Type & Number		Depth	Blows per 6 in. (Coring min/ft) [Downpress psi]	SOIL AND ROCK SAM Burmister Soil Class		ON	Depth of Stratum Change		STRATUM ESCRIPTION	R E M A R K
Ft.	G/Ft.	SS-1	24/13	0.0	12-7-10-17	Dry, medium dense, dark l	brown FINE SAN	ID	0.3/	ASPHALT/F	CADWAY	S
	18 21	55.		2.0		some coarse sand and grav	el.	,	0.3/	/ IDI ID IDI	COAD WAT	
	36				1980							
5_	44	55-2	24/18	5.0	15-24-19-27	Wet, dense, brown-gray Fl	NE SAND some					
-	11 SS-2 24/18 15-24-19-27 We con				13-24-19-27	coarse sand, trace gravel, t	race silt.					
	53 70											
10_	81	SS-3	24/12	10.0	12-25-31-48	Wet, very dense, brown-gr	av FINF SAND I	little				
		33-3	. 27112	12.0	12-25-51-46	coarse sand and gravel, tra- fragments.	ce silt, trace rock	D, little ck				1
						nagments.	•		12.0	Bottom of Ex	ploration - 12'	
15												
"												
4												
-												
20												
-												
-												
25												
-												
-												
30												
	to <u>12 Soi</u>	l Driven	Casing									
REN	ARKS:						-					
						140# We = 20# &# 2#</td><td>On cc camala</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>Prop</td><td>ortions l</td><td>Jsed</td><td>Samp</td><td>oler Ty</td><td>/pe Cohesi</td><td>140# Wt x 30" fall on 2" (onless Density Coh</td><td>OD SS Sampier esive Consiste</td><td>ency</td><td></td><td></td><td></td><td></td></tr><tr><td></td><td>0 to 10</td><td></td><td>SS - S</td><td>plit Sp</td><td>con 0 -</td><td></td><td>- 4 Soft - 8 Firm</td><td></td><td>RIC#:</td><td>00000</td><td></td><td></td></tr><tr><td></td><td>20 to</td><td></td><td>UP - Fix</td><td>ced Po</td><td>sition 30 -</td><td></td><td>- 8 Firm - 15 Stiff</td><td></td><td>Boring No.</td><td></td><td></td><td></td></tr><tr><td>and</td><td>35 to</td><td></td><td>C-R</td><td></td><td></td><td>+ Very Dense 15</td><td>- 30 Very St</td><td>tiff</td><td>Date Com</td><td></td><td>/18</td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td>30</td><td>) + Hard</td><td>1</td><td>Database 1</td><td>D No.:</td><td></td><td></td></tr></tbody></table>						

NEBC Database 11 # : Date End : Al 2 0 2		9									
Part Code Part Bayside Part Bayside Part Bayside Part Bayside Part Bayside Part Bayside Part Bayside Part Bayside Part Bayside Part Bayside Part Part Bayside Part Pa	NEI	BC LC	G = B	ayside Sew	er System		BORING	#: C-19		Sheet	2 of 2
Bridge (Road # : Baysside			, ,								
Design Consult Co. : Gordon Archibald Inc. S. Coord. : 0 Ft.					FAP#:	2			8 Dat		12/18
Revenue Constit Co. New England Boring Contractors Bryan Deely / Gordon Archibald Elevation Datum NGVD29		_			.d A1.:1	1.1 T					
Borehole Location Description: Clara Avenue Sampler: Cules otherwise noted, coll sampler consists of a 2 in. split spoon driven using a 140 h barmer, 30° fall. Date Time Depth Casing at Slab. Time Od/12/18 00:00 10 0.25 hr Od/12/18 Od/12/18 Od/12/18 Od/12/18 Od/12/18 Od/12/18 Od/12/18 Od/12/18 Od/12/18 Od/12/18 Od/12/18 Od/12/18 Od/12/18 Od/12/18 Od/12/18 Od/12/18 Od/12/18 Od/12/18 Od/12/18 Od/12/18 Od/12/18 Od/12/18 Od/12/18 Od/12/18 Od/12/18 Od/12/18 Od/12/18 Od/12/18 Od/12/18 Od/12/18 Od/12/18 Od/12/18 Od/12/18 Od/12/18 Od/12/18 Od/12/18 Od/12/18 Od/12/18 Od/12/18 Od/12/18 Od/12/18 Od/12/18 Od/12/18 Od/12/18 Od/12/18 Od/12/18 Od/12/18 Od/12/18 Od/12/18 Od/12/18 Od/12/18 Od/12/18 Od/12/18 Od/12/18 Od/12/18 Od/12/18 Od/12/18 Od/12/18 Od/12/18 Od/12/18 Od/12/18 Od/12/18 Od/12/18 Od/12/18 Od/12/18 Od/12/18 Od/12/18 Od/12/18 Od/12/18 Od/12/18 Od/12/18 Od/12/18 Od/12/18 Od/12/18 Od/12/18 Od/12/18 Od/12/18 Od/12/18 Od/12/18 Od/12/18 Od/12/18 Od/12/18 Od/12/18 Od/12/18 Od/12/18 Od/12/18 Od/12/18 Od/12/18 Od/12/18 Od/12/18 Od/12/18 Od/12/18 Od/12/18 Od/12/18 Od/12/18 Od/12/18 Od/12/18 Od/12/18 Od/12/18 Od/12/18 Od/12/18 Od/12/18 Od/12/18 Od/12/18 Od/12/18 Od/12/18 Od/12/18 Od/12/18 Od/12/18 Od/12/18 Od/12/18 Od/12/18 Od/12/18 Od/12/18 Od/12/18 Od/12/18 Od/12/18 Od/12/18 Od/12/18 Od/12/18 Od/12/18 Od/12/18 Od/12/18 Od/12/18 Od/12/18 Od/12/18 Od/12/18 Od/12/18 Od/12/18 Od/12/18 Od/12/18 Od/12/18 Od/12/18 Od/12/18 Od/12/18 Od/12/18 Od/12/18 Od/12/18 Od/12/18 Od/12/18 Od/12/18 Od/12/18 Od/12/18 Od/12/18 Od/12/18 Od/12/18 Od/12/18 Od/12/18 Od/12/18 Od/12/18 Od/12/18 Od/12/18 Od/12/18 Od/12/18 Od/12/18 Od/12/18 Od/12/18 Od/12/18 Od/12/18 Od/12/18 Od/12/18 Od/12/18 Od/12/18		_					_	-	, TF4 . ()		
Description: Clara Avoue										.0	
Description: Clara Avenue Sampler: Unless there wise noted, soil sampler consists of a 2 in. split spoon driven using a 140 lb hammer, 30° fall.					yuli Beelj 7 c	Jordon I Momodia					
Sampler Unless otherwise noted, soil sampler consists of a 2 in. split spoon of riveu using a 140 ib hammer, 30° fall on 2° OD SS Sampler											
Casing: Unless otherwise noted, casing is driven using 340 lb hammer, failing 24 in. Casing Size: 4 in. HS Auger					soil sampler co	nsists of a 2 in. split spoon		Groundy	water Obse	ervations	
Casing Size 4 in	_	dr	iven usin	g a 140 lb hai	nmer, 30'' fall.			Time	Depth		
Casing Size: 4 in	Casin				ising is driven t	ising 300 lb hammer,	04/12/18	00:00	10		0.25 hr
Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Form	Casir		_		HS Auger						
Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Formula Form	D				Blows	SOIL AND ROCK SAMPL	E DESCRIPTION	V Denth		STRATIM	R
SS-1 24/12 0.0 10-11-10-9 Dry, medium dense, brwon FINE SAND, trace 0.3 ASPHALT/ROADWAY	P	SO	Type &	Rcy.				of	I		M
SS-1 24/12 0.0 10-11-10-9 Dry, medium dense, brwon FINE SAND, trace 0.3 ASPHALT/ROADWAY	H	NS	Number	Core reej.	(Coring min/ft)						R
10	Ft.	G /Ft.	00.1	24/12 00			EINIE SANID two		- ACDUALT	/DO A DWA V	Š
SS-2 24/16 5.0 31-61-79-32 Dry, very dense, brown/gray COARSE SAND, some fine sand, trace gravel, trace silt. 5.0 Coarse sand			55-1		10-11-10-9	coarse sand and gravel, trace	rine sand, trac e silt.	0.3/	ASPHALL	ROADWAY	
SS-2 24/16 31-61-79-32 Dry, very dense, brown/gray COARSE SAND, some fine sand, trace gravel, trace silt. Dry, dense, gray/brown COARSE SAND and	1-			2.0							
SS-2 24/16 31-61-79-32 Dry, very dense, brown/gray COARSE SAND, some fine sand, trace gravel, trace silt. Dry, dense, gray/brown COARSE SAND and gravel, trace silt. Dry, dense, gray/brown COARSE SAND and gravel, trace silt. Dry, dense, gray/brown COARSE SAND and gravel, trace silt. Dry, dense, gray/brown COARSE SAND and gravel, trace silt. Dry, dense, gray/brown COARSE SAND and gravel, trace silt. Dry, dense, gray/brown COARSE SAND and gravel, trace silt. Dry, dense, gray/brown COARSE SAND and gravel, trace silt. Dry, dense, gray/brown COARSE SAND and gravel, trace silt. Dry, dense, gray/brown COARSE SAND and gravel, trace silt. Dry, dense, gray/brown COARSE SAND and gravel, trace silt. Dry, dense, gray/brown COARSE SAND and gravel, trace silt. Dry, dense, gray/brown COARSE SAND and gravel, trace silt. Dry, dense, gray/brown COARSE SAND and gravel, trace silt. Dry, dense, gray/brown COARSE SAND and gravel, trace silt. Dry, dense, gray/brown COARSE SAND and gravel, trace silt. Dry, dense, gray/brown COARSE SAND and gravel, trace silt. Dry, dense, gray/brown COARSE SAND and gravel, trace silt. Dry, dense, gray/brown COARSE SAND and gravel, trace silt. Dry, dense, gray/brown COARSE SAND and gravel, trace silt. Dry, dense, gray/brown COARSE SAND and gravel, trace silt. Dry, dense, gray/brown COARSE SAND and gravel, trace silt. Dry, dense, gray/brown COARSE SAND and gravel, trace silt. Dry, dense, gray/brown COARSE SAND and gravel, trace silt. Dry, dense, gray/brown COARSE SAND and gravel, trace silt. Dry, dense, gray/brown COARSE SAND and gravel, trace silt. Dry, dense, gray/brown COARSE SAND and gravel, trace silt. Dry, dense, gray/brown COARSE SAND and gravel, trace silt. Dry, dense, gray/brown COARSE SAND and gravel, trace silt. Dry, dense, gray/brown COARSE SAND and gravel, trace silt. Dry, dense, gray/brown COARSE SAND and gravel, trace silt. Dry, dense, gray/brown COARSE SAND and gravel, trace silt. Dry, dense, gray/brown COARSE SAND and											
10	5_		00.0		21 (1 70 22	B	COADCE CANE		0	,	
25 24/14 10.0 29-27-25-21 Dry, dense, gray/brown COARSE SAND and gravel, trace silt. 12.0 Bottom of Exploration = 12' 1 20 25 25 25 26 27 27 27 27 27 27 27	1		88-2		31-61-79-32	Dry, very dense, brown/gray some fine sand, trace gravel	, COARSE SANL , trace silt.),	Coarse sand	1	
SS-3 24/14 29-27-25-21 Dry, dense, gray/brown COARSE SAND and gravel, trace slit. 12.0 Bottom of Exploration = 12' 1	-			7.0							
SS-3 24/14 29-27-25-21 Dry, dense, gray/brown COARSE SAND and gravel, trace slit. 12.0 Bottom of Exploration = 12' 1	100										
12.0	10_										
12.0			SS-3		29-27-25-21	Dry, dense, gray/brown CO. gravel, trace silt.	ARSE SAND and				
20 25 25 26 27 25 26 27 26 27 27 27 27 27 27 27 27 27 27 27 27 27				12.0				12.0	Bottom of I	Exploration = 12	1
25											
25 Oto 12 Soil Driven Casing REMARKS: 1. Installed monitoring well at 12'. Proportions Used trace 0 to 10% SS - Split Spoon little 10 to 20% some 20 to 35% UP - Fixed Position and 35 to 50% C - Rock Core 50 + Very Dans 15 - 30 Very Stiff Oto 12 Soil Driven Casing 140# Wt x 30" fall on 2" OD SS Sampler Cohesioness Density Cohesive Consistency 0 - 10 Loose 0 - 4 Soft 10 - 30 Medium Dense 4 - 8 Firm 30 - 50 Dense 8 - 15 Stiff C - Rock Core 50 + Very Danse 15 - 30 Very Stiff Date Completed: 4/12/18	15_										
25 Oto 12 Soil Driven Casing REMARKS: 1. Installed monitoring well at 12'. Proportions Used trace 0 to 10% SS - Split Spoon little 10 to 20% some 20 to 35% UP - Fixed Position and 35 to 50% C - Rock Core 50 + Very Dans 15 - 30 Very Stiff Oto 12 Soil Driven Casing 140# Wt x 30" fall on 2" OD SS Sampler Cohesioness Density Cohesive Consistency 0 - 10 Loose 0 - 4 Soft 10 - 30 Medium Dense 4 - 8 Firm 30 - 50 Dense 8 - 15 Stiff C - Rock Core 50 + Very Danse 15 - 30 Very Stiff Date Completed: 4/12/18											
25 Oto 12 Soil Driven Casing REMARKS: 1. Installed monitoring well at 12'. Proportions Used trace 0 to 10% SS - Split Spoon little 10 to 20% some 20 to 35% UP - Fixed Position and 35 to 50% C - Rock Core 50 + Very Dans 15 - 30 Very Stiff Oto 12 Soil Driven Casing 140# Wt x 30" fall on 2" OD SS Sampler Cohesioness Density Cohesive Consistency 0 - 10 Loose 0 - 4 Soft 10 - 30 Medium Dense 4 - 8 Firm 30 - 50 Dense 8 - 15 Stiff C - Rock Core 50 + Very Danse 15 - 30 Very Stiff Date Completed: 4/12/18	=										
25 Oto 12 Soil Driven Casing REMARKS: 1. Installed monitoring well at 12'. Proportions Used trace 0 to 10% SS - Split Spoon little 10 to 20% some 20 to 35% UP - Fixed Position and 35 to 50% C - Rock Core 50 + Very Dans 15 - 30 Very Stiff Oto 12 Soil Driven Casing 140# Wt x 30" fall on 2" OD SS Sampler Cohesioness Density Cohesive Consistency 0 - 10 Loose 0 - 4 Soft 10 - 30 Medium Dense 4 - 8 Firm 30 - 50 Dense 8 - 15 Stiff C - Rock Core 50 + Very Danse 15 - 30 Very Stiff Date Completed: 4/12/18											
Proportions Used trace 0 to 10% Isome 20 to 35% UP - Fixed Position and 35 to 50% ISOME AND ADDRESS OF TO ADDRESS	20										
Proportions Used trace 0 to 10% Isome 20 to 35% UP - Fixed Position and 35 to 50% ISOME AND ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS											
Proportions Used trace 0 to 10% Isome 20 to 35% UP - Fixed Position and 35 to 50% ISOME AND ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS	1=										
Proportions Used trace 0 to 10% Isome 20 to 35% UP - Fixed Position and 35 to 50% ISOME AND ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS OF TO ADDRESS											
REMARKS: 1. Installed monitoring well at 12'. Proportions Used trace 0 to 10% SS - Split Spoon little 10 to 20% UT - Shelby Tube some 20 to 35% UP - Fixed Position and 35 to 50% C - Rock Core S0 + Very Dense 15 - 30 Very Stiff Date Completed : 4/12/18	25_										
REMARKS: 1. Installed monitoring well at 12'. Proportions Used trace 0 to 10% SS - Split Spoon little 10 to 20% UT - Shelby Tube some 20 to 35% UP - Fixed Position and 35 to 50% C - Rock Core S0 + Very Dense 15 - 30 Very Stiff Date Completed : 4/12/18	-										
REMARKS: 1. Installed monitoring well at 12'. Proportions Used trace 0 to 10% SS - Split Spoon little 10 to 20% UT - Shelby Tube some 20 to 35% UP - Fixed Position and 35 to 50% C - Rock Core S0 + Very Dense 15 - 30 Very Stiff Date Completed : 4/12/18	-										
REMARKS: 1. Installed monitoring well at 12'. Proportions Used trace 0 to 10% SS - Split Spoon little 10 to 20% UT - Shelby Tube some 20 to 35% UP - Fixed Position and 35 to 50% C - Rock Core S0 + Very Dense 15 - 30 Very Stiff Date Completed : 4/12/18	1 =										
REMARKS: 1. Installed monitoring well at 12'. Proportions Used Sampler Type Cohesionless Density Cohesive Consistency trace 0 to 10% SS - Split Spoon little 10 to 20% UT - Shelby Tube some 20 to 35% UP - Fixed Position and 35 to 50% C - Rock Core Sampler Type Cohesive Cohesive Consistency Cohesionless Density Cohesive Consistency Cohesionless Density Cohesive Consistency Cohesive Consistency Cohesionless Density Cohesive Consistency Cohesive Consistency Cohesive Consistency Cohesive Consistency Cohesive Consistency Cohesive Consistency Cohesive Consistency Cohesive Consistency Cohesive Consistency Cohesive Consistency Cohesive Consistency Cohesive Consistency Cohesive Consistency Cohesive Consistency Cohesive Consistency Cohesive Consistency Cohesive Consistency Cohesive Cohesive Consistency Cohesive Consistency Cohesive Consistency Cohesive Cohesive Consistency Cohesive Consistency Cohesive Cohesive Consistency Cohesive Cohesive Cohesive Consistency Cohesive	30										
Troportions Used Sampler Type Cohesionless Density Cohesive Consistency	0	to <u>12 So</u>	il Driven	Casing							
Proportions Used trace 0 to 10% SS - Split Spoon little 10 to 20% or 20 to 35% and 35 to 50% SS - Rock Core SS - Split Spoon little 10 to 20% or 20 to 35% and 35 to 50% or 20 to 35% or 35% or 20 to 35% or 35% or 20 to 35% or 35% or 35% or 20 to 35% or 35	REN	/ARKS	: 1. Inst	alled monitori	ng well at 12'.						
Proportions Used trace 0 to 10% SS - Split Spoon little 10 to 20% some 20 to 35% and 35 to 50% SS - Rock Core Trace 0 to 10% SS - Split Spoon little 10 to 20% by the some 20 to 35% and 35 to 50% SS - Rock Core Trace 0 to 10% SS - Split Spoon little 10 to 20% by the some 20 to 35% and 35 to 50% SS - Split Spoon little 10 to 20% by the some 20 to 35% by the solution little 10 to 20% by the solution little 10 to 20% by the solution little 10 to 20% by the solution little 10 to 20% by the solution little 10 to 20% by the solution little 10 to 20% by the solution little 10 to 20% by the solution little 10 to 20% by the solution little 10 to 20% by the solution little 10 to 20% by the solution little 10 to 20% by the solution little 10 to 20% by the solution little 10 to 20% by the solution little 10 to 20% by the solution little 10 to 20% by the solution little 10 to 20% by the solution little 10 to 20% by the solution little 10 to 20% by the solution little 10 to 20% by the solution little 10 to 20% by the solution little 10 to 20% by the solution little 10 to 20% by the solution little 10 to 20% by the solution little 10 to 20% by the solution little 10 to 20% by the solution little 10 to 20% by the solution little 10 to 20% by the solution little 10 to 20% by the solution little 10 to 20% by the solution little 10 to 20% by the solution little 10 to 20% by the solution little 10 to 20% by the solution little 10 to 20% by the solution little 10 to 20% by the solution little 10 to 20% by the solution little 10 to 20% by the solution little 10 to 20% by the solution little 10 to 20% by the solution little 10 to 20% by the solution little 10 to 20% by the solution little 10 to 20% by the solution little 10 to 20% by the solution little 10 to 20% by the solution little 10 to 20% by the solution little 10 to 20% by the solution little 10 to 20% by the solution little 10 to 20% by the solution little 10 to 20% by the solution little 10 to 20% by the solution little 10 to 20% by the solution little 10 to 20% by the solut											
trace 0 to 10% SS - Split Spoon 0 - 10 Loose 0 - 4 Soft RIC #: 00000	Pron	ortions	Used	Sampler T	ype Cohe			ncy			
some 20 to 35% UP - Fixed Position and 35 to 50% C - Rock Core 10 - 30 Medium Dense 20 to 35% C - Rock Core 20 to 35% C - Rock	trace	e 0 to 1	10%	SS - Split S	poon 0 ·	· 10 Loose 0 -	4 Soft	*	00000		
and 35 to 50% C - Rock Core 50 + Very Dense 15 - 30 Very Stiff Date Completed: 4/12/18								Boring N	lo.: C-19	4/18/10	
						0 + Very Dense 15 -				4/12/18	

NEBC LOG Bayside Sewer System **BORING #:** C-20 Sheet <u>2</u> of <u>2</u> Location (C/T): Kent / WARWICK NEBC Database ID #: 00000 FAP#: RIC#: Date Start: 4/12/18 Date End: 4/12/18 Bridge/Road #: N Coord.: Bayside Design Consult Co.: Gordon Archibald, Inc. E Coord.: 0 Ft. Ground Surface Elev., Ft.: **New England Boring Contractors** Geotech Consult Co.: 0.0 Bryan Deely / Gordon Archibald Inspector Name/Co.: Elevation Datum NGVD29 **Borehole Location** Description: Cady Avenue Sampler: Unless otherwise noted, soil sampler consists of a 2 in. split spoon **Groundwater Observations** driven using a 140 lb hammer, 30" fall. Date Time Casing at Stab. Time Depth Casing: Unless otherwise noted, casing is driven using 300 lb hammer, 04/12/18 00:00 0.25 hr falling 24 in. Casing Size: 4 in HS Auger R E M SAMPLER СВ DEPTHE Blows SOIL AND ROCK SAMPLE DESCRIPTION Depth STRATUM AL SO IW Pen/ Depth per 6 in. Type & Number Rcy. Core Rcy. Burmister Soil Classification System DESCRIPTION A R K S Stratum (Coring min/ft) [Downpress psi] NS G/Ft Change & RQD SS-1 15-12-12-10 Dry, medium dense, brown FINE SAND, trace 24/14 ASPHALT/ROADWAY 20 0.0 coarse sand and gravel, trace silt, trace shells. 27 2.0 15 42 59 5 5.0 SS-2 24/16 18-30-23-25 Moist, very dense, brown FINE SAND, some 22 coarse sand, trace gravel, trace silt. 38 7.0 39 51 28 10 10.0 SS-3 24/18 7-6-11-11 Wet, medium dense, gray FINE SAND, trace coarse sand, trace silt. 12.0 12.0 Bottom of Exploration = 12' I 15 20 25 30 0 to 12 Soil Driven Casing REMARKS: 1. Installed monitoring well at 12' 140# Wt x 30" fall on 2" OD SS Sampler **Proportions Used** Sampler Type Cohesionless Density Cohesive Consistency trace 0 to 10% SS - Split Spoon 0 - 10Loose 0 - 4Soft RIC#: UT - Shelby Tube little 10 to 20% 10 - 30 Medium Dense 4-8 Firm Boring No.: C-20 20 to 35% UP - Fixed Position 30 - 50 some Dense 8-15 Stiff 35 to 50% Date Completed: 4/12/18 C - Rock Core 15 - 30Very Stiff 50 +and Very Dense Database ID No.: 30 +Hard

Loca RIC Brid Desig Geot Insp Bore Desc	#: ge/Ro gn Co ech C ector chole I	C/T): 00000 ad #: nsult Consult Name/Cocation: Pen	Bayside Co.: Gore Co.: Ne Co.: Bry n der Avenue	FAP # don Archib w England /an Deely /	ald, Inc. Boring Contractors Gordon Archibald	BORING NEBC D Date Star N Coord E Coord Ground Elevation	atab rt : . : Surf n Da	ase ID # 4/13/18 0 0 face Elev	B Date	e End :4/1 Ft. Ft.	2 of 2 13/18
Samp	ler: Un	less othe	rwise noted, s g a 140 lb har	oil sampler c nmer, 30" fal	onsists of a 2 in. split spoon	Date		Groundy Time	Depth	Casing at	Stab. Tim
Casin	g: Unle	ess other	wise noted, ca	sing is driven	using 300 lb hammer,	04/13/18		00:00	4		0.25 hr
Ci-		ng 24 in.		HS Auger							
D E P T H Ft.	CB AL SO IW NS G/Ft.	4 in Type & Number	SAMPLER Pen/ Depth Rcy. Core Rcy. & RQD	Rlows	SOIL AND ROCK SAMP Burmister Soil Classif	LE DESCRIPTION System	ON	Depth of Stratum Change	Γ	STRATUM DESCRIPTION	F N A F K
-	22 15 11 19	SS-1	24/10 0.0 2.0	14-9-7-7		Ory, medium dense, brown FINE SAND, some 0.3 ASPHALT/ROADWAY oarse sand, trace gravel, trace silt.					
5_	23 25 47 51 68	SS-2	5.0 24/14 7.0	17-22-21-1	Wet, dense, brown FINE Sand, trace gravel, trace silt	AND, some coars	se				
10_	51 68 124 59 SS-3 75 12.0 38-46-59-61 Wet, very dense, brown fine sand, trace gravel, t					DARSE SAND, s e silt.	ome	10.0	Coarse sand	d Exploration = 12	
15_											
20_											
25_											
30	to <u>12</u> <u>S</u>	oil Drive	n Casing								
RE	MARK	S: 1. Ins	stalled monitor	ing well at 12							
	ne 20 t		Sampler SS - Split UT - Shelb UP - Fixed C - Rock	Spoon y Tube Position	0 - 10 Loose (10 - 30 Medium Dense 30 - 50 Dense 8 50 + Very Dense 15	OD SS Sampler hesive Consis 0 - 4 So 4 - 8 Fir 1 - 15 Sti 5 - 30 Very 30 + Ha	tency ft m iff Stiff	RIC#: Boring Date Co		4/13/18	

NEB	C LO	G B	ayside Sew	er System		BORING	;#:	C-23		Sheet	2 of _	2
Loca	tion ((C/T):	Kent / W	ARWICK		NEBC D	atab	oase ID #				
RIC		00000		FAP# :		_ Date Sta	rt :	4/17/18	BDate	e End : 4/	17/18	
Brid	ge/Ro	ad #:	Bayside			N Coord		0		Ft.		
Desi	gn Co	nsult (don Archiba		_ E Coord		0		Ft.		
Geo	tech C	Consult			Boring Contractors	Ground				.0		
Insp	ector	Name/	Co.: Br	an Deely / C	Gordon Archibald	Elevation	n Da	tum N	IGVD29			
Rore	hole l	Locatio	n									
			ngmeadow A	Avenue								
Samp	ler: Ur	iless othe	rwise noted,	soil sampler co	nsists of a 2 in. split spoon	Data			vater Obse	crvations Casing at	Ctob T	
Casin	dr o- Unb	iven usin ess other	ig a 140 lb hai wise noted, ca	nmer, 30" fall. sing is driven t	ising 300 lb hammer,	Date 04/17/18		Fime 00:00	Depth	Casing at	0.25 h	
Cusin		ng 24 in.		B	,	0 1/1//10	Ì		•			
Casin	g Size:	4 in		HS Auger	T		L				l	D
D E	CB AL		SAMPLER Pen/ Depth	Blows	SOIL AND ROCK SAMPI		ON	Depth		STRATUM		R E M
P	SO I W	Type & Number	Rcy.	per o m.	Burmister Soil Classifi	cation System		of Stratum	Γ	DESCRIPTION		Α
H	NS	Nulliber	Core Rcy. & RQD	(Coring min/ft) [Downpress psi]				Change				R K
Ft.	G/Ft.	SS-1	24/14 0.0	9-10-10-8	Dry, mediumd dense brown	FINE SAND. tra	ace	0.3/	ASPHALT	ROADWAY	7	S
-	12 22	33-1	2.0	<i>y</i> -10-10-0	coarse sand trace silt.	11100110,0		(1.27)	(
	25		2.0									
-	70											
5_	120		5.0			DD ID GAND						
12	52	SS-2	24/18	26-31-22-23	Wet, medium dense, brown coarse sand, trace silt.	FINE SAND, tra	ace		Coarse sand	3		
-	77		7.0		,		7.0					
1.5	93 84											
10	88		10.0									
10_	59	SS-3	24/18	55-75-53-55	Wet, very dense, gray FINE sand and gravel, trace silt, tr	SAND, trace co	arse					
	100		12.0		sand.	acc blown fine		12.0	Dottom of I	Exploration = 12	,	1
-									Dolloin of 1	Exploration 12		1
16												
15_												
20_												
-												
75												
25_												
-												
27												
30												_
0	to <u>12</u> Se	oil Driver	n Casing									
REI	MARK!	S: 1. Ins	talled monitor	ing well at 12'								
					140# Wt x 30" fall on 2"							
_	ortions		Sampler 7	* *		esive Consist	-					
little		20%	SS - Split S UT - Shelby	Tube 10	- 30 Medium Dense 4	- 8 Firm	373	RIC#: Boring N	00000 No.: C-23			
som and	e 20 to	0 35% 0 50%	UP - Fixed I C - Rock			15 Stif - 30 Very S		Date Co	mpleted:	4/17/18		
anu	JJ (I	0.0070	O-MOUN) + Har		Databas	e ID No.:			

Loc RIC Brid Des Geo Insp Bor Des Samp Casin	ation () #: lge/Ro ign Co tech () cector chole: dring: Uni	(C/T): 00000 oad #: onsult Consult Name Location: Location: tooless oth	Bayside Co.: Gor t Co.: No Co.: Br on ngmeadow erwise noted, ca aga 140 lb har wise noted, ca	VARWICK FAP # don Archiba ew England yan Deely / 0 Avenue soil sampler co mmer, 30" fall sing is driven HS Auger	ald, Inc. Boring Contractors Gordon Archibald msists of a 2 in. split spoon	NEBC Da Date Start N Coord.: E Coord.:	: 0 0 urface Elev Datum 1	#:Dat	e End: 4/ Ft. Ft.	2 of 2 9/18 Stab. Time 0 hr
D E P T H Ft.	AL SO IW NS G/Ft.	Type & Number	Pen/ Depth	Blows per 6 in. (Coring min/ft) [Downpress psi]	SOIL AND ROCK SAMPI Burmister Soil Classifi		Depth of Stratum Change	Г	STRATUM DESCRIPTION	R E M A R K
							0.3	ASPHALT/	ROADWAY	3
5_							4.0	coarse sand Moist, gray	FINE SAND, so and gravel, trace	silt.
10_							10.0	Moist, dense	, FINE SAND, t	race
							12,0		and gravel, trace red rock.	
	10.0	1 4								
<u>U</u> 1	0 12 <u>So</u>	l Augeri	ng							
REN	IARKS	: 1. Soli	d stem auger p	robe - no sampl	es taken.					
trace little	ortions 0 to 1 10 to 20 to 35 to	0% 20% 35%	Sampler Ty SS - Split Sp UT - Shelby UP - Fixed Po C - Rock C	Tube 10- sition 30-	140# Wt x 30" fall on 2" Officionless Density Cohes 10 Loose 0 - 4 - 30 Medium Dense 4 - 50 Dense 8 - 10 + Very Dense 15 - 30 - 30 - 30 - 30 - 30 - 30 - 30 - 3	sive Consistency 4 Soft 8 Firm 15 Stiff 30 Very Stiff	RIC#: Boring No	pleted: 4/	9/18	

Loc		(C/T):	Kei		er System /ARWICK			ata	base ID #		Sheet _	2 of 2
		00000			FAP#		_ Date Sta		4/9/18	Dat	e End: 4/	9/18
	-	ad #:	Bay				N Coord		0		Ft.	
	_	nsult (don Archiba		_ E Coord		0		Ft.	
		Consult		_		Boring Contractors	 -		face Elev		.0	
Ins	ector	Name/	Co.:	Br	yan Deely / (Gordon Archibald	Elevation	n D	atum <u>l</u>	NGVD29		
		Location: Lo		idow	Avenue							
Sam						nsists of a 2 in. split spoon				water Obse		
Casi	ng: Unle		wise not		nmer, 30" fall. sing is driven 1	using 300 lb hammer,	Date 04/09/18		Time 00:00	Depth 5.5	Casing at	Stab. Time 0.25 hr
Casin	ng Size:		T		HS Auger							
D E P T H Ft.	CB AL SO IW NS G/Ft.	Type & Number	SAMF Pen/ Rcy. Core Ro & RQD	Depth	Blows per 6 in. (Coring min/ft) [Downpress psi]	SOIL AND ROCK SAMPL Burmister Soil Classifi		N	Depth of Stratum Change	ם	STRATUM ESCRIPTION	R E M A R K
25		SS-1	24/18	0.0	16-14-12-10	Dry, medium dense, brown I coarse sand and gravel, trace		ce	0.3/	ASPHALT/	ROADWAY	
		SS-2	24/18	2.0	17-20-25-37	Dry, dense, brown/gray FINI coarse sand, trace gravei, trace						
5_		SS-3	24/18	4.0	15-46-76-89	Dry, very dense, brown/gray some fine sand, trace gravel,	COARSE SANI trace silt, trace	D,	5.0	COARSES	AND, weathered	rock
:5 :5	v	SS-4	10/8	6.0	72-120/4"	weathered rock. Dry, very dense, gray FINE trace weathered rock.	SAND and grave	ıl,		CON MIDE DA	n 12, weathered	IOGR.
SS-4 10/8 6.8 72-120/4" Dry, very dense, g trace weathered ro sand and gravel, to					Wet, very dense, gray FINE sand and gravel, trace silt, tra	et, very dense, gray FINE SAND, trace coarse and and gravel, trace silt, trace weathered rock. 8.0 8.4 Split Spoon Refusal at 8' Split Spoon Refusal at 8.4'						
10_		SS-6	0.3/4		120/0"	Wet, very dense, gray FINE SAND, trace coarse sand and gravel, trace silt, trace weathered rock.			10.3	Split Spoon 1	Refusal at 10.3 polyage	4 Till
15_										and weathers	d bedrock	7. 110
20_												
25_												
30												
0 to 10.3 Soil Augering												
										-		
KEN	IARKS:	intag.										
_		.				140# Wt x 30" fall on 2" Ol						
-		0% 20% 35%	Samp SS - SI UT - SI UP - Fix C - R	olit Sp relby ' red Po	oon 0 - Fube 10 - sition 30 -	Ionless Density Cohes 10 Loose 0 - 4 30 Medium Dense 4 - 8 50 Dense 8 - 1	ive Consisten Soft Firm Stiff Very Sti		RIC #: Boring No Date Com Database	pleted: 4/9	9/18	

Loc RIC Bric	C#: dge/Ro	OG E (C/T): 00000 pad #:	Kent / V Bayside	ver System VARWICK FAP # :		NEBC Database ID # : Date Start : 4/9/18 Date End : 4/9 N Coord. : 0 Ft. E Coord. : 0 Ft.				2 of 2 /9/18	
Geo	tech (Consult Name/	Co.: N	ew England I	Boring Contractors Gordon Archibald	Ground Elevatio	Surf	ace Elev	., Ft. : 0 IGVD29	.0	
		Location: Lor	on ngmeadow	Avenue							
Sam	pler: Ur dr ng: Unl	iless othe	rwise noted, s g a 140 lb har	soil sampler co nmer, 30" fall.	nsists of a 2 in. split spoon using 300 lb hammer,	Date 04/09/18	T	Froundy ime 0:00	vater Obse Depth 10		Stab. Time 0.25 hr
Casia	ng Size:	11 F 2 111.		HS Auger							
D E P T H Ft	CB AL SO IW NS G/Ft.	Type & Number	SAMPLER Pen/ Depth Rcy. Core Rcy. & RQD	Blows per 6 in. (Coring min/ft) [Downpress psi]	SOIL AND ROCK SAMP Burmister Soil Classi			Depth of Stratum Change		STRATUM ESCRIPTION	R E M A R K S
								0.3	ASPHALT/I		
2- 2-								1.0		FINE SAND, so and gravel, trace	
5_								4.0	Moist, gray I coarse sand,	FINE SAND, lit trace gravel, tra	tle ce silt.
10_								10.0	coarse sand a trace weather		race silt,
15_									Bottom to Ex	sploration = 12	
20_											
25_											
30											
<u>0</u> t	o <u>12 Soi</u>	l Augerin	g								
REM	IARKS:	1. Solid	l stem auger pi	robe. No sample	es taken.						
Duan	netion 1	baal	Complete The	ma Cahari	140# Wt x 30" fall on 2" C						
	0 to 1	0% 20% 35% I	Sampler Ty SS - Split Sp UT - Shelby T UP - Fixed Po C - Rock Co	oon 0 - Tube 10 - sition 30 -	30 Medium Dense 4- 50 Dense 8-	4 Soft 8 Firm 15 Stiff 30 Very Sti	iff I	RIC#: Boring No. Date Comp Database I	oleted: 4/9	V18	

									U.S			
	BC LC	_	Bayside Sev			BORING				Sheet	2 of	2
	ation			VARWICK		NEBC D						
	C#:	00000		FAP#		_ Date Sta		4/12/1	8 Dat	-	12/18	
	dge/Ro		_	adam Amalatica	1.1 7	N Coord		0		Ft.		
	ign Co tech (-	rdon Archiba		E Coord		0	77, 0	Ft.		
1	pector		_		Boring Contractors Gordon Archibald	_ Ground				.0		
Ins	hector	14Mille	Co.: Di	yan Deery / C	Jordon Archibald	Elevation	п ра	itum _	NGVD29			
	ehole :											
			ng Meadow									
Sam				soil sampier co: mmer, 30" fail.	nsists of a 2 in. split spoon	Date		Ground Time	water Obse		S4 1 5	F15
Casi	ng: Unl	ess other	wise noted, ca		using 300 lb hammer,	04/02/18		0:00	Depth 5	Casing at	0.25	
		ng 24 in	•	****							0.20	***
	ng Size:	3 in	SAMPLER	HS Auger	T							1 0
D E P T H	CB AL		Pen/ Denth	Blows per 6 in.	SOIL AND ROCK SAMPI		M	Depth		STRATUM		R E M
P	SO	Type & Number	Rcv.	per o it.	Burmister Soil Classif	ication System		of Stratum	D	ESCRIPTION		M A
H Ft	NS G/Ft.	Ī	& RQD	(Coring min/ft) [Downpress psi]			1	Change				A R K S
	6	SS-1	24/14 0.0	9-6-5-7	Dry, medium dense, brown	FINE SAND, trac	ce	0.3/	ASPHALT/	ROADWAY		S
8	7		2.0		coarse sand, trace silt, trace	wood.	,		(10111111111	NOTED WILL		
	12											
	49											
5_	91	SS-2	24/15 5.0	51-57-42-45	11. I DIN ID	04310	i					1
1-	25 60	33-2		31-3/-42-43	Wet, very dense, gray FINE sand, trace silt.	SAND, trace coa	urse					
2.5	62		7.0				- 1					1 1
-	38						-	8.0	WEATHERI	ED SHALE		1
10	50		10.0		_							
		SS-3	24/12	18-62-97-100	Wet, very dense, gray lightly SHALE.	WEATHERED						
			12.0		STALE.			12.0	D			1 1
-									Bottom of Ex	cploration = 12'		
15												
13								,	a			
]												
-						~		1				
20_							- 1					i
1								17				
Ī												
]												
25_			1									
-												
1			İ				1					
1												1
30												
0 to 12 Soil Driven Casing												
REM	IARKS:						-					
A-ALIV	i Callatana											
		140# Wt x 30" fall on 2" OD SS Sampler										
Propo	ortions U	Jsed	Sampler Ty	pe Cohesi	onless Density Cohes		icy					
	0 to 10		SS - Split Sp	oon 0-	10 Loose 0-4	Soft S	- 1	RIC#:	00000			
little some		35%	UT - Shelby T UP - Fixed Pos	sition 30 -				Boring No	.: C-27			
and	35 to 5	50%	C - Rock Co			30 Very Sti		Date Com Database l		2/18		_
					30 7	Direct	1 '		1100 0			

	DOI C		. '1 6			DODDIO			~-	
1		_	Bayside Sew			BORING	#: C-28		Sheet _	2 of 2
		(C/T):		VARWICK		-			17	0/10
1		ad #:		FAP#:	-	Date Star N Coord.		Dat	-	9/18
	_	nsult (don Archiba	ld Inc	E Coord.			— Ft. Ft.	
	_	onsult			Boring Contractors		urface Elev	, IF+).0	
1		Name/			Gordon Archibald	Elevation		NGVD29	1.0	
Ynsi	ector	1\ame	Co.: Di	yan Deery / C	Joidon Archibaid	Elevation	Datum 1	NG V DZ9		
		Locatio								
			ng Meadow				0	4 01		
Samp	oler: Ut dr	Hess Oth iven usir	erwise noted, : .o a 140 lb hai	son sampler con nmer, 30" fall.	nsists of a 2 in. split spoon	Date	Time	water Obse Depth		Stab. Time
Casin	ig: Unl	ess other	wise noted, ca		ising 300 lb hammer,	04/09/18	00:00	10	Casing at	0.25 hr
۵.		ng 24 in.		***						
	ng Size:		SAMPLER	HS Auger	<u> </u>					D
D E P T	CB AL		Pen/ Depth	Blows per 6 in.	SOIL AND ROCK SAMPL			_	STRATUM	R E M
P T	SO IW	Type & Number	Rev.		Burmister Soil Classifi	cation System	of Stratum		DESCRIPTION	A
Ĥ Ft.	NS G/Ft.		& RQD	(Coring min/ft) [Downpress psi]			Change			A R K S
1.	On t	SS-1	24/15 0.0	12-16-22-14	Dry, dense, dark brown FINI	E SAND, some	0.3/	ASPHALT/	ROADWAY	S
-			2.0		coarse sand and gravel, trace	silt.		(. 10. 12.17	KO/LD (I/L)	
			2.0							
5_			5.0			mp (m a	5.0			
- 4		SS-2	24/14	24-41-52-54	Dry, very dense, brown/gray some coarse sand and gravel,	FINE SAND, trace rock		trace bedroc	k fragments.	
			7.0		fragments.	, ====				
-										
10			10.0							
10_		SS-3	24/18	46-72-60-41	Wet, very dense, gray FINE	SNAD, trace coars	se			
1			12.0		sand and gravel, trace weather	red rock,	12.0			
_								Bottom of E	xploration = 12'	
14										_
15_										
-						•				
1										
]			1							1
20_										
-										
1-										
1-										
25									•	
-										
-										
30										
	n 12 Soi	l Augeri	no							
			26							
REN	IARKS:	1								
							-,			
Prop	ortions l	ised	Sampler Ty	vne Cohesi	140# Wt x 30" fall on 2" Ol onless Density Cohes		v			
_	0 to 1		SS - Split Sp		•		RIC#:	nnnnn		
little	10 to	20%	UT - Shelby	Tube 10 -	30 Medium Dense 4 - 8	Firm	Boring No	00000 .: C-28		
some and	20 to 35 to		UP - Fixed Po C - Rock C				Date Com	pleted: 4/	9/18	
					30 +		Database 1	ID No.:		

	BC LC		Bayside Sew		1-1-	BORING	G#: C-2	29	Sheet	2 of	2
		(C/T):		VARWICK			atabase II				
	C#:	00000		FAP#:		_ Date Sta	-)/18Dat		/10/18	
		oad # :	Bayside	f. A .1.41	ET. T	_ N Coord			Ft.		
	_	onsult (rdon Archiba		_ E Coord			Ft.		
		Consult			Boring Contractors		Surface El		.0		
ıns	pector	Name/	Co.: Da	IVId Nacci / C	Gordon Archibald	Lievatio	n Datum	NGVD29			
		Location: Lor	n ngmeadow	Avenue							
Sam					ısists of a 2 in. split spoon			dwater Obse	rvations		
Casi				mmer, 30" fail. Ising is driven I	sing 300 lb hammer,	Date 04/10/18	7ime 00:00	Depth 5	Casing at	Stab. 0.25	Time
	falli	ing 24 in.	,,			0-7/10/16	00.00	3		0.23	1111
Casi	ng Size:			HS Auger		1					
D E P T H Ft	CB AL SO IW NS G/Ft.	Type & Number	SAMPLER Pen/ Depth Rcy. Core Rcy. & RQD	Blows per 6 in. (Coring min/ft) [Downpress psi]	SOIL AND ROCK SAMP Burmister Soil Classif		Depth of Stratum Change	n D	STRATUM ESCRIPTION		R E M A R K S
14.	On L							3 ASPHALT/I	ROADWAY		S
									own FINE SAN	D, trace	
5_							5.				
								Mosit, dark t SAND and g	row/gray COA ravel.	RSE	
10_							10.	Wet, gray FI	NE SAND, som	e coarse	4
							12.		vel, trace silt. uploration = 12		
15									•		1
-											
20_											
-											
25											
25_											
-											
30											
REN	IARKS:										-
									4		
					140# Wt x 30" fall on 2" O		1				
_	ortions U		Sampler Ty	-	onless Density Cohes		*				
little	10 to 2	20%	SS - Split Sp UT - Shelby T	Γube 10 -	30 Medium Dense 4 - 4	8 Firm	RIC#:	00000			
some and	20 to 3	35% 1	JP - Fixed Pos C - Rock Co	sition 30 -	50 Dense 8 - 1	5 Stiff	Boring ! Bate Co		0/18		_
and	JJ 10 :	50 70	C - RUCK CO	20.	7 very Dense 15	30 Very Stil Hard		e ID No. :	v. 10		

Loca RIC Brid Desi Geo Insp Bore Desc Samp	#: lge/Ro gn Co tech Co ector chole l criptio dr g: Unl	C/T): 00000 ad #: nsult Consult Name/ Location: Lor aless other iven usin	Bayside Co.: Gor Co.: No Co.: Br on ngmeadow A crwise noted, ca g a 140 lb har wise noted, ca	ARWICK FAP # don Archiba ew England yan Deely / Avenue soil sampler commer, 30" fall	ald, Inc. Boring Contractors Gordon Archibald maists of a 2 in. split spoon	Date Star N Coord. E Coord.	atabase ID a rt: 4/12/1 : 0 : 0 Surface Elevan Datum	#: 8 Dat	e End :4/ Ft. Ft.	2 of 2	
D E P T H Ft. 5 _ 10 _ 20 _ 25 _ 30 _ 0	CB AL SO IW NS G/Ft. 12 25 100	Type & Number SS-1	& RQD 24/12 0.0 2.0	Blows per 6 in. (Coring min/ft) [Downpress psi 13-18-27-37	SOIL AND ROCK SAMI Burmister Soil Classi Dry, dense, dark brown FI coarse sand and gravel, tra	ification System NE SAND, trace	Depth of Stratum Change 0.3 2.0	ASPHALT	STRATUM DESCRIPTION /ROADWAY usal at 2'. Bottor = 2'	F k	REMARKS
Prop trac	oortions e 0 to e 10 to e 20 to 35 to	Used 10%	Sampler T SS - Split S UT - Shelby UP - Fixed F C - Rock 6	France of Tube 10 Tube 10 September 10 Septe	- 10 Loose (1) - 30 Medium Dense 4 0 - 50 Dense 8 50 + Very Dense 15	OD SS Sampler hesive Consiste 1 - 4 Soft 1 - 8 Firm - 15 Stiff 5 - 30 Very S 30 + Hard	RIC #: Boring Date Co	No.: C-30	4/12/18		

	BC LC ation (G <u>E</u> (C/T) :	Bayside Sew Kent / V	ver System		BORING NEBC Da	S#: C-31		Sheet	t <u>2</u> of <u>2</u>			
		00000		FAP#		Date Star			e End :	4/10/18			
		ad #:				N Coord.			Ft.				
				don Archiba	ld, Inc.	E Coord.	.: 0		Ft.				
	_	onsult			Boring Contractors	Ground S	Surface Ele	v., Ft.: 0.	.0				
1		Name/			Gordon Archibald	Elevation		NGVD29					
Bor	ehole l	Locatio	on						"-				
			ngmeadow					. 01					
Samj	oler: Ur	less othe	erwise noted, :	soil sampler co mmer, 30" fall.	nsists of a 2 in. split spoon	Date	Time	water Obse Depth		t Stab. Tim			
Casin	ng: Unle	ess other ng 24 in.	wise noted, ca	ising is driven	using 300 lb hammer,	04/10/18	00:00	10	Casing a	0.25 hr			
Casin	ng Size:	. N====		HS Auger									
D E P T H FL	CB AL SO IW NS G/Ft	Type & Number	SAMPLER Pen/ Depth Rcy. Core Rcy. & RQD	Blows per 6 in. (Coring min/ft) [Downpress psi]	SOIL AND ROCK SAME Burmister Soil Classi		Depth of Stratum Change		STRATUM ESCRIPTION	N A R K S			
	un.		-				0.3/	ASPHALT/I	ROADWAY	S			
14							\	Dry, brown	FINE SAND, trace gravel,				
5_							5.0						
								Moist, brown	ygray FINE S	SAND,			
24								30/110 00/1130	omia mia Bra				
32										1			
10										1			
10-										1			
-							12.0						
_								Bottom of Ex	cploration = 1	2' 1			
15_										1			
-							1						
-													
20_													
2-										1			
-													
-													
25_													
_													
-													
i.e													
30													
50													
REN	ARKS	RKS: 1. Solid stem auger probe. No samples taken.											
P			S- : -		140# Wt x 30" fall on 2" (
	ortions i		Sampler T			esive Consisten - 4 Soft	•	22225					
little	10 to	20%	UT - Shelby	Tube 10	- 30 Medium Dense 4	-8 Firm	RIC#: Boring N	00000 o.: C-31					
some	20 to 35 to		UP - Fixed Po C - Rock C	osition 30 ·		15 Stiff -30 Very Stiff	0.40		10/18				
ailu	<i>33</i> 10	JU 70	C - MUCK C	.0.0	30 30	+ Hard	Database						

Casing: Unless otherwise noted, casing is of riven using 300 lb hammer, 04/10/18 00:00 5 0.25 hr first field start noted, casing is of riven using 300 lb hammer, 04/10/18 00:00 5 0.25 hr display 4 in. Casing Size: HS August 18 A	1	BC LC	_	Bayside Sew			BORING			Sheet	2 of 2
Bridge/Road #: Bayside N. Coord.: 0 Ft. Design Consult Co.: Gordon Archibald, Inc. Ecotech Consult Co.: New England Boring Contractors Inspector Name/Co.: David Nacci (Gordon Archibald Borehole Location Description: Longmeatow A venue Sampler: Unless otherwise noted, call ampler consists of a 2 in. split spoon Casing: Unless otherwise noted, call ampler consists of a 2 in. split spoon Casing: Unless otherwise noted, casing is driven unless 300 ib hammer. His Auger His Auger His Auger His Auger David Ric David Ric Depth Casing at 1 Stab. Time Od/10/18 00:00 5	T.										
Design Consult Co.: Gordon Archibald Inc. R. Coord.: O Ft.					FAP #	:		_	18 Date	_	/10/18
Cectech Consult Co. New England Boring Contractors David Nance! Gordon Archibald David		_									
Remarks: 1. Solid stem suger probe. No samples tuken. Sampler Type trace 0 to 10 19% St. Sampler Type trace 0 to 10		~						-			
Borehole Location				-						.0	
Description: Longmeadow Avenue Sampler Units of 2 in split speen Date Time Depth Casing at Stab. Time	Ins	pector	Name	Co.: Da	vid Nacci /	Gordon Archibald	Elevation	Datum _	NGVD29		
Sampler Unless otherwise noted, soil sampler consists of a 2 in, split spoon of riven using a 40 ib. hammer, 30° fall Date Time Depth Casing at Stab. Time Od/10/18 Od/00 S											
driven using a 140 lb hammer, 30" fall. Casing: Unless otherwise neted, easing is driven using 300 lb hammer, falling 24 in. Casing Size: HS Auger D Cab ALD P SO Where Per Depth P Rev Depth P Re						angista of a 2 in anlit angon		Cround	luvatan Ohaa	westions	
Casing Size: HS Auger SAMPLER (Sam						Date				Stah, Time
Casing Sine: HS Augr Type & Core Ry. A ROD A ROD Core Ry. A ROD Core Ry. A ROD A ROD Core Ry. A ROD Core Ry. A ROD A ROD Core Ry. A ROD A ROD Core Ry. A ROD Core Ry. A ROD A ROD Core Ry. A ROD Core Ry. A ROD A ROD Core Ry. A ROD A ROD Core Ry. A ROD A ROD Core Ry. A ROD A ROD Core Ry. A ROD A ROD A ROD A ROD A ROD A ROD A ROD A ROD A ROD A ROD A ROD A ROD A ROD A ROD A ROD A ROD A ROD A ROD A ROD A ROD A ROD A ROD A ROD A ROD A ROD A ROD A ROD A ROD A ROD A ROD A ROD A ROD A ROD A ROD A ROD A ROD A ROD A ROD A ROD A ROD A ROD A ROD	Casi	ng: Unl	ess other	wise noted, ca							0.25 hr
Depth of STRATUM DESCRIPTION Burmister Soil Classification System Signature Core Rep. 20 ARQD ARQD Soll AND ROCK SAMPLE DESCRIPTION Burmister Soil Classification System Signature Change ARQD SITRATUM DESCRIPTION Signature Change ARQD ASPHALT/ROADWAY Dy, brown FINE SAND, some coarse sand, trace gravel, trace silt. 10 10 Soll AND ROCK SAMPLE DESCRIPTION Burmister Soil Classification System Signature Change ASPHALT/ROADWAY Dy, brown FINE SAND, some coarse sand and gravel, trace silt. 10 Wet, gray FINE SAND, some coarse sand and gravel, trace silt. 10 Bottom of Exploration = 12 11 22 25 Sompler Type Some 20 to 53% Sompler Type Some 20 to 53% Fire Fixed Position Some 20 to 53% Depth of Stratum Change ASPHALT/ROADWAY Dy, brown FINE SAND, some coarse sand and gravel, trace silt. 100 Bottom of Exploration = 12 1 ABW Wr. 30" fall on 2" OD SS Sampler Cohesiones Density Cohesiones Dens	۵.		ng 24 in.	•	77C A					İ	
E AL Type & Solid Stem auger probe. No samples taken. Solid Stem		_		CANDI ED	H5 Auger						l D
10	D E			1						STRATUM	Ë
10	P	SO		Rcy.	por o an	- I	fication System		D.	ESCRIPTION	M A
10	H	NS	1 VALUE		(Coring min/fi) iii			1		R
Dy, brown FINE SAND, some coarse sand, trace gravel. 10	Pt.	G/Ft.			La composition product	1			ACDITATE	O A DWA W	S
10	:=							0.3)me
Moist, brown FINE SAND, some coarse sand and gravel, trace silt.	2.5								coarse sand,	trace gravel.	ALIC .
Moist, brown FINE SAND, some coarse sand and gravel, trace silt.	-										
Moist, brown FINE SAND, some coarse sand and gravel, trace silt.	5							5.0			
10) -							3.0	Moist, brown	FINE SAND,	some
12.0 Sampler Type SS - Split Spoon Title 10 20% SS - Split Spoon Title 10 20% SS - Split Spoon Title 10 20% SS - Split Spoon Title 10 20% SS - Split Spoon Title 10 20% SS - Split Spoon Title 10 20% SS - Split Spoon Title 10 10 20% SS - Split Spoon Title 10 20% SS - Split Spoon Title 10 10 20% SS - Split Spoon Title 10 10 20% SS - Split Spoon Title 10 10 20% SS - Split Spoon Title 10 10 20% SS - Split Spoon Title 10 10 20% SS - Split Spoon Title 10 10 20% SS - Split Spoon Title 10 10 20% SS - Split Spoon Title 10 10 20% SS - Split Spoon Title 10 10 20% SS - Split Spoon Title 10 10 20% SS - Split Spoon Title 10 10 20% SS - Split Spoon Title 10 10 20% SS - Split Spoon Title 10 10 20% SS - Split Spoon Title 10 20% SS - Split Spoon Title 10 20% SS - Split Spoon Title 10 20% SS - Split Spoon Title 10 20% SS - Split Spoon Title 10 20% SS - Split Spoon Title 10 20%									coarse sand a	und gravel, trace	: silt.
12.0 Sampler Type SS - Split Spoon Title 10 20% SS - Split Spoon Title 10 20% SS - Split Spoon Title 10 20% SS - Split Spoon Title 10 20% SS - Split Spoon Title 10 20% SS - Split Spoon Title 10 20% SS - Split Spoon Title 10 10 20% SS - Split Spoon Title 10 20% SS - Split Spoon Title 10 10 20% SS - Split Spoon Title 10 10 20% SS - Split Spoon Title 10 10 20% SS - Split Spoon Title 10 10 20% SS - Split Spoon Title 10 10 20% SS - Split Spoon Title 10 10 20% SS - Split Spoon Title 10 10 20% SS - Split Spoon Title 10 10 20% SS - Split Spoon Title 10 10 20% SS - Split Spoon Title 10 10 20% SS - Split Spoon Title 10 10 20% SS - Split Spoon Title 10 10 20% SS - Split Spoon Title 10 10 20% SS - Split Spoon Title 10 20% SS - Split Spoon Title 10 20% SS - Split Spoon Title 10 20% SS - Split Spoon Title 10 20% SS - Split Spoon Title 10 20% SS - Split Spoon Title 10 20% Title 10 20% Title 10 20% Title 10 20% Title 10 20% Title 10 20% Title 10 20% Title 10 20% Title 10 20% Title 10 20% Title 10 20% Title 10 20% Title 10 20% Title 10 20% Title 10 20% Title 10 20% Title 10 20% Title 10 20% Title 10 20% Title 10 20% Title 10 20% Title 10 20% Title 10 20% Title 10 20% Title 10 20% Title 10 20% Title 10 20% Title 10 20% Title 10 20% Title 10 20% Title 10 20% Title 10 20% Title 10 20% Title 10 20% Title 10 20% Title 10 20% Title 10 20% Title 10 20% Title 10 20% Title 10 20% Title 10 20% Title 10 20% Title 10 20% Title 10 20% Title 10 20% Title 10 20% Title 10 20% Title 10 20% Title 10 20% Title 10 20% Title 10 20% Title 10 20% Title 10 20% Title 10 20% Title 10 20% Title 10 20% Title 10 20% Title 10 20% Title 10 20% Title 10 20% Title 10 20% Title 10 20% Title 10 20% Title 10 20% Title 10 20% Title 10 20% Title 10 20% Title 10 20% Title 10 20% Title 10 20% Title 10 20% Title 10 20%											1
12.0 Sampler Type SS - Split Spoon Title 10 20% SS - Split Spoon Title 10 20% SS - Split Spoon Title 10 20% SS - Split Spoon Title 10 20% SS - Split Spoon Title 10 20% SS - Split Spoon Title 10 20% SS - Split Spoon Title 10 10 20% SS - Split Spoon Title 10 20% SS - Split Spoon Title 10 10 20% SS - Split Spoon Title 10 10 20% SS - Split Spoon Title 10 10 20% SS - Split Spoon Title 10 10 20% SS - Split Spoon Title 10 10 20% SS - Split Spoon Title 10 10 20% SS - Split Spoon Title 10 10 20% SS - Split Spoon Title 10 10 20% SS - Split Spoon Title 10 10 20% SS - Split Spoon Title 10 10 20% SS - Split Spoon Title 10 10 20% SS - Split Spoon Title 10 10 20% SS - Split Spoon Title 10 10 20% SS - Split Spoon Title 10 20% SS - Split Spoon Title 10 20% SS - Split Spoon Title 10 20% SS - Split Spoon Title 10 20% SS - Split Spoon Title 10 20% SS - Split Spoon Title 10 20% Title 10 20% Title 10 20% Title 10 20% Title 10 20% Title 10 20% Title 10 20% Title 10 20% Title 10 20% Title 10 20% Title 10 20% Title 10 20% Title 10 20% Title 10 20% Title 10 20% Title 10 20% Title 10 20% Title 10 20% Title 10 20% Title 10 20% Title 10 20% Title 10 20% Title 10 20% Title 10 20% Title 10 20% Title 10 20% Title 10 20% Title 10 20% Title 10 20% Title 10 20% Title 10 20% Title 10 20% Title 10 20% Title 10 20% Title 10 20% Title 10 20% Title 10 20% Title 10 20% Title 10 20% Title 10 20% Title 10 20% Title 10 20% Title 10 20% Title 10 20% Title 10 20% Title 10 20% Title 10 20% Title 10 20% Title 10 20% Title 10 20% Title 10 20% Title 10 20% Title 10 20% Title 10 20% Title 10 20% Title 10 20% Title 10 20% Title 10 20% Title 10 20% Title 10 20% Title 10 20% Title 10 20% Title 10 20% Title 10 20% Title 10 20% Title 10 20% Title 10 20% Title 10 20% Title 10 20% Title 10 20% Title 10 20% Title 10 20%	>5										1
12.0	10							10.0			
15									Wet, gray FI	NE SAND, little	e coarse
20 25 25 26 27 26 27 27 28 28 28 29 29 29 29 29 29 29 29 29 29 29 29 29								12,0	_		
REMARKS: 1. Solid stem auger probe. No samples taken. Proportions Used trace 0 to 10% little 10 to 20% some 20 to 35% of 20 to 50% of 30 to 50% of 30 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of	-								Bottom of Ex	ploration = 12	1
REMARKS: 1. Solid stem auger probe. No samples taken. Proportions Used trace 0 to 10% little 10 to 20% some 20 to 35% of 20 to 50% of 30 to 50% of 30 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of 20 to 50% of											
REMARKS: 1. Solid stem auger probe. No samples taken. Proportions Used trace 0 to 10% little 10 to 20% UT - Shelby Tube 5 some 20 to 35% UP - Fixed Position and 35 to 50% C - Rock Core Solve	15_										
REMARKS: 1. Solid stem auger probe. No samples taken. Proportions Used trace 0 to 10% little 10 to 20% UT - Shelby Tube 5 some 20 to 35% UP - Fixed Position and 35 to 50% C - Rock Core Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve	3										
REMARKS: 1. Solid stem auger probe. No samples taken. Proportions Used trace 0 to 10% little 10 to 20% UT - Shelby Tube 5 some 20 to 35% UP - Fixed Position and 35 to 50% C - Rock Core Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve	1										
REMARKS: 1. Solid stem auger probe. No samples taken. Proportions Used trace 0 to 10% little 10 to 20% UT - Shelby Tube 5 some 20 to 35% UP - Fixed Position and 35 to 50% C - Rock Core Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve											
REMARKS: 1. Solid stem auger probe. No samples taken. Proportions Used trace 0 to 10% little 10 to 20% UT - Shelby Tube 5 some 20 to 35% UP - Fixed Position and 35 to 50% C - Rock Core Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve Solve	20										
REMARKS: 1. Solid stem auger probe. No samples taken. Proportions Used trace 0 to 10% SS - Split Spoon UT - Shelby Tube Some 20 to 35% and 35 to 50% The proportions Used trace 20 to 35% and 35 to 50% REMARKS: 1. Solid stem auger probe. No samples taken. 140# Wt x 30" fall on 2" OD SS Sampler Cohesionless Density Cohesive Consistency 0 - 10 Loose 0 - 4 Soft 10 - 30 Medium Dense 4 - 8 Firm 30 - 50 Dense 8 - 15 Stiff CF - Rock Core 50 + Very Dense 15 - 30 Very Stiff Date Completed: 4/10/18											
REMARKS: 1. Solid stem auger probe. No samples taken. Proportions Used trace 0 to 10% SS - Split Spoon UT - Shelby Tube Some 20 to 35% and 35 to 50% The proportions Used trace 20 to 35% and 35 to 50% REMARKS: 1. Solid stem auger probe. No samples taken. 140# Wt x 30" fall on 2" OD SS Sampler Cohesionless Density Cohesive Consistency 0 - 10 Loose 0 - 4 Soft 10 - 30 Medium Dense 4 - 8 Firm 30 - 50 Dense 8 - 15 Stiff CF - Rock Core 50 + Very Dense 15 - 30 Very Stiff Date Completed: 4/10/18											
REMARKS: 1. Solid stem auger probe. No samples taken. Proportions Used trace 0 to 10% SS - Split Spoon UT - Shelby Tube Some 20 to 35% and 35 to 50% The proportions Used trace 20 to 35% and 35 to 50% REMARKS: 1. Solid stem auger probe. No samples taken. 140# Wt x 30" fall on 2" OD SS Sampler Cohesionless Density Cohesive Consistency 0 - 10 Loose 0 - 4 Soft 10 - 30 Medium Dense 4 - 8 Firm 30 - 50 Dense 8 - 15 Stiff CF - Rock Core 50 + Very Dense 15 - 30 Very Stiff Date Completed: 4/10/18											
REMARKS: 1. Solid stem auger probe. No samples taken. Proportions Used trace 0 to 10% SS - Split Spoon UT - Shelby Tube Some 20 to 35% and 35 to 50% The proportions Used trace 0 to 10% UP - Fixed Position C - Rock Core S0 + Very Dense S15 - 30 Very Stiff Date Completed: 4/10/18								1			
REMARKS: 1. Solid stem auger probe. No samples taken. Proportions Used trace 0 to 10% SS - Split Spoon little 10 to 20% UT - Shelby Tube some 20 to 35% UP - Fixed Position and 35 to 50% C - Rock Core S0 + Very Dense Sampler Tobacca Tobac	25_										
REMARKS: 1. Solid stem auger probe. No samples taken. Proportions Used trace 0 to 10% SS - Split Spoon little 10 to 20% UT - Shelby Tube some 20 to 35% UP - Fixed Position and 35 to 50% C - Rock Core S0 + Very Dense Sampler Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobac	_										
REMARKS: 1. Solid stem auger probe. No samples taken. Proportions Used trace 0 to 10% SS - Split Spoon little 10 to 20% UT - Shelby Tube some 20 to 35% UP - Fixed Position and 35 to 50% C - Rock Core S0 + Very Dense Sampler Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobacca Tobac	-										
REMARKS: 1. Solid stem auger probe. No samples taken. Proportions Used trace 0 to 10% SS - Split Spoon little 10 to 20% UT - Shelby Tube some 20 to 35% UP - Fixed Position and 35 to 50% C - Rock Core Soft Very Dense Soft Very Stiff Some 20 to 35% C - Rock Core Soft Very Dense Soft Very Stiff Some 20 to 35% C - Rock Core Soft Very Dense Soft Very Stiff Some 20 to 35% C - Rock Core Soft Very Dense Soft Very Stiff Date Completed : 4/10/18	-										
REMARKS: 1. Solid stem auger probe. No samples taken. Proportions Used trace 0 to 10% SS - Split Spoon little 10 to 20% UT - Shelby Tube some 20 to 35% UP - Fixed Position and 35 to 50% C - Rock Core Soft Very Dense Soft Very Stiff Some 20 to 35% C - Rock Core Soft Very Dense Soft Very Stiff Some 20 to 35% C - Rock Core Soft Very Dense Soft Very Stiff Some 20 to 35% C - Rock Core Soft Very Dense Soft Very Stiff Date Completed : 4/10/18	20										
The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late	30										
The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late The late											
Proportions Used trace 0 to 10% SS - Split Spoon UT - Shelby Tube Some 20 to 35% UP - Fixed Position and 35 to 50% C - Rock Core Cohesionless Density Cohesive Consistency 0 - 10 Loose 0 - 4 Soft Firm 30 - 50 Dense 8 - 15 Stiff Stiff Dense Stiff	REN	IARKS:	1. Soli	d stem auger p	robe. No sam	ples taken.					
Proportions Used trace 0 to 10% SS - Split Spoon UT - Shelby Tube Some 20 to 35% UP - Fixed Position and 35 to 50% C - Rock Core Cohesionless Density Cohesive Consistency 0 - 10 Loose 0 - 4 Soft Firm 30 - 50 Dense 8 - 15 Stiff Stiff Dense Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff Stiff											
Proportions Used trace 0 to 10% SS - Split Spoon UT - Shelby Tube some 20 to 35% UP - Fixed Position and 35 to 50% C - Rock Core Cohesionless Density Cohesive Consistency 0 - 10 Loose 0 - 4 Soft Firm 30 - 50 Dense 8 - 15 Stiff Stiff Date Completed : 4/10/18 4/10/18 4/10/18 4/10/18						140# Wt x 30" fall on 2" (DD SS Sampler	T			
Some 20 to 35% UP - Shelby Tube 10 - 30 Medium Dense 4 - 8 Firm Stiff Stiff Or Stiff Stiff Or Stiff Or Stiff Or Stiff Or Stiff Or Stiff Or Stiff Or Stiff Or Stiff Or Stiff Or Stiff Or Stiff Or Stiff Or Stiff Or Stiff Or Stiff Or Or Stiff Or Stiff Or Stiff Or Stiff Or Stiff Or Stiff Or Stiff Or Stiff Or Stiff Or Stiff Or Stiff Or Stiff Or Stiff Or Stiff Or Stiff Or Stiff Or Stiff Or Stiff Or Stiff Or Stiff Or Stiff Or Stiff Or Stiff Or Stiff Or Stiff Or Stiff Or Stiff Or Stiff Or Stiff Or Stiff Or Stiff Or Stiff Or Stiff Or Stiff Or Stiff Or Stiff Or Stiff Or Stiff Or Stiff Or Or Stiff Or Stiff Or Or Stiff Or Or Stiff Or Or Or Or Or Or Or	Prop	ortions (Used					су			
some 20 to 35% UP - Fixed Position and 35 to 50% C - Rock Core 10 - 30 Medium Dense 4 - 8 Firm Stiff C - Rock Core 50 + Very Dense 15 - 30 Very Stiff Date Completed: 4/10/18				SS - Split Sp	oon 0			RIC#:	00000		
and 35 to 50% C - Rock Core 50 + Very Dense 15 - 30 Very Stiff Date Completed : 4/10/18								Boring N	lo.: C-32		
						50 + Very Dense 15 -	30 Very Stif			0/18	

				_	~		nonvil	~	0.00			
					er System		BORING			1	_ Sheet _	2 of 2
		(C/T):		nt / W	ARWICK		_ NEBC D Date Sta		base ID #	-	TO . 4 . 4/	16/10
		00000 ad #:		side	FAP#		N Coord		4/16/1 0	o Date	e End: 4/ Ft.	16/18
	-	nsult (don Archiba	ld Inc	E Coord		0		— Ft.	
	-	Consult				Boring Contractors			face Elev	., Ft.: 0.		
		Name/				Gordon Archibald	Elevation			NGVD29		
					, tur Beery 7	Jordon I II viii out				10122		
		Locatio			A							
					Avenue	nsists of a 2 in. split spoon		-	Grounds	water Obse	rvotions	
	dr	iven usin	g a 140	lb har	nmer, 30" fall.	-	Date		Time	Depth		Stab. Tim
Casi				ted, ca	sing is driven	using 300 lb hammer,	04/10/18	(00:00	10		0.25 hr
Cosi	tallı 1g Size:	ng 24 in.			HS Auger							
	CB		SAME	LER		T.					l	R
D E P T H	AL SO	Time &	Pen/	Depth	Blows per 6 in.	SOIL AND ROCK SAMPL Burmister Soil Classifi		N	Depth of		STRATUM ESCRIPTION	l M
Ť	IW	Type & Number		cy.	(Coring min/ft)	Danista don Oladali.			Stratum	_	booldi ilon	A R
Ft.	NS G/Ft.		& RQD	'	[Downpress psi]				Change			A R K S
		SS-1	24/14	0.0	24-20-23-29	Dry, dense, brown FINE SA	ND, trace coarse	:	0.3/	ASPHALT/I	ROADWAY	
				2.0		sand, and gravel, trace silt.	DD 10 0 11 10					
		SS-2	24/13		18-48-58-60	Dry, very dense, brown/gray some coarse sand, trace grav						
		SS-3	24/18	4.0	18-22-21-27	fragments. Moist, dense, gray/brown Fli		.				
5_		000	= 0.10	6.0	10 22 21 27	coarse sand, trace silt.	INE SAIND, MACC	'				
-		SS-4	10/8	6.8	18-100/4"	Moist, very dense, gray FINI coarse sand and gravel, trace	E SAND, trace silt.					
10		SS-5	6/6	8.5	100	Moist, very dense, gray FlNl coarse sand, trace gravel, trace	E SAND, some ce silt.					
10_		SS-6	24/16	12.0	33-27-29-31	Wet, very dense, gray FINE sand, trace gravel, trace silt.	SAND, little coa	irse	12.0			
				12.0					12.0	Bottom of Ex	cploratrion = 12	
-												
15_												1
-												
-												
20_												
-												
3												
3												
25												
3												
30												
	to 12 So	il Augeri	ng									
			_					_				
RE	MARKS	:										
_						1404334 2011 6.11 611 61	D 00 0					
Pron	ortions	Used	Sami	oler T	ype Cohes	140# Wt x 30" fall on 2" Officionless Density Cohes		ncy				
trac	e 0 to 1	0%	SS-S	plit Sr	oon 0-	10 Loose 0-4	4 Soft		RIC#:	00000		
little	: 10 to e 20 to		UT - S	helby ked Pr	Tube 10	- 30 Medium Dense 4 - 3 - 50 Dense 8 - 1			Boring No	o.: C-33		
and	35 to			ock C) + Very Dense 15 - 30 -	30 Very St	iff	Date Com Database		16/18	

	-											
NEE	C LO	G B	ayside Sev	ver Syste	em		BORING	#:	C-35		Sheet	2 of 2
		C/T):		WARWI			NEBC Da	ıtab	ase ID#	:		
RIC	,	00000		FA	P#:		Date Star	t:	4/17/18	BDat	e End : 4/	17/18
Brid	ge/Ro	ad # :	Bayside	:			N Coord.		0		Ft.	
Desi	gn Co	nsult C		rdon Ar			E Coord.		0		Ft.	
		onsult				Boring Contractors	Ground S				.0	
Insp	ector	Name/	Co.: B	ryan Dee	ly/G	ordon Archibald	Elevation	Da	tum N	IGVD29		
Desc	riptio	Location: Lor	ngmeadow	Avenue						. 01		
Samp	ler: Un	less othe	erwise noted g a 140 lb h	, soil samp	ler con	sists of a 2 in. split spoon	Date		Groundy Time	vater Obse Depth		Stab. Tim
Casin	g: Unle	ess other	wise noted,	casing is d	riven u	sing 300 lb hammer,	04/17/18		0:00	10	casing at	0.25 hr
Casin	falli 1g Size:	ng 24 in. 3 in		HS Au	ger							
	СВ		SAMPLER	Blox		SOIL AND ROCK SAMP	LE DESCRIPTIO	N	Depth		STRATUM	R
E P	A L S O	Type &	Pen/ Dept Rcy.	h per 6		Burmister Soil Classif		•	of	Ι	DESCRIPTION	M. A
D E P T H	I W N S	Number	Core Rcy. & RQD	(Coring)					Stratum Change			A R K
Ft.	G/Ft.	00.1	24/14 0			Dry, medium dense, brown	FINE SAND trac	re l	0.3/	ASPHALT	ROADWAY	S
-	8 10	SS-1	24/14 0.		×-11	coarse sand and gravel, trac		~	U.3/	THE REAL PROPERTY.		
	18		2.									
	18											
5_	45	SS-2	5. 24/16	30-35-3	27_2/	Dry, very dense, brown-gra	v COARSE SANI	D	5.0	Coarse sand	1.	
	52 45	33-2			3 /-34	some fine sand, trace grave	i, trace silt.	,		Compt sum	••	
-	55		7.	U								
	69											
10_	59		10.		20.10	D d l	IE CANID come					
		SS-3	24/15	18-31-	30-19	Dry, very dense, brown FIN coarse sand, trace gravel, tr	ace silt.		12.0			
			12.	0					12.0	Bottom fo	Exploration = 12	•
15												
-												
-												
20												
-												
-												
25												
-												
-												
30	-											
	to <u>12 So</u>	oil Driver	n Casing			11						
RE	MARK	S:										
						140# Wt x 30" fall on 2"	OD SS Sampler					
Pro	portions	Used	Samplei	Туре	Cohe		nesive Consiste					
trac	e 0 to		SS - Split UT - Shell		_		-4 Soft -8 Firm		RIC#:	00000		
	e 20 to	35%	UP - Fixed	Position	30	- 50 Dense 8	 15 Stiff 	f	Boring N	No.: <u>C-35</u> mpleted:	4/17/18	
and	35 to	50%	C - Rocl	Core	5		- 30 Very S 0 + Hard			e ID No. :		

Loca RIC Brid Desig Geot Inspe Bore Desc Samp	C LO tion (#: ge/Ro gn Co ecch C ector chole J criptio ler: Un dri g: Unle	C/T): 00000 ad #: nsult Consult Name/ Location: Sho	Bayside Co.: Gor Co.: No Co.: Br on ore Avenue erwise noted, g a 140 lb har wise noted, ca	ARWICK FAP # don Archib ew England yan Deely / soil sampler c mmer, 30" fal	ald, Inc. Boring Contractors Gordon Archibald onsists of a 2 in. split spoon	Date Start N Coord.: E Coord.:	tabase ID # : 4/13/13 : 0 0 urface Elev Datum N	8 Dat	e End: 4/ Ft. Ft.	2 of 2 13/18 Stab. Time 0.25 hr
D E P T H Ft.	CB AL SO 1W NS G/Ft.	Type & Number	SAMPLER Pen/ Depth Rcy. Core Rcy. & RQD	Blows	SOIL AND ROCK SAMPI Burmister Soil Classifi	LE DESCRIPTION ication System	Depth of Stratum Change	I	STRATUM DESCRIPTION	R E M A R K S
5	10 12 18 27 45 20 28 44 79	SS-1	24/18 0.0 2.0 2.0 24/15 5.0 7.0	16-26-24-19	coarse sand and gravel, trace	e silt			/ROADWAY	
10	85	SS-3	24/15 12.0	36-39-47-6	Wet, very dense, gray FINE sand and gravel, trace silt, to shale.	SAND, trace coarrace weathered	10.0 12.0	Sand and g shale.	ravel, trace weat Exploration = 12	
	to <u>12 So</u>	oil Driver	n Casing							
trac little	e 20 to	10% 0 20%	Sampler SS - Split UT - Shelb UP - Fixed l C - Rock	Spoon y Tube Position	0 - 10 Loose 0 10 - 30 Medium Dense 4 30 - 50 Dense 8 - 50 + Very Dense 15	OD SS Sampler lesive Consister - 4 Soft - 8 Firm - 15 Stiff - 30 Very Sti 0 + Hard	RIC#: Boring I Date Co	00000 No.: C-36 mpleted: te ID No.:	4/13/18	

	2010		\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \			DODDIO				
	BC LC		Bayside Sew			BORING	-		Sheet _	2 of 2
		(C/T):		VARWICK			atabase II		4. TO 3. 4.	(10/10
	C#:	00000		FAP#:		Date Star	-	/18 Da	_	10/18
	~	oad # :	Bayside	.d A l. !!. a	1.1 T	N Coord			Ft.	
	_	nsult (rdon Archiba		E Coord.		T74 /	Ft.	
		Consult	-		Boring Contractors		Surface El	_).0	
	2	Name		yan Deely / C	Gordon Archibald	Elevation	Datum	NGVD29		
Des	criptio		ore Avenue							
Sam					nsists of a 2 in. split spoon	Data		dwater Obs	ervations	To. 1 mi
Casi				mmer, 30" fall. Ising is driven t	ising 300 lb hammer,	Date 04/10/18	Time 00:00	Depth 5	Casing at	Stab. Time 0.25 hr
	falli	ng 24 in.			,	04/10/10	00.00			0.25 in
	ng Size:		DANON CO	HS Auger				4		D
D P T H	CB AL SO	Type &	SAMPLER Pen/ Depth	Blows per 6 in.	SOIL AND ROCK SAM Burmister Soil Class		N Depth		STRATUM DESCRIPTION	E
T H Ft	IW NS G/Ft	Number		(Coring min/ft) [Downpress psi]		in but by home	Stratum Change	ı)LOCIAL FIOR	R E M A R K S
11.	G/IL		ļ				0.	ASPHALT	/ROADWAY	S
:=							\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	Dry, brown	FINE SAND, to and gravel, trace	
-									J	
5_							5.		, FINE SAND, se	ome
-								caorse snad	t race gravel, tra	ce silt.
2										
10_	4						10.	Wet, gray F	INE SAND, little gravel, trace silt.	coarse
							12.	וט	Exploration = 12	1
15										
132										
-										
20_										
Ī										
25										
25_										
30										
30					414-02-04-0-0-0-0-0-0-0-0-0-0-0-0-0-0-0-0-			4		
REN	ARKS:	: 1. Soli	d stem auger p	robe. No sampl	es taken.					
_					140# Wt x 30" fall on 2"					
_	ortions		Sampler Ty			esive Consisten	*			
little	0 to 1 10 to		SS - Split Sp UT - Shelby	000n 0 - Tube 10 -		-4 Soft -8 Firm	RIC#:	00000		
some	20 to	35%	UP - Fixed Po	sition 30 -	50 Dense 8 -	15 Stiff	Boring Boring		10/18	
and	35 to	20%	C - Rock C	ore 50	+ Very Dense 15	- 30		se ID No. :	10/10	

NE	BC LC	OG E	Bayside Sev	ver System		BORING	G#: C-3	8	Sheet	2 of 2
		(C/T):	-	VARWICK		NEBC D	atabase ID			
		00000		FAP#		Date Sta	-	/18 Da t	te End: 4	/10/18
	_	oad # :	Bayside			N Coord			Ft.	
		onsult (rdon Archiba		E Coord			Ft.	
		Consult			Boring Contractors		Surface Ele	_	0.0	
Ins	ector	Name/	Co.: Br	yan Deely /	Gordon Archibald	Elevation	n Datum	NGVD29		
		Location: Oce	on ean Avenue							
	oler: Ur	iless othe	rwise noted,	soil sampler co	nsists of a 2 in. split spoon		Ground	lwater Obs	ervations	
Cario				mmer, 30" fall		Date	Time	Depth	Casing at	Stab. Time
Casii		ess omer ng 24 in.		ising is driven	using 300 lb hammer,	04/10/18	00:00	10		0.25 hr
Casia	ıg Size:			HS Auger						
D	СВ		SAMPLER	Blows	COUL AND DOOK GAA	DI EL DEGGE HAMA	N1 D 1	1		RE
D P T	AL SO	Type &	Pen/ Depth	per 6 in.	SOIL AND ROCK SAM Burmister Soil Class		ON Depth of	1	STRATUM DESCRIPTION	M
T H	I W N S	Number	Rcy. Core Rcy. & RQD	(Coring min/ft)		•	Stratum			AR
Ft.	G/Ft.		& RQD	[Downpress psi]			Change			A R K S
							0.3		ROADWAY	7
								Dry, dark be coarse sand.	rown FINESAN	D, Ittle
, ,								- Cotta SC States	tiuse sin.	
::=										
5_							5.0		NE SAND, trac	e coarse
+								sand and gra	ivel.	o coarse
-										
10_							10.0		ha_14	
-								Wet, gray F	NE SAND, son ravel, trace silt,	ie coarse
							12.0	weathered re	d shale.	92
-			2.0					Bottom of E	xploration = 12	1
15							1			1
13										1 1
=										1 1
]										
										1 1
20_										1 1
-	1									1 1
-				1	Y					1
-										1 1
25								i i		
J										
-										
20										
30								l		
REM	IARKS:	1. Solid	l stem auger p	robe. No sampl	es taken.					
					140# Wt x 30" fall on 2"	OD SS Sampler			-31	
Propo	ortions L	Jsed	Sampler Ty			esive Consisten	ey			
	0 to 10		SS - Split Sp	oon 0-		-4 Soft	RIC#:	00000		
little some	10 to 2 20 to 3		UT - Shelby 1 UP - Fixed Po			-8 Firm 15 Stiff	Boring N	lo.: C-38		
and	35 to :		C - Rock C		+ Very Dense 15	- 30 Very Sti	ff Date Con Database		10/18	
					31)+ Hard	Database	: יוואו מד:		

	• .											
RIDOT P Location	•	Bays Ken		Sewer Systen	1	BORING		: <u>C-41</u> abase ID	ш.	Sheet _	of	2_
	00000		<u> </u>	FAP #:		_ RIDOT				e End : 6/	8/18	
Bridge/Ro		Bays	side			N Coord		0	Dat	Ft.	0/10	
Design Co				don Archibal	d, Inc.	E Coord		0		Ft.		
Geotech C	Consult	Co.:	Ne	ew England F	Boring Contractors	Ground	Sur	face Elev	., Ft.: 0	.0		
Inspector	Name/	Co.:	<u>Ga</u>	ry Fortier / G	ordon Archibald	_ Elevation	n D	atum <u>l</u>	NGVD29			_
Borehole				151 11 4								
				l Riverside A	ve sists of a 2 in. split spoon	T		Crounds	water Obse	wationa		
				nmer, 30" fall.	isists of a 2 m. split spoon	Date		Time	Depth	Casing at	Stab. Ti	me
			ed, ca	sing is driven u	sing 300 lb hammer,	06/08/18		00:00	10		0.25 h	
Casing Size:	ing 24 in. 2 in			HS Auger	<u>x</u>							
D CB E AL P SO		SAMPI Pen/ I		Blows	SOIL AND ROCK SAMPI	LE DESCRIPTIO	N	Depth		STRATUM		R E
P SO T IW	Type & Number	Rcy.	-	per 6 in.	Burmister Soil Classifi	cation System		of Stratum	Ε	DESCRIPTION	i	M
H NS Ft. G/Ft.	Number	Core Rcy & RQD	/.	(Coring min/ft) [Downpress psi]				Change				A R K S
	SS-1	24/12	0.0	11-21-32-18	Dry, dense, brown FINE SA sand and gravel, trace silt.	ND, trace coarse	;	0.3/	\ASPHALT/	ROADWAY		<u></u>
	SS-2	24/15	2.0	5-6-9-10	Dry, medium dense, brown coarse sand and gravel, trace	FINE SAND, sor	ne					
5	SS-3	24/15	4.0	3-5-4-4	Moist, loose, brown COARS	SE SAND AND		4.0	COARSE S	AND		
	SS-4	24/14	6.0	5-5-8-17	GRAVEL, trace fine sand, to Moist, loose, brown COARS	SE SAND AND						
	SS-5	24/12	8.0	18-59-71-100	GRAVEL, trace fine sand, to Moist, loose, brown FINE S.		se					
10_			10.0		sand and gravel, trace silt.							
	SS-6	24/12		22-60-81-88	Wet, very dense, gray FINE sand and gravel, trace silt, trace		arse					
		1	12.0		bedrock.			12.0	Bottom of E	Exploration = 12'		
15_												
-		ļ										
-												
20												
-												
-												
25_												
-												
30 0 to 12 So	il Driven	Casing	1			V = 1 & 1 = 0 + 0 + 0 + 0 + 0 + 0 + 0 + 0 + 0 + 0						-
												\dashv
REMARKS	i											
					140# \\/ = 20!! & !! 2!! O	n cc com-1						_
Proportions	Used	Sampl	ler T	ype Cohesi	140# Wt x 30" fall on 2" O onless Density Cohe		ncy					
trace 0 to 1	0%	SS - Sp UT - Sh	lit Sp	oon 0 - Tube 10 -		4 Soft	-	RIC#:	00000			
some 20 to	35%	UP - Fixe	ed Po	sition 30 -	50 Dense 8 - 1	15 Stiff		Boring No Date Com		/8/18		_
and 35 to	50%	C - Ro	ек С	ore 50	+ Very Dense 15 - 30			Data Con Database		0/10		

	~~~	G D	638 11 G	Continu		BORING	ч 4.	C-42		Chant	2 of 2	,
	C LO	C/T):	ayside Sew	ARWICK		NEBC D			•	Sheet _	012	-
RIC		00000	Kent / W	FAP #	•	Date Sta		4/19/18	_	End: 4/	19/18	-
	1.0	ad #:	Bayside		•	N Coord		0		Ft.	.,,,,,	
	_	au # . nsult C		don Archiba	ıld Inc.	E Coord		0		Ft.		
		onsult			Boring Contractors	Ground	-		., Ft.: 0.	0		
		Name/	-		Gordon Archibald	Elevation			IGVD29			
				,								_
Boro	ehole l	Locatio	on erside Avei	1110								
Samr	ler: Ur	less othe	rwise noted.	soil sampler co	nsists of a 2 in. split spoon			Groundy	vater Obse	rvations		
_	dr	iven usin	g a 140 lb hai	mmer, 30" fall	•	Date		ime	Depth	Casing at	Stab. Ti	me
Casir		ess other ng 24 in.		ising is driven	using 300 lb hammer,	04/19/18	0	0:00	0	0	0 hr	
Casir	g Size:	ng 24 m.		HS Auger	X							
	СВ		SAMPLER	Blows		E DESCRIBITIO	)NI	Donth		STRATUM		R E
D E P T	AL SO	Type &	Pen/ Depth Rcy.	per 6 in.	SOIL AND ROCK SAMPI Burmister Soil Classifi		JIN	Depth of	D	ESCRIPTION		M
T H	I W N S	Number	Core Rcy.	(Coring min/ft)		•		Stratum Change				A R K S
Ft.	G/Ft.		& RQD	[Downpress psi						D. A. D. T. T. T. T. T. T. T. T. T. T. T. T. T.		S
		SS-0	5/0 0.0		Dry, brown FINE SAND, so gravel, trace silt.	ome coarse sand	and	0.3/	ASPAHLT/	ROADWAY		
			0.4									
-												
-			5.0									
5		SS-0	10/0 5.8		Moist, gray/brown FINE SA	ND, trace coarse	e l					
					sand and gravel, trace silt gr fragments.	ay weathered sha	ale					
10_												
=								12,0				
									Bottom of E	Exploration $= 12$	`	
15												
1												
-												
2												
20												
3=												
:=												
25												
25_												
30												
0	to <u>5</u> <u>Soi</u>	l Augerin	ig .									_
RE	MARK	S:										
Descri	20r4i	Ugod	Camples '	Type Coh	140# Wt x 30" fall on 2" desionless Density Coh	OD SS Sampler esive Consist						
1 '	portions e 0 to		Sampler ' SS - Split 5	**	•	-4 Sof		RIC#:	00000			
littl	e 10 to	20%	UT - Shelby	Tube 1	0 - 30 Medium Dense 4	- 8 Fire	n	Boring N				
som	ie 20 to 35 to	0 35% 0 50%	UP - Fixed I C - Rock		50 + Very Dense 15	- 30 Very 5	Stiff	Date Co	mpleted:	4/19/18		
	220					)+ Har		Databas	e ID No.:			_

Loca RIC Brid Desi	# : ge/Ro gn Co	<b>C/T)</b> :	Bayside	ARWICK FAP #  don Archiba		BORING NEBC D Date Sta N Coord E Coord Ground	atal rt : . :	4/17/18 0 0	B Date		2 of	2
		Name/			Gordon Archibald	Elevation			IGVD29			
		Location: Riv	on erside Aver	nue								
	ler: Ur	iless othe	erwise noted,	soil sampler co	onsists of a 2 in. split spoon	Date		Groundy Time	vater Obse Depth	crvations Casing at	Stab T	ime
Casin	g: Unl	ess other	wise noted, ca	nmer, 30" fall sing is driven	using 300 lb hammer,	04/17/18		00:00	6	casing at	0.25 h	
Casin	falli 1g Size:	<b>ng 24 in.</b> 4 in		HS Auger								
D E P T H Ft.	CB AL SO IW NS G/Ft.	Type & Number	SAMPLER Pen/ Depth Rcy. Core Rcy. & RQD	Blows per 6 in. (Coring min/ft) [Downpress psi		LE DESCRIPTION	ON	Depth of Stratum Change	Ľ	STRATUM DESCRIPTION		R E M A R K S
3	12 15 29	SS-1	24/12 0.0 2.0	9-7-4-2	Dry, medium dense, dark be some coarse sand and grave		D,	0.3/	ASPHALT	/ROADWAY		
5	47 35 37 55 69	SS-2	24/15 5.0 7.0	28-16-25-41	Moist, dense, brown/gray F coarse sand, trace gravel, tr	TINE SAND, som ace silt.	ne					
10_	58 50 45 49	SS-3	10.0 24/12 12.0	22-20-20-49	Wet, very dense, gray FINI sand and gravel, trace silt.	E SAND, trace co	oarse	12.0	Bottom of l	Exploration = 12		1
15_												
20_												
25_												
30 <u>0</u>	to <u>12</u> Se	oil Driver	n Casing									
RE	MARK	S: 1. Ins	talled monitor	ing well at 12'.								
trac littl	portions te 0 to e 10 to te 20 to	10% o 20%	Sampler 7 SS - Split S UT - Shelby UP - Fixed F C - Rock	Spoon (7) Tube 1 Position 3	0 - 10 Loose 0 0 - 30 Medium Dense 4 0 - 50 Dense 8 50 + Very Dense 15	OD SS Sampler nesive Consist - 4 Sot - 8 Fire - 15 Sti - 30 Very 0 + Hai	tency ft m ff Stiff	RIC#: Boring N Date Co		4/17/18		

Loca RIC Brid Desi Geot Insp	#: lge/Ro gn Co tech C ector	G B C/T): 00000 ad #: nsult C Consult Name/	Bayside Co.: Gord Co.: Ne	ARWICK FAP # don Archiba ew England		BORING NEBC D Date Sta N Coord E Coord Ground Elevation	atab rt: .: Surf	4/19/18 0 0 ace Elev	B Date	E End : 4/ Ft. Ft.	2 of 2 19/18
Desc	criptio	n: Riv	erside Aver	nue				0 1	4 01	42	
Samp	oler: Ur	less othe	rwise noted, s	soil sampler co nmer, 30" fall	nsists of a 2 in. split spoon	Date		Groundy Time	vater Obse Depth	Casing at	Stab. Time
Casin	ig: Unl	ess other	wise noted, ca	sing is driven	using 300 lb hammer,	04/19/18		0:00	7	0	0 hr
Casin	falli 1g Size:	ng 24 in.		HS Auger	X						
D E P T H Ft.	CB AL SO IW NS G/Ft.	Type & Number	SAMPLER Pen/ Depth Rcy. Core Rcy. & RQD	Plane	SOIL AND ROCK SAMP Burmister Soil Classin	LE DESCRIPTIO	ON	Depth of Stratum Change	D	STRATUM DESCRIPTION	R E M A A R K S
		SS-0	0.0		Dry, brown FINE SAND, strace gravel, trace silt.	some coarse sand,	1	0.3/	ASPHALT/	ROADWAY	
5_ 10_ 15_ 20_ 25_ 30		SS-0	5.0		Wet, dark brown FINE SA sand and gravel, trace silt.	ND, trace coarse		12.0	Bottom of E	Exploration = 12	
		oil Auger	mg								
RE	MARK	S:									
trac	portions ce 0 to le 10 to ne 20 t	10% o 20%	Sampler SS - Split S UT - Shelby UP - Fixed I C - Rock	Spoon 0 y Tube 1 Position 3	0 - 10 Loose 0 0 - 30 Medium Dense 4 0 - 50 Dense 8 50 + Very Dense 15	OD SS Sampler hesive Consis  1 - 4 Sol 1 - 8 Fir - 15 Sti 5 - 30 Very 30 + Har	tency ft m ff Stiff			4/19/18	

NEB	C LO	G B	ayside Sewe	er System		BORING	#:	C-45		Sheet	2 of	2
		C/T):		ARWICK		NEBC Da			:			
RIC	•	00000	Teorie / //	FAP # :		Date Star	t:	4/25/18	Dat	e <b>End</b> : 4/2	25/18	
		ad #:	Bayside			N Coord.	: (	)		Ft.		
		nsult C		don Archiba	ld. Inc.	E Coord.	: (	)		Ft.		
	_	onsult			Boring Contractors	Ground S	urfa	ce Elev	, <b>Ft.</b> : 0	.0		
		Name/	-		Gordon Archibald	Elevation	Dati	um N	IGVD29			
		Locatio										
Desc	riptio	n: Riv	erside Aver	nue	the Cold in only many		G	roundy	vater Obs	ervations		
Samp	ler: Un	iless othe	rwise noted, s a o 140 lb bar	oil sampler co nmer, 30" fall.	nsists of a 2 in. split spoon	Date		me	Depth	Casing at	Stab. 7	[ime
Casin	g: Unle	ess other ng 24 in.	wise noted, ca	sing is driven	using 300 lb hammer,	04/25/18		:00	10		0.25	hr
Casin	g Size:			HS Auger	<u>X</u>							D
D	СВ		SAMPLER	Blows	SOIL AND ROCK SAMP	LE DESCRIPTION	N	Depth		STRATUM		RE
D E P T H	AL SO IW NS	Type & Number	Pen/ Depth Rcy. Core Rcy. & RQD	per 6 in. (Coring min/ft)	Burmister Soil Classif	ication System		of Stratum Change	I	DESCRIPTION		A R K
Ft.	G/Ft.			[Downpress psi]		EDIE CAND two		0.2				S
		SS-1	24/14 0.0 2.0	8-6-10-20	Dry, medium dense, brown coarse sand and gravel, trac	e silt.		0.3/	ASPHALT	/ROADWAY		
5_		SS-2	24/18	18-24-20-20	Moist, dense, gray FINE SA	AND, some coarse						
			7.0		sand, trace gravel, trace silt,	, cobbles.						
10			10.0									
10		SS-3	24/18	25-15-12-15	Wet, medium dense, gray F coarse sand, trace silt, trace	FINE SAND, some weathered shale.	,	12.0				
-			12.0						Bottom of	Exploration = 12		
15_												
20_												
9												
25_												
30												
	to <u>12</u> S	oil Auger	ing									
RE	MARK	S:										
					140# Wt x 30" fall on 2"							
tra litt	ce 0 to le 10 t ne 20 t	10% to 20% to 35%	SS - Split UT - Shelb UP - Fixed	Spoon y Tube Position 3	0 - 10 Loose 0 0 - 30 Medium Dense 4 0 - 50 Dense 8	hesive Consiste  1 - 4 Soft  4 - 8 Firm  1 - 15 Stiff	t n f	RIC #: Boring I	00000 No.: C-4:	5 4/25/18		
and	oportions Used Sampler Type Cohesionless Density ace 0 to 10% SS - Split Spoon UT - Shelby Tube Tube UP - Fixed Position  Cohesionless Density 0 - 10 Loose 10 - 30 Medium Dense 30 - 50 Dense					5 - 30			se ID No. :			

	1	_								
NEB	C LOG	Ba	yside Sewe	r System		BORING #			Sheet _	2_of_2_
	tion (C		Kent / W.	ARWICK		NEBC Dat			e End : 4/2	25/18
RIC	#: 0	0000		FAP :	<b>#:</b>	Date Start		y Date	Ft. 4/2	.3/10
	ge/Roa		Bayside			N Coord.:	0		— Ft.	
	gn Con			lon Archi		E Coord. : Ground Su		Trt · O	.0	
	ech Co				d Boring Contractors	Elevation		IGVD29	.0	
Insp	ector N	ame/(	Co.: Bry	an Deely	/ Gordon Archibald	Elevation	Datum 1	10 ( D2 )		
Desc	hole La ription	: Rive	erside Aven	ue			Groundy	water Obs	ervations	
Samp	ler: Unle	ess other	rwise noted, s g a 140 lb han	oil sampler omer, 30'' f	consists of a 2 in. split spoon	Date	Time	Depth	Casing at	Stab. Time
Casin	g: Unles	s otherv	vise noted, ca	sing is drive	en using 300 lb hammer,	04/25/18	00:00	10	0	0 hr
Casin	falling g Size:	g 24 in.		HS Auger	X					P
	СВ		SAMPLER	Blows	SOIL AND ROCK SAMP	DESCRIPTION	Depth		STRATUM	R E M
D E P T	A I.	Туре &	Pen/ Depth	per 6 in.	Burmister Soil Classi	fication System	of	1	DESCRIPTION	A R
T	I W	Number	Rcy. Core Rcy.	(Coring min	/ft)		Stratum Change			K
H Ft.	NS G/Ft.		& RQD	[Downpress			0.2	ACDUALV	//ROADWAY	S
		SS-0	0.0		Dry, brown FINE SAND, strace gravel, trace silt.	some coarse sand,	0.3	/USLIME	INUIDINI	
۱ .			5.0							
5_		SS-0	5.0		Wet, brown-gray FINE SA sand and gravel, trace silt.	ND, trace coarse				
					sand and graver, trace sit.					
2			10.0	1						
10_	1		10.0							
							12.0	D	Touloution = 1	1
-								Bottom of	Exploration = 12	•
15_										
19	1									
20	1									
	1									
25	1									
23										
	-									
20	=									
30	0 to 10 So	sil Ange	ring							
RE	EMARKS	S:								
					140# Wt x 30" fall on 2					
	oportions		Sampler		Cohesionless Density C 0 - 10 Loose	Cohesive Consiste 0 - 4 Soft	•	: 00000		
tra	ace 0 to	10% o <b>2</b> 0%	SS - Split UT - Shell	y Tube	10 - 30 Medium Dense	4 - 8 Firm	Roring			
SO	me 20 t	o 35%	UP - Fixed C - Rock	Position		8 - 15 Stiff 15 - 30 Very S	tiff Date C	Completed:	4/25/18	
an	id 35 t	o 50%	C - Rock	Core	So i very Delise	30 + Har		ase ID No.:		

BORING CO	NTRACTOR	:			G	ordon R. Ar	rchibald,	Inc.			SHEET:	1	OF	1
-	12 BOL	1 a W	-		David	200 Mai					LOCATION:		VERSIO	
	- 000	NUG.	-	-	Paw	tucket, Rho	G LOG		)		HOLE NO.: BORING TYPE		C- 47	
LOG PREPA	ARED BY:		TOWN, S				Varwick, F	1	Island		LINE & STA.:		ASIN	in .
CONTR.	-	PBA	PROJECT PBA NO.:			OFFICE	Bayside	e Sew	/ers		OFFSET:			
(a	, fursh	en.	DA NO.,			OFFICE:		-						
GROUNDY	VATER OBS	RVATIONS			AUGER	CASING	SAMPL	.ER	CORE	T				_
AT	FT. AFTER	<u>44</u> HRS.	BAR.			141	5/	_		SURFACE				
AT	FT. AFTER	HRS.	SIZE, I.D.			HW 4"	13/	7		BORING FO	RTED-FINISHE DREMAN:		15/1	
			HAMMER HAMMER			300	14			INSPECTO	R:		Arry For	
LOCATION	OF BORING:		I DAMAICI C	TALL		74	AU	שו		SOILS ENG	iR.: 			
DEPTH	CASING	SAMPLE	BLO	OWS PER	6" ON SAMI	PI FR	T.,,,,,,					T	SAMPLE	
BELOW	BLOWS	DEPTH			M - TO		MONITO G WE				N OF SOIL & ISS OF WASH		JANIPLE	
SURFACE	PER FOOT	FROM - TO	0-6	6-12	12-18	18-24	INFO				OCK, ECT.	NO.	PEN.	REC.
1	10						_		4 00-1	25 620	2 21	+	-	+
2	15	0.3'	11	8	6	5	Dey	4		NAT ROA		51	24	12
3	40			1			-	/	Drymo	n Dense	BELLINA GENESE TR SILT	-	15.7	-
1 3	50 45	27 71					1	4	PINE SI	אמל , פניון	& CEARSO			
345474	60	5'-7'	76	32	30	37	40.51	6	SANOSO	MANGU	12 5129	52	24	18
á	71							BLAN	MOSS VO	ry Desist	62/BR			
9	88			-			1	<	PINE GON	5, TR-C	OARSE SAWY VILT	<b>,</b>		-
10	93	10,-15,	15	21	28	25	WET	8	5 GRAVE	ב שח נאצי	int	33	24	15
iz	106						wer	101			FINE SAND			
							1				of Caren			
				-			1		TO SILI	nu				
										1	_/			
										B. O. B 16				
									17	USDAL O	iw.			
					-									
								- 1						
								1						
								1						
								- 1						
-														
								- 1						
ł														
ļ														
+														
1														-
ł														
								- 1					-	
-														
1														
Votes:	The boring lo	cation was on	eviously va	cuumed by	(a concrete		Ammunada	1	41 - 8 - 11					
,	Ci cui la watei	was not odse	rvea aurino	i the arillin	operation.						red prior to the	boring ad	vancemer	ıt.
	Refusal (Bedi A monitorina :	ock) encount well was insta	ered at 14:	feet below	grade. The	encountere	d bedrock	appe	eared weathered	d.				
			meu abuve	THE DECITOR	A as SHOWN	above.	.1							
GROUND SU D=DRY	RFACE TO W=WASHED	C=COF	USED	MA P=PIT	CASING		27		CASING TO	A F		GE IN EA		10
JP=UNDISTU	RBED, PIST	ON UB=	UNDISTU	RRED RAI	A=AUGER L CHECK	OFP-0	NE TEST		D			AGE IN RO OF SAMPL		3
PROPORTION	NS USED: TR	ACE=0-10%,	LITTLE=1	0-20%, SO	ME=20-35%	6, AND 35-5	0%				HOLE		TYPE	

C-47/OW CASING

	1										
NEB	C LO	G B	ayside	Sew	er System		BORING			Sheet	2 of 2
Loca	tion (	C/T):	Ken	t/W	ARWICK		NEBC Dat			<b>37 3</b> 4/	10/10
RIC	-	00000			FAP	<b>#:</b>	Date Start	_	8 Date		18/18
	ge/Ro		Bays			11 *	N Coord.			Ft.	
	_	nsult C			don Archi		E Coord.		ν <b>Τ</b> Γ4 • Λ	.0 Ft.	
		onsult				d Boring Contractors	Ground Street		NGVD29	.0	
		Name/		Da	vid Nacci	/ Gordon Archibald	Elevation	Datum	NG VD29		
Desc	riptio	Locatio n: Pay	ton Av	enue					. 01		
Samp	ler: Un	less othe	rwise no	oted, s	oil sampler	consists of a 2 in. split spoon	Date	Ground Time	water Obse	Casing at	Stab. Time
Casin	arı o: Unle	ven usın ess other	g a 140 i wise not	io nar ed, ca	nmer, 30" f sing is drive	en using 300 lb hammer,	04/18/18	00:00	5		0.25 hr
	falli	ng 24 in.		,							
	g Size:	4 in	SAMP	LED	HS Auger	X					R
D E	C B A L		1	Depth	Blows per 6 in.	SOIL AND ROCK SAMP	LE DESCRIPTION	l Depth of	r	STRATUM DESCRIPTION	E M
E P T H	S O I W	Type & Number	Rcy. Core Rc	ev.	(Coring min	Burmister Soil Classif	ication system	Stratum	1	DESCRIPTION	A R
Ĥ Ft.	NS G/Ft.		& RQD	·.	[Downpress	psi]		Change			R K S
1 (.	7	SS-1	24/14	0.0	6-10-2-4			0.3	ASPHALT	/ROADWAY	
	14	_		2.0		coarse sand, trace gravel, tra	ace silt.				
1	31										
1	88										
5_	75	SS-2	24/16	5.0	38-32-28-	27 Moist, very dense, gray FIN	JE SAND, trace				
4	50 55	33-2	24/10	7.0	36-32-26-	gravel, trace silt.	in or a to, auto				
+	61		-	7.0							
	63										
10	125			10.0							
	100	SS-3	24/18		95-81-72-	00 Wet, very dense, gray FINE highly weathered shale.	E SAND, trace silt,				
	120			12.0		ingin, wanted size		12.0	Bottom of	Exploration = 12	1
										1	
15											
15											
20											
20_											
=											
25_											
-											
-											
30											
0	to <u>12 So</u>	oil Drive	n Casing								
REI	MARK	S: 1. Ins	talled m	onitor	ing well at 1	2'					
						140# Wt x 30" fall on 2"	OD SS Sampler				
	portions			pler '		ohesionless Density Col	hesive Consiste	*			
trac	e 0 to	10% o 20%	SS -	Split S Shelb	Spoon Tube	0 10 20000	-4 Soft -8 Firm	RIC#			
som	ie 20 t	0 35%	UP - F	ixed İ	Position	30 - 50 Dense 8	- 15 Stiff - 30 Very St	Boring	No.: C-48 Completed:	4/18/18	
and	35 t	o <b>50%</b>	C	Rock	Core		6 - 30	.111	ase ID No. :		

	4			- C - 1			BORING	#:	C-49		Sheet	2 of	2
	C LO	-	yside Sew				NEBC Date				_		
	-	C/ <b>T</b> ):	Kent / W	ARWICK			Date Start		4/19/18		End: 4/1	9/18	
RIC		00000		FAP:	7:		N Coord.		0		Ft.		
	ge/Roa		Bayside		11 T		E Coord.		0		Ft.		
Desig	gn Coi	nsult C		don Archi			Ground S			. Ft.: 0.			
		onsult (		w Englan	d Borin	g Contractors	Elevation			GVD29			
_		Name/C		yan Deely	/ Gorde	on Archibald	Elevation	Da		G ( D 2 )			
Dosc	rintio	ocation: Payt	on Avenue	<b>;</b>					Cde	ater Obse	myations		
Samp	ler: Un	less other	wise noted,	soil sampler	consists	of a 2 in. split spoon	Date		ime	Depth	Casing at	Stab. 7	Cime
-	dri g: Unle	ven using ess otherv	a 140 lh ha	mmer. 30'' 1	all.	300 lb hammer,	04/19/18		0:00	5		0.25	hr
Casin	fallu g Size:	ng 24 in.		HS Auger	X	<u>:-</u>							R
	СВ		SAMPLER	Blows	St	OIL AND ROCK SAN	APLE DESCRIPTION	N	Depth	_	STRATUM		E M
D E P T	A L S O	Type &	Pen/ Depth	per 6 in.	30	Burmister Soil Clas	ssification System		of	Ι	DESCRIPTION		A
T	ΙW	Number	Rcy. Core Rcy.	(Coring mir	/ft)				Stratum Change				R K
H Ft.	NS G/Ft.		& RQD	[Downpress	psi]						MOADWAY		S
1	0.7.1.	SS-0	60/0 0.0		Di	y, brown/gray, FINE S	SAND, trace coarse		0.3/	ASPHALT	/ROADWAY		1
5		SS-0	60/0		M	oist, gray FINE SANE ace silt, trace weathered	), trace coarse sand, d shale.		10.0	Bottom of	Exploration = 10	),	
25													
	0 to 10	Soil Auge	ring										
RI	EMARI	KS:											
tr:	ace 0 t tle 10 me 20	ns Used to 10% to 20% to 35% to 50%	SS - Spl UT - She UP - Fixe	er Type it Spoon lby Tube d Position ck Core	Cohesio	Medium Dense Dense	0 - 4 So 4 - 8 Fir 8 - 15 Sti 15 - 30 Very 30 + Ha	stenc oft rm iff Stiff	RIC # Boring Date C		49 4/19/18		

								~ This !!	0.60		a.	2 6	_
	C LO	-	ayside Sew					RING#	: <u>C-50</u> base ID #		Sheet _	2_01	
		(C/T):	Kent / W	ARWICK				e Start :			End: 4/	18/18	
RIC		00000	D 3.11.	FAP	Ŧ: _			e Start : loord. :	0	Date	Ft.	10/10	
	_	ad #:	Bayside	1 A la i	hald T			oord. :	0		Ft.		
	_	nsult C		don Archi					rface Elev	., Ft. : 0.			
		Consult				ing Contractors  lon Archibald		vation D		GVD29	.0		
		Name/		VIO Nacci	Gord	ion Atemoaid	EIC	ation D	atum 1	1011111			
Desc	riptio		an Avenue										
Samp						s of a 2 in. split spoon	Dat	to.	Groundy Time	vater Obse Depth	Casing at	Stah	Time
Casin	g: Unl	iven usin ess other ing 24 in.	g a 140 lb hai wise noted, ca	mmer, 50" is	an. n using	g 300 lb hammer,	04/18		00:00	9		0.25	
Casin	g Size:	3 in		HS Auger		page-terminal and the second s							
D	СB		SAMPLER	Blows		SOIL AND ROCK SAM	MPLE DESC	RIPTION	Depth		STRATUM		R
D E P T	A L S O	Type &	Pen/ Depth Rcy.	per 6 in.		Burmister Soil Clas	ssification Sy	stem	of	Г	ESCRIPTION		M A
T H	I W N S	Number	Core Rcy. & RQD	(Coring min	ft)				Stratum Change				A R K
Ft.	G /Ft.				-		) 1 DD II	CAND		ACDITALT	DOADWAY		S
	20	SS-1	24/12 0.0	20-10-8-1	I D	ry, medium dense, darl ace coarse sand and gra	k brown FINI avel, trace silt	trace	0.3/	ASPHALI/	ROADWAY		
-	10		2.0			rick.	,	•					
-	6												
	7 5		5.0										
5	6	SS-2	24/12 5.0	6-3-3-3	ν	Vet, loose, brown COA	RSE SAND A	AND					
	7		7.0		G	RAVEL, trace fine san	nd, trace silt.						
-	44		1.0										
	56												
10	50		10.0				DIE CAND.	А		Can and u	anthomad abolo		
4		SS-3	18/12	48-56-100-0	)/U" V	Vet, very dense, gray Fl ray-brown highly weatl	INE SAND at hered shale tr	na ace silt.	11.5	nne sand, w	eathered shale.		
			1										
1 =													
15													
13_													
-													
20_													
97													
25													
23_													
-													
72													
30													
0	to <u>11.5</u>	Soil Driv	en Casing										
RE	MARK	S:											
						140# Wt x 30" fall on							
_	ortion		Sampler '	71		•	Cohesive ( 0 - 4	Consistenc Soft		00000			
	e 0 to e 10 t		SS - Split S UT - Shelby	y Tube	0 - 10 10 - 30		4 - 8	Firm	RIC#: Boring N	00000 No.: C-50			
	e 20 t		UP - Fixed I C - Rock	Position	30 - 50 50 +	Dense Dense	8 - 15 15 - 30 30 +	Stiff Very Stiff Hard	Date Co.		4/18/18		

	,												_
	C LO	-	-		er System			RING#	: <u>C-51</u> base <b>ID</b> #	•	Sheet _	2_of_	2
		C/T):	Ken	t/W	'ARWICK FAP#	•		e Start :			e End : 4/1	19/18	
RIC	#: ge/Ro	00000	Bays	ida	FAF#	*		Coord. :	0	Date	Ft.	17/10	
	_	au # : nsult C			don Archib	ald Inc		coord.:	0		Ft.		
		onsult				Boring Contractors			rface Elev	Ft.: 0	.0		
		Name/				Gordon Archibald		vation D		IGVD29			
		Locatio											
Desc	riptio	n: Pay	ton Av										
Samp	ler: Un	less othe	rwise no	oted, s Ib bor	soil sampler c nmer, 30'' fal	onsists of a 2 in. split spoon	Da	te	Groundy Time	vater Obse Depth	Casing at	Stab. T	im
Casin	g: Unle	ess other	wise not	ed, ca	sing is driven	using 300 lb hammer,	04/19		00:00	5		0.25 ł	ır
Casin	falli g Size:	ng 24 in.			HS Auger	X							
	CB		SAMP	LER	Blows	SOIL AND ROCK SAM	DUE DESC	DIDELON	Donth		STRATUM		R
Ē	A L S O	Type &	Pen/ Rcy.	Depth	per 6 in.	Burmister Soil Class	sification Sy	stem	Depth of	П	DESCRIPTION		E M
D E P T H	I W N S	Number	Core Ro & ROD	y.	(Coring min/fl	)	·		Stratum Change				A R K S
Ft.	G/Ft.		,		[Downpress ps					A OID A LEE CO			S
-		SS-0	5/0	0.0 0.4		Dry, brown FINE SAND, gravel, trace silt.	some coars	e sand and	0.3/	ASPAHLT			
-				J1 ⁻ T									
=													
5_				5.0			2.230						
		SS-0	10/0	5.8		Moist, dark brown FINE S sand and gravel, trace sitl.	SAND, trace	e coarse					
-													
- 2													
10_									10.0	Dattam of I	Eumlanation — 10		
										Bottom of 1	Exploration = 10		
-													
15_													
1													
1													
-													
20_													
1.5													
-													
25_													
14													
19													
30	to 10 C	.il A	l no										1_
		oil Auger	mß										
RE	MARKS	S:											
						140# Wt x 30" fall on 2"	" OD SS Sa	ampler					
_	ortions			pler I		nesionless Density Co	ohesive (	Consistenc	•				
trac little	e 0 to		SS - S UT - S	Split S Shelby		10 - 30 Medium Dense	0 - 4 4 - 8	Soft Firm	RIC #: Boring I	00000 No.: C-51			
	e 20 to		UP - F		osition	30 - 50 Dense 8	8 - 15 5 - 30	Stiff Very Stiff	f Date Co	mpleted:	4/19/18		
anu	33 (C	JU 70	C-1	ZULR	COIC		30 +	Hard	Databas	e ID No.:			

	C LO		ayside Sew				BORING				Sheet _	2 of 2
		<b>C/T)</b> :	Kent / W				NEBC Da				. To J	10/10
RIC	1	00000	D -11-	FA	P#:		Date Star N Coord.		4/18/18	Date	End: 4/ Ft.	18/18
	ge/Ro		Bayside	don Arc	hibal	d Inc	E Coord.		0		Ft.	
	_	nsult C Consult				oring Contractors	Ground S			., Ft.: 0.		
_		Name/				ordon Archibald	Elevation			IGVD29		
			-	, 10 1 (100								
		Locatio										
			ton Avenue		er con	sists of a 2 in. split spoon		- (	Groundy	vater Obse	rvations	
`	dr	iven usin	g a 140 lb han	nmer, 30'	' fall.		Date		l'ime	Depth	Casing at	Stab. Time
Casin		ess other ng 24 in.	wise noted, ca	sing is dr	iven us	sing 300 lb hammer,	04/18/18	U	00:00	6		0.25 hr
Casin	g Size:	3 in		HS Aug	er _	***						
Ď	СB		SAMPLER	Blow		SOIL AND ROCK SAMPL	E DESCRIPTIO	N	Depth		STRATUM	R E
D E P T	AL SO	Type &	Pen/ Depth Rcy.	per 6 i		Burmister Soil Classifi	cation System		of Stratum	D	ESCRIPTION	M A
H	I W N S	Number	Core Rcy. & RQD	(Coring n					Change			A R K
Ft.	G /Ft.	SS-1	24/12 0.0	16-11-		Dry, medium dense, brown	FINE SAND, sor	ne	0.3/	ASPHALT/	ROADWAY	S
-	5 8	20-1	2.0	10.11-		coarse sand and gravel, trace	silt.		Mid	-		
1	8		2.0									
	43											
5_	35	SS-2	24/18	20-21-1	8-12	Moist, dense, gray-brown Fl	NE SAND and					
-	20 27	35-2	7.0	20 21 1		gravel, trace silt.						
-	36		1.0									
	43											
10_	50	SS-3	10.0 24/14	39-50-5	7-36	Wet, very dense, gray FINE	SAND trace car	orse	10.0	Fine sand, t	race weathered s	hale.
4		33-3	12.0	37-30-3	7-50	sand, and gravel, trace silt, t weathered shale and bedrock	race highly		12.0	,		
			12.0			weathered shale and bedrock	t magments.		12.0	Bottom of E	Exploration = 12	
15_												
-												
-												
20_												
12												
-												
25_												
=												
30	1. 10.0	up.	Continue									
0	10 <u>12</u> S	oil Driver	i Casing									
RE	MARK!	S:										
						140# Wt x 30" fall on 2" (	DD SS Sampler					
Pro	portions	Used	Sampler 7	<i>u</i> 1		sionless Density Coh	esive Consist					
trac litti	e 0 to	10% 20%	SS - Split S UT - Shelby	Poon Tube			- 4 Soft - 8 Firm		RIC#:	00000		
som	e 20 t	35%	UP - Fixed F	osition	30	- 50 Dense 8 -	15 Stif -30 Very S	f	Boring I Date Co		4/18/18	
and	35 t	50%	C - Rock	core	51		+ Har		Databas	e ID No. :		

		• .	Davida O	arron Wom	wick RI - Various location	s BORING	#:	C-53		Shee	et 2	of 2	
	OT Pr	-		ARWICK	VICK IXI - VALIOUS locations	RIDOT			<b>#</b> :	_			
	tion (		Kent / w	FAP #	•	Date Star		6/5/18		End:	6/5/	18	
	#: ge/Ros	00000	Bayside		•	N Coord.	: _	0		Ft.			
		nsult C		don Archib	ald. Inc.	E Coord.	_	0		Ft.			
		onsult '	Co · Ne	w England	Boring Contractors	Ground S				0			-
		Name/(		ry Fortier /	GZA GeoEnvironmental,	Inc.Elevation	Date	um N	IGVD29				
Bore	hole L	ocatio	n ton Ave										
Samn	ler. Iln	less othe	rwise noted.	soil sampler	consists of a 2 in. split				vater Obse	Cosing	04 6	Stab. Tin	200
_	eme	on drive	en neino a 140	) ib hammer.	30" fall.	<b>Date</b> 06/05/18		ime ):00	Depth 10	Casing	at	0.25 hr	10
Casin	g: Unic	ess other ng 24 in.	wise noted, ca	ising is drive	n using 300 lb hammer,	00/05/10	•						
Casin	g Size:			HS Auger	X								R
	СВ		SAMPLER	Blows	SOIL AND ROCK SAMPI	LE DESCRIPTIO	N	Depth	_	STRATUN			R E M
D E P T H	AL SO	Type &	Pen/ Depth Rcy.	per 6 in.	Burmister Soil Classif	ication System	1	of Stratum	D	ESCRIPTION OF THE PERSON OF TH	JN	1	A R
Ť	I W N S	Number	Core Rcy. & RQD	(Coring min/ [Downpress p				Change				- 1	K S
FL.	G/Ft.			[Dompress p	Dry, brown FINE SAND, se	ome coarse sand		0.3/	ASPHALT/	ROADWA	Y		۵
-		SS-1	0.0		and gravel, trace silt, trace of	cobbles.							
-													
-							1		Encountered		DC		
5			5.0		TINE CAND A	coarso sand	baa		Encountered	BOOLDE	Ro.		
		SS-2			Moist, gray FINE SAND, to gravel, trace silt and weather	ered bedrock	and					1	
					fragments.								
10			10.0				L	10.0		SEDBOOK	C		
10_		_	10.0				1		Weathered	BEDROCK	. ıragn	ients.	
							}	12.0	Bottom of B	Exploration	= 12'		1
							1						
15_							- 1						
20_	-												
	1						- 1						
3	1												
												1	
25_	-												
	1												
	-												
	1												
30													
2	) to <u>10 S</u>	oil Auge	ring										_
RE	MARK	S: 1. A	ll samples take	en off augers.									
****				_									
													_
	2 <del></del>			PM	140# Wt x 30" fall on 2"	OD SS Sampler hesive Consis	r						
	portion		Sampler SS - Split	21	Olicarollidae manina	nesive Consis ) - 4 So		RIC#:	00000				
litt	ice 0 to	to 20%	UT - Shelb	v Tube	10 - 30 Medium Dense	1 - 8 Fir - 15 Sti		Boring	No.: C-53				
soi	me 20 1	to 35% to 50%	UP - Fixed C - Rock		50 + Very Dense 15	5-30 Very	Stiff		ompleted : se ID No. :	6/5/18			_
57.11			- 2.000		- 3	30 + Ha	ra	Darana	2¢ ID 140' ;				_

	BC LO		ayside Sew			BORING:	#: C-54 tabase <b>ID</b> #		Sheet _	2 of 2
RIC Brid	#: lge/Ro	C/T): 000000 ad #:	Bayside	VARWICK FAP # bORING	:	Date Start N Coord.	5/16/13 0		Ft.	16/18
Geo	tech C	onsult Consult Name/	Co.: N		Boring Contractors Gordon Archibald	E Coord.: Ground S Elevation	urface Elev	., <b>Ft.</b> : 0.	<b>Ft.</b>	
Desc	criptio		ton Avenue			1	0 1	4 01	4.	
	dr ng: Unl	iven usin ess other	g a 140 lb ha	mmer, 30" fa	consists of a 2 in. split spoon ll. n using 300 lb hammer,	<b>Date</b> 05/16/18	Time 00:00	water Obse Depth 5		Stab. Time 0.25 hr
Casin	iaili 18 Size:	<b>ng 24 in.</b> 3 in		HS Auger	X					
D E P T H	CB AL SO IW NS	Type & Number	SAMPLER Pen/ Depth Rcy. Core Rcy. & RQD	Blows per 6 in. (Coring min/f			Depth of Stratum Change	D	STRATUM ESCRIPTION	R E M A R K
Ft.	G /Ft. 22 34	SS-1	24/14 0.0 2.0	21-23-15-10		NE SAND, trace e silt.	0.4	ASPHALT/	ROADWAY	S
5	66 58 61 42 49 71 76	SS-2	5.0 24/12 7.0	28-37-39-4	Dry, very dense, gray FINE coarse sand, trace silt.	SAND, some				
10_	93	SS-3	24/15	10.0		NE SAND, trace slt, trace rock	12.0	Bottom of E	Exploration = 1	2'
20_										
25_										
30	to 12 S	oil Driver	1 Casing							
-	MARK									
trac		10%	Sampler SS - Split UT - Shelb UP - Fixed C - Rock	Spoon y Tube Position	0 - 10 Loose 0 10 - 30 Medium Dense 4 30 - 50 Dense 8 50 + Very Dense 15	OD SS Sampler resive Consister - 4 Soft - 8 Firm - 15 Stiff - 30 Very St 0+ Hard	RIC#: Boring I Date Co		5/16/18	

NEF	, BC LO	G B	ayside	Sew	er System		BORING:			Sheet	2 of 2
Loca	ation (	C/T):	Ken	t/W	'ARWICK		NEBC Dat	tabase ID #	:		
RIC		00000			FAP#		Date Start	4/23/13	8Date	e <b>End</b> : 4/	23/18
		ad #:	Bays	ide			N Coord.	0		Ft.	
	_	nsult (			don Archiba	ld. Inc.	E Coord. :	0		Ft.	
	_	onsult				Boring Contractors	Ground St	urface Elev	., Ft.: 0	.0	
		Name/				Gordon Archibald	Elevation		NGVD29		
				Dij	dir Beery	JOI GOIL THE THE STATE OF THE S					
Desc	criptio	Location: Parl	k Aven					Cround	water Obse	revotione	
Samp	oler: Ui	iless othe	rwise no	ted, s	soil sampler co nmer, 30" fall	nsists of a 2 in. split spoon	Date	Time	Depth		Stab. Time
Casir	ng: Unl	iven usin ess other ng 24 in.	wise note	ed, ca	sing is driven	using 300 lb hammer,	04/23/18	00:00	5		0.25 hr
Casir	ng Size:				HS Auger						D
D E	CB AL		SAMPI Pen/		Blows	SOIL AND ROCK SAMP				STRATUM	R E M
P T	S O I W	Type & Number	Rcy.	•	per o m.	Burmister Soil Classif	ication System	of Stratum	L	ESCRIPTION	A R
H	NS	Number	Core Rc	у.	(Coring min/ft) [Downpress psi			Change			K
Ft.	G /Ft.	ac :	04/10	0 -		Dry, medium dense, gray-b	rough COADSE	0.3/	ASPHATT	ROADWAY	S
	9	SS-1	24/12	0.0	9-10-6-4	SAND and gravel, trace fin	e sand, trace silt.	U.3/	ASITIALI	ROADWAT	
4	8		1	2.0							
	10										
-	29			<b>.</b>							1
5	50 13	SS-2	24/16	5.0	18-24-20-20	Moist, dense, gray FINE SA	AND, some coarse				
+	13	552	2,710	7.0		sand, trace gravel, trace silt	•				
-	20	-	+	7.0							
9	35										
10	82			10.0							
10_	02	SS-3	24/18	10.0	25-15-12-15	Wet, medium dense, gray F	FINE SAND, trace				
-				12.0		gravel trace silt, trace weath	nered shale.	12.0			
				12.0					Bottom of I	Exploration $= 12$	
1.7											
15											
-											
15											
20_											
-											
05	-										
25_	-										
9	-										
- 6											
30	-										
	to 12 S	oil Driver	Casing								
KE	MARK	3;									
						140# Wt x 30" fall on 2"	OD SS Sampler				
Pro	portion	s Used	Sam	pler '	Type Coh		hesive Consister	ncy			
tra	ce 0 to	10%	SS - S	Split S	Spoon	) - 10 Loose 0	-4 Soft	RIC#:	00000		
	le 10 t ne 20 t		UT - S	Shelby	Tube 1	0 00 11202121111 - 011111	- 8 Firm - 15 Stiff	Boring 1	No.: C-55		
son		0 50%			Core	50 + Very Dense 15	5-30 Very St	***		4/23/18	
*****	- 551	0 5070	- I				0 + Hard		se ID No. :		

	BC LO	G <u>B</u>	ayside Sew			BORING :	#: <u>C-56</u>	:	Sheet _	2 of 2
RIC		00000	(11.22.011.2	FAP#:		Date Start		_	e End : 4/	19/18
		ad #:	Bayside			N Coord.	0		Ft.	
	_	nsult C	Co.: Gor	don Archibal	d, Inc.	E Coord.:	0		Ft.	
Geo	tech C	onsult			Boring Contractors		urface Elev		0.0	
		Name/		vid Nacci / G	ordon Archibald	Elevation	Datum N	IGVD29		
Desc	riptio		k Avenue							
Samp					sists of a 2 in. split spoon	Data		vater Obse		Ctob Time
asir	dr Joe IInk	iven usin ess other:	g a 140 lb har wise noted, ca	nmer, 30" fall. sing is driven u	sing 300 lb hammer,	<b>Date</b> 04/19/18	Time 00:00	Depth 5	Casing at	Stab. Tim 0.25 hr
		ng 24 in.		HS Auger	X	0 11 17/10	00.00			0.25 .11
	CB AL		SAMPLER Pen/ Depth	Blows per 6 in.	SOIL AND ROCK SAMPI	E DESCRIPTION			STRATUM	R E M
D E P T H	SO IW NS	Type & Number	Rcy. Core Rcy. & RQD	(Coring min/ft)	Burmister Soil Classifi	cation System	of Stratum Change	1	DESCRIPTION	A R K
Ft.	Ġ/Ft.		1	[Downpress psi]				ACDITATO	/D.O. A. P. V. A. S. J.	S
-		SS-0	60/0 0.0		Dry, brown FINE FINE SAT sand and gravel, trace silt.	ND, trace coarse	0.3/	ASPHALT	/ROADWAY	
-										
5_		SS-0	60/0		Moist, dark gray FINE SAN	ID. trac coarse sand	5.0	Fine sand, 1	race weathered s	shale.
2.4		55-0	00/0		trace silt, trace weathered sh fragments.	ale and rock	,			
14					nagments.					
72			10.0							
10_			10.0							
							12.0	D.4161	7l	
(**								Bottom of I	Exploration = 12	
15										
15_										
-										
72										
20_										
25_										
30										
0	to <u>10</u> <u>Sc</u>	oil Augeri	ng							
RE	MARKS	S:								
					140# Wt x 30" fall on 2" (	OD SS Sampler				
_	ortions		Sampler T		sionless Density Coh	esive Consisten	cy			
trac little	e 0 to e 10 to	10%	SS - Split S UT - Shelby	poon 0. Tube 10		- 4 Soft - 8 Firm	RIC#:	00000		
som	e 20 to		UP - Fixed P C - Rock (	osition 30	- 50 Dense 8 -	15 Stiff - 30 Very Sti	Boring N  fr Date Cor		4/19/18	
and	33 to	J 3U70	C - ROCK (	JULE 31		- 50 very Su ) + Hard		e ID No.:		

	C LO		ayside Sewe Kent / W	ARWICK		BORING NEBC Da	taba				2 of 2
RIC	#:	00000		FAP #		Date Star		4/19/18	Date	_	19/18
Brid	ge/Ro	ad #:	Bayside			N Coord.				Ft.	
Desi	gn Co	nsult C		don Archib		E Coord.				Ft.	
Geot	tech C	onsult			Boring Contractors	Ground S				.0	
Insp	ector :	Name/0	Co.: Bry	an Deely /	Gordon Archibald	Elevation	Dati	um N	IGVD29		
Desc	riptio	ocation: Park	Avenue								
Samp	ler: Un	less othe	rwise noted, s	oil sampler	consists of a 2 in. split spoon	D-4-		roundy me	vater Obse Depth	Casing at	Stoh Tim
Casin	g: Unle	ss other	g a 140 lb har wise noted, ca	nmer, 30" ta sing is drive	il. n using 300 lb hammer,	<b>Date</b> 04/19/18		0:00	10	0	0.25 hr
Casin	tallii g Size:	ng 24 in.		HS Auger	X						n
D E P T H	CB AL SO	Type &	SAMPLER Pen/ Depth Rcy.	Blows per 6 in.	SOIL AND ROCK SAMF Burmister Soil Classi	PLE DESCRIPTIO fication System		Depth of Stratum	ι	STRATUM DESCRIPTION	R E M
T H Ft.	1 W N S G /Ft.	Number	Core Rcy. & RQD	(Coring min/: [Downpress p	ft) si]			Change			R K S
		SS-0	60/0 0.0		Dry, brown FINE SAND, some gravel, trace silt	some coarse sand,	\	0.3/	ASPHALT	/ROADWAY	
-											
5_		SS-0	60/0		Moist, gray FINE SAND, some coarse gravel, trace s	some coarse sand, silt.		5.0	Fine sand,	weathered shale.	
10_			10.0					10.0	Fine sand.		
								12.0	Bottom of	Exploration = 12	
15_											
20_											
25_											
30	-										
0	to <u>10 S</u>	oil Auger	ing								
RE	MARK	S:									
					140# Wt x 30" fall on 2"		one:				
tra litt	portions ce 0 to le 10 t ne 20 t l 35 t	10% o 20%	Sampler SS - Split UT - Shelb UP - Fixed C - Rock	Spoon y Tube Position	0 - 10 Loose 10 - 30 Medium Dense 30 - 50 Dense 8 50 + Very Dense 1	ohesive         Consist           0 - 4         Sof           4 - 8         Firr           3 - 15         Stif           5 - 30         Very \$           30 +         Har	t n f Stiff			3 4/19/18	

gs	•										
NEB	C LO	G B	ayside Sew	er System		BORING	#:	C-59		Sheet	2 of 2
		C/T):		/ARWICK		NEBC Da	ataba	ase ID#			
RIC	•	00000		FAP#	:	Date Star		5/16/18	BDate		16/18
Brid	ge/Ro	ad # :	Bayside			N Coord.	-	0		Ft.	
		nsult (		don Archib		E Coord.	-	0		Ft.	
		onsult	_		Boring Contractors	Ground S			,	.0	
Insp	ector	Name/	Co.: Br	yan Deely /	Gordon Archibald	Elevation	ı Dat	um N	IGVD29		
Desc	riptio		k Avenue		· ·						
Samp	ler: Ur	less othe	erwise noted, : ng a 140 lb hai	soil sampler o	onsists of a 2 in. split spoon	Date		roundy ime	vater Obse Depth		Stab. Time
Casin	g: Unle	ess other	wise noted, ca	ising is driver	using 300 lb hammer,	05/16/18		0:00	5		0.25 hr
	falli	ng 24 in.									
Casin	g Size:	3 in		HS Auger	<u>X</u>						R
D	CB AL		SAMPLER Pen/ Depth	Blows	SOIL AND ROCK SAMP		N	Depth	_	STRATUM	E M
D E P T	SO	Type &	Rcy.	per o an	Burmister Soil Classif	fication System		of Stratum	Ι	DESCRIPTION	A
Н	I W N S	Number	Core Rcy. & RQD	(Coring min/f [Downpress page 12]	t)   sin			Change			R K
Ft.	G /Ft.	00.1	24/16 0.0		Dry, medium dense, brown	FINE SAND trac	ce l	0.24	ASPHALT	ROADWAY	S
-	17	SS-1	24/16 0.0		coarse sand, trace silt	THRE SAIND, IRE		0.3/	LOI HALL	WITH HAI	
-	32		2.0								
12	51 102										
5	50		5.0								
, ,	37	SS-2	24/15	17-15-11-9	Dry, medium dense, gray-b	rown FINE SANI	D,				
-	33		7.0		trace coarse sand and grave	el, trace silt.					
-	64										
	82										
10_	100	00.2	10.0	10 20 22 5	Wat war dange grow FINI	CAND some					
=	59	SS-3	24/18	19-28-33-5	Wet, very dense, gray FINI coarse sand and gravel, trace	ce silt, trace		12.0			
	60		12.0		weathered shale.			12.0	Bottom of I	Exploration = 12	1
-										_	
15											
15											
-											
20_											
-											
==											
25_											
-											
2.0											
20											
30	to 12 ft	oil Drive	2 Casina								
_											
REI	MARK	S: 1. Ins	stalled monitor	ing well at 12'							
					140# Wt x 30" fall on 2"	OD SS Sampler					
Prop	ortions	Used	Sampler '	~ .	hesionless Density Col	hesive Consist					
trac little	e 0 to	10% 20%	SS - Split S UT - Shelby		0 10 20000	- 4 Soft - 8 Firm		RIC#:	00000		
som	e 20 to	35%	UP - Fixed I	Position	30 - 50 Dense 8	- 15 Stiff	f	Boring N Date Co	No.: C-59 mpleted:	5/16/18	
and	35 to	50%	C - Rock	Core		5 - 30 Very S 60 + Har			e ID No. :		
				I							

\$40												
NEB	C LO	G Ba	vside S	ewe	r System		BORING		-60		Sheet _	2 of 2
	tion (	_	WAR				NEBC Dat				20 1 4/1	0/10
RIC		00000			FAP#	•	Date Start		19/18	Date		9/18
	ge/Ro	ad #:	Baysi	de			N Coord.				= Ft. Ft.	ľ
		nsult C	0.: (		lon Archib		E Coord.		171	. <b>Ft.</b> : 0.		
Geot	ech C	onsult (	Co.:	Ne	w England	Boring Contractors	Ground S			,	U	
Insp	ector ]	Name/C	Co.:	Bry	an Deely /	Gordon Archibald	Elevation	Datum	I N	GVD29		
Desc	rintio	ocation n: Park	Avenu	ie						4 01	4	
Samp	ler: Un	less other	rwise not	ed, s	oil sampler c	onsists of a 2 in. split spoon	Date	Gro Time		ater Obse Depth	Casing at	Stab. Time
Casin	g: Unle	ss otherv	g a 140 lb vise note	ham d, cas	nmer, 30" fal sing is driven	using 300 lb hammer,	04/19/18	00:00		5		0.25 hr
Casin	falli: g Size:	ng 24 in.			HS Auger	X						R
	СВ		SAMPL	ER	Blows	SOIL AND ROCK SAMP	LE DESCRIPTION	J De	epth		STRATUM	E M
D E P T	AL SO	Type &	Pen/ D	epth	per 6 in.	Burmister Soil Classif	ication System	1 1	of	Ε	DESCRIPTION	A
T H	I W N S	Number	Rcy. Core Rcy & RQD		(Coring min/f				atum ange			R K S
Ft.	G/Ft.	~~ 1			[Bompress p.	Brown FINE SAND, trace	coarse sand, trace		0.3/	ASPHALT	ROADWAY	
		SS-1	60/0	0.0		gravel.	every seeing seed		- LANGE	Fine sand		
-												
5				5.0		DINE GAL	ID same coorse	-	5.0			
		SS-2	60/0			Wet, moist, gray FINE SAI sand, trace gravel.	ND, some coarse					
				10.0								
10_	1		1	10.0								
3									12.0	Bottom of	Exploration - 12	
										Dottom or	carpioianos	
15_												
	-											
3												
20_												
	1											- 1
25												
	-											
	-											
30												
	0 to <u>5</u> So	oil Augeri	ng									
RI	EMARK	XS:										
						140H33H 20H C-H 31	I OD SS Somnlar					
D.	portion	e Head	Sam	nler	Туре С	140# Wt x 30" fall on 2" ohesionless Density Co	hesive Consist	ency				
- 10	oportion ace 0 t		SS-	Split	Spoon	0 - 10 Loose	0 - 4 Sof	1	RIC#;			
lit	tle 10	to 20%	IIT-9	Shelb	y Tube Position	30 - 50 Dense	4 - 8 Firs 8 - 15 Stif	ff   ¦	Boring		0 4/19/18	
so ar	me 20 id 35	to 55% to 50%	C-	Rock	Core	50 + Very Dense 1	5 - 30 Very : 30 + Hai	Stiff		ompleted : se ID No. :	4/17/10	

										~		C1		
	CLO				er System			BORING NEBC Da		C-61	: 5	Sheet _	2 of	2
		C/T):	Ken	t / W	ARWICE			Date Star		# 4/23/1		e <b>End</b> : 4/2	23/18	
RIC	1.6	00000 ad #:	Bays	ida	FAP	#:	5	N Coord.		0	Date	Ft.	23/10	
	_	nsult C			don Archi	ibald	I Inc.	E Coord.		0		Ft.		
	_	Consult					oring Contractors	Ground S		ace Elev	., Ft.: 0	.0		
		Name/		_	- No.		ordon Archibald	Elevation			IGVD29			
D.	1 2 . 3	r 4t -												
		Location: Parl		ue										
Samp	ler: Ur	less othe	rwise no	ted, s	oil sampler	r cons	ists of a 2 in. split spoon				water Obse	ervations	CALL TO	
Cosin	dr o Unb	iven usin ess other	g a 140 l wise note	lb har ed. ca	nmer, 30" 1 sing is driv	fall. 'en us	ing 300 lb hammer,	<b>Date</b> 04/23/18		Cime 00:00	Depth 5	Casing at	0.25 h	ıme
	falli	ng 24 in.		,			,	0 1/25/10	·		_			
	g Size:	3 in	04340	LPD	HS Auger	r 								R
D E	CB AL		SAMPI Pen/	LEK Depth	Blows per 6 in.		SOIL AND ROCK SAMPL	E DESCRIPTION	N	Depth	_	STRATUM		R E M
D E P T H	S O I W	Type & Number	Rcy. Core Rc	-	(Coring mir		Burmister Soil Classifi	cation System		of Stratum	L	DESCRIPTION		A R
H Ft.	NS G/Ft.		& RQD		[Downpress	psi]				Change				K S
	8									0.3/	ASPHALT	ROADWAY		
	8			2.0	10.10.0		D. P. Janes Lauren	CINIC CANID two						
-	19	SS-1	24/12		10-10-8-	.9	Dry, medium dense, brown loarse sand, trace gravel, tra	ce silt.	æ					
5	45 40		-	4.0 5.0										
3_	10	24/15	2.0	20-18-15-	-15	Moist, dense, gray FINE SA sand, trace silt.	ND, some coarse							
	7.0						sand, trace sitt.							
10			ļ,	10.0										
10_	37 36 SS-3 24/14 10.0 26-					351	Wet, very dense, gray FINE	SAND, trace coa	rse					
				12.0			sand and gravel, trace silt.			12.0	Dattam of I	Exploration = 12		
-											DOMOIN OF I	exploration — 12		
15														
13_														
-														
20														
20_														
-														
- 9														
25														
23_														
-														
30														
	to <u>12</u> S	oil Driver	Casing											
	MARK													
KE	VIARRE	3;												
							140# Wt x 30" fall on 2" (	OD SS Sampler						
1	ortions			pler 7	V K		ionless Density Coh-	esive Consiste						
trac littl	e 0 to e 10 t			Shelby	Tube	10 -	- 30 Medium Dense 4	-4 Soft -8 Firm	1	RIC #: Boring I	00000 No.: C-61			_
	me 20 to 35% UP - Fixed Posit				osition			15 Stiff - 30 Very St		Date Co	mpleted :	4/23/18		
and		0 20 70	U-1					)+ Hard		Databas	e ID No. :	5		_

, ,

100												
NEB	C LO	G Ba	ayside Sewe	er System			BORING		C-62		Sheet _	2 of 2
	tion (	C/ <b>T</b> ):	Kent				NEBC Dat		se ID # 4/23/18		e End : 4/2	23/18
RIC		00000		FAP	#:		Date Start N Coord.:			Dati	Ft.	23/10
	ge/Ro		Bayside	lon Archi	bold	Inc	E Coord. :				Ft.	
		nsult C				ring Contractors	Ground St			, Ft.: 0	.0	
		onsult Name/C		an Deelv	/ Go	rdon Archibald	Elevation			GVD29		
				un Beekj								
Bore	hole I	ocatio	n Avenue									
Samo	ler: Un	less othe	Avenue	oil sample	consi	sts of a 2 in. split spoon				vater Obse	ervations	Stab. Time
	dri	van usin	σ a 140 lh har	nmer. 30'' 🗆	fall.	ng 300 lb hammer,	<b>Date</b> 04/23/18		me :00	Depth 5	Casing at	0.25 hr
Casin	ıg: Unle fallii	ess otnerv ng 24 in.	wise noteu, ca	sing is ut iv	cii usii	ing 500 ib ilaiinii v	04/25/10	00				
Casin	g Size:	4 in		HS Auger	r							R
D E P	CB AL		SAMPLER Pen/ Depth	Blows per 6 in		SOIL AND ROCK SAMPI	E DESCRIPTION	N	Depth of	ſ	STRATUM DESCRIPTION	M
P	S O I W	Type & Number	Rcy. Core Rcy.	(Coring min		Burmister Soil Classifi	ication System		Stratum	•	) <u></u>	A R K
Ĥ Ft.	NS G/Ft.	110011041	& RQD	[Downpress	psi]				Change			K S
16	21	SS-1	24/12 0.0	12-10-6-	10	Dry, dense, brown FINE SA sand, trace gravel, trace silt	ND, trace coarse		0.3/	ASPHALT	/ROADWAY	
1	32		2.0			sand, trace graver, trace sit	and silens.					
	18											
-	66 51		5.0									
5_	33	SS-2	24/12	28-21-25	-31	Wet, dense, brown COARS sand, trace gravel, trace silt.	E SAND, some fir	ne				
	44		7.0			Said, trace graver, trace site						
-	61											
10	100 85		10.0									
10_	559	SS-3	24/15	16-21-30	)-35	wet, very dense, gray FINE sand and gravel, trace silt tr	SAND, some coar	rse s.				
	60		12.0			Suita and graves, save save		+	12.0	Bottom of	Exploration = 12	2' 1
	-											
15												
	-											
	-											
20												
	-											
	-											
25												
	-											
30	0100	1 - 21 TS - 2	un Coolina							1		
-			en Casing									
RE	EMARK	<b>S:</b> 1. In	stalled monito	ring well at	12'							
						140# Wt x 30" fall on 2"	OD SS Sampler					
Pro	portion	s Used	Sampler	Type	Cohes		hesive Consist	ency				
tra	ace 0 to	10%	SS - Split	Spoon	0 -	- 10 Loose	0 - 4 Sof 4 - 8 Firr		RIC#:		2	
	tle 10 me 20	to 35%	UT - Shell UP - Fixed	Position	30	- 50 Dense 8	3 - 15 Stif	ff	Boring Date C	No.: C-6 ompleted:	4/23/18	
an		to 50%	C - Rock	Core	50		5 - 30 Very S 30 + Har	d un		se ID No.:		

Locati RIC # Bridge Design Geote Inspec Boreh Descri Sample Casing:	ion (C/T : 000 e/Road # n Consult ch Consult	t Cone/Contion Samuelation Samuelation Sherwing:	Bayside  .: Gorc  co.: Ne  o.: Bry  nel Gorton  wise noted, so a 140 lb ham	ARWICK FAP #:  don Archiba w England I an Deely / C  Avenue oil sampler con mer, 30" fall. sing is driven u  HS Auger	Id, Inc. Boring Contractors Bordon Archibald  Insists of a 2 in. split spoon  Ising 300 lb hammer,	BORING # NEBC Data Date Start N Coord.: E Coord.: Ground Su Elevation I	abase ID # : 4/20/13 0 0 urface Elev Datum N	8 Date	e End: 4/2 Ft. Ft0	2 of 2 20/18 Stab. Time 0.25 hr
E P S	AL SO Typ IW Nun NS 3/Ft.	e & F aber (	Pen/ Depth Rey. Core Rey. & RQD	Blows per 6 in. (Coring min/ft) [Downpress psi]	SOIL AND ROCK SAMPL Burmister Soil Classifi Dry, brown FIEN SAND, trace gravel and silt.	cation System	Depth of Stratum Change		STRATUM DESCRIPTION ROADWAY	E M A R K S
10	5 SS-0 60/0 5.0  10 10.0  20 25			Wet, dark brown FINE SAN sand, trace gravel, trace sitl.	ID, some coarse	12.0	FINE SANI	D Exploration - 12'		
Propor trace little	rtions Used 0 to 10% 10 to 20% 20 to 35% 35 to 50%		Sampler T SS - Split S UT - Shelby JP - Fixed Po C - Rock C	poon 0 Tube 10 osition 30	140# Wt x 30" fall on 2" Cohesionless Density Cohe - 10 Loose 0 - 30 Medium Dense 4 - 50 Dense 8 - 0 + Very Dense 15 - 30	esive Consistence 4 Soft 8 Firm 15 Stiff 30 Very Stiff	RIC#: Boring N Date Con		4/20/18	

, ,

1	OT P	•			Sewer Syste	m	BORING	}#	: <u>C-64</u>		Sheet _	2_ of	2
	•	(C/T):		t / W	ARWICK				abase ID				
1	-	00000			FAP #	:	_ Date Sta			Date		3/18	
1	lge/Ro		Bays		d a	1.1 1	N Coord		$\frac{0}{0}$	V	Ft.		
		nsult ( Consult	-		don Archib	Boring Contractors	_ E Coord		face Elev	TF+ O	Ft.		
1		Name/				Gordon Archibald	_ Ground			NGVD29	.0		
		Locatio	on nuel Go	ordoi	n Ave								
	oler: Un	less othe	erwise no	ted, s	oil sampler co	onsists of a 2 in. split spoon			Ground	water Obse	ervations		
Cosi					nmer, 30" fall	using 300 lb hammer,	<b>Date</b> 06/08/18		Time	Depth	Casing at		
Casii		ng 24 in.		eu, ca	sing is at iven	using 500 ib nammer,	06/08/18		00:00	5		0.25	nr
Casi	ıg Size:	_2 in	Ť.		HS Auger	X			<u></u>	<u> </u>			1 5
D E P	CB AL		SAMPI Pen/ I		Blows	SOIL AND ROCK SAMPI		N	Depth		STRATUM		RE
P T	S O I W	Type & Number	Rev.	•	per 6 in.	Burmister Soil Classifi	cation System		of Stratum		ESCRIPTION		M A
H Ft.	NS G/Ft.		& RQD	,.	(Coring min/ft) [Downpress psi				Change				A R K
		SS-1	24/14	0.0	14-15-15-11	Dry, medium dense, brown	FINE SAND, tra	ce	0.3/	\ASPHALT/	ROADWAY		S
_		22.0		2.0	6 7 6 0	coarse sand and gravel, trace		•					
		SS-2	24/16	4.0	6-5-6-8	Moist, medium dense, brown trace coarse sand, trace silt.	n FINE SAND,						
5		SS-3	24/16	4.0	8-12-18-15	Wet, medium dense, brown/	gray FINE SANI	Э,					
				6.0		trace coarse sand, trace grav							
_		SS-4	24/18	8.0	12-20-21-25	Wet, dense, gray FINE SAN sand and gravel, trace silt.							
10		SS-5	24/16	10.0	8-12-10-12	Wet, medium dense, gray-br trace coarse sand and gravel,	own, FINE SAN trace silt.	D,					
10_		SS-6	24/16	10.0	7-16-14-17	Wet, medium dense, gray Fl	NE SAND, som	e					
				12.0		coarse sand, trace gravel, tra	ce siit.		12.0	Dottom of F	1		_
-										Bottom of E	xploration = 12'		
15													
												•	
-													
-													
20_													
-													
-													
-													
25_													
-													
-													
30													
<u>0</u>	to <u>12 So</u>	il Driven	Casing	-				*****			***************************************		
REN	MARKS	:											
						140# Wt x 30" fall on 2" O				***************************************			
_	ortions i e 0 to 1	I	Samp SS - Sp			sionless Density Cohe - 10 Loose 0 -		ncy		00555			
little	10 to	20%	UT - Sh	elby	Tube 10	- 30 Medium Dense 4 -	8 Firm		RIC#: Boring No	00000 c.: C-64			
some and	20 to 35 to		UP - Fix C - Re			-50 Dense 8-1 0+ Very Dense 15-	30 Very St		Date Com	pleted: 6	/8/18		
						30	+ Hard		Database	ID No.:			

	OT Pr	-				RI - Various locatio		ORING			и.	She	et _	2_ of _	2
	-	<b>C/T)</b> :	Kent / W	ARWICK						base ID		The A	(15	/10	
RIC		00000		FAP	#:			ate Star		6/5/18	Date	End:	0/5	/18	_
Brid	ge/Ro	ad #:	Bayside					Coord.		0		Ft.			
Desi	gn Co	nsult C		don Archi			_	Coord.		0		Ft.			
Geot	tech C	onsult	Co.: Ne	w Englan	d Bo	ring Contractors				face Elev		0			
		Name/		y Fortier	/ GZ	A GeoEnvironmental	Inc.E	levation	Da	tum <u>N</u>	IGVD29				
Bore	hole I	ocatio	n						375						
Desc	riptio	n: San	nuel Gordon	Ave			_			0 1					
Samp	ler: Un	less othe	rwise noted,	soil sampler	consi	sts of a 2 in. split	1	_4a		Groundy Time	water Obse Depth	Cosing	tot	Stab. T	ima
Casin	g: Unle	oon drive ess other ng 24 in.	en using a 140 wise noted, ca	lb hammer sing is drive	en usi	ng 300 lb hammer,		05/18		00:00	10	Casing	al	0.25	
Casin	g Size:	ing 2-7 mi.		HS Auger		<u>x</u>									R
D	СB		SAMPLER	Blows		SOIL AND ROCK SAMI	LE DES	CRIPTIC	N	Depth		STRATU			R E
D E P	AL SO	Type &	Pen/ Depth Rcy.	per 6 in.		Burmister Soil Class	fication	System		of	D	ESCRIPTI	ON		M A
TH	I W N S	Number	Core Rcy. & RQD	(Coring min	(ft)					Stratum Change					A R K
Ft.	G/Ft.		ע וועט	[Downpress]	1					_					S
		SS-1	0.0		1	Dry, brown-gray FINE SA sand and gravel, trace silt.	ND, son	ne coarse		0.3/	ASPHALT/	KOADWA	Y		
1					!	sand and graver, trace sitt.									
Ī															
Ī									- 4						
5			5.0		Ι.	DD ID OAND A			ا بر						
		SS-2				Wet, gray FINE SAND, tr gravel, trace silt, weathere	ace coar: d BEDR	ock	u	6.0	Coarse GRA	VEL love	r		1
						fragments-grind.					Coarse Gree	IVEL layer	•		
10_			10.0												
										11.0	Weathered I	BEDROCK	fraer	nents.	1
										12.0	Bottom of E				1
-												•			
15_															
-															
1.5															
-															
20															
20_															
1															
25_															
-															
30	to 10 Sc	oil Auger	ing								1				
			5						_						
RE	MARKS	S:													
_				Т		140# Wt x 30" fall on 2"	OD SS	Sampler	-						
Pro	ortions	Used	Sampler 7	Гуре С			hesive	Consist	епсу						
trac	e 0 to	10%	SS - Split S	poon	0 - 1	0 230000	) - 4	Soft		RIC#:	00000				
littl	e 10 to	20%	UT - Shelby UP - Fixed P	Tube	10 - 3 30 - 5	,, ,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	4 - 8 15	Firn Stift		Boring h					=
som	e 20 to	0 50%	C - Rock		50 - 5	Very Dense 1	5 - 30	Very S	tiff			5/5/18			
	. 55 6						30 +	Har		Databas	e ID No.:				

ŕ												
NEB	C LO	G B	ayside Sew	er System			BORING		C-66		Sheet _	2 of 2
		C/T):		'ARWICK			NEBC Da					20.11.0
RIC		00000		FAP	<b>#:</b>		Date Star		23/18	Date		23/18
		ad # :	Bayside				N Coord.	-			Ft.	
	_	nsult C		don Archi			E Coord.		171	Ft.: 0.	Ft.	
		onsult			d Boring Contracto		Ground S Elevation			GVD29	U	
Insp	ector	Name/	Co.: Bry	an Deely	/ Gordon Archibalo	<u>u</u>	Elevation	Datum	1 11	U V D Z )		
Desc	riptio	Locatio n: Bay	side Sewer	S							4.	
Samp	ler: Un	less othe	rwise noted, s g a 140 lb har	soil sampler	consists of a 2 in. split	spoon	Date	Gro Time		ater Obse Depth	Casing at	Stab. Time
Casin	g: Unk	ess other ng 24 in.	g a 140 io nai wise noted, ca	sing is drive	n using 300 lb hamme	er,	05/23/18	00:00		4		0.25 hr
Casin	g Size:	3 in		HS Auger								D
D E P T	CB AL SO	Type &	SAMPLER Pen/ Depth	Blows per 6 in.	SOIL AND ROC Burmister S	CK SAMPL	E DESCRIPTION Cation System	-   (	epth of	Е	STRATUM ESCRIPTION	R E M
T H Ft.	IW NS G/Ft.	Number	Rcy. Core Rcy. & RQD	(Coring min [Downpress	ff) osi]				atum ange			A R K S
	3 2	SS-1	24/9 0.0 2.0	6-2-2-3	Moist, loose, gray sand little mediun	MEDIUM n gravel.	I SAND, some fir	ne	0.5	ASPHALY	ROADWAY	
-	7 21		2.0									
5_	26 69	SS-2	5.0 24/17	11-8-9-1	Wet, medium den	nse, gray, v	ery decposed		5.0	Top of BED	DROCK.	
	76 81		7.0		BEDROCK.							
10	92 98		10.0									
		SS-3	24/11.4 12.0	25-42-74-1	00 Dry, very dense, BEDROCK.	gray WEA	THERED		12.0	Dottom of I	Exploration = 12	
18										Bottom of 1	exploration — 12	
15_												
4												
20_												
19												
25_												
30	-											
	to <u>12 S</u>	oil Drive	Casing		****							
RE	MARK	S:										
					140# Wt x 30"	fall on 2"	OD SS Sampler					
tra	portions	10%	Sampler SS - Split	Spoon	ohesionless Density  0-10 Loose 10-30 Medium Dens	Coh 0	resive Consister - 4 Soft - 8 Firm	R	IC#:	00000		
	e 10 t ne 20 t l 35 t		UT - Shelb UP - Fixed I C - Rock	Position	30 - 50 Dense 50 + Very Dense	8 · 15	- 15 Stiff - 30 Very S 0 + Hard	f D		lo.: C-66 npleted: EID No.:	5/23/18	

. •									Cl 4	2 05 2
NEB	C LO	G Ba	yside Sew			BORING # NEBC Dat			Sheet _	2 of 2
	tion (C		Kent / W	ARWICK		Date Start		7 : 8 Date	End: 4/2	20/18
RIC	_	00000		FAP	<b>‡:</b>	N Coord. :		0 Date	Ft.	
	ge/Roa		Bayside	don Archi	hald Inc	E Coord. :			Ft.	
Desig	gn Coi	nsult C			d Boring Contractors	Ground St		v., Ft.: 0.	0	
		onsult Name/C		on Deelv	/ Gordon Archibald	Elevation		NGVD29		
				yan beery	7 00.401.1					
Desc	rintio	Location: Sam	uel Gorton	Avenue			Ground	water Obse	rvations	
Samp	ler: Un	less othe	rwise noted, : g a 140 lb hai	soil sampler	consists of a 2 in. split spoon	Date	Time	Depth	Casing at	Stab. Time
Casin	arı g: Unle	ess other	wise noted, ca	sing is drive	en using 300 lb hammer,	04/20/18	00:00	5		0.25 hr
	falli	ng 24 in.								
Casin	g Size:		SAMPLER	HS Auger					CODD ACTINA	R E
D E	CB AL		Pen/ Depth	Blows per 6 in.	SOIL AND ROCK SAMP Burmister Soil Classi	PLE DESCRIPTION	N Depth of	Е	STRATUM ESCRIPTION	M
D E P T	S O I W	Type & Number	Rcv.	(Coring min		iidanon by bioin	Stratum			A R K S
Ĥ Ft.	NS G/Ft.		& RQD	[Downpress	psi]		Change			S
rt.	Ont.	SS-0	60/0 0.0		Dry, brown-gray FINE SA	ND, some coarse	0	3/\ASPAHLT/	ROADWAY	
					sand, trace gravel, trace sil	l.				
5_		SS-0	60/0		Wet, gray FINE SAND, tr	ace coarse sand and				
		33-0	00/0		gravel, trace silt.			Weathered	shale and bould	er.
							8.	0 FINE SAN	n	
								FINE SAIN	D	
10			10.0							
							12.	0		
							12.	Bottom of	Exploration $= 12$	)1
100										
15										
13										
20	-									
20_										
	-									
	-									
25								4		
	-									
	1									
30										
	0 to 10 s	Soil Auge	ring							
RI	EMARI	KS:								
-					140# Wt x 30" fall on 2	2" OD SS Sampler				
	oportio		Sample	71.	Concatonicas	Cohesive Consist	. '	ш. 00000		
	ace 0 t	o 10% to 20%	SS - Spli UT - Shel	t Spoon by Tube	0 - 10 Loose 10 - 30 Medium Dense	4-8 Fir	m Rori	#: 00000 ng No.: C-6	7	
so	me 20	to 35%	UP - Fixed	l Position	30 - 50 Dense	8 - 15 Stir 15 - 30 Very	Stiff Date	Completed:	4/20/18	
an	id 35	to 50%	C - Roc	k Core	30 T VELY DELISE	30 + Hai		base ID No. :		

	C LO	G Ba	ayside Sew Kent / W	er System /ARWICK		BORING #		:	Sheet _	2_ of _	2
Loca RIC	-	00000	Kent / W	FAP #	•	Date Start			End: 4/	26/18	
	1.0		Bayside	FAL #		N Coord. :			Ft.		
	_	ad # :		don Archib	ald Inc	E Coord. :	_		Ft.		
		nsult C Consult			Boring Contractors	Ground St		Ft.: 0.	0		
_					Gordon Archibald	Elevation 1		NGVD29	•		
•		Name/		yan Deery /	Gordon Arcinoaid	Elevation					
Desc	riptio	Locatio n: San	nuel Gorton	Avenue			C	water Obse	wations		_
Samp	ler: Ur	less othe	rwise noted,	soil sampler c mmer, 30" fal	onsists of a 2 in. split spoon	Date	Time	Depth	Casing at	Stab. T	'im
Casin	g: Unle	iven using ess otherw ng 24 in.	g a 140 to nat wise noted, ca	ising is driven	using 300 lb hammer,	04/26/18	00:00	5		0.25 1	nr
Casir	g Size:	3 in		HS Auger							R
D E	CB AL SO	Type &	SAMPLER Pen/ Depth	Blows per 6 in.	SOIL AND ROCK SAMP Burmister Soil Classif	LE DESCRIPTION ication System	of	Г	STRATUM ESCRIPTION		N A
E P T H	I W N S	Number	Rcy. Core Rcy. & RQD	(Coring min/fi	i)	-	Stratum Change				R K S
Ft.	G/Ft.	SS-1	2/12 0.0	7-6-6-12/0"	Dry, medium dense brown/some coarse sand and grave	gray FINE SAND,	0.3	ASPHALT	ROADWAY		-
5_	15 47 56 59 26 24	SS-2	0.2 5.0 24/12 7.0	22-28-11-10							
10_	30 25	SS-3	10.0	19-16-18-2	1 Wet, dense, gray FINE SAI	ND, some coarse					
			12.0		sand, trace gravel, trace silt	•	12.0		Exploration = 12	1	1
15_											
20_											
25_											
30	10.0		Onder								
		oil Driver	i Casing								
RE	MARK	S:									
trace 0 to 10% SS - Split Spoon 0 - 1					0 - 10 Loose 0 10 - 30 Medium Dense 4	OD SS Sampler hesive Consiste  - 4 Soft 1 - 8 Firm - 15 Stiff	RIC#		4/26/18		

-1 '	•										
NEE	C LO	G B	ayside Sew	er System		BORING	<b>;</b> #:	C-69		Sheet _	2 of 2
1		C/T):	_	ARWICK		NEBC D	atak	oase ID#			
RIC	#:	00000		<b>FAP</b> # :		Date Sta		4/20/18	Date		20/18
Brid	ge/Ro	ad # :	Bayside			N Coord		0		Ft.	
Desi	gn Co	nsult C	Co.: Gore	don Archiba	ld, Inc.	_ E Coord		_0		Ft.	
Geo	tech C	onsult			Boring Contractors	Ground				.0	
Insp	ector	Name/	Co.: Bry	an Deely / O	Fordon Archibald	Elevation	n Da	itum N	IGVD29		
Dow	shala l	Locatio	n .								
			nuel Gorton	Avenue							
	ler: Ur	less othe	rwise noted, s	oil sampler co	nsists of a 2 in. split spoon				vater Obse		O. 1 m
Cosin	dr. Unk	iven usin	g a 140 lb han wise noted co	nmer, 30" fall. sing is driven i	using 300 lb hammer,	<b>Date</b> 04/20/18		<b>Γime</b> 00:00	Depth	Casing at	Stab. Time 0.25 hr
Casii	ig. Onio falli	ng 24 in.	wise noteu, ca	and is at their	ionig boo io manimor,	04/20/10	,	00.00	J		0,23 11
Casir	g Size:			HS Auger	X		L.,				D
D E	CB AL		SAMPLER Double	Blows	SOIL AND ROCK SAMPI	LE DESCRIPTIO	ON	Depth		STRATUM	R E M
P	SO	Type &	Pen/ Depth Rcy.	per 6 in.	Burmister Soil Classif	ication System		of Stratum		DESCRIPTION	
T H	I W N S	Number	Core Rcy. & RQD	(Coring min/ft) [Downpress psi]				Change			A R K S
Ft.	G/Ft.	SS-1	60/0 0.0	,,,	Dry, brown FINE SAND, so	ome coarse sand	and	0.3/	ASPHALT/	ROADWAY	S
-		20-1	60/0 0.0		gravel, trace silt.	one course suite	unu	(1.3)	(10111111111	10110	
=											
5_			5.0		NZ 1 PRIEGA	ID tosas sassus					
		SS-2	60/0		Wet, brown-gray FINE SAN sand, trace coarse gravel, tra	ace silt.					
=											
-											
10			10.0								
									FINE SAN	J	
								12.0	Bottom of I	Exploration = 12	
-										•	
15											
-											
-											
20											
1.5											
25											
25_											
20											
30	to 10 C	il Auger	ina								
	10 10 30	ni Augei	mig								
RE	MARKS	8:									
T.		**	0. 1.7		140# Wt x 30" fall on 2" (						
1	portions e 0 to		Sampler T SS - Split S	* *		esive Consist		RIC#:	00000		
littl	e 10 to	20%	UT - Shelby	Tube 10	30 Medium Dense 4	- 8 Firi	m	Boring N	No.: C-69		
som		35% 50%	UP - Fixed P C - Rock (		50 + Very Dense 15	- 30 Very !	Stiff		mpleted : e ID No. :	4/20/18	
					30	0+ Har	a	Databas	C IID 140° !		

NEBC Location RIC # Bridge Design	on (0 : _( e/Roa	C/T): 000000 ad #:	Bayside	er System  ARWICK  FAP #:		BORING NEBC D Date Sta N Coord E Coord	atab rt : . :	C-70 ase ID # 5/16/18 0 0			2 of _	2
Geotec	ch Co	onsult	Co.: Ne	w England I	Boring Contractors Gordon Archibald	Ground Elevation	Surf	ace Elev.	, <b>Ft.</b> : 0.	.0		
Casing:  Casing S  D E A P S T I	ole L ption r: Unl driv Unles	ocation: Avo	n Avenue rwise noted, s g a 140 lb har wise noted, ca	soil sampler co	nsists of a 2 in. split spoon using 300 lb hammer,  X  SOIL AND ROCK SAMP Burmister Soil Classi	Date 05/15/18	<b>T</b>		vater Obse Depth 5	Casing at STRATUM DESCRIPTION	Stab. T 0.25 l	
5	3 /Ft. 11 22 40 44 61 72 32 59 88 97	SS-1	24/14 0.0 2.0 24/15 7.0 24/16 12.0	10-11-14-16	Dry, medium dense, brown coarse sand and gravel, trace.  Wet, very dense, brown-gr some coarse sand and grav rock fragments.  Wet, very dense, gray FIN sand and gravel, trace silt, bedrock.	ce silt.  ay FINE SAND, el, trace silt, trace E SAND, trace co	:					
REMA		il Driver	Casing		140# Wt x 30" fall on 2"							
trace	race 0 to 10% ittle 10 to 20% come 20 to 35%  SS - Split Spoon UT - Shelby Tube UP - Fixed Position				esionless Density Co 9 - 10 Loose 6 0 - 30 Medium Dense 6 0 - 50 Dense 8 50 + Very Dense 1	hesive Consis 0 - 4 So: 4 - 8 Fir 8 - 15 Sti 5 - 30 Very 30 + Ha	tency ft m ff Stiff		00000 No.: C-70 mpleted: e ID No.:	5/16/18		

NEE	BC LO	G B	ayside Sew	er System		BORING	#: C	<u>-</u> 71		Sheet _	2 of 2
		C/T):		ARWICK		NEBC Da	tabase	ID#:			
RIC	,	00000		<b>FAP#</b> :		Date Star	t: 4/2	20/18	Dat	e End : 4/	20/18
		ad #:	Bayside			N Coord.	: 0			Ft.	
	0	nsult C		don Archiba	ld. Inc.	E Coord.	: 0			Ft.	
		Consult			Boring Contractors	Ground S	urface	Elev., Ft	.: 0	.0	
		Name/			Gordon Archibald	Elevation					
		Locatio		,							
Desc	eriptio	n: San	nuel Gorton	Avenue			Cmar	d4-	w Oba	ervations	
Samp	oler: Ur	iless othe	erwise noted, s	son sampler com mmer, 30" fall.	nsists of a 2 in. split spoon	Date	Time		epth		Stab. Time
Casin	ur. ig: Unle	ess other	wise noted, ca	sing is driven	using 300 lb hammer,	04/20/18	00:00		5		0.25 hr
	falli	ng 24 in.									
Casin	ig Size:		7	HS Auger	X						D
D E	CB		SAMPLER	Blows	SOIL AND ROCK SAMPI	LE DESCRIPTION	N De	oth		STRATUM	R E
P	A L S O	Type &	Pen/ Depth Rcy.	per 6 in.	Burmister Soil Classif		o	f	I	DESCRIPTION	M
P	I W	Number	Core Rcy.	(Coring min/ft)				turn			A R K
H Ft.	NS G/Ft.		& RQD	[Downpress psi]			Cha	nige			K S
		SS-0	60/0 0.0		Dry, dark brown FINE SAN	D, trace coarse		0.3 AS	PHALT.	/ROADWAY	
Ħ					sand and gravel, trace silt.						
5			5.0								
		SS-0	60/0		Wet, gray COARSE SAND fine sand, and silt.	and gravel, trace					
Į.					Title Sailu, and Sitt.						
]											
10_			10.0					ED	NIE O ANT	D and anough	
-									NE SAIN	D and gravel.	
								12.0	ttom of 1	Exploration = 12	
-								150	tionii oi i	Exploration 12	
15_											
-											
=											-
:=											
20											
20_											
-			1								
25											
:=											
- 1											
30											
0	to <u>10</u> So	oil Auger	ing								
RE	MARKS	S:									
					140# Wt x 30" fall on 2"	OD SS Sampler					
Prop	portions	Used	Sampler 7		esionless Density Coh	esive Consiste					
	e 0 to		SS - Split S			- 4 Soft	KI		0000		
little	e 10 to ie 20 to	0 20%	UT - Shelby UP - Fixed F			- 8 Firm - 15 Stiff	150	ring No. :	C-71		
and		50%	C - Rock		50 + Very Dense 15	- 30 Very St	tiff Da	te Comple		4/20/18	
					3	0 + Hard	ı Da	tabase ID	NO.:		

	OT Pr	oject C/T) :		Sewer Warw ARWICK	ick RI - Various location	BORING RIDOT			#:	Sheet _	2 of _	2
		00000	Vent / AA	FAP#:		Date Sta				End: 6/	5/18	
	_		Bayside			N Coord		0		Ft.		
		ad # : nsult C		don Archiba	ld Inc	E Coord		0		Ft.		
		onsult (			Boring Contractors	Ground			, Ft.: 0.	0		
				ry Fortier / C	ZA GeoEnvironmental,				IGVD29			
Tusb	ector	Name/(	.0.: <u>Ga</u>	ly Portion / C	ZII GCODII I I Omnomen,							
		ocation: Oce										
Samp	ler: Un	less othe	rwise noted,	soil sampler co	nsists of a 2 in. split				vater Obse	rvations	Q4-1-70	· · · ·
Casin	g: Unio	oon drive ess other ng 24 in.	en using a 140 wise noted, ca	lb hammer, 3 sing is driven	0" fall. using 300 lb hammer,	<b>Date</b> 06/05/18		0:00	Depth 10	Casing at	0.25	
Casin	g Size:	ng 24 na		HS Auger	<u>X</u>		L					R
D E P T H	CB AL SO IW NS	Type & Number	SAMPLER Pen/ Depth Rcy. Core Rcy. & RQD	Blows per 6 in. (Coring min/ft)	SOIL AND ROCK SAMPI Burmister Soil Classifi		ON	Depth of Stratum Change		STRATUM ESCRIPTION		R E M A R K
Ft.	G/FL			[Downpress psi]		ID some coarse	_	0.3/	ASPHALT/	ROADWAY		S
		SS-1	0.0		Dry, brown-gray FINE SAN sand, and gravel, trace silt, t	trace cobbles.			APR HAT IVE	NODD II A I		
					-		}	2.0	Encountered	BOULDERS		1
-												
5_			5.0									
1		SS-2			Moist, gray FINE SAND, tr gravel, trace silt, trace weat	race coarse sand : hered bedrock	and					
					fragments.	ncica boaroek						
			-				1	8.0	Coarse GRA	VEL laver.		
			100					10.0				
10_			10.0					10.0	Trace weath	ered BEDROC	K	
-								12.0				
									Bottom of E	xploration = 12		1
15_												
-												
-												
20												
20_												
		1										
3												
25_												
-												
30												
	to <u>60 Sc</u>	oil Auger	ing									
RE	MARKS	S: 1. No	split spoon sa	mpales taken, o	fff auger flights							
		1			140# Wt x 30" fall on 2" (							
1	ortions	-	Sampler 7	J	sionless Density Coh	esive Consist	ency					
	e 0 to		SS - Split S UT - Shelby			- 4 Sof - 8 Firr	-	RIC#:	00000			
	e 10 to e 20 to		UP - Fixed P	osition 30	- 50 Dense 8 -	- 15 Stif	Ť	Boring N		5/5/18		
and		50%	C - Rock	Core 5		- 30 Very S ) + Har			inpleted:	n J 1 1 V		_
						- AAGI	_					

. 10	•							~			<b>C1</b>	0 0 0
	C LO	_	ayside Sew				BORING NEBC D			•	Sheet _	2 of 2
RIC		C/T):	Kent / V		Σ <u>κ</u> Ρ#:		Date Sta				e <b>End</b> : 5/	16/18
	1.9	ad #:	Bayside		L 11 •		N Coord		0		Ft.	
	_	nsult (		don Arc	hibal	d, Inc.	E Coord	. :	0		Ft.	
		onsult		ew Engl	and B	oring Contractors			face Elev		.0	
Insp	ector	Name/	Co.: Br	yan Dee	ly / G	ordon Archibald	Elevation	n Da	itum <u>N</u>	IGVD29		
		Locatio	on ington Ave	nue								
Samp	ler: Ur	iless othe	erwise noted,	soil sampl	ler con	sists of a 2 in. split spoon				vater Obse		0. 1 70
Cosin	dri	iven usin	g a 140 lb ha	mmer, 30	'' fall. 'iven 11	sing 300 lb hammer,	<b>Date</b> 05/15/18		Time 00:00	Depth	Casing at	Stab. Time 0.25 hr
	falli	ng 24 in.					05/15/16	`	30.00	,		0.25 111
	g Size:	3 in	SAMPLER	HS Aug	ger	X		_				R
D E	CB AL		Pen/ Depth	Blow per 6		SOIL AND ROCK SAMPL	LE DESCRIPTIO	NC	Depth of		STRATUM DESCRIPTION	E M
P	S O I W	Type & Number	Rcv	(Coring r	- 1	Burmister Soil Classif	ication System		Stratum	L	ESCRIPTION	A R
H Ft.	NS G/Ft.		& RQD	[Downpre	ss psi]				Change			R K S
	7	SS-1	24/12 0.0	6-8-3	-3	Dry, medium dense, brown	FINE SAND, tra	ace	0.5		ROADWAY	
	3		2.0			coarse sand and gravel, trace	. 311L			FINE SAN	D.	
	5 32											
5	30		5.0									
J -	18	SS-2	24/18	21-37-3	0-23	Wet, very dense, gray FINE sand and gravel, trace silt.	SAND, trace co	arse				
	37 41 7.0					said aid graver, trace sitt.						
=	41 60											
10	110		10.0									
10_	1.0	SS-3	24/12	25-37-2	26-17	Wet, very dense, gray FINE sand and gravel, trace silt ar	SAND, trace co	arse				
			12.0			fragments.	id bediock		12.0	Bottom of I	Exploration = 12	
:-										Dottom of 1	Exploration 12	
15												
-												
20												
7.5												
1 3												
25												
1												
3												
30												
0	to <u>12</u> So	oil Driver	n Casing									
RE	MARK	S:										
					_	140# Wt x 30" fall on 2"						
	ortions e 0 to		Sampler SS - Split				esive Consist			00000		
little	e 10 to	20%	UT - Shelb	y Tube	10	- 30 Medium Dense 4	-8 Fire	m	RIC#: Boring!	00000 No.: C-73		
som and	e 20 to 35 to	0 35% 0 50%	UP - Fixed I C - Rock			) + Very Dense 15	- 30 Very	Stiff	Date Co		5/16/18	
						30	0+ Hai	rd	Databas	е ID No. :		

MICE	BC LO	C P	ayside Sew	ar Sustam		BORING	#: C-74		Sheet	2 of 2
		C/T):	K	ARWICK			tabase ID #	:		
RIC		00000	IXCIII / W	FAP#:		Date Start			e <b>End</b> : 4/	20/18
	# . lge/Ro		Bayside			N Coord.			Ft.	
	_	nsult (		don Archiba	ld Inc	E Coord.			Ft.	
	0	onsult			Boring Contractors		urface Elev	Ft.: 0	.0	
		Name/	-		Gordon Archibald	Elevation		IGVD29		
				un Booly / C	JOI GOIL I TANNOWIN					
Desc	riptio	Location: Arl	ington Aver	nue		***	G 1		4.4	
Samp				ioil sampler coi nmer, 30'' fall.	nsists of a 2 in. split spoon	Date	Time	vater Obse Depth	Casing at	Stab. Time
Casin	ur. 19: Unk	ess other	wise noted, ca	sing is driven t	sing 300 lb hammer,	04/20/18	00:00	5	casing at	0.25 hr
	falli	ng 24 in.				0 // 20/ 00		-		
	ig Size:		CAMPI ED	HS Auger	X					R
D E P	CB AL		SAMPLER Pen/ Depth	Blows	SOIL AND ROCK SAMPI	E DESCRIPTION	l Depth	_	STRATUM	R E M
P T	S O I W	Type & Number	Rcy.	per 6 in.	Burmister Soil Classifi	cation System	of Stratum		DESCRIPTION	A
Н	NS	TAGINOCI	Core Rcy. & RQD	(Coring min/ft) [Downpress psi]			Change			R
Ft.	G /Ft.	00.0		b. 200 bayl	Day brown FINE CAND	ma coorea cond	0.2	ACDUALT	ROADWAY	S
_		SS-0	60/0 0.0		Dry, brown FINE SAND, so trace gravel, trace silt.	ome coarse sand,	0.3/	ADETIAL!	NOUND ANY I	
-										
-										
5			5.0							
3-		SS-0	60/0		Wet, dense, brown-gray FIN	IE SAND, some				
-					coarse sand and gravel, trace	e silt.				
1										
10			10.0						_	
								FINE SAN	D	
							12.0	D-#		
								Bottom of I	Exploration = 12	
15										
:4										
20										
20_										
:=										
25										
=										
30	to 10.0	.:1 A	ing							
<u>U</u>	10 <u>10 Sc</u>	oil Auger	mR							
REI	MARKS	S:								
					140# Wt x 30" fall on 2" (	OD SS Samoler	1			
Prop	ortions	Used	Sampler T	Type Cohe		esive Consister	ıcy			
trac	e 0 to	10%	SS - Split S	spoon 0	10 210011	-4 Soft	RIC#:	00000		
little		20%	UT - Shelby UP - Fixed P	Tube 10 Position 30		- 8 Firm 15 Stiff	Boring N		10000	
and		50%	C - Rock		0 + Very Dense 15	- 30 Very Sti		1	4/20/18	
					30	)+ Hard	Databas	e ID No. :		

RIDOT P	•		Sewer System	n	BORING # RIDOT Da		·	Sheet _	2 of
Location RIC#:			VARWICK FAP#:		RIDOT Da  Date Start			e End : 6/	8/18
Ric # . Bridge/Ro		Bayside			N Coord.:		Dat	Ft.	0/10
Design Co			don Archiba	ld. Inc.	E Coord.:	0		Ft.	
Geotech (				Boring Contractors	Ground Su	rface Elev	., Ft. : 0	0.0	
Inspector	Name/	Co.: Br	yan Deely / C	Gordon Archibald	Elevation I	Datum <u>N</u>	NGVD29		
Borehole	Locatio	n							· · · · · · · · · · · · · · · · · · ·
		ington Ave							
				ısists of a 2 in. split spoon			vater Obse		[O. 1. 001
			mmer, 30" fall. Ising is driven u	sing 300 lb hammer,	<b>Date</b> 06/08/18	Time 00:00	Depth 5	Casing at	<b>Stab. Ti</b> 0.25 h
fall	ing 24 in.		· ·		00/00/10	00.00	,		0.23 11
Casing Size:	4 in	T O A A ADV ED	HS Auger	X					
D CB E AL P SO		SAMPLER Pen/ Depth	Blows per 6 in.	SOIL AND ROCK SAMP		Depth	_	STRATUM	
P SO T IW	Type & Number	Rcy. Core Rcy.	(Coring min/ft)	Burmister Soil Classif	ication System	of Stratum	Ι	DESCRIPTION	
H NS Ft. G/Ft.		& RQD	[Downpress psi]			Change			
	SS-1	24/12 0.0	6-13-8-10	Dry, medium dense, brown-	gray FINE SAND,	0.3/	ASPHALT/	ROADWAY	
j		2.0		some coarse sand and grave	l, trace silt.		***************************************		
_									
5_	SS-2	24/16	12-28-19-18	Wet, dense, gray FINE SAN	ND, trace coarse				
1		7.0		sand and gravel, trace silt.					
]									
									İ
10_	SS-3	10.0 24/18	4-8-12-9	Wet, medium dense, gray-b	rown FINE SAND.				
1		12.0		some coarse sand and grave weathered bedrock fragmen	l, trace silt, trace	12.0			
				weathered bedrock fragmen	G.		Bottom of E	Exploration = 12'	
_									
15_									
1									
20_									
1	ļ								
]									
25_									
1									The state of the s
]									
20 -									
30	il Deire	Cooin					·		
0 to 12 Sc	Driven	Casing				Williams to	***************************************		
REMARKS	<b>5:</b>								
				140# Wt x 30" fall on 2" C	DD SS Sampler	1			
Proportions	I	Sampler T		ionless Density Cohe	sive Consistency				
trace 0 to 1 little 10 to		SS - Split Sp UT - Shelby		10 Loose 0 - - 30 Medium Dense 4 -		RIC#:	00000	OLAHOP.	
some 20 to	35%	UP - Fixed Po	osition   30 -	- 50 Dense 8 -	15 Stiff	Boring No Date Com		/8/18	
and 35 to	50%	C - KOCK C	Core 50	+ Very Dense 15 - 30		Database			<del> </del>

Loca RIC Brid Desi Geot Insp Bore Desc Samp	tion ( #: ge/Ro gn Co tech C ector chole l criptio	nless othe	Bayside  Co.: Gore  Co.: Ne  Co.: Gar  n ngton Ave er wise noted, seen using a 140 wise noted, ca	don Archib w England ry Fortier /	bald, Inc. d Boring Contractors GZA GeoEnvironmental, consists of a 2 in. split	RIDOT I Date Star N Coord E Coord Ground	Data rt: .: Surf n Da	6/5/18 0 0 face Elev.	Date	Ft. Ft.	2 of	<b>'ime</b>
D E P T H Ft.	CB AL SO IW NS G/Ft.	Type & Number	SAMPLER Pen/ Depth Rcy. Core Rcy. & RQD	Blows per 6 in. (Coring min/i [Downpress p	Dry. brown-gray FINE SAN	cation System		Depth of Stratum Change		STRATUM ESCRIPTION ROADWAY		R E M A R K S
10_ 15_ 20_ 25_	5_			sand and gravel, trace silt.  Wet, gray FINE SAND, trace gravel, trace silt, trace weath	ce coarse sand an hered bedrock.	ad	10.0		ered BEDROCK			
_				mples taken,	samples off auger flights.							
trac	portions te 0 to to 10 to te 20 to	10% o 20%	Sampler T SS - Split S UT - Shelby UP - Fixed P C - Rock (	Tube Position	0 - 10 Loose 0 - 10 - 30 Medium Dense 4 - 30 - 50 Dense 8 - 50 + Very Dense 15 - 15 - 15 - 15 - 15 - 15 - 15 - 15	OD SS Sampler esive Consist - 4 Soft - 8 Firm 15 Stiff - 30 Very S	ency t n f Stiff	RIC#: Boring N Date Con Database	npleted:	5/5/18		

•	,											
NEB	C LO	G B	ayside Sew	er System			BORING		C-77		Sheet _	2_ of _2_
Loca	tion (	C/T):	Kent / W	ARWICI			NEBC Da				73 1 6/2	C/10
RIC		00000		FAP	#:		Date Star		5/16/18	Date	_	16/18
	ge/Ro		Bayside			_	N Coord.	-	0		Ft.	
	_	nsult C	-	don Arch			E Coord.		0	., Ft.: 0.		
		onsult				ring Contractors	Ground S Elevation			., Ft. : _0. IGVD29	U	
Insp	ector ]	Name/	Co.: Bry	an Deely	/ Gor	don Archibald	Lievation	Dat	um 1	10 1029		
Desc	riptio	.ocatio n: Arli	ngton Aver	nue						4 01	4	
Samp	ler: Un	less othe	rwise noted, s g a 140 lb har	soil sample	consis	ts of a 2 in. split spoon	Date		ime	vater Obse Depth	Casing at	Stab. Time
Casin	arı v: Unle	ven usın; ss otherv	g a 140 ib nai wise noted, ca	niner, 30 sing is driv	en usin	g 300 lb hammer,	05/16/21		0:00	5		0.25 hr
Cabin		ng 24 in.	,									
Casin	g Size:	4 in		HS Auger	r _ >	<u>X</u>						R
Ď	CB AL		SAMPLER Pen/ Depth	Blows		SOIL AND ROCK SAMPL	E DESCRIPTION	N	Depth	•	STRATUM	E M
D E P T	S O I W	Type & Number	Rcy.	per o m		Burmister Soil Classifi	cation System		of Stratum	L	ESCRIPTION	A
H	NS	INUMINUCI	Core Rcy. & RQD	(Coring min					Change			R K S
Ft.	G /Ft.	SS-1	24/15 0.0	5-6-9-6		Dry, medium dense, brown	COARSE SAND		0.5	ASPHALT/	ROADWAY	1
-	18 20	22-1	0.0	3-0-5-0	´   å	and ravel, trace fine sand,						
1	25		2.0									•
-	77											
5	91		5.0				CINE (					1.
	69	SS-2	24/18	36-48-41	-44	Dry, very dense, gray FINE sand and gravel, trace silt.	SAND, trace coar	rse				
	85		7.0									
4	110 125											
10	141		10.0									
10_	101	SS-3	24/12	55-70-79	-91	Wet, very dense, gray FINE sand and gravel, trace silt ar	SAND, trace coa	arse				
	112		12.0	-		bedrock fragments.	d welldiered		12.0	Bottom of e	exploration - 12'	
										Dottoin or c	Aproration 12	
100												
15_												
-												
20_												
12					1							
					1							
	=											
25_												
-	-											
-												
1.4												
30												
0	to <u>2</u> So	l Driven	Casing									
RE	MARK	S: 1. Ins	stalled monitor	ing well at	12'							
		J. 1. 11.										
-						140# Wt x 30" fall on 2"	OD SS Sampler					
	portions		Sampler	- J L		onless Density Coh	esive Consist					
trac littl	e 0 to	10% o 20%	SS - Split UT - Shelb		0 - 1 10 - 1	. 20000	-4 Soft		RIC#:	00000		
som	ie 20 t	o 35%	UP - Fixed	Position	30 -	50 Dense 8	- 15 Stiff	Ť	Boring I Date Co	No.: C-77 mpleted:	5/16/18	
and	35 t	o 50%	C - Rock	Core	50		- 30 Very S 0 + Har			se ID No. :		

En .										
NEB	C LO	G B	ayside Sewe	er System		BORING #			Sheet _	2_ of _2_
Loca	tion (	C/T):	Kent / W	ARWICK		NEBC Data			201 1 4//	10/10
RIC	-	00000		FAP #		Date Start		Date	End: <u>4/2</u> Ft.	20/18
	ge/Ro		Bayside	1 4 1 7	11 T .	N Coord.: E Coord.:	0		= Ft.	
		nsult C		don Archiba		Ground Su		Et : 0	.0	
_		onsult			Boring Contractors  Gordon Archibald	Elevation I		IGVD29		
		Name/		all Deely /	Jordon Archibaid					
Desc	riptio	Locatio n: Arli	ngton Aver	nue			Croundy	vater Obse	ervations	
Samp	ler: Un	less othe	rwise noted, s o a 140 lb har	oil sampler co nmer, 30" fall	nsists of a 2 in. split spoon	Date	Time	Depth	Casing at	Stab. Time
Casin	g: Unle	ess other	wise noted, ca	sing is driven	using 300 lb hammer,	04/20/18	00:00	5		0.25 hr
Cosin	falli g Size:	ng 24 in.		HS Auger	X					
	CB		SAMPLER			LE DESCRIPTION	Douth		STRATUM	R E
D E P T	AL SO	Type &	Pen/ Depth	Blows per 6 in.	SOIL AND ROCK SAMP Burmister Soil Classif	ication System	Depth of	Γ	DESCRIPTION	MA
Ţ	ΙW	Number	Rcy. Core Rcy.	(Coring min/ft)	,	-	Stratum Change			R K S
H Ft.	NS G/Ft.		& RQD	[Downpress psi				ACIDITATO	/DOADWAY	S
		SS-0	60/0 0.0		Dry, brown FINE SAND, s trace gravel, trace silt.	ome coarse sand,	0.3/	ASPHALT	ROADWAY	1
5			5.0							
		SS-0	60/0		Wet, dark brown gray FINE coarse sand and gravel, trac	E SAND, some				
1										
10			10.0					EDUC OAN	D	
							10.0	FINE SAN	D	
							12.0	Bottom of	Exploration = 12	
3										
15										
-										
:=										
-										
20										
_										
25										
-	1									
3										
- 64	1									
30										
0	to <u>10</u> S	oil Auger	ring							
RE	MARK	<b>S:</b> 1. No	split spoons s	ampling. Off	augers.					
					140# Wt x 30" fall on 2"					
	portion		Sampler			hesive Consister ) - 4 Soft	•	00000		
	ce 0 to le 10 t		SS - Split UT - Shelb	y Tube	10 - 30 Medium Dense 4	-8 Firm	RIC#: Boring		3	
	ne 20 t		UP - Fixed C - Rock	Position		- 15 Stiff 5 - 30 Very Sti	iff Date Co	mpleted:	4/20/18	
anc	. <i>3</i> 51	0/ UC U.	C - MUCK	2010		30 + Hard	Databa	se ID No.:		

RIDOT Project   Rent / WARWICK   RIC # : 00000   FAP # :   Date End : 0/15/18   Date End :												
Bridge/Road #:   Bayside   Shright   Bridge/Road #:   Bayside   Shright   Bridge/Road #:   Bayside   Shright   Shr	RIDO	OT Pr	oject	Bayside S	Sewer Warw	ick RI - Various locations	-	-		Sheet _	2 of	2_
Bridge/Road #:   Bayside   No Coord. : 0   Ft.	Loca		•	Kent / W			_					
Design Consult Co. :   Gordon Archibald Inc.   Geotech Consult Co. :   New England Boring Contractors					FAP#:		_		8Dat	-	15/18	
Second Surface Elev., Fr. : 0.0   Surface Elev., Fr. : 0.0	•	_			1 4 1 11	11.7	-	-				
Descriptions   Used   Arington   Avenue   Sampler   Unions otherwise noted, calling   Sire   Unions otherwise noted, calling   Sire   Unions otherwise noted, calling   Sire   Unions otherwise noted, calling   Sire   Unions otherwise noted, calling   Sire   Unions otherwise noted, calling   Sire   Unions otherwise noted, calling   Sire   Unions otherwise noted, calling   Sire   Unions otherwise noted, calling   Sire   Unions otherwise noted, calling   Sire   Unions otherwise noted, calling   Sire   Unions otherwise noted, calling   Sire   Unions otherwise noted, calling   Sire   Unions otherwise noted, calling   Sire   Unions otherwise noted, calling   Sire   Unions otherwise noted, calling   Sire   Unions otherwise noted, calling   Sire   Unions otherwise noted, calling   Sire   Unions otherwise noted, calling   Sire   Unions otherwise noted, calling   Sire   Unions otherwise noted, calling   Sire   Unions otherwise noted, calling   Sire   Unions otherwise noted, calling   Sire   Unions otherwise noted, calling   Sire   Unions otherwise noted, calling   Sire   Unions otherwise noted, calling   Sire   Unions otherwise noted, calling   Sire   Unions otherwise noted, calling   Sire   Unions otherwise   Unions otherwise   Unions otherwise   Unions otherwise   Unions otherwise   Unions otherwise   Unions otherwise   Unions otherwise   Unions otherwise   Unions otherwise   Unions otherwise   Unions otherwise   Unions otherwise   Unions otherwise   Unions otherwise   Unions otherwise   Unions otherwise   Unions otherwise   Unions otherwise   Unions otherwise   Unions otherwise   Unions otherwise   Unions otherwise   Unions otherwise   Unions otherwise   Unions otherwise   Unions otherwise   Unions otherwise   Unions otherwise   Unions otherwise   Unions otherwise   Unions otherwise   Unions otherwise   Unions otherwise   Unions otherwise   Unions otherwise   Unions otherwise   Unions otherwise   Unions otherwise   Unions otherwise   Unions otherwise   Unions otherwise   Unions otherwise   Unions otherwise   Unions o	_	-							TF+ O			
Description: 104 Artington Avenue   Sampler tonsists of a 2 in split   Spoon driven using a 140 th hammer, 30° fall.   Date   Time   Depth   Casing at 18tab. Time   Spoon driven using a 140 th hammer, 30° fall.   Od   Od   Od   Od   Od   Od   Od   O				-						.0		
Descriptions   104 Artington Avenue   Sampler tonsists of a 2 in. split   Spoon driven using a 140 lb hammer, 30° fall.   Date   Time   Depth   Casing at   Stab. Time   O6/15/18   O0:00   7.5	ınspe	ctor	чише/ч	JU. : _1.	r lattic / GZA	GCOLITY II OIIII CHIAI, III C.	Elevation					
Sampler   Unless otherwise noted, and sampler consists of a 2 in. split   Date   Time   Depth   Casing at   Stab. Time   Casing to driven using a 10 ble hammer, and the property of the split   Date   Time   Depth   Casing at   Stab. Time   Date   Time   Depth   Casing at   Stab. Time   Date   Time   Depth   Casing at   Stab. Time   Date   Time   Depth   Date   D												
Section   Casing State   Section						neiete of a 7 in enlit		Groundy	vater Obse	ervations		
Casing Size	•	SDO	on drive	en using a 140	) lb hammer, 3	0" fall.		Time	Depth			
Casing Size:	Casing				asing is driven	using 300 lb hammer,	06/15/18	00:00	7.5		0.25	hr
Depth   STATUM   Depth   Pow	Casing		ng 24 in.		HS Auger	х						
SS-1				SAMPLER			D DECORIDEROS	I D. d		OTD ATLINA		R
SS-1	Ē	AL	Type &						r			M
SS-1	Ť	IW		Core Rcy.								R
SS-2   24/16   6-4-7-10   SS-3   24/16   9-12-26-43   Dry, medium dense, brown FINE SAND, some coarse sand, trace gravel, trace sit.	Ft.			1								S
SS-2   24/16   6-4-7-10   2-26-43   3-15-19-15   3-26-43   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-3   3-26-			SS-1	24/12 0.0	24-9-10-7	Dry, medium dense, dark bro	own FINE SAND, vel.	0.1			/	
SS-3   24/16   9-12-26-43   Dry, dense, brown FINE SAND, some coarse sand, trace gravel, trace silt.   Dry, dense, brown FINE SAND, some silt, trace coarse sand, trace gravel, trace silt.   Wet, dense, dark brown FINE SAND, some silt, trace coarse sand, trace obles.   Wet, dense, dark brown FINE SAND, some silt, trace coarse sand, trace obles.   Wet, dense, dark brown FINE SAND, some silt, trace coarse sand, trace gravel.   Trace obles.   Trace obles.   Wet, dense, dark brown FINE SAND, some coarse sand, trace gravel.   Trace obles.   Wet, dense, dark brown FINE SAND, some coarse sand, trace gravel.   Trace obles.   Wet, dense, dark brown FINE SAND, some coarse sand, trace gravel.   Trace obles.   Wet, dense, dark brown FINE SAND, some coarse sand, trace gravel.   Trace obles.   Wet, dense, dark brown FINE SAND, some coarse sand, trace gravel.   Trace obles.   Wet, dense, dark brown FINE SAND, some coarse sand, trace gravel.   Trace obles.   Wet, dense, dark brown FINE SAND, some coarse sand, trace gravel.   Trace obles.   Wet, dense, dark brown FINE SAND, some coarse sand, trace gravel.   Trace obles.   Wet, dense, dark brown FINE SAND, some coarse sand, trace gravel.   Trace obles.   Wet, dense, dark brown FINE SAND, some coarse sand, trace gravel.   Trace obles.   Wet, dense, dark brown FINE SAND, some coarse sand, trace gravel.   Trace obles.   Wet, dense, dark brown FINE SAND, some coarse sand, trace gravel.   Trace obles.   Wet, dense, dark brown FINE SAND, some coarse sand, trace gravel.   Trace obles.   Wet, dense, dark brown FINE SAND, some coarse sand, trace gravel.   Trace obles.   Wet, dense, dark brown FINE SAND, some coarse sand, trace gravel.   Trace obles.   Wet, dense, dark brown FINE SAND, some coarse sand, trace gravel.   Trace obles.   Wet, dense, dark brown FINE SAND, some coarse sand, trace gravel.   Trace obles.   Wet, dense, dark brown FINE SAND, some coarse sand, trace gravel.   Trace obles.   Trace obles.   Wet, dense, dark brown FINE SAND, some coarse sand, trace gravel.   Trace obl	-		\$52		6-4-7-10			e l				
SS-3   24/16   9-12-26-43   0.0/3"   SS-4   32   6.3   100/3"   SS-5   24/18   13-15-19-15   10.0   SS-5   24/14   12.0   13-16-18-21   Wet, very dense, thrown FINE SAND, some sind, trace coarse sand, trace coarse sand, trace gravel, trace silt.   Wet, very dense, thrown FINE SAND, some sit, trace coarse sand, trace gravel, trace silt.   Wet, very dense, thrown FINE SAND, some silt, some coarse sand, trace gravel, trace silt.   Wet, dense, dark brown FINE SAND, some silt, some coarse sand, trace gravel, trace silt.   Wet, dense, dark brown FINE SAND, some sand, trace gravel, trace silt.   Wet, dense, dark brown FINE SAND, some coarse sand, trace gravel, trace silt.   Wet, dense, dark brown FINE SAND, some coarse sand, trace gravel, trace silt.   Wet, dense, dark brown FINE SAND, some coarse sand, trace gravel, trace silt.   Wet, dense, dark brown FINE SAND, some coarse sand, trace gravel, trace silt.   Wet, dense, dark brown FINE SAND, some coarse sand, trace gravel, trace silt.   Wet, dense, dark brown FINE SAND, some coarse sand, trace gravel, trace silt.   Wet, dense, dark brown FINE SAND, some coarse sand, trace gravel, trace silt.   Wet, dense, dark brown FINE SAND, some coarse sand, trace gravel, trace silt.   Wet, dense, dark brown FINE SAND, some coarse sand, trace gravel, trace silt.   Wet, dense, dark brown FINE SAND, some coarse sand, trace gravel, trace silt.   Wet, dense, dark brown FINE SAND, some coarse sand, trace gravel, trace silt.   Wet, dense, dark brown FINE SAND, some coarse sand, trace gravel, trace silt.   Wet, dense, dark brown FINE SAND, some coarse sand, trace gravel, trace silt.   Wet, dense, dark brown FINE SAND, some coarse sand, trace gravel, trace silt.   Wet, dense, dark brown FINE SAND, some coarse sand, trace gravel, trace silt.   Wet, dense, dark brown FINE SAND, some coarse sand, trace gravel, trace silt.   Wet, dense, dark brown FINE SAND, some coarse sand, trace gravel, trace silt.   Wet, dense, dark brown FINE SAND, some coarse sand, trace gravel, trace silt.   Wet, den	-		55-2		0-47-10	coarse sand, trace gravel, tra	ce silt.					
SS-4   3/2   6.3   100/3"   8.0   13-15-19-15   SS-5   24/18   13-15-19-15   SS-5   24/14   12.0   13-16-18-21   Wet, dense, dark brown FINE SAND, some sitt, some coarse sand, trace gravel.   Wet, dense, dark brown FINE SAND, some coarse sand, trace gravel.   Wet, dense, dark brown FINE SAND, some coarse sand, trace gravel, trace sit.   Some sand, trace gravel, trace sit.   Wet, dense, dark brown FINE SAND, some coarse sand, trace gravel, trace sit.   Wet, dense, dark brown FINE SAND, some coarse sand, trace gravel, trace sit.   Wet, dense, dark brown FINE SAND, some coarse sand, trace gravel, trace sit.   Wet, dense, dark brown FINE SAND, some coarse sand, trace gravel, trace sit.   Wet, dense, dark brown FINE SAND, some coarse sand, trace gravel, trace sit.   Wet, dense, dark brown FINE SAND, some coarse sand, trace gravel.   Wet, dense, dark brown FINE SAND, some coarse sand, trace gravel.   Wet, dense, dark brown FINE SAND, some coarse sand, trace gravel.   Wet, dense, dark brown FINE SAND, some coarse sand, trace gravel.   Wet, dense, dark brown FINE SAND, some coarse sand, trace gravel.   Wet, dense, dark brown FINE SAND, some coarse sand, trace gravel.   Wet, dense, dark brown FINE SAND, some coarse sand, trace gravel.   Wet, dense, dark brown FINE SAND, some coarse sand, trace gravel.   Wet, dense, dark brown FINE SAND, some coarse sand, trace gravel.   Wet, dense, dark brown FINE SAND, some coarse sand, trace gravel.   Wet, dense, dark brown FINE SAND, some coarse sand, trace gravel.   Wet, dense, dark brown FINE SAND, some coarse sand, trace gravel.   Wet, dense, dark brown FINE SAND, some coarse sand, trace gravel.   Wet, dense, dark brown FINE SAND, some coarse sand, trace gravel.   Wet, dense, dark brown FINE SAND, some coarse sand, trace gravel.   Wet, dense, dark brown FINE SAND, some coarse sand, trace gravel.   Wet, dense, dark brown FINE SAND, some coarse sand, trace gravel.   Wet, dense, dark brown FINE SAND, some coarse sand, trace gravel.   Wet, dense, dark brown FINE SAND, some coarse sa	5_		SS-3	24/16	9-12-26-43	Dry, dense, brown FINE SA sand, trace gravel, trace silt.	ND, some coarse					
SS-5   24/18   13-15-19-15   slit, some coarse sand, trace gravel, trace slit.   Wet, dense, dark brown FINE SAND, some coarse sand, trace gravel, trace slit.   Wet, dense, dark brown FINE SAND, some coarse sand, trace gravel, trace slit.   Wet, dense, dark brown FINE SAND, some coarse sand, trace gravel, trace slit.   Bottom of Exploration = 12	1		SS-4	3/2 6.3	100/3"	Wet, very dense, brown FIN silt, trace coarse sand, trace of	E SAND, some cobbles.					
13-16-18-21   Wet, dense, dark brown FINE SAND, some coarse sand, trace gravel, trace silt.   12.0   Bottom of Exploration = 12	1		SS-5	24/18	13-15-19-15	Wet, dense, dark brown FIN silt, some coarse sand, trace	E SAND, some gravel.					
12.0	10	10.0										
20				12.0		,	12.0	Bottom of E	Exploration = 12		4 1	
25	4											
25	15											
25												
25	-											1 1
25	-											
25	20											
Q to 12 Soil Augering  REMARKS:    Proportions Used trace 0 to 10% little 10 to 20% some 20 to 35% up - Fixed Position and 35 to 50%   UP - Fixed Position C - Rock Core   50+ Very Dense   15 - 30   Very Stiff   Date Completed : 6/15/18   6/15/18   6/15/18   10 to 20%   10 - 10   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 2												
Q to 12 Soil Augering  REMARKS:    Proportions Used trace 0 to 10% little 10 to 20% some 20 to 35% up - Fixed Position and 35 to 50%   UP - Fixed Position C - Rock Core   50+ Very Dense   15 - 30   Very Stiff   Date Completed : 6/15/18   6/15/18   6/15/18   10 to 20%   10 - 10   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 2	]											
Q to 12 Soil Augering  REMARKS:    Proportions Used trace 0 to 10% little 10 to 20% some 20 to 35% up - Fixed Position and 35 to 50%   UP - Fixed Position C - Rock Core   50+ Very Dense   15 - 30   Very Stiff   Date Completed : 6/15/18   6/15/18   6/15/18   10 to 20%   10 - 10   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 2	12-											
Q to 12 Soil Augering  REMARKS:    Proportions Used trace 0 to 10% little 10 to 20% some 20 to 35% up - Fixed Position and 35 to 50%   UP - Fixed Position C - Rock Core   50+ Very Dense   15 - 30   Very Stiff   Date Completed : 6/15/18   6/15/18   6/15/18   10 to 20%   10 - 10   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 20   10 - 2	25											
Q to 12 Soil Augering           REMARKS:           140# Wt x 30" fall on 2" OD SS Sampler           Proportions Used trace 0 to 10% little 10 to 20% little 10 to 20% some 20 to 35% and 35 to 50% C - Rock Core         Sampler Type Cohesionless Density Cohesive Consistency Cohesionless Density Cohesive Consistency Double 4 - 8 Firm 30 - 50 Dense 8 - 15 Stiff Date Completed: 6/15/18	20											
Q to 12 Soil Augering           REMARKS:           140# Wt x 30" fall on 2" OD SS Sampler           Proportions Used trace 0 to 10% little 10 to 20% little 10 to 20% some 20 to 35% and 35 to 50% C - Rock Core         Sampler Type Cohesionless Density Cohesive Consistency Cohesionless Density Cohesive Consistency Double 4 - 8 Firm 30 - 50 Dense 8 - 15 Stiff Date Completed: 6/15/18	]											1 1
Q to 12 Soil Augering           REMARKS:           140# Wt x 30" fall on 2" OD SS Sampler           Proportions Used trace 0 to 10% little 10 to 20% little 10 to 20% some 20 to 35% and 35 to 50% C - Rock Core         Sampler Type Cohesionless Density Cohesive Consistency Cohesionless Density Cohesive Consistency Double 4 - 8 Firm 30 - 50 Dense 8 - 15 Stiff Date Completed: 6/15/18	-											
Q to 12 Soil Augering           REMARKS:           140# Wt x 30" fall on 2" OD SS Sampler           Proportions Used trace 0 to 10% little 10 to 20% little 10 to 20% some 20 to 35% and 35 to 50% C - Rock Core         Sampler Type Cohesionless Density Cohesive Consistency Cohesionless Density Cohesive Consistency Double 4 - 8 Firm 30 - 50 Dense 8 - 15 Stiff Date Completed: 6/15/18	30											
The image		12 So	il Augeri	ng								
Trace 0 to 10%   SS - Split Spoon   UT - Shelby Tube   Some 20 to 35%   UP - Fixed Position   and 35 to 50%   C - Rock Core   Sampler Type   Tade   140# Wt x 30" fall on 2" OD SS Sampler   Cohesionless Density   Cohesive Consistency   Cohesionless Density   Cohesive Consistency   Cohesionless Density   Cohesive Consistency   Cohesionless Density   Cohesive Consistency   Cohesionless Density   Cohesive Consistency   Cohesionless Density   Cohesive Consistency   Cohesionless Density   Cohesive Consistency   Cohesionless Density   Cohesive Consistency   Cohesionless Density   Cohesive Consistency   Cohesionless Density   Cohesive Consistency   Cohesionless Density   Cohesionless Density   Cohesive Consistency   Cohesionless Density   Cohesionless Density   Cohesionless Density   Cohesionless Density   Cohesionless Density   Cohesionless Density   Cohesive Consistency   Cohesionless Density   Cohesionless Density   Cohesive Consistency   Cohesionless Density   Cohesionless Density   Cohesionless Density   Cohesionless Density   Cohesionless Density   Cohesionless Density   Cohesionless Density   Cohesionless Density   Cohesionless Density   Cohesionless Density   Cohesionless Density   Cohesionless Density   Cohesionless Density   Cohesionless Density   Cohesionless Density   Cohesionless Density   Cohesionless Density   Cohesionless Density   Cohesionless Density   Cohesionless Density   Cohesionless Density   Cohesionless Density   Cohesionless Density   Cohesionless Density   Cohesionless Density   Cohesionless Density   Cohesionless Density   Cohesionless Density   Cohesionless Density   Cohesionless Density   Cohesionless Density   Cohesionless Density   Cohesionless Density   Cohesionless Density   Cohesionless Density   Cohesionless Density   Cohesionless Density   Cohesionless Density   Cohesionless Density   Cohesionless Density   Cohesionless Density   Cohesionless Density   Cohesionless Density   Cohesionless Density   Cohesionless Density   Cohesionless Density   Cohesionless Density   Cohesionless De											-	
Proportions Used   Sampler Type   Cohesionless Density   Cohesive Consistency	REM	ARKS	:									
Proportions Used   Sampler Type   Cohesionless Density   Cohesive Consistency						140# Wt x 30" fall on 2" O	D SS Sampler	T				
little       10 to 20%       UT - Shelby Tube       10 - 30       Medium Dense       4 - 8       Firm         some       20 to 35%       UP - Fixed Position       30 - 50       Dense       8 - 15       Stiff         and       35 to 50%       C - Rock Core       50 +       Very Dense       15 - 30       Very Stiff	Propo	rtions	Used	Sampler T	ype Cohes	sionless Density Cohe	sive Consisten	cy				
some 20 to 35% UP - Fixed Position and 35 to 50% C - Rock Core S0 + Very Dense S - 15 Stiff Very Stiff Date Completed: 6/15/18				SS - Split S								
and 35 to 30% C- Rock Core 30 ' very bease 15-50 ' very bease 15-50	some	20 to	35%	UP - Fixed P	osition 30	- 50 Dense 8 - 1	5 Stiff	Dota Com		5/15/18		
	and	<i>3</i> 5 to	50%	C - Rock (	ore 5							

	а										
NEB	C LO	G Ba	ayside Sewe			BORING		C-80		Sheet _	2 of 2
Loca	tion (	<b>C/T)</b> :	Kent / W	ARWICK		NEBC Da				End: 4/2	20/18
RIC	-	00000		FAP #	<u></u>	Date Star	1.5	4/20/18	Date	Ft	20/10
		ad # :	Bayside		11 T	<ul><li>N Coord.</li><li>E Coord.</li></ul>				Ft.	
		nsult C		don Archib		Ground S	_		. Ft.: 0.		
		onsult		w England	Boring Contractors Gordon Archibald	Elevation			GVD29		
Insp	ector	Name/	Co.: Bry	an Deely /	Gordon Archibaid	Licyation	Duci		0 ( )		
Bore	hole l	Locatio	<b>n</b> ngton Aven	iue						_	
Samp	ler: Ur	less othe	rwise noted, s	oil sampler o	onsists of a 2 in. split spoon	Date		roundy me	vater Obse Depth	rvations Casing at	Stab. Time
Casin	g: Unl	ess other	g a 140 lb han wise noted, ca	nmer, 30" fa sing is drive	ll. a using 300 lb hammer,	04/20/18		0:00	10	casing at	0.25 hr
Casin	falli g Size:	ng 24 in.		HS Auger	_X						R
D	СВ		SAMPLER	Blows	SOIL AND ROCK SAMP	LE DESCRIPTIO	N	Depth		STRATUM	E
F	A L S O	Type &	Pen/ Depth Rcy.	per 6 in.	Burmister Soil Classif	fication System		of Stratum	Γ	ESCRIPTION	A
P T H	Î W N S	Number	Core Rcy. & RQD	(Coring min/f	1)			Change			A R K
Ft.	G/Ft.			[Downpress p		was accorded and a	nd	0.5	ASPHALT	RAODWAY	S 1
		SS-1	60/60 0.0		Dry, brown FINE SAND, t gravel, trace silt.	race coarse sand a	iiu	U.2/	FINE SAN	D	
							1				
-	5.0										
5			5.0					5.0	DD ID OANI	n	
3	SS-2 60/60 Wet, brown-gray FI sand and gravel, trac					ND, trace coarse			FINE SAN	D	
					Sand and graves, added site						
			10.0					10.0			
10_		-	10.0						FINE SAN	D	
-								12.0	Dattom of	Exploration - 12	
									Bottom of	Exploration = 12	
15_	-										
1 -											
1											
20_											
	-										
	-										
	-										
25											
	-										
30											
	ni [†]										
RE	MARI	<b>(S:</b> 1. N	o split spoon s	amples taken.	Off augers.						
					140# Wt x 30" fall on 2"	' OD SS Sampler					
Pro	portion	ns Used	Sampler	Туре	ohesionless Density Co	ohesive Consis	tency				
tra	ice 0 t	o 10%	SS - Split	Spoon	U - IU EGOSE	0 - 4 So: 4 - 8 Fir		RIC#:		<u> </u>	
		to 20% to 35%	UT - Shelt UP - Fixed	Position	30 - 50 Dense	8 - 15 Sti	ff	Boring Date C	No.: C-8 ompleted:	4/20/18	
an		to 50%	C - Rock	Core		5 - 30 Very 30 + Ha			se ID No. :		

			_						_		
NEB	C LO	G B	ayside Sewe			BORING		-81		Sheet _	2 of 2
Loca	tion (	C/T):	Kent / W	ARWICK		NEBC Da				TO. 1 . 4/	16/10
RIC		00000		FAP :	#:	Date Star		26/18	Date	End: 4/2 Ft.	26/18
	ge/Ro		Bayside		11 T	N Coord. E Coord.				Ft.	
		nsult C		don Archi		Ground S	_	Flow	Ft.: 0		
		onsult			d Boring Contractors / Gordon Archibald	Elevation			GVD29	.0	
		Name/		all Deely	Gordon Archibaid	LIC VACION					
Desc	riptio	Location: Gro	ve Avenue						4 Ob-		_
Samp	ler: Un	less othe	rwise noted, s g a 140 lb har	oil sampler	consists of a 2 in. split spoon	Date	Gro Time		ater Obse Depth	Casing at	Stab. Time
Casin	arı g: Unle	ess other	wise noted, ca	sing is drive	n using 300 lb hammer,	04/26/18	00:00		5		0.25 hr
		ng <b>24 in.</b> 4 in		HS Auger							"
D	СВ		SAMPLER	Blows	SOIL AND ROCK SAMP.	E DESCRIPTIO	N De	pth		STRATUM	R E
E P	AL SO	Type &	Pen/ Depth Rcy.	per 6 in.	Burmister Soil Classif			of	Γ	DESCRIPTION	M A
Ť H	I W N S	Number	Core Rcy. & RQD	(Coring min	ft)			atum ange			A R K
Ft.	G/Ft.			[Downpress	-	PINIT CANIL			ACDUALT	ROADWAY	S
	30	SS-1	24/16 0.0	20-8-10-1	2 Dry, medium dense, brown trace coarse san and graeve	gray FINE SAMI l, trace silt.	J,	0.3/	UNITALI	NOLD WAT	
-	35		2.0								
=	50 75										
5	59		5.0			-					
	32	SS-2	24/15	14-23-16-	wet, dense, gray FINE SAN and gravel, trace silt, trace	ND, trace coarse sa weathered shale.	and				
	51		7.0								
1=	40 43						ľ				
10	55		10.0								
10_	59	SS-3	24/17	22-25-31-	Wet, very dense, gray FINI sand and gravel, trace silt, to	E SAND, trace cos trace highly	arse				
	60		12.0		weathered shale.			12.0	Bottom of	Exploration= 12'	1
15											
1 1											
20											
	-										
	-										
25											
30	100	_II Do!	n Cogina								
_		oil Drive									
RE	MARK	S: 1. In:	stalled monitor	ing well at 1	Z'.						
					140# Wt x 30" fall on 2"						
	portion		Sampler	-JF-		hesive Consist  ) - 4 Sof		TC "	00000		
litt		o 20%	SS - Split UT - Shelb	y Tube	10 - 30 Medium Dense	1-8 Fire	m R	IC#: oring N	00000 lo.: C-81		
	ne 20 t		UP - Fixed C - Rock	Position Core		- 15 Stir 5 - 30 Very	Stiff D	ate Co	mpleted:	4/26/18	
and	ມ ນວາ	W JU /0	C - NUCK	0010		30 + Hai		atabas	e ID No.:		

NEB	C LO	G Ba	ayside Sewe	er System		BORING			Sheet _	2 of 2
Loca	tion (	C/T):	Kent / W	ARWICK		_	tabase ID #		T 1 4//	77/10
		00000		FAP#		Date Star	-	8 Dat		25/18
	ge/Ro		Bayside			N Coord.			— Ft. Ft.	
	_	nsult C		don Archiba		E Coord.	: <u>0</u> urface Elev	. 104 . O	.0	
		onsult	-		Boring Contractors	_ Ground S Elevation		v., Ft. : vGVD29	.0	
		Name/C		an Deely /	Gordon Archibald	Elevation	Datum 1	(0 102)		
		Location: Gro	n ve Avenue							
Samp	ler: Un	less othe	rwise noted, s	oil sampler co	onsists of a 2 in. split spoon	D.		water Obse	ervations Cosing of	Stab. Time
Casin	g: Unle	ess otherv	g a 140 lb har wise noted, ca	nmer, 30" fall sing is driven	using 300 lb hammer,	<b>Date</b> 04/25/18	<b>Time</b> 00:00	Depth 5	Casing at	0.25 hr
Casin	falli: g Size:	ng 24 in.		HS Auger	X					
	СВ		SAMPLER	Blows	SOIL AND ROCK SAMPI	E DESCRIPTIO	N Depth		STRATUM	R E M
D E P T	AL SO	Type &	Pen/ Depth	per 6 in.	Burmister Soil Classifi	ication System	of	I	DESCRIPTION	M A
Ţ	1 W	Number	Rcy. Core Rcy.	(Coring min/ft)	)		Stratum Change			R
H Ft.	NS G/Ft.		& RQD	[Downpress ps				A CIDATA A TO	VDO ATMITTE	Š
		SS-0	0.0		Dry, dark brown-gray, FINI coarse sand and gravel, trace	E SAND, some	0.3	ASPHALT	/ROADWAY	
					Course state and graves, and					
-										
-										
5_		SS-0	5.0		Wet, gray FINE SAND, litt	le coarse sand, tra	ce			
-		55 0			gravel, trace silt, trace weath	hered shale.				1
=										
-										1
10			10.0							
		SS-0	11.0		FINE SAND					
							12.0	Bottom of	Exploration = 12	•
-									•	
1,000										
15_										
20_										
10					-					
1.										
25										
	-									
30	+									
	to <u>10 S</u>	oil Auger	ing		•					
RE	MARK	S:								
					140# Wt x 30" fall on 2"	OD SS Sampler				
Pro	portion	s Used	Sampler	**	hesionless Density Col	hesive Consist	. 1			
	ce 0 to		SS - Split UT - Shelb	Spoon v Tube	0 10 20000	1-4 Sof 1-8 Firr	n Rorino		2	
sor	ne 201	to 35%	UP - Fixed	Position	30 - 50 Dense 8	- 15 Stif	f Boring	Completed:	4/25/18	
ane	d 351	to 50%	C - Rock	Core		5 - 30	Juli	ase ID No. :		

price and the second										
RIDOT P	roject			ck RI - Various locations				Sheet _	2 of _	2
Location		Kent / W	ARWICK		_	Database ID				
RIC#:	00000		FAP#:		Date Star		8 Dat	_	15/18	
Bridge/Ro		Bayside			N Coord.			Ft.		
Design Co			don Archibal		E Coord.		TP4 A	Ft.		
Geotech (		_		Boring Contractors	_	Surface Elev	NGVD29	.0		
Inspector	Name/	JO.: 1.	Plante / GZA	GeoEnvironmental, Inc.	Lievation	Datum	NG V D29			
Borehole	Locatio	n								
Description	on: 62 (	Grove Stree	t	1. 6 6 1 124		Cuound	water Obse	wations		
Sampler: U	nless othe	rwise noted, . en using a 146	soil sampler co ) Ib hammer, 3(	nsists of a 2 in. split	Date	Time	Depth		Stab. T	ime
Casing: Un	less other	wise noted, ca	sing is driven u	ising 300 lb hammer,	06/15/18	00:00	6.8		0.25	
	ing 24 in.		IIC Aman	<b>v</b> .						
Casing Size:	1	SAMPLER	HS Auger	<u>X</u>						R
D CB E AL P SO T IW H NS		Pen/ Depth	Blows per 6 in,	SOIL AND ROCK SAMPL Burmister Soil Classific		N Depth of		STRATUM ESCRIPTION		R E M
P SO T IW	Type & Number	Rcy. Core Rcy.	(Coring min/ft)	Bulliuster 3011 Classific	ation system	Stratum		Lberar Hor		A R K
H NS Ft. G/Ft.		& RQD	[Downpress psi]			Change				K
	SS-1	24/12 0.0	21-9-7-10	Dry, medium dense, dark bro		0.1		ROADWAY		
]		2.0		osme coarse sand, trace grav			FINE SANI			
	SS-2	24/14	21-27-63-95	Dry, very dense, gray-brown some coarse sand, some grav	rel, trace silt.					
-	SS-3	12/8 5.0	38-100	Highly weathered BEDROC		4.0	Highly wear	thered BEDROC	K	
5_	50-5	12/8 5.0 6.0	20.00	,						
1	SS-4	6/5 6.5	100	Highly weathered BEDROC	K.					
	SS-5	18/14 9.5	28-61-100	Highly weathered BEDROC	K					
10_	SS-6	12/10 11.0	95-100	Highly weathered BEDROC	K					
-		11.0				12.0				
							Bottom of E	Exploration = 12'		
15_						1				
7.4										li
]										
20_										
::4										
:-										
1	1									
25	1									
13-										
-										1 1
										1
30										
<u>Q</u> to <u>10.5</u>	Soil Auge	ring								
REMARK	S:									
				140# Wt x 30" fall on 2" O	D SS Sampler					-
Proportion	Used	Sampler T	ype Cohes	ionless Density Cohe		ncy				
trace 0 to	10%	SS - Split S	poon 0-	10 Loose 0		RIC#:	00000			
little 10 t some 20 t	0 35%	UT - Shelby UP - Fixed P	osition 30	- 50 Dense 8 - 1	5 Stiff	Boring P		/15/18		
and 35 t	0 50%	C - Rock C	ore 50	) + Very Dense 15		151	e ID No. :	- 10/10		

Loca RIC Brid Desig Geot Inspendence Bore Desc Samp	#: ge/Ro gn Co ector chole I criptio ler: Und drig: Unle	C/T): 00000 ad #: nsult C onsult Name/C Locatio n: Gro	Bayside  Co.: Gord  Co.: Ne  Co.: Bry  n  ve Avenue  rwise noted, s g a 140 lb han wise noted, cas	ARWICK FAP # don Archiba w England van Deely / oil sampler co	ald, Inc. Boring Contractors Gordon Archibald onsists of a 2 in. split spoon	BORING NEBC Da Date Star N Coord. E Coord. Ground S Elevation  Date 04/25/18	ataba rt: .: Surfa n Dat	4/25/18 0 0 nce Elev	B Date	End: 4/2 Ft. Ft.	2 of 2 25/18 Stab. Tip 0.25 hr	me
D E P T H Ft.	CB AL SO IW NS G/Ft.	Type & Number	SAMPLER Pen/ Depth Rcy. Core Rcy. & RQD	Blows per 6 in. (Coring min/ft [Downpress ps	SOIL AND ROCK SAMPL Burmister Soil Classifi  Dry, brown/gray FINE SAN and gravel, trace silt.	ication System		Depth of Stratum Change		STRATUM DESCRIPTION ROADWAY		R E M A R K S
5_ 10_ 15_ 20_ 25_ 30		SS-0	5.0		Wet, brown-gray FINE SAI sand, trace gravel, trace silt, shale.	ND, trace coarse trace weathered		12.0	Bottom of F	Exploration = 12		
-	MARK	oil Auger S:										
				n	140# Wt x 30" fall on 2"							
trac littl	portions ce 0 to e 10 t ne 20 t l 35 t	10% o 20%	Sampler T SS - Split S UT - Shelby UP - Fixed F C - Rock	Spoon Tube Position	0 - 10 Loose 0 10 - 30 Medium Dense 4 30 - 50 Dense 8 50 + Very Dense 15	- 4 Sof - 8 Firr - 15 Stift - 30 Very 5 0 + Har	ft m ff Stiff		00000 No.: C-84 empleted:	4/25/18		

NEB	C LO	G B	ayside Sewe	er System		BORING	;#:	C-85		Sheet	2_of_2_
		C/T):		ARWICK		NEBC Da	atab	ase ID#			
RIC	,	00000	TEOLIC / TV	FAP#	:	Date Star	rt :	4/26/18	Date	e End: 4/2	26/18
		ad #:	Bayside			N Coord.	. :	0		Ft.	
		nsult C		don Archib	ald Inc	E Coord.	. :	0		Ft.	
		ionsult			Boring Contractors	Ground		ace Elev	, Ft.: 0	.0	
		Name/			Gordon Archibald	Elevation			GVD29		
				an Deery /	COIGOII I DOMOGRA						
Desc	riptio	Location: Gro	ve Avenue			1		<u> </u>	. 01	4.	
Samp	ler: Ur	less othe	rwise noted, s	soil sampler c	onsists of a 2 in. split spoon	Data		Groundy Cime	vater Obso Depth	Casing at	Stab. Time
Casin	g: Unle	iven usin ess other ng 24 in.	g a 140 lb har wise noted, ca	nmer, 30" tal sing is driver	using 300 lb hammer,	<b>Date</b> 12/26/18		00:00	8		0.25 hr
Casin	ıanı g Size:	ng 24 in. 3 in		HS Auger							
	CB	<u> </u>	SAMPLER			n processionic		D. dl.		STRATUM	R E
D E P T	AL SO IW NS	Type & Number	Pen/ Depth Rcy. Core Rcy.	(Coring min/f	SOIL AND ROCK SAMPI Burmister Soil Classifi	LE DESCRIPTIC ication System	N	Depth of Stratum Change	I	DESCRIPTION	M A R K
H Ft.	G/Ft.		& RQD	[Downpress ps						/DO 47537 + */	Š
	16	SS-1	24/14 0.0	16-17-8-7	Dry, medium dense, brown coarse sand and gravel, trace	FINE SAND, tra e silt.	ice	0.3/	ASPHALT	/ROADWAY	
-	17 17		2.0								
	21										
5_	7	00.0	5.0		Moist, medium dense, brow	m-gray FINE					
	3	SS-2	24/12	13-6-8-5	SAND, some coarse sand tr	ace fine gravel, t	race				
	5		7.0		silt.						
-	17										
	19 22		10.0								
10_	22	SS-3	24/16	31-17-29-3	Wet, dense, gray-brown FI	NE SAND, trace					
			12.0		coarse sand and gravel, trac	e silt, trace highl	У	12.0			
-			12.0		weathered shale.				Bottom of	Exploration = 12	
=											
15											
20_											
53											
2											
19											
25											
25_											
30	) to 12 9	Soil Drive	n Casina					1	1		I
			ii Casing								
RE	MARK	S:									
					140# Wt x 30" fall on 2"						
Pro	portion	s Used	Sampler	D.1.	110010111000 2 111111	hesive Consis					
	ce 0 to		SS - Split UT - Shelb	Spoon	0 - 10 E005c	) - 4 So   - 8 Fir		RIC#:			
	le 10 ne 20	to 35%	UP - Fixed	Position	30 - 50 Dense 8	- 15 Sti	iff	Boring Date Co	No.: C-8 ompleted:	4/26/18	
an		to 50%	C - Rock	Core		5 - 30 Very 80 + Ha			se ID No. :		

	C LO		yside Sewe Kent / W	er System		BORING NEBC Da	tabas				2 of 2	_	
RIC	-	00000		FAP	#:	Date Start		4/25/18	Date		25/18	-	
	ge/Ro		Bayside			N Coord.				Ft.			
		nsult C		don Archi		E Coord.			<b>33.</b> 0	Ft.			
		onsult	Co.: Ne	w Englan	d Boring Contractors	Ground S				.0		-	
^		Name/(		an Deely	/ Gordon Archibald	Elevation	Datu ——	m N	GVD29			_	
Desc	rintio	n: Gro	ve Avenue	oil compler	consists of a 2 in. split spoon		Gı	roundw	ater Obse	ervations			
_	dri	ven using	a 140 lb han	nmer, 30" f	all.	Date	Ti	ne	Depth	Casing at	Stab. Tin		
Casir	g: Unle	ss otherv	vise noted, ca	sing is drive	en using 300 lb hammer,	04/25/18	00:	00	8		0.25 hr		
Casir	falling Size:	ng 24 in.		HS Auger	_ X _							R	
D E P T H Ft.	CB AL SO 1W NS G/Ft.	Type & Number	SAMPLER Pen/ Depth Rcy. Core Rcy. & RQD	Blows per 6 in. (Coring min [Downpress	SOIL AND ROCK SAME Burmister Soil Classi psi]	PLE DESCRIPTION fication System		Depth of Stratum Change		STRATUM DESCRIPTION	1	E M A R K S	
Tt.	G/I C							0.5	Dry, brown coarse sand	ROADWAY FINE SAND, trace and gravel, trace	ace	1	
								4.0	concrete.				
								5.0	Dry, brown	/gray FINESAN	D, some		
5_									Wet, gray (	el, trace silt. COARSE SAND e fine sand, trace shale.	and silt,		
10								10.0					
10_								12.0	COARSES	SAND			
									Bottom of	Exploration = 12			
15_													
1													
	-												
20													
25													
30													
		oil Auger											
RI	EMARK	S: 1. No	split spoon, t	aken off aug	ers.								
	portion		Sampler	**	Contract =	ohesive Consist							
lit			SS - Split UT - Shelb UP - Fixed C - Rock	y Tube Position		12" OD SS Sampler   Cohesive   Consistency   0 - 4   Soft   4 - 8   Firm   Boring No. :   C-86   Date Completed :   4/25/18   Database ID No. :							

								ODDIC		0.07		Cl4	2 .6	2
	OT Pı					ck RI - Various loca		BORING		C-87	4.	Sneet _	2 of _	4
	•	C/T):	Kent / W					Oate Stai		6/15/13	-	e End : 6/	15/18	
RIC		00000	Danaida	PAI	P#:			V Coord.		0	Date	Ft.	15/10	
	ge/Ro	ac # : nsult C	Bayside	don Arcl	hihal	d Inc		Coord.		0		Ft.		
,	_	usun C onsult				oring Contractors				face Elev	.Ft.: 0			
		Vame/(				GeoEnvironmental		Clevation			IGVD29			
				Tollie 7							***************************************			
		ocatio		C										
Desc	riptio	n: 1100	ewater and	Grove	er con	sists of a 2 in. split				Groundy	vater Obse	rvations		
٦ .	SD	on drive	en using a 140	lb hamm	ier, 30	" fall.		Date	7	<b>Time</b>	Depth	Casing at	Stab. T	
Casin				sing is dr	iven u	sing 300 lb hammer,	06	/14/18	(	00:00	0	0	0 hr	
Casin	rain g Size:	ng 24 in.		HS Aug	er _	<u>x</u>								
D	СВ		SAMPLER	Blows	s	SOIL AND ROCK SA	AMPLE DE	SCRIPTIO	N	Depth		STRATUM		RE
D E P T	AL SO	Type &	Pen/ Depth Rcy.	per 6 i		Burmister Soil C	lassification	System		of Stratum	D	ESCRIPTION		M
T     H	I W N S	Number	Rcy. Core Rcy. & RQD	(Coring m	in/ft)					Change				A R K S
Ft.	G /Ft.	00.1				Dry, medium dense, g.	rav-brown l	INF SANI		0,1	\ASPHALT/	ROADWAY		S
-		SS-1	24/12 0.0	19-10-8	D-0	some silt, soem coarse	sand, trace	gravel.	-,	0.1	FINE SANI			
15			2.0											
-					1					4.5				
-5_										4.5	BORING T	ERMINATED =	= 4.5' (*)	1
100														
-														
10														
-														
15					1									
_														
-					1									
20														
					1									
-					- 1									
25														
-														
30														
	to <u>2</u> Soi	l Augerin	ıg											
				ated at A'A	" _ hit	an unmarked water line	that the tow	n had no ic	lea e	xisted.				
KEI	VIAKK	o: 1. (™)	DUING (CHIND	aiou at 40	, - titt	en diministre Marci Hile	Jame IIIC COM	110 10						
						140# Wt x 30" fall or		Sampler						
	ortions		Sampler 1	2 X		ionless Density	Cohesive	Consiste Soft			44			
	e 0 to		SS - Split S UT - Shelby	Tube	10 -	10 Loose - 30 Medium Dense	0 - 4 4 - 8	Firm	1	RIC#: Boring N	00000 lo.: C-87			
som	e 20 to	35%	UP - Fixed P	osition	30 -	- 50 Dense + Very Dense	8 - 15 15 - 30	Stiff Very St		Date Cor	npleted: 6	5/15/18		
and	35 to	50%	C - KOCK	-ure	50	, . very Delise	30 ÷	Hard	ì	Database				

RIDOT Pr	niect	Bayside S	ewer Warw	ick RI - Various location	ns BORING	#: C	-87A	-11	She	et _	2 of _	2
Location (	_		ARWICK		RIDOT I	)atabase	ID#					
RIC#:			FAP#		Date Star	rt: <u>6/</u>	15/18	Date	End:	6/1	5/18	
Bridge/Ro		Bayside			N Coord.	: 0			Ft.			
Design Co			ion Archiba	ld Inc.	E Coord.	: 0			Ft.			
Geotech C				Boring Contractors	Ground S	Surface 1	Elev.,	Ft.: 0.0	0			
-		-	Plante / G7	GeoEnvironmental, In				VD29				
Inspector 1	Name/C	.U. : _ 1. 1	lante / OZa	1 Goodin vironimentari, in						_		-
Borehole I Descriptio	n: 125	Grove Stree	et					. 01				
Sampler: Lin	less othe	rwise noted, s	oil sampler c	onsists of a 2 in. split	Date	Gro		iter Obsei Depth	Casing	at	Stab. T	ime
Casing: Unle	ess other	wise noted, ca	lb hammer, 3 sing is driven	using 300 lb hammer,	06/15/18	00:00		0			0 h	
Casing Size:	ng 24 in. 		HS Auger	<u>x</u>								R E
D CB E AL	Towns &	SAMPLER Pen/ Depth	Blows per 6 in.	SOIL AND ROCK SAME Burmister Soil Classi	PLE DESCRIPTIO	0	pth of		STRATU! ESCRIPTI			MA
P SO T IW H NS	Type & Number	Rcy. Core Rcy. & RQD	(Coring min/ft) [Downpress psi				itum inge					R K S
Ft. G/Ft.	SS-1	24/5 0.0 2.0	19-10-8-12	Dry, medium dense, brown coarse sand, some gravel.	n FINE SAND, so	me		ASPHALT/I FINE SAND		Y		
5_	SS-2	5.0 24/20 7.0	18-30-28-37	Dry, very dense, brown gr some coarse sand, some si	ay FINE SAND, It and gravel.							
10_	SS-3	10.0 24/20 12.0	11-11-15-17	Dry, meidum dense, dark some silt, some coarse san	gray FINE SAND, Id, trace gravel.		12.0	Bottom of E	xploration	= 12'		1
15_												
20_												
25_												
-												
30											-	
0 to 12 S	Soil Auger	ing										
REMARK	S: 1. C-	87A was drille	ed east of C-87									
				140# Wt x 30" fall on 2"								
some 20		Sampler SS - Split UT - Shelb UP - Fixed C - Rock	Spoon y Tube Position	10   10   10   10   10   10   10   10	ohesive         Consist           0 - 4         Sof           4 - 8         Fire           8 - 15         Stif           5 - 30         Very 5           30 +         Har	iency it Ri m Bo ff Stiff D:			A 6/15/18			

Loca RIC Brid Desi Geo	ge/Ros gn Cos tech C	C/T): 00000 ad #: nsult C onsult	Bayside Co.: Gore Co.: Ne	ARWICK FAP #  don Archiba ew England	ald, Inc. Boring Contractors	BORING NEBC De Date Star N Coord E Coord Ground	atab rt : . : Surf	4/25/18 0 0 ace Elev	B Dat		2 of 2 25/18			
		Name/ Locatio		an Deely /	Gordon Archibald	Elevation	1 Da	tum N	IG V D29					
Desc	riptio	n: Gro	ve Avenue		audiate of a 2 in anlit annon			Graundy	vater Obs	ervations				
-	dri	ven usin	g a 140 lb han	nmer, 30" fall	onsists of a 2 in. split spoon	Date	T	ime	Depth	Casing at				
Casin		ess other ng 24 in.	wise noted, ca	sing is driven	using 300 lb hammer,	04/25/18	0	0:00	8		0.25 hr			
Casir	g Size:			HS Auger	X						I F			
D E P T H Ft.	CB AL SO IW NS G/Ft.	Type & Number	SAMPLER Pen/ Depth Rcy. Core Rcy. & RQD	Blows per 6 in. (Coring min/ft) [Downpress psi		LE DESCRIPTIC fication System	N	Depth of Stratum Change	I	STRATUM DESCRIPTION	F F N F F			
								0.5	Dry, brown	ROADWAY FINE SAND, tr and gravel, trace	ace			
5_								5.0		FINE SAND, son	ne coarse			
									burd dive gi					
10_	A control of the cont							10.0	Bottom of	Exploration = 10				
15														
15														
20_														
25_														
30	1 to 5 Soil	l Augerir	200											
_				taken off auger	·									
					140# Wt x 30" fall on 2"	On SS Samples								
tra		10%	Sampler ' SS - Split S UT - Shelb UP - Fixed I C - Rock	Spoon y Tube	Density   Column	hesive Consist  - 4 Soft  - 8 Firi  - 15 Stift  5 - 30 Very 5  0 + Har	RIC#: 00000 Boring No.: C-88 Date Completed: 4/25/18							

NUMB	CIO	C P	nyside Sewe	er System			BORING #	: C-	.89		Sheet	2_of_2
	C LO	-	Kent / W				NEBC Date					
	-	C/T):	Kent/ W	FAP			Date Start		2/18		End: $5/2$	2/18
RIC		00000	D -11-	FAI	π.		N Coord. :	-			Ft.	
	ge/Ro		Bayside	1	11-1-	1 Tmg	E Coord.:	0			Ft.	
		nsult C		don Arch			Ground Su		Clev	Ft.: 0.		
		onsult				oring Contractors	Elevation l			GVD29	-	
Insp	ector .	Name/(	Co.: Bry	an Deery	// <b>G</b>	ordon Archibald	Elevation			0,722		
Desc	rintio	Locatio n: Bay	side Sewers	S				C		ater Obse	wrotions	
Samp	ler: Un	less othe	rwise noted, s	oil sample	r con	sists of a 2 in. split spoon	Date	Time		Depth	Casing at	Stab. Time
Casin	g: Unle	iven using ess otherwing 24 in.	g a 140 lb han wise noted, ca	sing is driv	ven u	sing 300 lb hammer,	05/22/18	00:00		5		0.25 hr
Casin	g Size:	3 in		HS Auge	r				_			R
D E P T	CB AL SO IW	Type & Number	SAMPLER Pen/ Depth Rcy. Core Rcy.	(Coring mi	n. in/ft)	SOIL AND ROCK SAMPI Burmister Soil Classifi	LE DESCRIPTION ication System	Dep or Strat Cha	f tum	D	STRATUM DESCRIPTION	R E M A R K
H Ft.	NS G/Ft.		& RQD	[Downpres	s psi]					ACDITATE	DOADWAY	S
-	4 4 8	SS-1	24/10 0.0 2.0	2-3-5-	6	Moist, loose, brown-gray, N some medium gravel, little	MEDIUM SAND, fine gravel.		0.5	ASPHAL I	ROADWAY	
	9								5.0			
5_	26 31 72	SS-2	24/16 5.0 7.0	8-25-30	-23	Dry, very dense, gray MED medium gravel.	NUM SAND, little		5.0	Medium sa	nd.	
	65 23											
10_	31	SS-3	24/18 10.0 12.0	7-9-18-	-21	Dry, medium dense, gray, little medium gravel.	MEDIÙM SAND,		12.0	Bottom of	Exploration = 12	
15_												
20_												
25												
30												
1	0 to 12 S	Soil Drive	n Casing									
RE	EMARK	XS:										
tra lit	oportion ace 0 to tle 10 me 20 d 35	o 10% to 20%	Sampler SS - Split UT - Shell UP - Fixed C - Rock	Spoon by Tube Position	10 10 30	0 - 10 Loose 0 - 30 Medium Dense 0 - 50 Dense 8 50 + Very Dense 1	OD SS Sampler chesive Consiste 0 - 4 Soft 4 - 8 Firm 5 - 30 Very S 30 + Harc	R B tiff D		00000 No.: C-8 ompleted: se ID No.:	9 5/22/18	

RIT	OT P	roject	Ravside S	Sewer Systen	1	BORING	<u> </u>	C-90		Sheet	2 of 2
		(C/T) :		VARWICK	I	BOKING RIDOT I				Succi_	<u> </u>
1		00000		FAP#:		Riber 1 Date Star		5/29/1	*****	e End : 5/	29/18
1		ad #:	Bayside			N Coord.		$\frac{3/27/1}{0}$		Ft	27/10
1	0	nsult (		don Archibal	d. Inc.	E Coord.	-	0		— Ft.	
I .	_	Consult			Boring Contractors	Ground S	Surfa	ace Elev	, Ft.: 0	.0	
Insp	ector	Name			rdon Archibald	Elevation			NGVD29		
D	_111	r 4°									
		Location: Sea	on 1 Crest Lane	<u>.</u>							
					sists of a 2 in. split spoon		(	Fround	water Obse	ervations	
				mmer, 30" fall.	-t 200 lb b	Date		ime	Depth	Casing at	Stab. Time
Casii		ess otner ng 24 in.		ising is ariven u	sing 300 lb hammer,	05/29/18	00	0:00	0		0.25 hr
Casi	ng Size:	2 in		HS Auger	X						
D E P T H	CB AL SO IW NS	Type & Number	SAMPLER Pen/ Depth Rcy. Core Rcy. & RQD	Blows per 6 in. (Coring min/ft) [Downpress psi]	SOIL AND ROCK SAMF Burmister Soil Classi		N	Depth of Stratum Change	С	STRATUM DESCRIPTION	R E M A R K
Ft.	G /Ft.			[Bownpress psi]					- ACDITAL T	DOADWAY	S
-								0.3/	Dry, brown	ROADWAY FINE SAND, so	ome
-							-	2.0 3.0	coarse sand	and gravel.	
							-	5.0	Hit Gas Ma Terminated		
5_											
_											
_											
-											
10											
_											
_								-			
15											
13_											
]											
4											
20											
20_											
1								•			
]											
25_											
-											
1											
]											
30						****			3110 market		
0	to <u>2</u> <u>Soil</u>	Driven (	Casing			A. A. A. A. A. A. A. A. A. A. A. A. A. A		***************************************	***************************************	Taros.	
REN	MARKS	: 1. sam	ples taken off	of augers.							
Prop	ortions	Used	Sampler T	ype Cohesi	140# Wt x 30" fall on 2" Conless Density Coh	OD SS Sampler esive Consisten	icy				
trace little	e 0 to 1 10 to e 20 to 35 to	0% 20% 35%	SS - Split Sp UT - Shelby UP - Fixed Po C - Rock C	000n 0 - Tube 10 - 000 - 10 - 10 - 10 - 10 - 10 - 10	10 Loose 0 . 30 Medium Dense 4 . 50 Dense 8 - + Very Dense 15 .	- 4 Soft - 8 Firm - 15 Stiff - 30 Very Stift - Hard	ff	RIC#: Boring No Date Com Database	pleted: 5/	29/18	

								DODING	и.	C 01		Sheet	2 of 2
<b>VEB</b>	C LO	G Ba	yside S	ewe	r System			BORING NEBC Da		C-91		Sheet _	
	tion (C		Kent	/ W	ARWICK					5/17/18		<b>End</b> : 5/	17/18
		00000			FAP #			Date Start			Date	Ft.	17710
	ge/Roa		Baysi	de				N Coord.		0		= Ft.	
Desig	m Coi	nsult C		Gord	on Archib	ald,	Inc.	E Coord.		0	774		
Cent	ech C	onsult (	Co. :	Nev	w England	Bor	ring Contractors	Ground S				.0	
		Name/C		Bry	an Deely	Gor	don Archibald	Elevation	Dat	um N	GVD29		
msþ	ctor i	· Turner		- 7					_				
Docc	eintio:	ocation n: Seac	rest La	ne						roundu	vater Obse	ervations	
Samp	er. Un	less other	wise not	ed, se	oil sampler	consis	ts of a 2 in. split spoon	Date		ime	Depth	Casing at	Stab. Time
Casin	g: Unle	ess otherv	g a 140 lb vise note	ham d, cas	mer, 30" fa sing is drive	n usin	ng 300 lb hammer,	05/17/18		0:00	10		0.25 hr
Casin	g Size:	ng <b>24 in.</b> 3 in			HS Auger		X		_				R
D E P T	CB AL	T	SAMPL Pen/ D	ER Septh	Blows per 6 in.		SOIL AND ROCK SAMPL Burmister Soil Classifi	E DESCRIPTION cation System	N	Depth of	I	STRATUM DESCRIPTION	E M A
Н	SO IW NS	Type & Number	Rcy. Core Rcy & RQD	·.	(Coring min/ [Downpress]	ft) osi]				Stratum Change			A R K S
Ft.	G /Ft.												
74	63			2.0	11 15 01 7	25	Dry, dense, brown/gray FIN	E SAND, trace					
	47 53	SS-1	24/12	4.0	11-15-21-2	دے	coarse sand and gravel, wea	thered bedrock.					
5_	59	00.0	24/19	5.0	23-26-40-	51	Dry, very dense, gray FINE	SAND, some					
	40	SS-2	24/18	7.0	23-20-40-	51	coarse sand, trace gravel, tra	ace silt.					
	48 60		-	7.0									
	87												
10	174		1	10.0			and a large large market	FINE SAND t	race				
10_		SS-3	24/15		25-37-42-	52	Wet, very dense, brown/gracoarse sand and gravel, trac	e silt, weathered	acc				
3				12.0			bedrock.						
	1												
15_	-												
=	-												
3	-					- 1							
	+												
20			1			ľ							
20													
	1										1		
	1												
										1			
25													
	-									1			
	-												
	1												
30		Soil Drive	en Casing	2									
-	EMARI												
K	LIVE COLUMN												
							140# Wt x 30" fall on 2"	' OD SS Sample	r				
			Sor	nnlai	Туре	Cohes		hesive Consi	stenc	y			
Pr	oportio	ns useo	381	mhici	Type	Como		_		11			
tr	oportio ace 0 :	to 10%	SS -	Split	Spoon	0 -	- 10 Loose	0 - 4 Se	oft	RIC#		01	
tr lit	ace 0 t		SS - UT -	Split Shel		0 · 10	- 10 Loose - 30 Medium Dense	0 - 4 Se 4 - 8 Fi 8 - 15 St		Boring	: 00000 g No.: C- Completed :	91 5/17/18	

	OT P	•		Sewer Systen ARWICK	n	BORING RIDOT I		<u>C-92</u>	4.	Sheet _	<u>2</u> of	
RIC		C/T):	Kent/ W	FAP#:		RIDOT I		6/7/18	-	End: 6/	7/18	
ļ	lge/Ro	• • • • • • • • • • • • • • • • • • • •	Bayside			N Coord		0	Date	Ft.	7710	
!	_	nsult C		don Archiba	ld, Inc.	E Coord.		0		Ft.		
		onsult		····	Boring Contractors	Ground S				.0		
Insp	ector	Name/	Co.: Bry	an Deely / C	Gordon Archibald	Elevation	n Dat	um <u>l</u>	NGVD29			
		Locatio										
			crest Lane	-:11	-sists of a 2 in andit angen	<del></del>		'mound	water Obse	muations		
_	dri	ven usin	g a 140 lb har	nmer, 30" fall.	nsists of a 2 in. split spoon	Date		ime	Depth	Casing at	Stab.	Гime
Casir		ess other ng 24 in.	wise noted, ca	sing is driven ι	ising 300 lb hammer,	06/07/18	00	00:00	10		0.25	hr
Casir	ıg Size:		<u> </u>	HS Auger	<u> </u>							
D	CB AL		SAMPLER Pen/ Depth	Blows	SOIL AND ROCK SAME	LE DESCRIPTIO	N N	Depth		STRATUM		R E
E P T	S O I W	Type & Number	Rcy.	per 6 in.	Burmister Soil Classi	fication System		of Stratum	D	ESCRIPTION		M A
Ĥ Ft.	NS G/Ft.		& RQD	(Coring min/ft) [Downpress psi]				Change				A R K S
								0.3/			/	7 1
									coarse sand	FINE SAND, trand gravel, trace	ace silt and	
-									cobbles.	_		
5								5.0				
									Dry, gray Fl	NE SAND, trace vel, trace silt.	coarse	2
_							•		band and gra	.rei, adee Biia		
4												
10_								10.0		non		
-			,					10.0	Advanced to	BOE		
							-	12.0	Bottom of E	xploration = 12'		-
15_												
-												
20_												
-												
25												
-												
-												
30												Ш
0	to <u>10</u> So	il Augerii	ng			·····						
REN	MARKS	1. All	samples off of	augers. 2. En	countered boulders 5' to 8'.							
					140# Wt x 30" fall on 2"	On ee consular						
Prop	ortions	Used	Sampler T			esive Consister	ncy					
	e 0 to 1 e 10 to		SS - Split Sp UT - Shelby	0 - 0 - 10 - 10 - 10 - 10 - 10 - 10 - 1		- 4 Soft - 8 Firm		RIC#:	00000	***************************************		
som		35%	UP - Fixed Po	sition 30	- 50 Dense 8 -	15 Stiff - 30 Very Sti		Boring N Date Con		7/18		
and	JO 10	JU /0	C - RUCK C	.o.c   3t		- 50 very 50 ) + Hard	***   ,	Database				

Loc	cation	Project (C/T)	Kent / V	WARWICK	rick RI - Various locatio		G#: C-9		Sheet	2 of 2
	C#:	00000		FAP #		Date Sta	art: 6/14/	18 Dat	te End: 6	/14/18
		oad # : onsult	_		1.0.	_ N Coord			Ft.	
		onsuit Consul		rdon Archiba		_ E Coord			Ft.	
		Name			Boring Contractors	_ Ground	Surface Ele	v., Ft.: (	0.0	
THZ	pector	raine	Co.: 1.	Plante / GZA	GeoEnvironmental, Inc	Elevatio	n Datum	NGVD29		
Des	criptic		Seacrest			III-		2:		
Sam	pler: U	nless oth	erwise noted,	soil sampler co	nsists of a 2 in. split		Ground	lwater Obse	ervations	
	ng: Uni fall	less othe ing 24 in	rwise noted, ca	0 lb hammer, 3 asing is driven	0" fall. using 300 lb hammer,	<b>Date</b> 06/14/18	<b>Time</b> 00:00	Depth 0	Casing at	Stab. Tim 0 hr
Casir	ng Size:			HS Auger	X					
D E P T	CB AL SO IW	Type & Number	SAMPLER Pen/ Depth Rcy. Core Rcy.	Blows per 6 in.	SOIL AND ROCK SAMPI Burmister Soil Classifi	LE DESCRIPTIO	ON Depth of	D	STRATUM ESCRIPTION	REM
Ĥ Ft.	NS G/Ft.		& RQD	(Coring min/ft) [Downpress psi]			Stratum Change			A R K S
1		SS-1	24/14 0.0 2.0 24/18	36-12-10-8 16-36-43-51	Dry, medium dense, brown coarse sand, some gravel, tre	ace slt.	ne 0.2	ASPHALT /	ROADWAY	
		SS-3	24/18 4.0 24/16	35-35-40-57	Dry, very dense, gray/brown some gravel, some coarse sa	nd, trace silt.				
5_		SS-4	24/16 6.0	27-31-44-30	Dry, very dense, gray/brown some gravel, some coarse sa Dry, very dense, gray/brown	nd, trace silt.				
1		SS-5	8.0 24/18	13-10-12-20	some gravel, some coarse sa Dry, medium dense, dark gra	nd, trace silt.				
10		SS-6	10.0 24/20	24-22-31-38	some silt, some gravel, trace Dry, very dense, dark grav F	coarse sand.  INE SAND som	e			
$\exists$		-	12.0		coare san, coarse gravel and	silt.	12.0	Bottom of Ex	ploration = 12	
15_									,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	
-										
.										
0_										
-										
5_										
-										
_	12 Soil	Augerin	,							
	ARKS:									
	tions U		Sampler Typ	e Cohesion	140# Wt x 30" fall on 2" OD less Density Cohesiv		v			
tle me	0 to 10° 10 to 20 20 to 3° 35 to 50	0%   U	SS - Split Spoo IT - Shelby Tu P - Fixed Posi C - Rock Cor	on 0 - 10 tbe 10 - 30 tion 30 - 50	Loose 0 - 4 Medium Dense 4 - 8	Soft Firm Stiff	RIC#: Boring No.	leted: 6/14	/18	

1	OT P	roject (C/T) :		Sewer Syste /ARWICK	em	BORING RIDOT I			Sheet _	2 of 2
1		00000		FAP#	•	RibO1 1 Date Stai			te End : 5/	29/18
1		ad # :			•	N Coord.		<u> </u>	Ft.	29/10
1	_		Co.: Gor	don Archib	ald Inc	E Coord.	*		Ft. Ft.	
	_	Consult			Boring Contractors	***************************************		lev., Ft.: (	).0	
1		Name	***************************************		ordon Archibald	Elevation		NGVD29	7.0	
								1101025		
		Location: Sea	o <b>n</b> a Crest Lane	;						
	pler: Ur	iless oth	erwise noted, s	soil sampler c	onsists of a 2 in. split spoon			ndwater Obs		
Casi			ng a 140 lb har wise noted, ca		using 300 lb hammer,	<b>Date</b> 05/29/18	Time 00:00	Depth 10	Casing at	Stab. Time 0.25 hr
		ng 24 in		ио л	v	00,23,710	00.00			0.23 III
	ng Size:		SAMPLER	HS Auger	<u>X</u>				a 104 data	R
D E	C B A L		Pen/ Depth	Blows per 6 in.	SOIL AND ROCK SAMP				STRATUM	R E M
P T	S O I W	Type & Number		(Coring min/ft	Burmister Soil Classit	ication System	of Stratu	m l	DESCRIPTION	A
H Ft.	NS G/Ft.		& RQD	[Downpress ps			Chang			A R K S
								) 3 \ ASPHALT	/ROADWAY	S   1
-								Dry, brown	FINE SAND, so	
-								coarse sand	and gravel.	
5_								5.0	PINIC CAND.	
-								coarse sand	FINE SAND, tra and gravel, trace	silt and
-								weathered b		
-										
10							10	0.0		
_								Advanced a	uger to BOE	
							12	2.0 Pottom of I	Symlogation — 12t	
-								Bottom of E	Exploration = 12'	
15										
-										
-										
20										
20_										
-										
25_										
4										
1										
1										
30			-							
REN	MARKS:	1. All	samples taken	off of augers			A 100 A 100 A 100 A 100 A 100 A 100 A 100 A 100 A 100 A 100 A 100 A 100 A 100 A 100 A 100 A 100 A 100 A 100 A			
				,						İ
										7.310
Pron	ortions !	lised	Sampler Ty	vne Cohe	140# Wt x 30" fall on 2" C sionless Density Cohe		cv			
	e 0 to 1		SS - Split Sp	- 1	- 10 Loose 0 -		RIC#	: 00000		
little		20%	UT - Shelby UP - Fixed Po	Tube 10	- 30 Medium Dense 4 - - 50 Dense 8 -	8 Firm	Boring		T	
and	35 to		C - Rock C		0 + Very Dense 15 - 30	30 Very Stif	T Date C		/29/18	

RII	OT P	roject	Bayside !	Sewer Syster	n	BORING	#: C-95		Shoot	2 of 2
		(C/T) :		VARWICK	11		Database ID		Sheet _	2 01 2
1		00000		FAP#		Date Star			e End : 5/	29/18
Brie		oad # :				N Coord.	***************************************		Ft.	
1	_			don Archiba	ld, Inc.	E Coord.			Ft.	
Geo	tech (	Consult	Co.: No	ew England	Boring Contractors	Ground S	Surface Ele	v., Ft.: (	0.0	
Insp	pector	Name/	<b>Co.:</b> To	m Plant / Go	rdon Archibald	Elevation	Datum _	NGVD29		
Por	oholo '	Locatio								
			n Crest Lane	<del>)</del>						
	pler: U	nless oth	erwise noted,	soil sampler co	nsists of a 2 in. split spoon			water Obs		
Cosi				mmer, 30" fall. Ising is driven	using 300 lb hammer,	<b>Date</b> 05/29/18	Time 00:00	Depth	Casing at	Stab. Time
Cusi		ng 24 in.		ising is driven	asing 500 is naminer,	03/29/16	00.00	5		0.23 III
Casi	ng Size:	7		HS Auger	X					
DE	C B A L		SAMPLER Pen/ Depth	Blows	SOIL AND ROCK SAMP		N Depth		STRATUM	R E M
D E P T	S O I W	Type & Number	Rcv.	per o m.	Burmister Soil Classif	ication System	of Stratum	1	DESCRIPTION	M A
Ĥ Ft.	NS G/Ft.	l turnou.	& RQD	(Coring min/ft) [Downpress psi]			Change			A R K S
	G/IL						0.3	ASPHALT	/ROADWAY	
-							V.	Dry, gray F	INE SAND, som	/   -
-								snad and gr	avel, trace sitl.	
-										
5_							5.0	1 13	INE SAND, trac	e coarse
							6.0		avel, trace silt an	d 📶
_								Auger Refu	edrock fragment sal at 6'	s
_										
10_										
-										
-										
_										
15_										
-										
-										
20_										
-										
-										
25_										
-										
30						***************************************			*****	
0	to <u>6</u> <u>Soil</u>	Augerin	g							
RE	MARKS	: 1. All	samples talen o	off of augers.						
Th.		* 7	G		140# Wt x 30" fall on 2" O				959 May (Balanta)	
_	ortions e 0 to 1		Sampler T SS - Split Sp		ionless Density Cohe 10 Loose 0-		•	00000		
little	10 to	20%	UT - Shelby UP - Fixed Po	Tube 10	- 30 Medium Dense 4 -	8 Firm	RIC # : Boring N	00000 o.: C-95		
som and	e 20 to 35 to		C - Rock C		- 50 Dense 8 - 15 - 15 - 30	30 Very Stit	D.4. O.	npleted: 5	/29/18	

							DODBIG	"	0.00		Chaot	2 of 2
NEB	C LO	G Ba	yside Sew	er System			BORING NEBC Da		C-96		Sheet _	<u></u>
		C/ <b>T</b> ):	Kent / W	ARWICH			Date Star		5/17/18		e End : 5/1	17/18
		00000		FAP	#:		N Coord.		0	Date	Ft.	
		ad #:	Bayside				E Coord.	-	0		Ft.	
		nsult C		don Arch			Ground S			TFt · O	.0	
		onsult (		ew Englar	id Boi	ring Contractors	Elevation			GVD29	.0	
Insp	ector :	Name/C	Co.: Br	yan Deely	/ Goi	rdon Archibald	Elevation	Dat	um 19	O V DZ)		
Bore	hole l	Locatio	n n									
Desc	ripiio	II: Seal	crest Lane	soil sample	consis	sts of a 2 in. split spoon				ater Obs	ervations	Cu I mn:
_	de	van usine	ສ ຄ 140 lb ha:	mmer. 30'' :	fall.		Date		ime	Depth 10	Casing at	Stab. Tim 0.25 hr
Casin	g: Unle	ess otherv	vise noted, ca	ising is driv	en usir	ng 300 lb hammer,	05/17/18	U	0:00	10		0.25 III
		ng 24 in.		LIC Augo		X						
Casin	g Size:	4 in	SAMPLER	HS Auger			1				CODE A SELENT	R
D E P T	CB AL SO	Type &	Pen/ Depth Rcv.	Blows per 6 in		SOIL AND ROCK SAMPI Burmister Soil Classifi	E DESCRIPTION Cation System	N	Depth of Stratum	I	STRATUM DESCRIPTION	M A R
T H Ft.	IW NS G/Ft.	Number	Core Rcy. & RQD	(Coring mi	n/ft) psi]				Change			K S
1 6.	11	SS-1	24/14 0.0	6-6-8-1	0	Dry, medium dense, brown	FINE SAND, trac	e .	0.5	ASPHALT	/ROADWAY	
	15		2.0			coarse sand, and gravel, trac	e siit.					
-	24											
	41											
5	50		5.0	10.10.0	10	Dry, mediumd dense, gray-l	brown COARSE					
	37	SS-2	24/16	10-10-9-	.10	SAND, trace fine sand, trace	e gravel, trace silt	.				
	45		7.0	)								
	66								BOULDE	R		
	87		10.0					10.0				
10_	115 75	SS-3	24/16 10.0	18-40-59	-58	Wet, very dense, gray-brow	n FINE SAND,					
-	91	000	12.0			trace coarse sand and grave weathered bedrock.	I, trace suit, highly	′	12.0		2 - 10	)'
	- /1		12.0			Weddieled overous				Bottom of	Exploration = 12	2
15					- 1							
		1										
	-											
× 2	4											
20_												
	-											
25	Ī											
	Ü											
	1											
	-											
	-											
30	0 to 2 S	oil Driven	Casing									
-					101							
RI	EMARI	<b>KS:</b> 1, In	stalled monite	oring well at	12"							
						140# Wt x 30" fall on 2"	OD SS Sampler					
Pre	portio	ns Used	Sample	r Type	Cohes	ionless Density Co	hesive Consis	tency				
tra	ace 0 t	o 10%	SS - Spli	t Spoon			0 - 4 So 4 - 8 Fir		RIC#:		)6	
		to 20% to 35%	UT - Shel UP - Fixed	l Position		- 50 Dense 8	3 - 15 Sti	ff	Boring Date C	No.: C-9	5/17/18	
ar		to 50%	C - Roc	k Core		0 + Very Dense 1:	5 - 30	Stiff rd		se ID No.:		

RID	OT P	roject	Bayside S	Sewer Syster	n	BORING	G#:	C-97		Sheet _	2 of 2
Loc	ation (	(C/T):	Kent / W	'ARWICK		RIDOT	Data	base ID	#:		
RIC	:#:	00000		FAP#	•	Date Sta	rt :	6/7/18	Date	e End : <u>6/</u>	7/18
		ad #:	Bayside			N Coord	.:	_0		Ft.	
Desi	ign Co	nsult C		don Archiba		E Coord		0		Ft.	
Geo	tech (	Consult			Boring Contractors	Ground				.0	
Insp	ector	Name/	Co.: Bry	an Deely / O	Gordon Archibald	Elevation	n Da	tum <u>N</u>	NGVD29		
Bor	ehole `	Locatio	n								
Des	eriptic	n: Har	bor View D			***************************************					
Samp				soil sampler co nmer, 30" fall.	nsists of a 2 in. split spoon	Date		Groundy Fime	vater Obse Depth		Stab. Time
Casir	ıg: Unl	ess other	wise noted, ca	sing is driven	using 300 lb hammer,	06/07/18		00:00	10		0.25 hr
Casir	falli 1g Size:	ng 24 in.		HS Auger	Х						
D	СВ		SAMPLER	Blows	SOIL AND ROCK SAME	DI E DESCRIPTIO	INC	Depth		STRATUM	R E
E P	A L S O	Type &	Pen/ Depth Rcy.	per 6 in.	Burmister Soil Classi		וא	of	D	ESCRIPTION	M
T H	I W N S	Number	Core Rcy. & RQD	(Coring min/ft)				Stratum Change			A R K S
Ft.	G/Ft.		a NQD	[Downpress psi]				Change			
								0.3/		ROADWAY FINE SAND, so	me l
									coarse sand	adn gravel, trace	silt. 2
-											
5								5.0			
									Moist, gray,	COARSE SAN fine sand, trace	D and
									trace weather	ered bedrock frag	ments.
-								10.0			
10_								10.0	Advanced to	BOE.	
-								12.0			
									Bottom of E	xploration = 12'	
-											
15_											
-							İ				
20_											
-											
25_											
-											
30											
0	to <u>10 Sc</u>	il Augeri	ng								
REI	MARKS	: 1. All	samples taken	off of augers.	2. Cobble layer 2' to 5'					*****	
					140# Wt x 30" fall on 2"						
	ortions		Sampler T	- ,	•	esive Consiste	- 1				
little	e 0 to e 10 to	20%	SS - Split Sp UT - Shelby	Tube   10	- 30 Medium Dense 4	-8 Firm	. ]	RIC#: Boring No	00000 o.: C-97		
som and	e 20 to	35% 50%	UP - Fixed Po C - Rock C	osition 30		- 15 Stiff - 30 Very St		Date Con		/7/18	
and	<i>3</i> 3 10	30 70	C - NOCK C	.ue   3		- 50 Very 50 0 + Hard	1	Database		THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE S	

RID	OT P	roject	Bayside	Sewer Warw	vick RI - Various location	s BORING	G#:	C-98		Sheet _	2 of 2
		(C/T):		VARWICK		RIDOT			-		
RIC		00000		FAP#		Date Sta		6/14/1	8 Date		14/18
10	_	ad #:	Bayside		11 1	N Coord		0		Ft.	
	-	nsult (		rdon Archiba		E Coord		0	T74 . 0	Ft.	
I.		Consult	-		Boring Contractors A GeoEnvironmental, Inc	Ground :			., Ft. : <u>0</u> . NGVD29	.0	
insp	ector	Name/	Co.: <u>1.</u>	Plante / GZA	A Geoenvironmental, inc	. Elevation	מע נו	itum <u>r</u>	VG V D29		
		Locatio	n Harbor Vie	NV							
	oler: U	nless oth	erwise noted,	soil sampler co	onsists of a 2 in. split				water Obse		
Casta	sp	oon driv	en using a 14	0 lb hammer, 3	0" fall. using 300 lb hammer,	Date		Cime	Depth 0	Casing at	
Casii		ng 24 in		asing is driven	using 500 in mainmen,	06/14/18	'	00:00	U		0 hr
Casir	ıg Size:			HS Auger	X						
D	CB AL		SAMPLER Pen/ Depth	Blows	SOIL AND ROCK SAMPL	E DESCRIPTIO	)N	Depth		STRATUM	R E M
D E P T	SO	Type & Number	Rcy.	per o m.	Burmister Soil Classifi			of Stratum		ESCRIPTION	M A
H	I W	Number	Core Rcy. & RQD	(Coring min/ft) [Downpress psi]				Change			A R K
Ft.	G/Ft.	SS-1	24/16 0.0		Dry, very dense, gray-brown	FINE SAND	_	0.1	ACPHALTY	ROADWAY	S
-		33-1	""	25-25-41-55	some coarse sand, some grav	vel, trace silt.		0.1	FINE SAND		
			2.0								
5		20.6	5.0		D. W. Colonia de Colon	0.110					
-		SS-2	24/14	21-22-28-35	Dry, very dense, gray FINE some coarse sand, trace gray	el, trace cobbles	,				
-			7.0								
15											
10			10.0					10.0			
		SS-3	24/0	52-70-70-65	No Recovery, pushed cobble	<b>.</b>	ſ		COBBLE		
			12.0				-	12.0	Dattam of C.	xploration = 12'	
-									BOROHI OF E	xpioration – 12	
15											
"-											
-											
20											
20_											
25_							1				
30											
<u>0</u> t	o <u>12 So</u>	il Augeri	ng								
REN	1ARKS	:									
						n 00 0					
Prop	ortions	Used	Sampler T	ype Cohes	140# Wt x 30" fall on 2" Onesionless Density Cohes		 ncy				
trace	0 to 1	0%	SS - Split S	poon 0-	· 10 Loose 0 - 4	4 Soft	,	RIC#:	00000		
	10 to		UT - Shelby UP - Fixed Po	Tube 10	- 30 Medium Dense 4 - 3 - 50 Dense 8 - 1			Boring No	.: C-98		
and	35 to		C - Rock C		) + Very Dense 15 - :	30 Very Sti		Date Com Database		14/18	
					30 -	+ Hard	- 1	watunase.	TD 110' !		

Bridge/Road #: Bayside   Design Consult Co.: Gordon Archibald, Inc. Geotech Consult Co.: New England Boring Contractors Inspector Name/Co.: Bryan Deely / Gordon Archibald   Ground Surface & Lev., Ft.: 0.0	Loc	ation	roject (C/T) :	Kent / V	Sewer Sy VARWIC FAI	<		BORING RIDOT	Database			2 of 2
Design Consult Co.:   Gordon Archibald, Inc.   Geotech Consult Co.:   New England Boring Contractors   Inspector Name/Co.:   Bryan Deely / Gordon Archibald	1			· · · · · · · · · · · · · · · · · · ·	FAI	<i>TT</i> •				/10 <b>D</b> a	Ft.	//18
Inspector Name/Co. :   Bryan Deely / Gordon Archibald   Elevation Datum   NGVD29	1	_			don Arch	ibald, Inc.					Ft.	
Borehole Location   Description: Harbor View Road		~			ew Engla	d Boring Contrac	ctors	Ground	Surface E	Clev., Ft. :		
Description: Harbor View Road	Ins	pector	Name	Co.: Br	yan Deel	/ Gordon Archib	ald	Elevation	n Datum	NGVD29		
Description: Harbor View Road   Sampler: Unless otherwise noted, soil sampler consists of a 2 in, split spoon   Time   Depth   Qa   Qa   Qa   Qa   Qa   Qa   Qa   Q	Ror	ahola i	Location									
driven using a 140 tb hammer, 30" fall.  Casing: Usines otherwise noted, casing is driven using 300 tb hammer,  Talling 24 in.  Casing Size:  HS Auger  X   Date  06/07/18  00:00  10  10  10  10  10  10  10  10					Road							
Casing Size:    Description   Part	Sam						lit spoon					
Talling 24 in.  Casing Size:  HS Auger X  SAMPLER Blows per 6 in.  Type & Roy. Wainber Red Ridge.  Type & Roy. Wainber Ridge.  Type & Roy. Wainber Ridge.  Type & Roy. Wainber Ridge.  Type & Roy. Wainber Ridge.  Type & Roy. Wainber Ridge.  Type & Roy. Ridge.  Type & Roy. Ridge.  Type & Roy. Ridge.  Type & Roy. Ridge.  Type & Roy. Wainber Ridge.  Type & Roy. Ridge.	Casi						mer.				Casing at	Stab. Time
Depth Part Depth Part Depth Part Depth Part Depth Part Depth Part Depth Part Depth Part Depth Part Depth Part Depth Part Depth Part Depth Part Depth Part Depth Part Depth Part Depth Part Depth Part Depth Part Depth Part Depth Part Depth Part Depth Part Depth Part Depth Part Depth Part Depth Part Depth Part Depth Part Depth Part Depth Part Depth Part Depth Part Depth Part Depth Part Depth Part Depth Part Depth Part Depth Part Depth Part Depth Part Depth Part Depth Part Depth Part Depth Part Depth Part Depth Part Depth Part Depth Part Depth Part Depth Part Depth Part Depth Part Depth Part Depth Part Depth Part Depth Part Depth Part Depth Part Depth Part Depth Part Depth Part Depth Part Depth Part Depth Part Depth Part Depth Part Depth Part Depth Part Depth Part Depth Part Depth Part Depth Part Depth Part Depth Part Depth Part Depth Part Depth Part Depth Part Depth Part Depth Part Depth Part Depth Part Depth Part Depth Part Depth Part Depth Part Depth Part Depth Part Depth Part Depth Part Depth Part Depth Part Depth Part Depth Part Depth Part Depth Part Depth Part Depth Part Depth Part Depth Part Depth Part Depth Part Depth Part Depth Part Depth Part Depth Part Depth Part Depth Part Depth Part Depth Part Depth Part Depth Part Depth Part Depth Part Depth Part Depth Part Depth Part Depth Part Depth Part Depth Part Depth Part Depth Part Depth Part Depth Part Depth Part Depth Part Depth Part Depth Part Depth Part Depth Part Depth Part Depth Part Depth Part Depth Part Depth Part Depth Part Depth Part Depth Part Depth Part Depth Part Depth Part Depth Part Depth Part Depth Part Depth Part Depth Part Depth Part Depth Part Depth Part Depth Part Depth Part Depth Part Depth Part Depth Part Depth Part Depth Part Depth Part Depth Part Depth Part Depth Part Depth Part Depth Part Depth Part Depth Part Depth Part Depth Part Depth Part Depth Part Depth Part Depth Part Depth Part Depth Part Depth Part Depth Part Depth Part Depth Part Depth Part Depth Part Depth Part Depth Part Depth Part Depth Part Depth Part Depth Part Depth Part		falli			g		,,,,	00/07/18	00.00	10		0.23 III
Solidary   Solidary   Solidary   Solidary   Solidary   Solidary   Solidary   Solidary   Solidary   Solidary   Solidary   Solidary   Solidary   Solidary   Solidary   Solidary   Solidary   Solidary   Solidary   Solidary   Solidary   Solidary   Solidary   Solidary   Solidary   Solidary   Solidary   Solidary   Solidary   Solidary   Solidary   Solidary   Solidary   Solidary   Solidary   Solidary   Solidary   Solidary   Solidary   Solidary   Solidary   Solidary   Solidary   Solidary   Solidary   Solidary   Solidary   Solidary   Solidary   Solidary   Solidary   Solidary   Solidary   Solidary   Solidary   Solidary   Solidary   Solidary   Solidary   Solidary   Solidary   Solidary   Solidary   Solidary   Solidary   Solidary   Solidary   Solidary   Solidary   Solidary   Solidary   Solidary   Solidary   Solidary   Solidary   Solidary   Solidary   Solidary   Solidary   Solidary   Solidary   Solidary   Solidary   Solidary   Solidary   Solidary   Solidary   Solidary   Solidary   Solidary   Solidary   Solidary   Solidary   Solidary   Solidary   Solidary   Solidary   Solidary   Solidary   Solidary   Solidary   Solidary   Solidary   Solidary   Solidary   Solidary   Solidary   Solidary   Solidary   Solidary   Solidary   Solidary   Solidary   Solidary   Solidary   Solidary   Solidary   Solidary   Solidary   Solidary   Solidary   Solidary   Solidary   Solidary   Solidary   Solidary   Solidary   Solidary   Solidary   Solidary   Solidary   Solidary   Solidary   Solidary   Solidary   Solidary   Solidary   Solidary   Solidary   Solidary   Solidary   Solidary   Solidary   Solidary   Solidary   Solidary   Solidary   Solidary   Solidary   Solidary   Solidary   Solidary   Solidary   Solidary   Solidary   Solidary   Solidary   Solidary   Solidary   Solidary   Solidary   Solidary   Solidary   Solidary   Solidary   Solidary   Solidary   Solidary   Solidary   Solidary   Solidary   Solidary   Solidary   Solidary   Solidary   Solidary   Solidary   Solidary   Solidary   Solidary   Solidary   Solidary   Solidary   Solidary   Solidary   Solidary		ng Size:		T 0.11 FF FF	HS Auge	X						
Dry, brown/gray, coarse sand and get trace cobbles.  5.0  Dry, gray FINE S. sand, and gravel, tweathered bedrock  10.0  Advanced to BOE  12.0  Bottom of Explora  25_  30  Q to 10 Soil Augering  REMARKS: 1. All samples taken off of auger. 2. Encountered boulders 8' to 10'.	P T H	AL SO IW NS		Pen/ Depth Rcy. Core Rcy.	per 6 in (Coring mi	Burmister/ft)			of Stratu	ım	STRATUM DESCRIPTION	R E M A R K S
5.0  Dry, gray FINE S. sand, and gravel, tweathered bedrock  10.0  Advanced to BOE  12.0  Soil Augering  REMARKS: 1. All samples taken off of auger. 2. Encountered boulders 8' to 10'.												7 1
Dry, gray FINE S. sand, and gravel, tweathered bedrock  10.0  Advanced to BOE  12.0  Bottom of Explore  25	-									coarse sand trace cobbl	d and gravel, trace	
20_ 25_ 30 Use 10 Soil Augering  REMARKS: 1. All samples taken off of auger. 2. Encountered boulders 8' to 10'.	<b>3</b>									Dry, gray l sand, and g	ravel, trace silt, to	race
20_ 25_ 30 Use 10 Soil Augering  REMARKS: 1. All samples taken off of auger. 2. Encountered boulders 8' to 10'.	_											2
15_ 20_ 25_ 30  O to 10 Soil Augering  REMARKS: 1. All samples taken off of auger. 2. Encountered boulders 8' to 10'.	10_								10		to BOE	
Bottom of Explora  20	-								11		.0 001	
20	_									Bottom of	Exploration = 12'	
25	15_											
25	1											
0 to 10 Soil Augering  REMARKS: 1. All samples taken off of auger. 2. Encountered boulders 8' to 10'.	20_											
0 to 10 Soil Augering  REMARKS: 1. All samples taken off of auger. 2. Encountered boulders 8' to 10'.	1											
0 to 10 Soil Augering  REMARKS: 1. All samples taken off of auger. 2. Encountered boulders 8' to 10'.	25											
0 to 10 Soil Augering  REMARKS: 1. All samples taken off of auger. 2. Encountered boulders 8' to 10'.	23											
0 to 10 Soil Augering  REMARKS: 1. All samples taken off of auger. 2. Encountered boulders 8' to 10'.	]											
0 to 10 Soil Augering  REMARKS: 1. All samples taken off of auger. 2. Encountered boulders 8' to 10'.	4											
0 to 10 Soil Augering  REMARKS: 1. All samples taken off of auger. 2. Encountered boulders 8' to 10'.	30								•			
REMARKS: 1. All samples taken off of auger. 2. Encountered boulders 8' to 10'.		to 10 Soi	l Augeri	ll								
					- CC - C	0.5	11 01 1	N				
1/04/N/2 2044 N - 04 05 00 0 1	REN	/IAKKS	: I. All	samples taken	off of auger	2. Encountered bot	ulders 8' to 10	r.				
Proportions Used Sampler Type Sampler Cohesionless Density Cohesive Consistency	Pron	ortions 1	llead	Samples T	una C					West		
trace 0 to 10% SS - Split Spoon 0 - 10 Loose 0 - 4 Soft PLC 4 . 00000	trace	e 0 to 1	0%	SS - Split Sp	oon	0 - 10 Loose	0 - 4	Soft	-	• 00000		
little 10 to 20% some 20 to 35% UP - Fixed Position and 35 to 50% C - Rock Core 10 - 30 Medium Dense 30 - 50 Dense 8 - 15 Stiff 15 - 30 Very Stiff 30 + Hard Database ID No. : C-99 Database ID No. :	some	20 to	35%	UT - Shelby UP - Fixed Po	Tube sition	30 - 50 Dense	8 - 1 15 - 3	Firm Stiff Very Sti	Boring Boring	No.: <u>C-99</u> Completed: <u>(</u>	5/7/18	

NRBC LOG   Bayside   Sewer   System     System     System     System     Sweet   System     Sweet   System     Sweet	da										
Bridge Road #:     Sayside     South   Sayside     South   S	NEB	C LO	G B	ayside Sew	er System					Sheet	2 of 2
Bridge/Road # :	Loca	tion (	C/T):	Kent / W	ARWICK						
Design Consult Co. :   Gordon Archibald, Inc.   Gordon Archibald, Inc.   South Co. :   New England Boring Contractors   Gordon Archibald   September   Co. :   New England Boring Contractors   September   Co. :   New England Boring Contractors   September   Co. :   September   Co. :   September   Co. :   September   Co. :   September   Co. :   September   Co. :   September   Co. :   September   Co. :   September   Co. :   September   Co. :   September   Co. :   September   Co. :   September   Co. :   September   Co. :   September   Co. :   September   Co. :   September   Co. :   September   Co. :   September   Co. :   September   Co. :   September   Co. :   September   Co. :   September   Co. :   September   Co. :   September   Co. :   September   Co. :   September   Co. :   September   Co. :   September   Co. :   September   Co. :   September   Co. :   September   Co. :   September   Co. :   September   Co. :   September   Co. :   September   Co. :   September   September   Co. :   September   Sep					FAP	<b>#:</b>			18 Dat	_	22/18
Contractors   Contractors   Contractors   Contractors   Contractors   Contractors   Contractors   Contractors   Contractors   Contractors   Contractors   Contractors   Contractors   Contractors   Contractors   Contractors   Contractors   Contractors   Contractors   Contractors   Contractors   Contractors   Contractors   Contractors   Contractors   Contractors   Contractors   Contractors   Contractors   Contractors   Contractors   Contractors   Contractors   Contractors   Contractors   Contractors   Contractors   Contractors   Contractors   Contractors   Contractors   Contractors   Contractors   Contractors   Contractors   Contractors   Contractors   Contractors   Contractors   Contractors   Contractors   Contractors   Contractors   Contractors   Contractors   Contractors   Contractors   Contractors   Contractors   Contractors   Contractors   Contractors   Contractors   Contractors   Contractors   Contractors   Contractors   Contractors   Contractors   Contractors   Contractors   Contractors   Contractors   Contractors   Contractors   Contractors   Contractors   Contractors   Contractors   Contractors   Contractors   Contractors   Contractors   Contractors   Contractors   Contractors   Contractors   Contractors   Contractors   Contractors   Contractors   Contractors   Contractors   Contractors   Contractors   Contractors   Contractors   Contractors   Contractors   Contractors   Contractors   Contractors   Contractors   Contractors   Contractors   Contractors   Contractors   Contractors   Contractors   Contractors   Contractors   Contractors   Contractors   Contractors   Contractors   Contractors   Contractors   Contractors   Contractors   Contractors   Contractors   Contractors   Contractors   Contractors   Contractors   Contractors   Contractors   Contractors   Contractors   Contractors   Contractors   Contractors   Contractors   Contractors   Contractors   Contractors   Contractors   Contractors   Contractors   Contractors   Contractors   Contractors   Contractors   Contractors   Contractors   Contractors	Brid	ge/Ro	ad #:								
Boychole   Location   Description:   Bayside   Severs								-			
Dore-hole Location   Description: Bayside Sewers	Geot	ech C	onsult							0.0	
Description: Bayside Sewers   Sampler Online   Sampler consists of a 2 in. split spoon driven using a 140 lb hammer, 30° fall.   Casing: Unlines otherwise noted, soil sampler consists of a 2 in. split spoon driven using a 140 lb hammer, 30° fall.   Casing: Unlines otherwise noted with the property of the casing to driven using a 140 lb hammer, 30° fall.   Casing: Unline otherwise noted with the property of the casing to driven using 300 lb hammer.   Soil   Casing: Unline otherwise noted with the property of the propert	Insp	ector ]	Name/	Co.: Bry	an Deely	/ Gordon Archibald	Elevation	Datum	NGVD29		
Carbon to Line   Carbon to Line   Carbon to Line   Carbon to Line   Carbon to Line   Carbon to Line   Carbon to Line   Carbon to Line   Carbon to Line   Carbon to Line   Carbon to Line   Carbon to Line   Carbon to Line   Carbon to Line   Carbon to Line   Carbon to Line   Carbon to Line   Carbon to Line   Carbon to Line   Carbon to Line   Carbon to Line   Carbon to Line   Carbon to Line   Carbon to Line   Carbon to Line   Carbon to Line   Carbon to Line   Carbon to Line   Carbon to Line   Carbon to Line   Carbon to Line   Carbon to Line   Carbon to Line   Carbon to Line   Carbon to Line   Carbon to Line   Carbon to Line   Carbon to Line   Carbon to Line   Carbon to Line   Carbon to Line   Carbon to Line   Carbon to Line   Carbon to Line   Carbon to Line   Carbon to Line   Carbon to Line   Carbon to Line   Carbon to Line   Carbon to Line   Carbon to Line   Carbon to Line   Carbon to Line   Carbon to Line   Carbon to Line   Carbon to Line   Carbon to Line   Carbon to Line   Carbon to Line   Carbon to Line   Carbon to Line   Carbon to Line   Carbon to Line   Carbon to Line   Carbon to Line   Carbon to Line   Carbon to Line   Carbon to Line   Carbon to Line   Carbon to Line   Carbon to Line   Carbon to Line   Carbon to Line   Carbon to Line   Carbon to Line   Carbon to Line   Carbon to Line   Carbon to Line   Carbon to Line   Carbon to Line   Carbon to Line   Carbon to Line   Carbon to Line   Carbon to Line   Carbon to Line   Carbon to Line   Carbon to Line   Carbon to Line   Carbon to Line   Carbon to Line   Carbon to Line   Carbon to Line   Carbon to Line   Carbon to Line   Carbon to Line   Carbon to Line   Carbon to Line   Carbon to Line   Carbon to Line   Carbon to Line   Carbon to Line   Carbon to Line   Carbon to Line   Carbon to Line   Carbon to Line   Carbon to Line   Carbon to Line   Carbon to Line   Carbon to Line   Carbon to Line   Carbon to Line   Carbon to Line   Carbon to Line   Carbon to Line   Carbon to Line   Carbon to Line   Carbon to Line   Carbon to Line   Carbon to Line   Carbon to Line   Carb	Desc	riptio	n: Bay	side Sewer	S				1 Ob .	4	
Casing: Unless other-wise noted, casing is driven using 390 lb hammer,  fulling 24 in both evidence noted, casing is driven using 390 lb hammer,  fulling 25 co full form of the properties of the properties of the properties and the properties and the properties are considered as a second of the properties and the properties are considered as a second of the properties and the properties are considered as a second of the pr	Samp	ler: Un	less othe	rwise noted, s	soil sampler	consists of a 2 in. split spoon	Data				Stab. Time
Casing Size: 3   3   5   15   15   15   15   15   15	Casin	arı e: Unle	ven usin ss other	g a 140 io nar wise noted, ca	sing is drive	n using 300 lb hammer,					
Depth   STRATUM   Depth   STRATUM   Depth   STRATUM   Depth   STRATUM   Depth   STRATUM   Depth   STRATUM   Depth   STRATUM   Depth   STRATUM   Depth   STRATUM   Depth   STRATUM   Depth   STRATUM   Depth   STRATUM   Depth   STRATUM   Depth   STRATUM   Depth   STRATUM   Depth   STRATUM   Depth   STRATUM   Depth   STRATUM   Depth   STRATUM   Depth   STRATUM   Depth   STRATUM   Depth   STRATUM   Depth   STRATUM   Depth   STRATUM   Depth   STRATUM   Depth   STRATUM   Depth   STRATUM   Depth   STRATUM   Depth   STRATUM   Depth   STRATUM   Depth   STRATUM   Depth   STRATUM   Depth   STRATUM   Depth   STRATUM   Depth   STRATUM   Depth   STRATUM   Depth   STRATUM   Depth   STRATUM   Depth   STRATUM   Depth   STRATUM   Depth   STRATUM   Depth   STRATUM   Depth   STRATUM   Depth   STRATUM   Depth   STRATUM   Depth   STRATUM   Depth   STRATUM   Depth   STRATUM   Depth   STRATUM   Depth   STRATUM   Depth   STRATUM   Depth   STRATUM   Depth   STRATUM   Depth   STRATUM   Depth   STRATUM   Depth   STRATUM   Depth   STRATUM   Depth   STRATUM   Depth   STRATUM   Depth   STRATUM   Depth   STRATUM   Depth   STRATUM   Depth   STRATUM   Depth   STRATUM   Depth   STRATUM   Depth   STRATUM   Depth   STRATUM   Depth   STRATUM   Depth   STRATUM   Depth   STRATUM   Depth   STRATUM   Depth   STRATUM   Depth   STRATUM   Depth   STRATUM   Depth   STRATUM   Depth   STRATUM   Depth   STRATUM   Depth   STRATUM   Depth   STRATUM   Depth   STRATUM   Depth   STRATUM   Depth   STRATUM   Depth   STRATUM   Depth   STRATUM   Depth   STRATUM   Depth   STRATUM   Depth   STRATUM   Depth   STRATUM   Depth   STRATUM   Depth   STRATUM   Depth   STRATUM   Depth   STRATUM   Depth   STRATUM   Depth   STRATUM   Depth   STRATUM   Depth   STRATUM   Depth   STRATUM   Depth   STRATUM   Depth   STRATUM   Depth   STRATUM   Depth   STRATUM   Depth   STRATUM   Depth   STRATUM   Depth   STRATUM   Depth   STRATUM   Depth   STRATUM   Depth   STRATUM   Depth   STRATUM   Depth   STRATUM   Depth   STRATUM   Depth   STRATUM   Depth   STRATUM   Depth   STRATUM   Depth   ST	Cusin					5					
Dec   Care   Proportions   Used   Sept   Deprive   Care   Proportion   Used   Care	Casin	g Size:	3 in		HS Auger				1,		R
S	D E	ΑL		Pen/ Denth							E M
S	P T	I W	Type & Number	Core Rcy.	(Coring min	rft)	neution bystem	Stratum	1	2200141 1101	R
21											Š
10			SS-1	24/13 0.0	6-7-12-1	Dry, medium dense, brown	-gray FINE SAND	0.	5 ASPHALT	KUADWAY	
10	1			2.0		and and and and and					
5	1										
SS-2   24/16   14-20-20-15   Moist, dense, gray FINE SAND, little medium gravel.	_ 1			5.0							
94	5_		SS-2		14-20-20-		AND, little mediun	n			
91   90   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101   101	-			7.0		gravel.					
10   101   SS-3   24/18   10.0   16-24-22-33   Moist, dense, gray FINE SAND, tracde fine gravel.   12.0   Bottom of Exploration = 12'    20   25   Soli Driven Casing   25   Sampler Type trace 0 to 10%   SS - Split Spoon UT - Shelby Tube   SS - Split Spoon UT - Shelby Tube   10-20%   Some 20 to 10.5%   WT - Shelby Tube   10-20%   Medium Dense   4-8   Firm Some 20 to 10.5%   WT - Shelby Tube   10-20%   Medium Dense   4-8   Firm Some 20 to 10.5%   WT - Shelby Tube   10-20%   Medium Dense   4-8   Firm Some 20 to 10.5%   WT - Shelby Tube   10-20%   Medium Dense   4-8   Firm Stiff   Stiff   WT - Shelby Tube   10-20%   Medium Dense   4-8   Firm Stiff   Stiff   WT - Shelby Tube   10-20%   Medium Dense   4-8   Firm Stiff   Stiff   Stiff   WT - Shelby Tube   10-20%   Medium Dense   4-8   Firm Stiff   Stiff   WT - String   Stiff	-			1							
SS-3   24/18   16-24-22-33   Moist, dense, gray FINE SAND, tracde fine gravel.   12.0   Bottom of Exploration = 12'		90									9
12.0	10_	101				NA LA LA LA LA PINIE C	ANID troods find				
12.0   Bottom of Exploration = 12'			SS-3	24/18	16-24-22-		AND, tracde fine				
25				12.0		B		12	.0 Bottom of	Exploration = 12	
20	4										
20	16										
25	15										
25	=										
25											
25											
Proportions Used trace 0 to 10% little 10 to 20% some 20 to 35% UP - Fixed Position  140# Wt x 30" fall on 2" OD SS Sampler Cohesive Consistency 0 - 10 Loose 0 - 4 Soft Firm 10 to 20% Some 20 to 35% UP - Fixed Position UT - Shelby Tube 10 - 30 Medium Dense 4 - 8 Firm 30 - 50 Dense 8 - 15 Stiff Pate Completed: 5/27/18	20_										
Proportions Used trace 0 to 10% little 10 to 20% some 20 to 35% UP - Fixed Position  140# Wt x 30" fall on 2" OD SS Sampler Cohesive Consistency 0 - 10 Loose 0 - 4 Soft Firm 10 to 20% Some 20 to 35% UP - Fixed Position UT - Shelby Tube 10 - 30 Medium Dense 4 - 8 Firm 30 - 50 Dense 8 - 15 Stiff Pate Completed: 5/27/18	:4										
Proportions Used trace 0 to 10% little 10 to 20% some 20 to 35% UP - Fixed Position  140# Wt x 30" fall on 2" OD SS Sampler Cohesive Consistency 0 - 10 Loose 0 - 4 Soft Firm 10 to 20% Some 20 to 35% UP - Fixed Position UT - Shelby Tube 10 - 30 Medium Dense 4 - 8 Firm 30 - 50 Dense 8 - 15 Stiff Pate Completed: 5/27/18	=										
Proportions Used trace 0 to 10% little 10 to 20% some 20 to 35% UP - Fixed Position  140# Wt x 30" fall on 2" OD SS Sampler Cohesive Consistency 0 - 10 Loose 0 - 4 Soft Firm 10 to 20% Some 20 to 35% UP - Fixed Position UT - Shelby Tube 10 - 30 Medium Dense 4 - 8 Firm 30 - 50 Dense 8 - 15 Stiff Pate Completed: 5/27/18											
Proportions Used trace 0 to 10% little 10 to 20% some 20 to 35% UP - Fixed Position  140# Wt x 30" fall on 2" OD SS Sampler Cohesive Consistency 0 - 10 Loose 0 - 4 Soft Firm 10 to 20% Some 20 to 35% UP - Fixed Position UT - Shelby Tube 10 - 30 Medium Dense 4 - 8 Firm 30 - 50 Dense 8 - 15 Stiff Pate Completed: 5/27/18	25										
REMARKS:  Proportions Used trace 0 to 10% SS - Split Spoon little 10 to 20% some 20 to 35% UP - Fixed Position  Proportions Used trace 0 to 10% SS - Split Spoon little 10 to 20% some 20 to 35% UP - Fixed Position  Proportions Used trace 0 to 10% SS - Split Spoon little 10 to 20% some 20 to 35% UP - Fixed Position  140# Wt x 30" fall on 2" OD SS Sampler Consistency Cohesionless Density Cohesive Consistency Consistency Consistency SS - Split Spoon little 10 to 20% SS - Split Spoo											
REMARKS:  Proportions Used trace 0 to 10% SS - Split Spoon little 10 to 20% some 20 to 35% UP - Fixed Position  Proportions Used trace 0 to 10% SS - Split Spoon little 10 to 20% some 20 to 35% UP - Fixed Position  Proportions Used trace 0 to 10% SS - Split Spoon little 10 to 20% some 20 to 35% UP - Fixed Position  140# Wt x 30" fall on 2" OD SS Sampler Consistency Cohesionless Density Cohesive Consistency Consistency Consistency SS - Split Spoon little 10 to 20% SS - Split Spoon little 10 to 20% SS - Split Spoon little 10 to 20% SS - Split Spoon little 10 to 20% SS - Split Spoon little 10 to 20% SS - Split Spoon little 10 to 20% SS - Split Spoon little 10 to 20% SS - Split Spoon little 10 to 20% SS - Split Spoon little 10 to 20% SS - Split Spoon little 10 to 20% SS - Split Spoon little 10 to 20% SS - Split Spoon little 10 to 20% SS - Split Spoon little 10 to 20% SS - Split Spoon little 10 to 20% SS - Split Spoon little 10 to 20% SS - Split Spoon little 10 to 20% SS - Split Spoon little 10 to 20% SS - Split Spoon little 10 to 20% SS - Split Spoon little 10 to 20% SS - Split Spoon little 10 to 20% SS - Split Spoon little 10 to 20% SS - Split Spoon little 10 to 20% SS - Split Spoon little 10 to 20% SS - Split Spoon little 10 to 20% SS - Split Spoon little 10 to 20% SS - Split Spoon little 10 to 20% SS - Split Spoon little 10 to 20% SS - Split Spoon little 10 to 20% SS - Split Spoon little 10 to 20% SS - Split Spoon little 10 to 20% SS - Split Spoon little 10 to 20% SS - Split Spoon little 10 to 20% SS - Split Spoon little 10 to 20% SS - Split Spoon little 10 to 20% SS - Split Spoon little 10 to 20% SS - Split Spoon little 10 to 20% SS - Split Spoon little 10 to 20% SS - Split Spoon little 10 to 20% SS - Split Spoon little 10 to 20% SS - Split Spoon little 10 to 20% SS - Split Spoon little 10 to 20% SS - Split Spoon little 10 to 20% SS - Split Spoon little 10 to 20% SS - Split Spoon little 10 to 20% SS - Split Spoon little 10 to 20% SS - Split Spoon little 10 to 20% SS - Split Spoon little 10 to 20% SS - Split Spoo											
REMARKS:  Proportions Used trace 0 to 10% SS - Split Spoon little 10 to 20% some 20 to 35% UP - Fixed Position  Proportions Used trace 0 to 10% SS - Split Spoon little 10 to 20% some 20 to 35% UP - Fixed Position  Proportions Used trace 0 to 10% SS - Split Spoon little 10 to 20% some 20 to 35% UP - Fixed Position  140# Wt x 30" fall on 2" OD SS Sampler Consistency Cohesionless Density Cohesive Consistency Consistency Consistency SS - Split Spoon little 10 to 20% SS - Split Spoon little 10 to 20% SS - Split Spoon little 10 to 20% SS - Split Spoon little 10 to 20% SS - Split Spoon little 10 to 20% SS - Split Spoon little 10 to 20% SS - Split Spoon little 10 to 20% SS - Split Spoon little 10 to 20% SS - Split Spoon little 10 to 20% SS - Split Spoon little 10 to 20% SS - Split Spoon little 10 to 20% SS - Split Spoon little 10 to 20% SS - Split Spoon little 10 to 20% SS - Split Spoon little 10 to 20% SS - Split Spoon little 10 to 20% SS - Split Spoon little 10 to 20% SS - Split Spoon little 10 to 20% SS - Split Spoon little 10 to 20% SS - Split Spoon little 10 to 20% SS - Split Spoon little 10 to 20% SS - Split Spoon little 10 to 20% SS - Split Spoon little 10 to 20% SS - Split Spoon little 10 to 20% SS - Split Spoon little 10 to 20% SS - Split Spoon little 10 to 20% SS - Split Spoon little 10 to 20% SS - Split Spoon little 10 to 20% SS - Split Spoon little 10 to 20% SS - Split Spoon little 10 to 20% SS - Split Spoon little 10 to 20% SS - Split Spoon little 10 to 20% SS - Split Spoon little 10 to 20% SS - Split Spoon little 10 to 20% SS - Split Spoon little 10 to 20% SS - Split Spoon little 10 to 20% SS - Split Spoon little 10 to 20% SS - Split Spoon little 10 to 20% SS - Split Spoon little 10 to 20% SS - Split Spoon little 10 to 20% SS - Split Spoon little 10 to 20% SS - Split Spoon little 10 to 20% SS - Split Spoon little 10 to 20% SS - Split Spoon little 10 to 20% SS - Split Spoon little 10 to 20% SS - Split Spoon little 10 to 20% SS - Split Spoon little 10 to 20% SS - Split Spoon little 10 to 20% SS - Split Spoo											
REMARKS:  Proportions Used trace 0 to 10% SS - Split Spoon little 10 to 20% some 20 to 35% UP - Fixed Position  Proportions Used trace 0 to 10% SS - Split Spoon little 10 to 20% some 20 to 35% UP - Fixed Position  Proportions Used trace 0 to 10% SS - Split Spoon little 10 to 20% some 20 to 35% UP - Fixed Position  140# Wt x 30" fall on 2" OD SS Sampler Consistency Cohesionless Density Cohesive Consistency Consistency Consistency SS - Split Spoon little 10 to 20% SS - Split Spoon little 10 to 20% SS - Split Spoon little 10 to 20% SS - Split Spoon little 10 to 20% SS - Split Spoon little 10 to 20% SS - Split Spoon little 10 to 20% SS - Split Spoon little 10 to 20% SS - Split Spoon little 10 to 20% SS - Split Spoon little 10 to 20% SS - Split Spoon little 10 to 20% SS - Split Spoon little 10 to 20% SS - Split Spoon little 10 to 20% SS - Split Spoon little 10 to 20% SS - Split Spoon little 10 to 20% SS - Split Spoon little 10 to 20% SS - Split Spoon little 10 to 20% SS - Split Spoon little 10 to 20% SS - Split Spoon little 10 to 20% SS - Split Spoon little 10 to 20% SS - Split Spoon little 10 to 20% SS - Split Spoon little 10 to 20% SS - Split Spoon little 10 to 20% SS - Split Spoon little 10 to 20% SS - Split Spoon little 10 to 20% SS - Split Spoon little 10 to 20% SS - Split Spoon little 10 to 20% SS - Split Spoon little 10 to 20% SS - Split Spoon little 10 to 20% SS - Split Spoon little 10 to 20% SS - Split Spoon little 10 to 20% SS - Split Spoon little 10 to 20% SS - Split Spoon little 10 to 20% SS - Split Spoon little 10 to 20% SS - Split Spoon little 10 to 20% SS - Split Spoon little 10 to 20% SS - Split Spoon little 10 to 20% SS - Split Spoon little 10 to 20% SS - Split Spoon little 10 to 20% SS - Split Spoon little 10 to 20% SS - Split Spoon little 10 to 20% SS - Split Spoon little 10 to 20% SS - Split Spoon little 10 to 20% SS - Split Spoon little 10 to 20% SS - Split Spoon little 10 to 20% SS - Split Spoon little 10 to 20% SS - Split Spoon little 10 to 20% SS - Split Spoon little 10 to 20% SS - Split Spoo											
REMARKS:    The standard list of the standard list		to 12 Se	il Drive	n Casing							
Proportions Used Sampler Type Cohesionless Density Cohesive Consistency trace 0 to 10% SS - Split Spoon little 10 to 20% SUT - Shelby Tube some 20 to 35% UP - Fixed Position Sampler Type Cohesive Consistency Cohesive Consistency Cohesive Consistency Cohesive Consistency Cohesive Consistency Cohesive Consistency Cohesive Consistency Cohesive Consistency Cohesive Consistency Cohesive Consistency Cohesive Consistency Cohesive Consistency Cohesive Consistency Cohesive Consistency Cohesive Consistency Cohesive Cohesive Consistency Cohesive Co	_										
Proportions Used   Sampler Type   Cohesionless   Density   Cohesive   Consistency	RE	MARK	S:								
trace 0 to 10% SS - Split Spoon 0 - 10 Loose 0 - 4 Soft little 10 to 20% UT - Shelby Tube some 20 to 35% UP - Fixed Position 30 - 50 Dense 8 - 15 Stiff Date Completed: 5/22/18											
Some   20 to 35%   UT - Shelby Tube   10 - 30   Medium Dense   4 - 8   Firm   Stiff				_				-			
some 20 to 35% UP - Fixed Position 30 - 50 Dense 8 - 15 Stiff Date Completed : 5/22/18						0 10	1-8 Firm	n Rich		)0 OW	
	som	e 20 t	35%	UP - Fixed I	Position	30 - 50 Dense 8	- 15 Stiff	Borin			
and 35 to 50% C - Rock Core 50 + Very Dense 15 - 30 Very Stiff 30 + Hard Database ID No. :	and	35 t	0 50%	C - Rock	Core			**** · ·			

-						DODANA	~ ··				
		roject		Sewer Syste /ARWICK	m	BORING			*	Sheet _	2 of 2
RIC		(C/T):		FAP#	<b>.</b>	RIDO1   Date Sta		6/7/18		e <b>End</b> : 6/	7/18
1		oad #:	Bayside	EZX II	•	N Coord		0	Date	Ft.	//10
1	_	nsult (		don Archiba	ald, Inc.	E Coord		0		Ft.	
E	_	Consult		ew England	Boring Contractors	Ground	Surf	ace Elev	., Ft.: 0	.0	
Insp	ector	Name	Co.: Br	yan Deely /	Gordon Archibald	Elevatio	n Da	tum <u>N</u>	NGVD29	double to accompany to the control of the control o	
Bor	ehole l	Location	on .		Manual Control of the						
			tht House La	ane							
Sam				soil sampler co nmer, 30'' fall	onsists of a 2 in. split spoon	Data		Groundy Time	water Obse		O4 3 70°
Casir					using 300 lb hammer,	<b>Date</b> 06/07/18		0:00	Depth 10	Casing at	0.25 hr
		ng 24 in		116.4	V						
	ng Size:		SAMPLER	HS Auger	<u>X</u>					<u> </u>	   R
D E P T	ΑL	Time &	Pen/ Depth	Blows per 6 in.	SOIL AND ROCK SAMI Burmister Soil Class		NC	Depth of	D	STRATUM ESCRIPTION	E
	S O I W	Type & Number	Core Rcy.	(Coring min/ft)		meation system		Stratum		ESCRII HON	
H Ft.	NS G/Ft.		& RQD	[Downpress psi				Change			A R K S
								0.3/		ROADAWAY	/ 1
_							l		coarse sadn	gray, FINE SAN and gravel, trace	cobbles. 2
-											2
5							ĺ	5.0			
									Moist, gray	FINE SAND, so and gravel, trace	me silt
-									trace weathe	red bedrock frag	ments.
-							ĺ				
10								10.0			
									Advanced at	iger to BOE.	
								12.0	Dottom of F	xploration = 12'	
-									DOMOIN OF E.	xpioration – 12	
15											
-											
20											
-											
+											
25											
-											
30											
-	to <u>10 So</u>	il Augeri	ng				1	<u> </u>			L
REA	/ARKS	: 1 All	samples taken	off of auger	2. Encountered boulders 2' to	5'					
ALU.	CHHILL	• 1, All	samples takell	on or augor.	2. Encountered boulders 2 to	•					
					140# Wt x 30" fall on 2"				-10-0200-11-		
	ortions	- 1	Sampler T		•	nesive Consiste	• 1				
little	0 to 1	20%	SS - Split Sp UT - Shelby	Tube 10	- 30 Medium Dense 4	-4 Soft -8 Firm	ı	RIC#: Boring No	00000 D.: C-101		***************************************
some and	20 to 35 to		UP - Fixed Po C - Rock C			- 15 Stiff - 30 Very St		Date Com	pleted: 6/	7/18	
*******	J. 10	20,0	- Hour C			0+ Hard		Database			

		roject (C/T) :			Sewer Systen VARWICK	1	BORING	#: <u>C-10</u> Database ID		Sheet	of
RIC		00000		it / V	FAP #:		RIDO1 D  Date Star			te End: 5/	/18/18
		oad # :	Bay	side			N Coord.	***************************************	Dat	Ft	10/10
	_	onsult (			don Archiba	ld, Inc.	E Coord.		***************************************	Ft.	
Geo	tech (	Consult	<b>Co.:</b>			Boring Contractors	Ground S	Surface Ele	v., Ft.: _(	).0	
Insp	ector	Name/	Co.:	Br	yan Deely / C	Gordon Archibald	_ Elevation	Datum _	NGVD29		
		Location: Lig		se La	ıne						
	ler: U	nless othe	erwise n	oted,	soil sampler cor	sists of a 2 in. split spoon			water Obs		
Casin					mmer, 30" fall. ising is driven u	sing 300 lb hammer,	<b>Date</b> 05/17/18	Time 00:00	Depth 10	Casing at	Stab. 0.2
	falli	ing 24 in.		,	_	,	03/1//10	00.00	10		0.2
	g Size:	2 in	SAMP	LED	HS Auger		LL				<u> </u>
D E	C B A L		Pen/	LEK Depth	Blows per 6 in.	SOIL AND ROCK SAMPI	E DESCRIPTION			STRATUM	
P T	S O I W	Type & Number	Rcy. Core Rc	у.	(Coring min/ft)	Burmister Soil Classif	cation System	of Stratum	l I	DESCRIPTION	
H Ft.	NS G/Ft.		& RQD	-	[Downpress psi]			Change			
	15	SS-1	24/15	0.0	7-10-15-20	Dry, medium dense, brown/		0.3		/ROADWAY	***
1	17		]	2.0		trace coarse sand, and grave	l, trace silt.		FINE SAN		
]	29										
_	38 48			. س					]		
5_	48 22	SS-2	24/15	5.0	7-7-6-9	Dry, medium dense, gray-br	own FINE SAND.				
-	31			7.0		trace coarse sand, trace grav	el and silt.	<b>'</b>			
1	49			7.0							
]	66										
10_	SS-3 24/18 21-45-27-28 Wet, very dense gray FI					Wat yang danga aray FINE	FANID troop com				
+	SS-3 24/18 21-45-27-28 Wet, very sand and g				21-43-27-28	sand and gravel, trace silt an	SAND, trace coars d weathered	12.0			
	12.0					bedrock fragments.			Bottom of I	Exploration = 12'	····
]										•	
15_											
4											
-											
1											
20_											
4											
+											
$\exists$											
25_											
-											
-											
30											
	o <u>12 So</u>	il Driven	Casing								
	ARKS										·····
ALIVI	CANA	•									
D	41	I I a a d		las m		140# Wt x 30" fall on 2" O					
_	rtions   0 to 1		Samp SS - Sp	-	- 1	onless Density Coher 10 Loose 0 -		·	00000		
	10 to		UT - Sh			30 Medium Dense 4-		RIC#:	00000		
little	20 to		UP - Fix				5 Stiff	Boring N	o.: C-102		

RIC Brid Desi Geo Insp Bord Desc Samp	# : lge/Ro	(C/T): 00000 oad #: onsult C	Bayside	VARWICK FAP # :		RIDOT D  Date Star	atabase ID t: 6/7/18		e End : 6/	/7/18
Brid Desi Geo Insp Bord Desc Samp	lge/Ro gn Co tech C	oad # : onsult C	Bayside	FAF#:	+	Date Star	i: 0///18	Date	e K.na ·	/// IX
Desi Geo Insp Boro Deso Samp	gn Co tech C	nsult C				NI COLLIN				7710
Geo Insp Boro Deso Samp	tech (			1 4 1 11 1		N Coord.			Ft.	
Insp Bord Desc Samp Casin				don Archibal		E Coord.			Ft.	
Bore Desc Samp	ector				Boring Contractors		urface Elev	-	.0	
Desc Samp Casin		Name/	Co.: Br	yan Deely / C	Gordon Archibald	Elevation	Datum <u>1</u>	NGVD29		
Samp Casin		Locatio	n bor View D	)rie						
	ler: Ur	less othe	rwise noted,	soil sampler con	sists of a 2 in. split spoon			vater Obse		
				mmer, 30" fall. Ising is driven u	sing 300 lb hammer,	<b>Date</b> 06/07/18	Time 00:00	Depth 10	Casing at	
Casin		ng 24 in.	wise noted, ea	ising is diffen u	sing soo is naminer,	00/07/18	00.00	10		0.25
	g Size:			HS Auger	X					
Ď	СВ		SAMPLER	Blows	SOIL AND ROCK SAM	DI È DESCRIBLION	N Depth		STRATUM	
E P	A L S O	Type &	Pen/ Depth Rcv.	per 6 in.	Burmister Soil Class		of	D	ESCRIPTION	
T H	I W N S	Number	Rcy. Core Rcy. & RQD	(Coring min/ft)		-	Stratum			
Ft.	G/Ft.		ע אעט	[Downpress psi]			Change			
						Y 17 Y 2 Y 3 Y 3 Y 3 Y 3 Y 3 Y 3 Y 3 Y 3 Y 3	0.3/		ROADWAY	
]								Dry, brown/	gray FINE SAN and gravel, trace	ID, some
]								comsc sailt	and graver, tract	. SIII.
4										
5_							5.0	Maint -	DINE CANDA	
4									FINE SAND, to and gravel, trace	
-								trace weathe	red bedrock frag	gments.
4										
10							10.0			
10_							10.0	Advanced at	uger to BOE	
-							12.0		-	
							12.0	Bottom of E	xploration = 12'	A
]										
15_										
1				İ						
4										
4										
20_				'						
4										
+										
1										
25										
1										
]										
]										
30										
<u>0</u> t	o <u>10 Soi</u>	l Augerin	g							
REM	IARKS	1 All c	amples taken (	off of anger 2	Encountered cobbles 5' to					***************************************
****(A)	., 14111),		anpies aren	on on augot. 2.	Encountries couples 5 10 (	··				
					140# Wt x 30" fall on 2"	OD SS Sampler				
	ortions l		Sampler Ty	· -	onless Density Coh	esive Consistenc	y			
Propo	Λ4-1	0%	SS - Split Sp	0 - 1	10 Loose 0	- 4 Soft	DIC.	00000		
trace	0 to 1	200/	TIME OF THE				RIC#:	00000		
	10 to		UT - Shelby UP - Fixed Po	Tube 10 -	30 Medium Dense 4	- 8 Firm - 15 Stiff	Boring No		7/18	

DTD	an n		D	:	7 W/	aiala D.C. Maniana la antian	s BORING	~ "		4	Ob4	2 .5	2
		roject C/T) :			ARWICK	vick RI - Various location	_		: <u>C-10</u> 4 abase <b>ID</b>		Sneet _	2 of	<u>Z</u>
RIC	•	00000	_	L / YV	FAP #	1	Date Sta			-	e <b>End</b> : 6/	14/18	-
li i	,	ad #:	Bays	side			N Coord		0	<u> </u>	Ft.	11110	
	-	nsult (			don Archib	ald Inc.	E Coord		0		Ft.		
_ ~	,	onsult	-			Boring Contractors			face Elev	., Ft. : 0.	.0		
		Name/				A GeoEnvironmental, Inc				NGVD29			
<u> </u>		4.						-					
		Location: 80 l	<b>n</b> Harbor	Viev	v								
						onsists of a 2 in. split				water Obse			
					lb hammer,		Date		Time	Depth	Casing at		
Casing		ess otner ng 24 in.		ea, ca	ising is arive	using 300 lb hammer,	06/15/18	'	00:00	7.5		0.25 h	r
Casing					HS Auger	<u>X</u>							
D	ÇВ		SAMPI		Blows	SOIL AND ROCK SAMPL	E DESCRIPTIO	NC	Depth		STRATUM		R E M
D E P T	AL SO	Type &	Rcv.	Depth	per 6 in.	Burmister Soil Classifi			of Stratum		ESCRIPTION		M A
H	IW NS	Number	Core Rcy & RQD	у.	(Coring min/fl (Downpress ps	)			Change			-	A R K S
Ft.	G /Ft.	SS-1	24/12	0.0	24-9-10-7	Dry, medium dense, dark br	own FINE SANI	D	0.1	\ASPHALT/	ROADWAY	-	<u>S</u>
-		10-1	27112	2.0	2-7-7-10-7	some coarse sand and grave		-,	0.1	FINE SAND	and the second s		
1		SS-2	24/16		6-4-7-10	Dry, medium dense, brown coarse sand, trace gravel, tra		me					
5_		SS-3	24/16	4.0	9-12-26-43	Dry, dense, brown FINE SA sand, trace gravel, trace silt.	ND, some coars	e					
		SS-4	4/2	6.0 6.3	100/4"	Wet, very dense, brown FIN silt, trace coarse sand and co	E SAND, some						
-		SS-5	24/18	8.0	13-15-19-15	Wet, dense, dark brown FIN	E SAND, some						
10_		00.6		10.0	12 16 10 21	silt, some coarse sand, trace	-						
-		SS-6	24/14		13-16-18-21	Wet, dense, dark brown FIN coarse sand, trace gravel, tra							
			1	12.0		coarse said, frace graver, trace site.			12.0	Bottom of E	xploration = 12'		
-											•		
15_													
-													
-													
1													
20_													
-													
-4													
- 4													
25_													
-													
-													
												İ	
30													
<u>O</u> to	12 So	il Augeri	ng										
REM	ARKS	:											
		-											
						140# Wt x 30" fall on 2" O	n ee eamaia-						-
Propor	rtions	Used	Samp	ler T	ype Coh	esionless Density Cohe		ncy					
trace	0 to 1	0%	SS - Sp UT - Sh	olit Sp	noon (	- 10 Loose 0 - 0 - 30 Medium Dense 4 -			RIC#:	00000			
some	10 to 20 to	35%	UP - Fix	ed Po	sition 3	) - 50 Dense 8 - 1	15 Stiff		Boring No Date Com		14/18		_
and	35 to	50%	C-Ro	oek C	ore	50 + Very Dense 15 - 30			Date Con Database		1-1/10		_

Loc	ation (	roject (C/T) :	WARW	Sewer System ICK FAP#:		BORING RIDOT Date Sta	Datal	C-10: pase ID 6/7/18	#:		2 of _2	2
		oad # :				N Coord		0		Ft.	7710	
1	_	nsult		don Archiba	ld, Inc.	E Coord	.: ]	0		Ft.		
1		Consul			Boring Contractors	Ground			/ <b>., Ft.:</b> 0	.0		
Insp	pector	Name	/Co.: <u>Br</u>	yan Deely / C	Gordon Archibald	Elevation	n Dat	um <u>1</u>	NGVD29			
Bor	ehole l	Locati										
			rbor View D	Orive								
	pler: Ui	nless oth	erwise noted,	soil sampler coi	nsists of a 2 in. split spoon				water Obse			
Casi				mmer, 30" fall.	ising 300 lb hammer,	<b>Date</b> 06/07/18		me ):00	Depth 10		Stab. Ti	
Casii		ng 24 in		ising is differ t	ising 500 ib nammer,	00/07/18	00	1:00	10		0.25 h	r
Casii	ng Size:			HS Auger	X							
D E P T H Ft.	CB AL SO IW NS G/Ft.	Type & Number	SAMPLER Pen/ Depth Rcy. Core Rcy. & RQD	Blows per 6 in. (Coring min/ft) [Downpress psi]	SOIL AND ROCK SAMPI Burmister Soil Classifi			Depth of Stratum Change	Ε	STRATUM DESCRIPTION		R E M A R K S
								0.3/		ROADWAY	A	1
										FINE SAND, so and gravel, trace s.	cilt	2
5_							-	5.0	Moist grav	FINE SAND, tra	ice.	
									coarse sand	and gravel, trace		
									weathered o	edrock fragment	S.	
10_								10.0	Advanced a	uger to BOE		
-								12.0	Advanced a	iger to BOE		
								12.0	Bottom of E	xploratin = 12'		
]												
15_												
-												
20_												
-												-
_												
25_												
i												
j												
_												
30	10.0	· · · · · ·										$\dashv$
		il Augeri										_
REN	ARKS:	: 1. All	samples talken	off of auger. 2	2. Encoutered boudlers intermi	ittently from 2' to	8'.					
Duar	outions !	Llead	Complex T	una Cahari	140# Wt x 30" fall on 2" O							7
	ortions \ e 0 to 1		Sampler Ty SS - Split Sp	-	onless Density Cohes  10 Loose 0 -		•	NO "	00000			
little	10 to	20%	UT - Shelby	Tube   10 -	30 Medium Dense 4 -	8 Firm		RIC#: Boring No	00000 .: C-105			-
some and	20 to 35 to		UP - Fixed Po C - Rock C				ff L	Date Com	pleted: 6/	7/18		_
					30 -			Database	ID No. :			

Loc	ation (	roject (C/T) :	Kent / V	Sewer Warwi VARWICK FAP#:	ick RI - Various location		Dat	tabase ID	#:		2 of 2 20/18
Brie Des	dge/Ro ign Co	ad # :	Bayside Co.: Gor	don Archiba		N Coord E Coord	d. : l. :	0 0 0 rface Elev		Ft. Ft. 0.0	20/10
Insp	pector	Name	<b>Co.:</b> Ga		GZA GeoEnvironmental				NGVD29	.0	
Des	criptio		mer Ave	noil gampley gor	nsists of a 2 in. split spoon			Cuound	votor Oho		
1	dr	iven usir	ng a 140 lb hai	mmer, 30" fall.		Date		Time	water Obso Depth	Casing at	Stab. Time
	falli	ess otner ng 24 in.		_	sing 300 lb hammer,	06/20/18		00:00	10		0.25 hr
}	ng Size:		SAMPLER	HS Auger	<u>X</u>						R
D E P T H Ft.	CB AL SO IW NS G/Ft.	Type & Number	Pen/ Depth Rev.	Blows per 6 in. (Coring min/ft) [Downpress psi]	SOIL AND ROCK SAMP Burmister Soil Classi		ON	Depth of Stratum Change	Е	STRATUM DESCRIPTION	E M A R K S
		SS-1	0.0		Dry, brown FINE SAND, s gravel, trace silt.	some coarse sand	and	0.3/	\ASPHALT-	ROADWAY	
5_		SS-2	5.0		Moist, gray FINE SAND, t	race caorse sand a	and	6.0			1
10			10.0		gravel, trace silt.			0.0	Coarse GRA	AVEL LAYER.	
"-										•	
								12.0	Bottom of E	Exploration = 12'	
15_											
-											
20_								-			
25											
_											
30	to 10 Co	1 4							16.1	·	
		l Augerii									*****
REN	/IAKKS	: 1. Sam	npels taken off	augers.							
trace little	ortions 0  0 to 1  10 to 2  20 to 35 to	0% 20% 35%	Sampler Ty SS - Split Sp UT - Shelby UP - Fixed Po C - Rock C	000n	10 Loose 0 - 30 Medium Dense 4 - 50 Dense 8 -	esive Consiste 4 Soft - 8 Firm 15 Stiff - 30 Very St	tiff	RIC#: Boring No Date Com Database	pleted: 6	/20/18	

falling 24 in.	Auger X  Blows SOIL AND ROCK SAMPL			10		Stab. Time 0.25 hr
Red	Burmister Soil Classifi  Burmister Soil Classifi  Burmister Soil Classifi  Burmister Soil Classifi  Burmister Soil Classifi  Burmister Soil Classifi  Burmister Soil Classifi  Burmister Soil Classifi  Burmister Soil Classifi  Burmister Soil Classifi  Burmister Soil Classifi  Burmister Soil Classifi  Burmister Soil Classifi  Burmister Soil Classifi  Burmister Soil Classifi  Burmister Soil Classifi  Burmister Soil Classifi  Burmister Soil Classifi  Burmister Soil Classifi  Burmister Soil Classifi  Burmister Soil Classifi  Burmister Soil Classifi  Burmister Soil Classifi  Burmister Soil Classifi  Burmister Soil Classifi  Burmister Soil Classifi  Burmister Soil Classifi  Burmister Soil Classifi  Burmister Soil Classifi  Burmister Soil Classifi  Burmister Soil Classifi  Burmister Soil Classifi  Burmister Soil Classifi  Burmister Soil Classifi  Burmister Soil Classifi  Burmister Soil Classifi  Burmister Soil Classifi  Burmister Soil Classifi  Burmister Soil Classifi  Burmister Soil Classifi  Burmister Soil Classifi  Burmister Soil Classifi  Burmister Soil Classifi  Burmister Soil Classifi  Burmister Soil Classifi  Burmister Soil Classifi  Burmister Soil Classifi  Burmister Soil Classifi  Burmister Soil Classifi  Burmister Soil Classifi  Burmister Soil Classifi  Burmister Soil Classifi  Burmister Soil Classifi  Burmister Soil Classifi  Burmister Soil Classifi  Burmister Soil Classifi  Burmister Soil Classifi  Burmister Soil Classifi  Burmister Soil Classifi  Burmister Soil Classifi  Burmister Soil Classifi  Burmister Soil Classifi  Burmister Soil Classifi  Burmister Soil Classifi  Burmister Soil Classifi  Burmister Soil Classifi  Burmister Soil Classifi  Burmister Soil Classifi  Burmister Soil Classifi  Burmister Soil Classifi  Burmister Soil Classifi  Burmister Soil Classifi  Burmister Soil Classifi  Burmister Soil Classifi  Burmister Soil Classifi  Burmister Soil Classifi  Burmister Soil Classifi  Burmister Soil Classifi  Burmister Soil Classifi  Burmister Soil Classifi  Burmister Soil Classifi  Burmister Soil Classi	ND, some coarse  ay FINE SAND, trace silt.	Depth of Stratum Change 0.3/	COARSE G	STRATUM ESCRIPTION ROADWAY  RAVEL layer	R E M A R K S
20	140# Wt x 30" fall on 2" Of Cohesionless Density Cohes 0 - 10 Loose 0 - 2 10 - 30 Medium Dense 4 - 8	ive Consistency Soft	RIC#: Boring No	00000 .: C-108		

DIE	OT D		D11- (	7	'-1-DI W'14'	- DODING	7 <i>1</i> 1	. 0.100	`		<b>a</b> c	
I		roject C/T) :		Sewer Warwi ARWICK	ick RI - Various location	_		: <u>C-109</u> abase ID		Sheet _	2_ ot_	2
l .		00000		FAP#:		_ RIDOT . Date Sta				End: 6/2	20/18	
ł	lge/Ro		Bayside			N Coord		0	Datt	Ft	20/10	
1	_	nsult (		don Archiba	ld, Inc.	E Coord		0		Ft.		
1	_	onsult		w England I	Boring Contractors	Ground	Sur	face Elev	., Ft.: 0	.0		
Insp	oector	Name/	Co.: <u>Ga</u>	ry Fortier / C	SZA GeoEnvironmental,	Inc.Elevation	n D	atum <u>N</u>	NGVD29			
Bor	ehole ]	Locatio	on .									
			mer Ave			1		0 1				
Sam				soil sampler cor nmer, 30'' fall.	nsists of a 2 in. split spoon	Date		Groundy Time	water Obse Depth	Casing at	Stab. T	'ime
Casii	ng: Unle	ess other	wise noted, ca	sing is driven u	ising 300 lb hammer,	06/20/18		00:00	10		0.25	
Casii	falli 1g Size:	ng 24 in.		HS Auger	X							
	СВ		SAMPLER	Blows	SOIL AND ROCK SAMPL	E DECODIMEN		Danah		OTD ATLINA		R E
D E P T	A L S O	Type &		per 6 in.	Burmister Soil Classifi		JN	Depth of	D	STRATUM ESCRIPTION		M A
T H	I W N S	Number	Core Rcy. & RQD	(Coring min/ft) [Downpress psi]				Stratum Change				R K S
Ft.	G /Ft,	SS-1			Dry, brown FINE SAND, so	ma conrea cond	and		- ACDLIALT	ROADWAY		S
-		33-1	0.0		gravel, trace silt, cobbles.	ine coarse sand	anu	0.3	(ASFRALI-	KOADWA I	/	
-												
5_		SS-2	5.0		Dry arou FINE SAND tree	o coorse sand an	, d	5.0	Coorgo CD A	VEL LAYER.		-
-		55-2			Dry, gray, FINE SAND, trac gravel, trace silt.	e coarse sand an	IG		Coarse GRA	VEL LA I EK.		
-								8.0				
									Encountered	BOULDER		
10_			10.0									
-								120				
								12.0	Bottom of E	xploration = 12'		1
_												
15_												
_												
-												
20_												
-												
-												
_												
25_												
_												
-												
]												
30												
0	to <u>10 So</u>	il Augeri	<u>ng</u>				-					
REN	MARKS	: I. All	samples taken	off augers.								
		Т			140# Wt x 30" fall on 2" O	D SS Sampler						
_	ortions		Sampler T		ionless Density Cohes	sive Consiste						
trac little	e 0 to 1		SS - Split Sp UT - Shelby	000n 0 - Tube 10 -	10 Loose 0			RIC#:	00000			
som	e 20 to	35%	UP - Fixed Po	sition 30 -	- 50 Dense 8 - 1	5 Stiff		Boring No Date Com		20/18		
and	35 to	30%	C - Rock C	ore 50	) + Very Dense 15 - 30 -			Database				

										_	···-·	
	OT P	•				ick RI - Various location					Sheet _	2 of 2
1		(C/T):	Kent /						tabase ID		T 1 (1)	10/10
1		00000			AP#:		_ Date Sta			8 Date		18/18
1	ige/Ro	aa # : nsult (	Bayside	rdon A	rahiha	ld Ino	N Coord E Coord		0		Ft. Ft.	
	_	Consult	-			Boring Contractors			rface Elev	., Ft.: 0		
		Name/				GeoEnvironmental, Inc				NGVD29	.0	
				1 141110	, 023							
		Locatio										
			ar Pole 21	soil san	nler cor	nsists of a 2 in. split spoon			Groundy	vater Obse	rvations	
	dr	iven usin	g a 140 lb h	ammer, S	30" fall.		Date		Time	Depth	Casing at	Stab. Time
Casii		ess other ng 24 in.		easing is	driven u	sing 300 lb hammer,	06/20/18		00:00	10		0.25 hr
Casir	ng Size:	ng 24 m.		HS A	uger							
Ď	СВ		SAMPLER	1 81	ows	SOIL AND ROCK SAMPL	E DESCRIPTIO	ואר	Depth		STRATUM	R E
E P	A L S O	Type &	Pen/ Depi		6 in.	Burmister Soil Classifi		JΙΝ	of	D	ESCRIPTION	l M
T H	I W N S	Number	Core Rcy. & RQD		g min/ft) press psi]				Stratum Change			A R K S
Ft.	G /Ft.	00.1				Day and in days because I	PINIC CANID		_	A CDUAL T	DOADWAY	S
-		SS-1	24/14 0.	´	2-10-7	Dry, medium dense, brown I coarse sand and gravel, trace		HC	0.3	·	ROADWAY COBBLES	
_			2.0	)		-			3.0	Lincountered	CODDLLD	
-									5.0	**		
5_			5.0	)								
_		SS-2	24/15	8-28	22-25	Moist, very dense, brown-gratrace coarse sand and gravel,	ay FINE SAND, trace silt			Encountered	BOULDERS	
-			7.0	)		auto tomos bara mia graves,			7.0	· ·		
-												
10			10.6	)								
		SS-3	24/18		-23-21	Wet, dense, gray FINE SAN	D, trace coarse					
			12.0	)		sand and gravel, trace silt.			12.0			
_										Bottom of E	xploration = 12	
1.5												
15_												
-												
20_				8								
j			:									
25_												
-												
1												
]												
30												
REN	MARKS	:										
									1			
Pron	ortions	Used	Sampler	<b>Type</b>	Cohesi	140# Wt x 30" fall on 2" Of onless Density Cohes		nev				
trace	e 0 to 1	0%	SS - Split	Spoon	0 -	10 Loose 0 - 4	4 Soft	•	RIC#:	00000		
little	10 to e 20 to		UT - Shelb UP - Fixed i	Tube	10 - 30 -	30 Medium Dense 4 - 3 50 Dense 8 - 1			Boring No	o.: C-110		
and	35 to		C - Rock		50	+ Very Dense 15 - 3	30 Very St	iff	Date Com		18/18	
					<u> </u>	30 -	+ Hard		Database	ייסען חו		

		roject			ick RI - Various location					Sheet _	2 of _	2
	,	(C/T):		ARWICK		_ RIDOT I						
1	-	00000		FAP # :		_ Date Star		6/19/1	8Date		19/18	
	_	ad # :	Bayside	dan Anabiba	ld Inc	_ N Coord		0	W	Ft.		
	_	nsult ( Consult		don Archiba	Boring Contractors	E Coord.  Ground S			., Ft.: 0.	$\frac{}{}$ Ft.		
		Name			GZA GeoEnvironmental,	_			., Ft. : <u>0.</u> NGVD29			
IIIS		1 vanic,	Co	iy i oitici / c	SZA GCOZNI W WOMMENTAN,				10 1027			
		Location										
			mer Ave		reieta ef e 2 in aulit annon			Cuoundi	water Obse	wiations.		
Sam				son sampier coi nmer, 30'' fall.	nsists of a 2 in. split spoon	Date		Cime	Depth		Stab. T	lime
Casi	ng: Unle	ess other	wise noted, ca		ising 300 lb hammer,	06/19/18		0:00	10		0.25	
Casi	falli ng Size:	ng 24 in	ı	HS Auger	X							
	C B	*******	SAMPLER								L	R
D E P	ΑL	Type &	Pen/ Depth	Blows per 6 in.	SOIL AND ROCK SAMPL Burmister Soil Classifi		N	Depth of		STRATUM ESCRIPTION		E M
Т	S O I W	Number	Core Rcy.	(Coring min/ft)	Duffilister 50ff Classiff	cation system		Stratum	D	ESCICITION		AR
H Ft.	NS G/Ft.		& RQD	[Downpress psi]				Change				A R K S
		SS-1	0.0		Dry, brown FINE SAND, so	me coarse sand a	and	0.3/	-\ASPHALT-I	ROADWAY		
					gravel, trace silt.							
_									Encountered	COBBLES		
_												
5_		SS-2	5.0		Dry, gray FINE SAND, trace	e coarse sand and	_d	5.0	Encountered	COARSE GRA	VEL.	+
-					gravel, trace silt.				layer			
-								8.0				
											***************************************	1
10_			10.0				_	10.0	D CI3			
_									Bottom of E	xploration = 10'		
							l					1
_							İ					
15												
_												
4												
20												
20-												
]												
_												
25_												
1												
1												
]												
30										******		
0	to <u>10</u> <u>Soi</u>	il Augeri	ng									
REN	<b>AARKS</b>	: 1. All	samples taken	from augers.								
					140# Wt x 30" fall on 2" O	D SS Sampler						-
_	ortions		Sampler T	-	ionless Density Cohes	sive Consisten	ncy					
trace little	e 0 to 1 10 to		SS - Split Sp UT - Shelby	oon 0 - Tube 10 -	10 Loose 0 - 4 - 30 Medium Dense 4 - 3			RIC#:	00000			
some	e 20 to 35 to		UP - Fixed Po C - Rock C	sition 30 -		5 Stiff		Boring No Date Com		19/18		
anu	<i>33</i> 10	JU /0		50	30 -			Database				

BORING CO	NTRACTOR:	<u> </u>				200 Main	chibald, Inc. Street e Island 02860		ļ	SHEET: LOCATION HOLE NO.:		7.5	OF ZEN/A	NE OW
				No.Ve1742		BORING	LOG			BORING T		-	5 NG	000
LOG PREPA	RED BY:		TOWN, ST.			W	arwick, Rhode			LINE & STA	۹.: 📱			
CONTR.		PBA	PROJECT PBA NO.:	NAME:		OFFICE:	Bayside Sewe	ers		OFFSET:	-			
6	, FURTIL	<u>~</u>												
GROUNDW	ATER OBSE	RVATIONS 4 HRS.	DAD		AUGER	CASING	SAMPLER	CORE	SURFACE E	E1 E1/ ·				
AI _2L	FI. AFIER	<u>74</u> nks.	TYPE			HW	55		DATE STAR		SHED	5	1,8/19	<i>x</i>
AT	FT. AFTER	HRS.				Hw 4"	13/4		BORING FO	REMAN:	_	Mi	ETZREIA	LA
			HAMMER I			300#			INSPECTOR		-	4	EVETT	BN_
	DE BODINO		MANIVIER	ALL		<u> 24 °</u>	AUTO.	<del></del>	SOILS ENG	r	_			
LOCATION	OF BORING:												0.1.451.5	_
DEPTH	CASING	SAMPLE	BLO	WS PER 6	" ON SAMF	LER	MONITORIN		NTIFICATION				SAMPLE	
BELOW	BLOWS	DEPTH	tun		M - TO		G WELL INFO.		. COLOR, LO			NO.	PEN.	REC.
SURFACE	PER FOOT	FROM - TO	-06-	8-12	12-10	18-24	INFO.		JOINTS IN R			140.	F LIV.	INLO.
1	16	0-2	14/5	46	8	ID		ASPHAL DRY ME M-SAND TRAD	TLUAD	WAY		51	24	15
2	24		-/-/			10	DAY	Day Me	א אינוער מיני	BRUNE W	101			
3 4	44						' '	M-64-00	Sums	1-Gens	1-		_	
7	30	5-7	5/5	/1	9	10	1 1	TANE	EOF FIN	E Spars	t	52	24	14
TUNKA	73					15	WET				L			
2	62						WEI		1-12016 (					
9	85								so, Little	C WEATH	may			
19	91	10-17	5/5		100/3	11	1	HRANEZ	_			5-3	_3	31
											-			
17							1	DRY -V. WEA	DENSE G	RES	H			
							1	WEA	ntared	Rock				
											-			
							1				H			
							j				Ė			
											-			
							ł				-			
							i l				t			
							]				F			
						_					-			
							1				- 1			
							1							
											-			
							1				-			
							1				Ė			
											-			
											H			
											-			
											F			
							'				H			_
							j l				t			
											H			
											H			
Notes:	Groundwate Refusal (Bed	r was not obs	erved during ntered at 14	g the drillin feet below	g operation grade. The	e encounter	Approximately			ered prior t	to the I	boring ac	Ivanceme	nt.
GROUND SU		12-FT.,		Hi				" CASING TO	F			GE IN E		12
D=DRY	W=WASHE			P=PIT	A=AUGE		ANE TEST					AGE IN F		<u>-</u>
UP=UNDIST PROPORTIC			3=UNDISTUI 6. LITTLE=1				OPEN END RO	)U			HOLE		TYPE	-
				,										

C-112/ CASED

1		roject		Sewer Syst		_ BORING				Sheet _	2 of 2
1		(C/T):		/ARWICK		_ RIDOT I				TO 1 5 /	21/10
1		00000 ad #:	Bayside	FAP #		Date Star N Coord		/31/1	<u>8</u> Date	End: <u>5/</u> Ft.	31/18
1	_	aa # : nsult (		don Archil	oold Inc	E Coord.				Ft.	
1	_	Consult			Boring Contractors	Ground		Elev	/., Ft.: 0		
l		Name/			rdon Archibald	_ Elevation			NGVD29		
								-	·····		·
		Locatio	on len Lane								
				soil sampler	consists of a 2 in. split spoon		Gro	und	water Obse	rvations	
	dr	iven usir	ig a 140 lb har	nmer, 30" fa	11.	Date	Time	e	Depth		Stab. Time
Casir		ess other ng 24 in.		sing is drive	using 300 lb hammer,	05/29/18	00:00	)	0		0.25 hr
Casir	ng Size:			HS Auger	Allocate Control State Control						
D E P	CB AL		SAMPLER	Blows	SOIL AND ROCK SAMPI	LE DESCRIPTIO	N De	pth		STRATUM	R E
P	SO	Type &	Pen/ Depth Rcy.	per 6 in.	Burmister Soil Classifi			of itum	D	ESCRIPTION	M A
H	I W N S	Number	Core Rcy. & RQD	(Coring min/ [Downpress p				ange			A R K S
Ft.	G /Ft.	-						0.3/	ASPHALT/	ROADWAY	
-									Dry, brown-	gray FINE SAN	D, some
-									trace cobble	and gravel, trace s.	silt,
5_								5.0	Moist gray	FINE SAND, t	race 2
-									coarse sand weathered b	and gravel, trace	
-									weathered b	eurock.	
10_								10.0	Advanced a	iger to BOE	
-								12.0	7 tavaneed at	iger to BOL	
								12.0	Bottom of E	xploration - 12'	***************************************
15_											
-											
-											
]											
20_											
-											
25_											
-											
_							-				
30	4- 10 C	!1 A	<u></u>								
		il Augeri							***************************************		
REN	MARKS	: 1. All	samples taken	off of augers.	2. Boulders encountered 4' to	6'					
											*
			<u> </u>		140# Wt x 30" fall on 2" O						
	ortions	1	Sampler T		esionless Density Cohe		·				
little	e 0 to 1 e 10 to	20%	SS - Split Sp UT - Shelby	Tube 1	0 - 10 Loose 0 - 0 - 30 Medium Dense 4 -	8 Firm		C#: ing N	00000 o.: C-113	***************************************	
som and	e 20 to 35 to		UP - Fixed Po C - Rock C		0 - 50 Dense 8 - 1 50 + Very Dense 15 -		D-4			31/18	
anu	55 10	50 /0	C - NOCK C		30 · Very Delise 13 -				iD No.:		

Loca	ation (	roject (C/T) :	Ker		Sewer Syst ARWICK			#: <u>C-1</u> Database I	D#:		2 of
	-	00000			FAP #		_ Date Stai		/18 Dat		18/18
	0	ad # :	Bay				N Coord.			Ft.	
	0	nsult (			don Archib		_ E Coord.			Ft.	
		onsult				Boring Contractors		Surface El	-	).0	
Insp	ector	Name/	Co.:	Br	yan Deely /	Gordon Archibald	_ Elevation	Datum	NGVD29		
Desc	riptio	Location: Nee	ed addr								
Samp					soil sampler o nmer, 30'' fa	onsists of a 2 in. split spoon	Date	<u>Groun</u> Time	dwater Obs		Ctab TC
Casin	g: Unle	ess other	wise not	ted, ca	sing is driver	using 300 lb hammer,	05/18/18	00:00	Depth 7	Casing at	Stab. Ti
Casin	g Size:	ng <b>24 in.</b> 3 in		<u> </u>	HS Auger						
D E P	CB AL SO	Type &	SAMP Pen/		Blows per 6 in.	SOIL AND ROCK SAMPI Burmister Soil Classifi		N Depth		STRATUM DESCRIPTION	
T H Ft.	I W N S G/Ft.	Number	Rcy. Core Ro & RQD	cy.	(Coring min/f [Downpress ps	n)	iodiion System	Stratum Change	ı	SESCIAI IIOIV	
	6 8	SS-1	24/13	0.0	4-4-6-4	Dry, loose, brown FINE SA gravel.	ND, some fine	0.	1 \ASPHALT	/ROADWAY	/
	8 13 21		-	2.0							
5_	27 56	SS-2	24/14	5.0	19-47-56-63	Dry, very dense, gray FINE	SAND and coarse				
=	63 78	<u></u>	-".	7.0	12 11 20 00	sand, piece os shale (weathe	red), trace silt.				
10	84 91			10.0				10.	0		
10_		SS-3	24/16	12.0	26-37-42-68	Wet, very dense, black WEA BEDROCK.	ATHERED	12.	Some coars	e weathered SHA	ALE.
		•		12.0				12.		Explroation = 12'	
15_											
20											
20-											
25_											
30							www				
<u>0</u> t	o <u>12 Soi</u>	il Driven	Casing								
REM	IARKS	:									
Pron	ortions	I lead	Same	oler T	vne Coh	140# Wt x 30" fall on 2" O esionless Density Cohe		iev i			
trace little	0 to 1 10 to 20 to 35 to	0% 20% 35%	SS - S UT - Si UP - Fi	plit Sp helby	ooon (Tube 1 sition 3	0 - 10 Loose 0 - 0 - 30 Medium Dense 4 - 0 - 50 Dense 8 - 15 - 50 + Very Dense 15 -	4 Soft 8 Firm 15 Stiff	RIC#:	No.: C-114	5/18/18	

		oject	Bayside S				BORING RIDOT I				Sheet _	2 of 2	<u>2</u>
		<b>C/T)</b> : 00000	Kent / W	FAI		A SA MARIA PARAMETERS	_ RIDOT I Date Stai		5/31/1		End: 5/3	31/18	
	# : lge/Ro		Bayside	FAI	π.		N Coord.		0	oDan	Ft	71710	
	_	au # . nsult (		don Arcl	nihalo	d Inc	E Coord.		0		Ft.		
	_	onsult				oring Contractors	Ground S			Ft.: 0.	<del></del>		
		Name/				on Archibald	_ Elevation			NGVD29	,		
		Locatio	on len Lane										
				soil sample	r con	sists of a 2 in. split spoon			Groundy	water Obse	rvations		
_	dri	iven usin	g a 140 lb har	nmer, 30"	fall.		Date	r	Time	Depth	Casing at		
Casir		ess other ng 24 in.		sing is dri	ven us	sing 300 lb hammer,	05/31/18	(	00:00	10		0.25 h	r
Casir	ıg Size:		<del></del>	HS Auge	r _	ALL ALL ALL ALL ALL ALL ALL ALL ALL ALL							
D E	CB AL		SAMPLER Pen/ Depth	Blows		SOIL AND ROCK SAMPL	E DESCRIPTIO	N	Depth		STRATUM		R E
P	SO	Type &	Rev	per 6 in		Burmister Soil Classifi			of Stratum		ESCRIPTION		M A
T H	I W N S	Number	Core Rcy. & RQD	(Coring mi					Change	٠			R K S
Ft.	G /Ft.				- 1				0.3/	ASPHALT-	ROADWAY		<u>S</u>
4					İ				V	Dry, brown-	gray FINE SAN	D, some	•
-										coarse sand	and gravel, trace	cobbles.	
5_								-	5.0	Davis amazi Pl	NE SAND, trace		
-										sand and gra	vel, trace silt and	i i	
-										weathered be	drock fragment	3.	
-					l								
10									10.0				
_										Advanced au	ger to BOE		
									12.0	Rottom of F	xploration = 12'		
-										Dottom of L	spioration 12		
15													
												***************************************	
]					l								
_													
20													
20_													
]													
25_													
-													
]													
30	10.0-	· · · · · · · · · · · · · · · · · · ·		-		k dahamen							$\dashv$
		il Augeri											
REN	MARKS	: 1. All	samples taken	off of auge	rs.								
						140# Wt x 30" fall on 2" O			<del></del>	<del> </del>			
_	ortions	1	Sampler T	-		onless Density Cohes		ıcy					
trac little		20%	SS - Split S _I UT - Shelby		0 - 1 10 -	30 Medium Dense 4 -	8 Firm		RIC#: Boring No	00000 0.: C-115			
som and	e 20 to 35 to		UP - Fixed Po C - Rock C		30 - 50			ff	Date Com		31/18		-
ailu	<i>33</i> 10	JU /0	C - ROCK C	.010	50	30 -			Database				

DIL	OTP	roject	Rayeide	Sewer Warw	ick RI - Various location	s BORING	C# -	: C-116		Shoot	2 of 2
		(C/T) :		VARWICK	ick Ki - Various location			abase ID		Sheet	<u> </u>
	; ;	00000		FAP#:		Date Sta				e End: 6	/11/18
	lge/Ro		Bayside			N Coord		0		Ft.	11/10
	-	nsult (		don Archiba	d. Inc.	E Coord		0		Ft.	
	_	onsult		ew England I	Boring Contractors	Ground	Sur	face Elev.	. Ft. : 0	0.0	
Inst	ector	Name/			GeoEnvironmental, Inc				GVD29		
						3					
Des	criptio		en Avenue	near Plye Av							
Samı				soil sampler co I lb hammer, 30	nsists of a 2 in. split	Date		Groundy Time	vater Obse Depth		Stab. Time
Casi	ng: Unl	ess other	wise noted, ca		ising 300 lb hammer,	06/11/18		00:00	8.6	casing at	0.25 hr
		ng 24 in.									
	ng Size:	_	OAN ADT ED	HS Auger	<u>X</u>						I D
D E	CB AL		SAMPLER Pen/ Depth	Blows	SOIL AND ROCK SAMPL		NC	Depth		STRATUM	Ë
E P T	SO IW	Type & Number	Rcy. Core Rcy.	perona	Burmister Soil Classifi	cation System		of Stratum	1	ESCRIPTION	M A
Ĥ Ft.	NS G/Ft.	Transco	& RQD	(Coring min/ft) [Downpress psi]				Change			R E M A R K S
1		SS-1	24/14 0.0	32-9-8-8	Dry, medium dense, brown l coarse sand and gravel, trace	FINE SAND, so silt.	me	0.2/	ASPHALT/ FINE SANI	ROADWAY	
1		SS-2	24/20 2.0	11-13-19-22	Dry, dense, gray-brown FIN coarse sand and gravel, trace						
5_		SS-3	24/18	13-27-35-29	Dry, very dense, gray FINE coarse sand, trace silt, trace	SAND, some					
		SS-4	24/14 6.0	29-23-23-31	Dry, dense dark gray FINE S		,				
-		SS-5	8.0 24/16	11-16-17-19	trace gravel.  Moist, dense, dark gray FIN	E SAND, some					
10			10.0		coarse sand, trace gravel, tra	ce silt.					
		SS-6	24/20	27-30-40-57	Moist, very dense, dark gray some silt, trace coarse sand a						
			12.0		some sm, nace comse sand a	ina graver.	ļ	12.0	Dattom of C		
2 -									DOMOIII OI E	xploration = 12	
15											
-											
20_											
-											
25											
7											
-											
-										,	
30											
<u>0</u> t	o <u>12 Soi</u>	l Augerii	og								
REM	IARKS:										
					140# Wt x 30" fall on 2" Ol	n SS Samalar					
Prop	ortions l	Used	Sampler Ty	ype Cohesi	onless Density Cohes		ncy				
trace little	0 to 1		SS - Split Sp UT - Shelby	oon 0 - 1 Tube 10 -				RIC#:	00000	7.	
some	20 to	35%	UP - Fixed Po	sition 30 -	50 Dense 8 - 1	5 Stiff		Boring No.		11/10	
and	35 to	50%	C - Rock C	ore 50	+ Very Dense 15 - 3 30 +			Date Comp Database I		11/18	

RII	OT P	roject	Bayside S	Sewer Syste	 m	BORING	G#:	C-117		Sheet	2 of 2
1		C/T):		/ARWICK		RIDOT		***************************************		~	<del></del>
ł.		00000		FAP#	•	Date Sta		5/31/1		End: 5/	31/18
	lge/Ro		Bayside			N Coord	-			Ft.	
1	_	nsult (		don Archib	ald. Inc.	E Coord	_		<del></del>	Ft.	
	_	onsult	*		Boring Contractors	Ground			. Ft.: 0.		
1		Name/			don Archibald	Elevation			NGVD29		
1		Locatio									
			len Lane	oil complex of	onsists of a 2 in. split spoon		<u> </u>	rounds	vater Obse	mations	
Sam	pier: Or dr	iven usin	g a 140 lb hai	nmer, 30" fal		Date		me	Depth		Stab. Time
Casi	ng: Unle	ess other	wise noted, ca	sing is driven	using 300 lb hammer,	05/31/18		:00	10		0.25 hr
Casii	falli ng Size:	ng 24 in.		HS Auger							
Ď	СВ		SAMPLER	Blows	SOIL AND ROCK SAMPI	E DESCRIPTIO	)N	Depth		STRATUM	R E M
E P	A L S O	Type &		per 6 in.	Burmister Soil Classifi			of		ESCRIPTION	M
T H	I W N S	Number	Core Rcy. & RQD	(Coring min/ft				Stratum Change			A R K S
Ft.	G/Ft.		a ngs	[Downpress ps				ge			S
_							<u> </u>	0.3/		ROADWAY gray FINE SAN	D same 1
_									coarse sand	and gravel, trace	cobbles.
-											
								5.0			
5_							-	3.0	Moist, gray,	FINE SAND, so	ome 2
-									coarse sand,	some gravel, tra red bedrock frag	ce silt,
-									uace weathe	ied bedrock mag	inches.
10_								10.0			
_									Advanced au	iger to BOE.	
							_	12.0	Rottom of F	xploration = 12'	
-									Dottom of L	spioration 12	
15											
-											
_											
20_											
-											
-											
-											
25_											
								1			
-											
-											
20											
30	to 10 %-	1 Augas!	l								
		il Augeri								**************************************	
RE	MARKS	: 1. all s	amples taken o	off of augers.	2. Boulders encountered from	5' to 10'.					
_				_	140# Wt x 30" fall on 2" O			***************************************	1000.4		
_	ortions		Sampler T		sionless Density Cohe		٠				
trac little	e 0 to 1 e 10 to	20%	SS - Split S _I UT - Shelby	Tube 10	- 10 Loose 0 - - 30 Medium Dense 4 -		1	UC#:	00000		
som	e 20 to	35%	UP - Fixed Po	osition 30	- 50 Dense 8 - 15 - 15 -		n	Boring No Date Com		31/18	
and	35 to	30%	C - Rock C	ore   3	0 + Very Dense 15 - 30			atabase			

l	OT P	•			Sewer	_	n	BORING		***************************************		Sheet _	2 of 2
1		<b>C/T)</b> :		<u>ıt / W</u>	/ARW			_ RIDOT			****		
i	-	00000			F	AP#:		Date Sta			<u>8Da</u>		18/18
I	_	ad # :	Bay					_ N Coord		0		Ft.	
1	_	nsult (					ld, Inc.	_ E Coord		0		Ft.	
		onsult					Boring Contractors	_ Ground				0.0	
Inst	ector	Name/	Co.:	Br	yan De	ely / C	Gordon Archibald	_ Elevatio	n Da	atum <u>f</u>	NGVD29		<del>~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~</del>
		Location: Ne	on ed addr	ess									
Sam			erwise no				sists of a 2 in. split spoon	Date		Ground Time	water Obs Depth	Servations Cosing at	Stab. Time
Casii	ng: Unle	ess other	wise not				sing 300 lb hammer,	05/18/18		00:00	4	0	l hr
Casir	falli: 1g Size:	ng <b>24 in.</b> 3 in			HS Au	ıger							
	СВ		SAMP	LER				D D D O O I D D I	L				RE
D E P	A L S O	Туре &	Pen/ Rcy.	Depth	Blo per 6		SOIL AND ROCK SAMPL Burmister Soil Classifi		)N	Depth of		STRATUM DESCRIPTION	M
T H	I W N S	Number	Core Rc		(Coring			·		Stratum			A R K S
Ft.	G/Ft.		& RQD		[Downp	ress psi]				Change			K S
_	13									0.5	ASPHALT	7/ROADWAY	
-	16	SS-1	24/16	2.0	9-7-9	3 1 1	Dry, medium dense, brown I	MEDILIM SANI	`				
_	43 56	33-1	24/10	4.0	<del>9-</del> 7-3	7-11	trace fine sand.	VIEDIOIVI SAINI	ر,				
5	34		1	4.0 5.0									
	47	SS-2	24/14	5.0	16-19-	21-28	Moist, dense, gray MEDIUM	1 SAND, some					
	46			7.0			medium gravel, trace fine sal	nd.					
	54												
	66 72												Ì
10_	12	SS-3	24/17	10.0	30-38-	49-45	Moist, very dense, gray FINI	E SAND, some					
-				12.0			medium gravel, trace fine sar	nd.		12.0			
				12.0							Bottom of	Exploration $= 12'$	
15_													
-													
-													
20_													
_													
-													
-													
25													
4													
4													
30													
	to <u>12 So</u>	il Driven	Casing						!			WALL TO SERVICE TO SER	1
	//ARKS												
ANDI	CHERRIA	•											
				·			1400334 20000 20 20	D CC .	-	· · · · · · · · · · · · · · · · · · ·	17784		
Pron	ortions	Used	Samp	ler T	ype	Cohesi	140# Wt x 30" fall on 2" Of Cohes		ncy				
trac	e 0 to 1	0%	SS - S	olit Sp	oon	0 -	10 Loose 0 - 4	4 Soft		RIC#:	00000		
little som	10 to		UT - Si UP - Fix			10 - 30 -	30 Medium Dense 4 - 8 50 Dense 8 - 1			Boring No	o.: C-118		
and	35 to		C-R			50	+ Very Dense 15 - 3	30 Very St	iff	Date Con Database		5/18/18	
							30 -	+ Hard		บลเลมสรัย	ID 110. i		

nn	OT D	• ,	D '1 (	7	4		DODIN	O #	. 0.110	`	01 4	2 6 2
	OT P	· ·	Bayside S				BORING		$\begin{array}{c} \cdot  \underline{\text{C-119}} \\ \textbf{abase ID} \end{array}$		Sheet _	2 of 2
	ation ( C#:	00000		FAP			_ RIDO1 Date Sta				End: 5/	31/18
1	dge/Ro		Bayside		π •		_ Date Sta		0	o Dan	Ft.	51/10
	ign Co			don Arch	ibald, Inc.		E Coord		0		Ft.	
1	tech C				nd Boring Contra	ctors	_		face Elev	Ft.: 0.		
l	ector				ordon Archibald		_ Elevatio			NGVD29		
	ehole l criptio		on len Lane									
Sam					consists of a 2 in. sp	plit spoon	Data			water Obse		Ctob Time
Casi			ig a 140 lb har wise noted, ca		an. en using 300 lb ham	mer,	<b>Date</b> 05/31/18		Time 00:00	Depth 10		Stab. Time 0.25 hr
		ng 24 in.		UC A								
	ng Size:		SAMPLER	HS Auger	T		<u> </u>	<u> </u>				R
D E	C B A L	m e	Pen/ Depth	Blows per 6 in.			E DESCRIPTION	NC	Depth		STRATUM ESCRIPTION	E M
E P T	S O I W	Type & Number	Core Rcy.	(Coring mir	Durmste	i Son Classin	cation System		Stratum	D	ESCRIPTION	AR
H Ft.	NS G/Ft.		& RQD	[Downpress					Change			A R K S
									0.3/		ROADWAY	/ 1
_										Dry, brown- coarse sand	gray FINE SAN and gravel, trace	D, some
_										trace cobbles		
- ہے									5.0			
5_									3.0		FINE SAND, tra	
-										coarse sand a	and gravel, trace red bedrock frag	silt,
_												´
10_									10.0	Advanced at	iger to BOE	
-									12.0		J	
										Bottom of E	xploration = 12'	
_												
15_												
-												
-												
_												
20_												
-												
-												
-												
25_												
-												
_												
-												
30	to <u>10 So</u>	il Augari	na						<u> </u>			
						1 = 2						
RE	MARKS	: 1. sam	ples taken off	of augers.	2. Boulders encounte	ered 5' to 8'.						
									T			
Pror	ortions	Used	Sampler T	vpe C	140# Wt x 30' hesionless Density	fall on 2" O' Cohe	D SS Sampler sive Consiste	encv				
trac	e 0 to 1	0%	SS - Split Sp	oon	0 - 10 Loose	0 -	4 Soft		RIC#:	00000		
	e 10 to e 20 to		UT - Shelby UP - Fixed Po		10 - 30 Medium Der 30 - 50 Dense	nse 4 - 8 - 1		_	Boring No	D.: C-119		
and			C - Rock C		50 + Very Dens		30 Very S	tiff	Date Com Database		31/18	
L						30	паго	2	~			

· · · ·														
	OT P		Bayside S					BORING				Sheet _	2 of	2
		C/T):	Kent / W							abase ID		. F. J . <i>Cl</i>	21/10	
RIC	#: lge/Ro	00000	Bayside	FAJ	P#:			_ Date Sta N Coord		5/31/1 0	oDate	End: <u>5/</u> Ft.	31/18	
	_	au # . nsult C		don Arc	hibald	Inc		E Coord		0		— Ft.		
i .	_	onsult				oring Contractors		***		face Elev	Ft.: 0	0 1 1		
		Name/				n Archibald		_ _ Elevatio			NGVD29			
Dow	shala l	Locatio												
			en Lane											
	oler: Un	less othe	rwise noted,			ists of a 2 in. split spe	oon	70.			water Obse	rvations	[Q. 1 5	TO!
Casir			g a 140 lb har wise noted, ca			ng 300 lb hammer,		<b>Date</b> 05/31/18		Time 00:00	Depth 10	Casing at	0.25	l'ime hr
	falli	ng 24 in.	,, ,, ,,			,		03/31/10		00.00	10		0.23	***
	ng Size:		SAMPLER	HS Auge	er							L		R
D E	CB AL		Pen/ Denth	Blows per 6 is		SOIL AND ROCK S			ON	Depth of	D	STRATUM		E
P T	T I W Number Core Rey. (Coring min/ft)						Ciassino	cation System		Stratum	D	ESCRIPTION		A
H Ft.	NS G/Ft.		& RQD	[Downpres						Change				R K S
										0.3/			<del></del> /	$\sqrt{1}$
											GRAVEL, t	gray FINE SAN race coarse sand	, trace	2
-											silt, trace co	bbles.		2
5										5.0				
											Moist, gray,	FINE SAND, trand gravel, trace	ace	
_											weathered be	edrock fragment	S.	
10										10.0				
											Advanced at	iger to BOE		
										12.0	Bottom of F	xploration = 12'		_
4											Bottom of E	Aproration 12		
15_														
4														
4														
4														
20_														
4														
4														
]														
25_														
-														
1														
1														
30	40.0													
<u>0</u>	to <u>10 So</u>	il Augerii	ng					···········						
REN	<b>MARKS</b>	: 1. sam	ples taken off	of augers.	2. 2'1	to 6' boulders encount	ered.							
						140# Wt x 30" fall o	n 2" OI	) SS Samular		<u> </u>				
-	ortions		Sampler T	_	Cohesio	nless Density	Cohes	ive Consiste	•					
	e 0 to 1 10 to		SS - Split Sp UT - Shelby		0 - 10 10 - 3		0 - 4 4 - 8			RIC#:	00000		<del></del>	
some	e 20 to	35%	UP - Fixed Po	sition	30 - 5	50 Dense	8 - 1: 15 - 3	5 Stiff		Boring No.		31/18		
and	35 to	50%	C - Rock C	оге	50 +	Very Dense	15 - 3 30 +			Database Database				

Sheet 2 of 2 C-121 OW Bayside Sewer System BORING #: NEBC LOG NEBC Database ID #: Kent / WARWICK Location (C/T): 5/20/18 5/21/18 Date End: **FAP#:** Date Start : 00000 RIC#: N Coord.: Ft. Bridge/Road #: Bayside 0 Ft. Gordon Archibald, Inc. E Coord.: Design Consult Co.: 0.0 Ground Surface Elev., Ft. : New England Boring Contractors Geotech Consult Co.: NGVD29 **Elevation Datum** Bryan Deely / Gordon Archibald Inspector Name/Co.: **Borehole Location Description:** Bayside Sewers **Groundwater Observations** Sampler: Unless otherwise noted, soil sampler consists of a 2 in. split spoon Casing at Stab. Time Depth driven using a 140 lb hammer, 30" fall. Time Date Casing: Unless otherwise noted, casing is driven using 300 lb hammer, 00:00 0.25 hr 05/21/18 4 falling 24 in. **HS** Auger 4 in Casing Size: R E M SAMPLER СВ D E P T H SOIL AND ROCK SAMPLE DESCRIPTION **STRATUM** Blows Depth AL SO IW Pen/ Depth per 6 in. DESCRIPTION of Burmister Soil Classification System Type & Rcy. Core Rcy. A R K S Stratum Number (Coring min/ft) Change NS & RQD [Downpress psi] G/Ft Dry, medium dense, brown/gray MEDIUM ASPHALT/ROADWAY 4-9-8-6 SS-1 24/18 0.0 2 SAND, some fine gravel. 6 2.0 23 19 10 5.0 5 Wet, loose, gray MEDIUM SAND, some fine 24/10 SS-2 2-1-1-4 14 sand, little fine gravel, trace silt. 21 7.0 46 62 89 10.0 10 14-14-15-13 Wet, medium dense, FINE SAND and silt, little SS-3 24/16 coarse sand. 12.0 12.0 Bottom of Exploration = 12' 15 20 25 30 0 to 12 Soil Driven Casing REMARKS: 140# Wt x 30" fall on 2" OD SS Sampler Cohesionless Density Cohesive Consistency Proportions Used Sampler Type 0 - 4Soft 0 - 10 SS - Split Spoon Loose trace 0 to 10% RIC#: 00000 UT - Shelby Tube UP - Fixed Position 10 to 20% 10 - 30Medium Dense 4 - 8 Firm little C-121 OW Boring No.: 30 - 508 - 15 Stiff Dense 20 to 35% some Date Completed: 5/20/18 Very Stiff 15 - 3035 to 50% C - Rock Core 50 +Very Dense and Database ID No.: 30 +Hard

[	OT P			Sewer Syste	m	BORING				Sheet _	2 of 2
		(C/T):		/ARWICK				abase ID		T. J. <i>El</i>	3 1 /1 0
1	-	00000		FAP #	• • • • • • • • • • • • • • • • • • •	_ Date Sta			8 Date		31/18
		ad #:				_ N Coord		0	***************************************	Ft.	
		nsult (		don Archiba		E Coord		0	<b>—</b>	Ft.	
1		Consult			Boring Contractors	*******		face Elev		.0	
Insp	pector	Name/	Co.: <u>T.</u>	Plante / Gor	don Archibald	Elevation	n Da	atum <u>N</u>	NGVD29		
		Location: Sta	on ndish Avent	ıe							
	oler: Ur	less othe	rwise noted, s		nsists of a 2 in. split spoon	Date	·	Groundy Time	water Obse Depth	rvations Casing at	Stab. Time
Casi	ng: Unle		wise noted, ca		using 300 lb hammer,	05/31/18		00:00	10		0.25 hr
Casi	ng Size:			HS Auger							
D E P T H	CB AL SO IW NS	Type & Number	SAMPLER Pen/ Depth Rcy. Core Rcy. & RQD	Blows per 6 in. (Coring min/ft) [Downpress psi	SOIL AND ROCK SAMP Burmister Soil Classif		N	Depth of Stratum Change	D	STRATUM ESCRIPTION	R E M A R K S
Ft.	G /Ft.			[Bownpress psi				0.2	¬ A CDLIA1 T/I	ROADWAY	<u> </u>
<u>-</u>								0.3/	Dry, brown	FINE SAND, so and gravel, some	me
5_								5.0	coarse sand a	FINE SAND, tra and gravel, trace red BEDROCK	ice silt,
10_								10.0	_		
-								12.0	Advanced at		
-									Bottom of E	xploration = 12'	
15_											
-											
20_											
_											
25_											
-											
-											
30	to 10 So	il Augeri	l <u> </u>					1			
				off of augers.	2. 4' - 6' encountered BOULD	DERS.		m			
			r								
trac little	oortions e 0 to 1 e 10 to e 20 to 35 to	0% 20% 35%	Sampler T SS - Split Sp UT - Shelby UP - Fixed Po C - Rock C	000n 0 Tube 10 0sition 30	140# Wt x 30" fall on 2" Consionless Density Cohe - 10 Loose 0 30 Medium Dense 4 50 Dense 8 - 0 + Very Dense 15 - 30	esive Consiste 4 Soft 8 Firm 15 Stiff 30 Very St	iff	RIC # : Boring No Date Com Database	pleted: 5/	31/18	

RID	OT Pi	roject	Bayside S	Sewer S	vstem		F	BORING	. #	: C-12	3	Sheet	2 of	2
		C/T):								abase ID		~	~	
RIC	,	00000			P#:			Date Star		5/30/3		End: 5/3	30/18	
	lge/Ro		Bayside					V Coord.		0		Ft.		
	_	nsult (		don Arc	hibald	. Inc.		Coord.		0	H-la-famour	Ft.		
		onsult				oring Contractors				face Elev	/., Ft.: 0.			
		Name/				n Archibald		Elevation			NGVD29			
		Locatio												
			yflower Av								401			
Samp			erwise noted, : ig a 140 lb hai			sts of a 2 in. split spoon		Date		Ground Time	water Obse Depth	Casing at	Stab T	'ime
Casir	ig: Unle	ess other	wise noted, ca	sing is di	iven usi	ng 300 lb hammer,		/30/18		00:00	10		0.25	
		ng 24 in.												
Casir	ig Size:		T	HS Aug	ger						1			В
D F	CB AL		SAMPLER Pen/ Depth	Blov		SOIL AND ROCK SAN	APLE DE	SCRIPTIO	N	Depth		STRATUM		R E
D E P T	SO	Type &	Rcy.	PC. 0	1	Burmister Soil Clas	sification	System		of Stratum	D.	ESCRIPTION		M A
Н	I W N S	Number	Core Rcy. & RQD	(Coring r						Change				A R K S
Ft.	G /Ft.			[20,p.	Pari						ASPHALT/I	OADWAY		S
-										0.3		FINE SAND, so	me	
-											coarse sand a	ind gravel, trace		
-											trace cobbles			
5										5.0				
٦٦										5.0	Moist, gray I	INE SAND, tra	ce	2
1											coarse sand a	ind gravel, trace drock fragment	silt and	
												an over magnitude		
]														
10_										10.0	A 1	POE		
4											Advanced au	ger to BOE		
										12.0	Bottom of Ex	ploration = 12'		
4												.p.o.uon		
15														
.,														
-														
20_														
-														
+														
-														
25														
_														
30	40.7													
<u>0</u>	to <u>10 So</u>	il Augeri	ng											
REN	MARKS	: 1. All	samples were	taken off	of augers	. 2. Encountered bould	lers 5' to 7	".						
Dunce	antia	Lieed	Samulas T	vno		140# Wt x 30" fall on 2"			1017					
_	ortions e 0 to 1	l l	Sampler T SS - Split S ₁	•	Conesioi 0 - 10		ohesive 0 - 4	Consister Soft	icy	DIC "	00000			
little	10 to	20%	UT - Shelby	Tube	10 - 3	0 Medium Dense	4 - 8	Firm		RIC#: Boring N	00000 o.: C-123			
som and	e 20 to 35 to		UP - Fixed Po C - Rock C		30 - 5 50 +		8 - 15 5 - 30	Stiff Very Sti	ff	Date Con		30/18		
anu	<i>55</i> 10	2070	C - Moun C		20 1		30 +	Hard		Database				

1	,									
NEB	C LO	G B	ayside Sew	er System		BORING			Sheet _	2 of 2
Loca	ition (	C/T):	Kent / W	ARWICK			tabase ID #			
RIC		00000		FAP #	:	Date Start		8 Date		21/18
	ge/Ro		Bayside			N Coord.			Ft.	
	_	nsult (		don Archib		E Coord.		T- 0	Ft.	
		onsult			Boring Contractors		urface Elev		.0	
Insp	ector !	Name/	Co.: Bry	an Deely /	Gordon Archibald	Elevation	Datum 1	IGVD29		
Rore	hole l	ocatio	n Pruscell	i di						
Desc	riptio	n: Bay	side Sewer	S						
Samp	ler: Un	less othe	erwise noted, s	oil sampler o	consists of a 2 in. split spoon	70		water Obse		Cash Times
Cosin	dri Unk	iven usin	g a 140 lb har	nmer, 30" fa sing is drive	ll. n using 300 lb hammer,	<b>Date</b> 05/21/18	Time 00:00	Depth 3	Casing at	Stab. Time 0.25 hr
Casin		ng 24 in.		sing is drive	Lubing 500 to manner,	05/21/10	00.00	J		0.23 II
Casin	g Size:	_3 in		HS Auger						D
Ď	СB		SAMPLER	Blows	SOIL AND ROCK SAMPI	E DESCRIPTION	√ Depth		STRATUM	R E
D E P	A L S O	Type &		per 6 in.	Burmister Soil Classifi		of Stratum	Г	DESCRIPTION	MA
Ť H	I W N S	Number	Core Rcy. & RQD	(Coring min/f [Downpress p	t) sil		Change			A R K S
Ft.	G /Ft.		1			ACDILINA CANID		A CDITAT TO	ROADWAY	S
4	1	SS-1	24/20 0.0	11-16-13-1	Dry, medium dense, brown little medium gravel.	WEDIUW SAND,	0.5	ASERIAL I	NOWD ANW I	
9	1 11		2.0							
-	23									
5	39		5.0							
	21	SS-2	24/18	19-18-18-1	<ol> <li>Wet, dense, gray MEDIUM sand, trace silt.</li> </ol>	SAND and fine				
	43		7.0		Sand, trace site.					
	37									
	32		10.0				10.0			
10_	43	SS-3	$\frac{1}{13/12}$ $\frac{10.0}{11.1}$	20-70-100/1	I" Wet, very dense, gray WEA	THERED	10.0	Weathered	BEDROCK	
=			11.1		BEDROCK.		12.0			
								Bottom of I	Exploration = 12	
15_										
-										
-										
2										
20_										
-										
1 =										
25										
23_										
30	4- 10 C	an Date	Conin							-
ū	10 <u>12 S</u>	oil Driver	i Casing							
RE	MARKS	S:								
					140# Wt x 30" fall on 2" (					
	ortions		Sampler 7			esive Consister	*			
	trace 0 to 10% SS - Split Spoon UT - Shelby Tube			Tube	10 - 30 Medium Dense 4	-4 Soft -8 Firm	RIC#: Boring I	00000 No.: C-124	1	
som	ome 20 to 35% UP - Fixed Position C - Rock Core				20 20 201111	15 Stiff - 30 Very St	D.4. O.		5/21/18	
and	35 to	J 3U%	C - ROCK	COLE		)+ Hard	111	e ID No.:		

pm	OT Pi	roject	Bayside 9	Sewer Syst	am	BORING	· # •	C-12		Shoot	2 of 2	
		(C/T):		ARWICK		RIDOT I				Sheet _	<u>Z</u> 01 <u>Z</u>	-
RIC		00000	TCHE/ VI	FAP #		Rabor i Date Stai		5/30/1		End: 5/3	30/18	-
	lge/Ro		Bayside			N Coord.		0	Dan	Ft	30/10	
	_	nsult (		don Archil	hald Inc	E Coord.	-	0		Ft. Ft.		
	_	Consult			Boring Contractors	Ground S	_		/., Ft.: 0.			
		Name/			rdon Archibald	Elevation			NGVD29			-
		Location: Pris	on scilla Avenu	ie								
	oler: Un	less othe	erwise noted, s	soil sampler	consists of a 2 in. split spoon				water Obse			
Casi			g a 140 lb har		ll. 1 using 300 lb hammer,	Date		ime	Depth	Casing at		ıe
Casii		ng 24 in.		sing is drive	i using 500 io nammer,	05/30/18	U	0:00	10		0.25 hr	
Casir	ng Size:			HS Auger			T		1		R	_
D E	CB AL		SAMPLER Pen/ Depth	Blows	SOIL AND ROCK SAMP		N	Depth		STRATUM	E	Ξ
P T	S O I W	Type & Number	Rcy. Core Rcy.	per 6 in.	Burmister Soil Classif	ication System		of Stratum	D	ESCRIPTION	M A	
Ĥ Ft.	NS G/Ft.	1 varnoer	& RQD	(Coring min/i [Downpress p			ĺ	Change			A R K S	
Ft.	G/FL							0.3/	ASPHALT/I	ROADWAY	S	
-									Dry, brown-	gray FINE SAN	D, some	
-									coarse sand	and gravel, trace	silt.	ŀ
5_							_	5.0	Wat and El	NE SAND, trac		
-									sand and gra	vel, trace silt and	d l	ŀ
-									weathered be	edrock fragment	S.	
-											2	2
10								10.0				
									Advanced au	ger to BOE		
							_	12.0	Dottom of Fr	ploration = 12		ı
-									Bottom of E	cpioration – 12	į	
15												
15												
]												
4												ı
20 -												
20_												
-												
]												
_												-
25_												-
-												
1												
]												
30												4
0	to <u>10 Soi</u>	il Augerii	ng									
REN	MARKS:	1. All	samples are of	f of augers.	2. Encountered boulders 8' - 10'	•						7
				_								
		<u>1</u>		·····	1400331. 300 6 0 6 6	ND 90 C :	·					
Prop	ortions	Used	Sampler T	ype Coh	140# Wt x 30" fall on 2" C esionless Density Cohe		ıcy					
trac	e 0 to 1	0%	SS - Split Sp	oon	) - 10 Loose 0 -	4 Soft	-	RIC#:	00000			
little som			UT - Shelby UP - Fixed Po	Tube   1 sition   3	0 - 30 Medium Dense 4 - 0 - 50 Dense 8 -			Boring N	o.: C-125			-
and	35 to		C - Rock C		50 + Very Dense 15 - 30	30 Very Sti		Date Con Database		30/18		-
					30	T mara	- 1	-acavasc	AD 110			_ [

RIDOT Project Bayside Sewer Warwick RI - Various location Location (C/T): Kent / WARWICK							G#: C-1 Database I		Sheet	2 of	2
RIC		00000	Kent / V	FAP#		Date Sta		-	e End: 6/	12/18	_
	lge/Ro		Bayside			N Coord	-		Ft.	12/10	
	_	nsult C		rdon Archiba	ld, Inc.	E Coord	.: 0		Ft.		
Geo	tech C	onsult	Co.: N	ew England	Boring Contractors	Ground	Surface El	ev., Ft.: 0	.0		
Insp	ector	Name/	Co.: <u>T.</u>	Plante / GZA	A GeoEnvironmental, Inc	. Elevation	n Datum	NGVD29			
Des	criptio		Priscilla								
Samp				soil sampler co 0 lb hammer, 3	onsists of a 2 in. split	Doto	Groun Time	dwater Obse		Carl 7	nt
Casiı					using 300 lb hammer,	<b>Date</b> 06/12/18	00:00	Depth	Casing at	O h	
	falli	ng 24 in.				00.1				"	
Casir	g Size:			HS Auger	<u>X</u>			1,			l n
D	CB AL		SAMPLER Pen/ Depth	Blows	SOIL AND ROCK SAMPL	E DESCRIPTIO	N Depth		STRATUM		R E M
D E P T	S O I W	Type &	Rcv.	Pa. 0	Burmister Soil Classifi		of	D	ESCRIPTION		M A
H	NS	Number	Core Rcy. & RQD	(Coring min/ft) [Downpress psi]			Stratun Change				A R K S
Ft.	G/Ft.	00.1				PDIP OAND			BOADWAY.		S
-		SS-1	24/12 0.0	28-12-9-10	Dry, medium dense, gray-br some gravel, some coarse sa	own FINE SAIN nd, trace silt.	D, 0.	FINE SAND	ROADWAY	/	
-			2.0								
-											
5			5.0								
		SS-2	21/16	21-52-78-100/3	Dry, very dense, gray FINE gravel, trace silt, trace coaers	SAND, some					
12			6.8		graves, trace sin, trace coacis	s said.					
-					52						
10			10.0								
10_		SS-3	14/10 11.2	34-85-100/2"	Dry, very dense, gray FINE	SAND, some		1			
			11.2		gravel, trace silt, trace coaer:	s sand.	12.	0			
92									xploration = 12'		
15_											
4											
-											
20_											
4											
25											
23										l	
]											
_ =											
30	10.0							1			_
<u>0</u> 1	o <u>12 Soi</u>	l Augerin	<u>ıg</u>								
REM	IARKS:										
					140# Wt x 30" fall on 2" O		1		•		$\dashv$
•	ortions l		Sampler T		ionless Density Cohes		-				
trace little	0 to 1		SS - Split S UT - Shelby		10 Loose 0 - 4 - 30 Medium Dense 4 - 4		RIC#:	00000			
some	20 to	35%	UP - Fixed Po C - Rock C	osition 30	- 50 Dense 8 - 1	5 Stiff	Boring Date Co		12/18		-
and	35 to	JU /0	€ - ROCK C	ore St	) + Very Dense 15 - 3 30 +			se ID No. :			

DID	OT D	• ,	D '1 (			DODDIC	W 0.10	~	OI 4	2 6 2
		roject C/T) :		Sewer System ARWICK	n	BORING	#: <u>C-12</u> atabase ID		Sheet _	2 of 2
	,	00000		FAP#		RDO1 B Date Star			End: 5/	20/18
1	lge/Ro		Bayside			N Coord.		<del></del>	Ft.	
Des	ign Co	nsult (	Co.: Gor	don Archiba	ld, Inc.	E Coord.			Ft.	
l		onsult			Boring Contractors		Surface Elev		0	
Insp	ector	Name/	Co.: <u>T.</u>	Plante / Gor	don Archibald	Elevation	Datum 1	NGVD29		
		Locatio	on scilla Avenu	ıe						
	oler: Un	less othe	erwise noted,	soil sampler co	nsists of a 2 in. split spoon			water Obse		,
Cacia				nmer, 30" fall	using 300 lb hammer,	<b>Date</b> 05/30/18	Time 00:00	Depth 10	Casing at	Stab. Time 0.25 hr
Casii		ng 24 in.		ising is driven	using 500 ib nammer,	03/30/16	00.00	10		0.25 111
Casir	ig Size:		T	HS Auger				1		l D
D E P	CB AL		SAMPLER Pen/ Depth	Blows per 6 in.	SOIL AND ROCK SAM			_	STRATUM	R E M
P T	S O I W	Type & Number	Rev.	(Coring min/ft)	Burmister Soil Clas	sification System	of Stratum	D	ESCRIPTION	A
H Ft.	NS G/Ft.		& RQD	[Downpress psi			Change			R K S
							0.3/		ROADWAY	/ 1
								Dry, brown/ coarse sand	gray FINE SAN and gravel, trace	D, some
_									<b>8</b>	
5							5.0	:		2
3_							5.0	Moist, gray	FINE SAND, tra	ice
]								and weather	trace gravel, tra ed bedrock.	ce sit
_										
10							10.0			
10_							10.0	Advanced at	iger to BOE	
							12.0			
								Bottom of E	xploration = 12'	
15										
15_										
20										
20_					<u>.</u>					
4										
25										
]										
-										
30										
	to <u>10 So</u>	il Augeri	ng		,					
REN	/ARKS	: 1. All	samples were	taken off of aug	ers. 2. Encountered bould	ers 4' to 6'.				
×-201					,	<del>-</del> •				
					1400131/2 2011 6 11 21	lon ec c				
Prop	ortions	Used	Sampler T	ype Cohe	140# Wt x 30" fall on 2' sionless Density Co	' OD SS Sampler Thesive Consisten	cy			
trac	e 0 to 1	0%	SS - Split Sp	oon 0	- 10 Loose	0 - 4 Soft	RIC#:	00000		
som		35%	UT - Shelby UP - Fixed Po	osition   30	- 50 Dense 8	4 - 8 Firm 5 - 15 Stiff	Boring N		20/18	
and	35 to	50%	C - Rock C	Core 5		5 - 30	Date Con Database		20/18	

.,										
NEB	C LO	G B	ayside Sew	er System		BORING #	#: C-128	OW	Sheet _	2 of 2
Loca	tion (	C/T):	Kent / W	ARWICK			abase ID #			
RIC	-	00000		FAP#	•	Date Start	-	B Dat		23/18
	ge/Ro		Bayside			N Coord.:			Ft.	
		nsult C		don Archib		E Coord.:		T24 . 0	Ft.	
	-	onsult		- Bod	Boring Contractors		rface Elev	,	.0	
		Name/		an Deely /	Gordon Archibald	Elevation 1	Datum N	IGVD29		
Desc	riptio	Location: Bay	side Sewer	S	•					
Samp			erwise noted, s g a 140 lb har		onsists of a 2 in. split spoon	Date	Groundy Time	vater Obse Depth		Stab. Time
Casin	arı g: Unle	ss other	wise noted, ca	sing is driven	using 300 lb hammer,	05/23/18	00:00	0		0.25 hr
	falli	ng 24 in.								
Casin	g Size:	4 in	G 43 (D) (D)	HS Auger	T					R
D E	CB AL		SAMPLER Pen/ Depth	Blows	SOIL AND ROCK SAMPI				STRATUM	E M
D E P T	S O I W	Type & Number	Rcv.	per 6 in.	Burmister Soil Classif	ication System	of Stratum	L	DESCRIPTION	AR
Ĥ Ft.	NS G/Ft.	1 (00.10 01	& RQD	(Coring min/ft [Downpress ps			Change			K
FL.	4	SS-1	24/16 0.0	4-5-6-6	Dry, medium dense, brown	FINE SAND, little	0.5	ASPHALT	/ROADWAY	
H	6	20.1	2.0	, , , ,	medium gravel, trace fine g	ravel.				
1	27		2.0							
	33									
5_	30	00.0	5.0	20.06.21.02	Day was dense and MED	II IM CANTO coma	5.0	FINE SAN	D	
_	49	SS-2	24/17	30-26-31-27	Dry, very dense, gray MED fine to medium gravel, trace	coarse sand.		TINE SAIN		
-	69 87		7.0							
-	73									
10	65		10.0				10.0			
		SS-3	24/15	16-21-27-35	Moist, dense, gray FINE SA medium gravel, trace silt.	AND, some fine to		MEDIUM	SAND	
			12.0		medium graver, trace site.		12.0	Bottom of l	Exploration = 12	
									Exploration 12	
15										
13_										
20_										
-										
-										
25_										
=										
-										
30										
0	to <u>12</u> Sc	il Driver	Casing							
REN	MARKS	3:								
					140# Wt x 30" fall on 2"					_
	ortions		Sampler		esionless Density Coh	esive Consisten	*			
trac little	race 0 to 10% SS - S ittle 10 to 20% UT - Si			P-0-0-11	0 10 20000	-4 Soft -8 Firm	RIC#:	00000	8 OW	
som	e 20 to	35%	UP - Fixed F	osition 3	0 - 50 Dense 8 -	- 15 Stiff - 30 Very Stif	Boring N  The Date Con		5/23/18	
and	35 to	50%	C - ROCK	Core		0 + Hard		e ID No. :		

DIE	OT D.		Davaida (	Carron Criston		BORING	C # .	C-129	······	Choot	2 of 2
1	OT P	C/T):		Sewer Syster ARWICK	II	_ BOKING		***************************************		_ Sheer _	2 of 2
		00000		FAP#	a rate autocata anti-transition and a second	_ RIDO1		5/30/18		End: 5/.	30/18
1	_	ad #:	Bayside	FALT #		Date Sta		0	Date	Ft	50/16
	_	au # : nsult (		don Archiba	ld Inc	E Coord		0		— Ft. Ft.	
i i	_	nsun C Consult			Boring Contractors	Ground			., Ft.: 0.		
1					don Archibald	Ground Elevatio			., Ft. : <u>0.</u> IGVD29	0	
ınsı	ector	Name/	Co.: <u>1.</u>	Plante / Gor	uon Archibaid	_ Elevatio	п ра	itum <u>r</u>	NG V D29		
		Location: Pris	n scilla Avenu	ie							
	oler: Un	less othe	rwise noted, s	soil sampler co	nsists of a 2 in. split spoon				vater Obse		
۵.				nmer, 30" fall		Date		Cime	Depth	Casing at	Stab. Time
Casii		ess otner ng 24 in.		sing is ariven	using 300 lb hammer,	05/30/18	0	00:00	10		0.25 hr
Casi	ng Size:			HS Auger							
	СВ		SAMPLER					·····			R
D E	ΑL	Type &	Pen/ Depth	Blows per 6 in.	SOIL AND ROCK SAMP Burmister Soil Classif		ON	Depth of	ום	STRATUM ESCRIPTION	E M
P T	S O I W	Number		(Coring min/ft)	Burmister Borr Classif	reaction by stem		Stratum	D.	Born Hon	A R
H Ft.	NS G/Ft.		& RQD	[Downpress psi]				Change			A R K S
- 1					4.00			0.3/	¬ASPHALT/F	ROADWAY	/ I
-									Dry, brown/g	ray FINE SAN	D, trace
_									coarse sand a	and gravel, trace	silt.
-							l				ą
5								5.0			***
									Moist, gray I	FINE SAND and	gravel, 2
_									trace sin, trac	e weathered be	Jrock.
10_								10.0		, DOP	
_									Advanced au	ger to BOE	
							-	12.0	Dottom of E	ploration = 12'	
-									DOMOIN OF LA	apioration – 12	
-											
15_											
-											-
-											
-											
20							l				
							1				
_											
25_											
_											
-											
-											
20								İ			
30	to 10 Sc	il Augari	1		I						
		il Augeri				derderderde in der States der States der States der States der States der States der States der States der Sta					
RE	MARKS	: 1. All	samples taken	off of augers.	2. Encountered boulders 5' to	8'					
		<del></del>			1400334 200 2 2 2 2	ND 00 0	·····				
Pron	ortions	Used	Sampler T	vne Cohe	140# Wt x 30" fall on 2" Consionless Density Cohe		encv				
-	e 0 to 1		SS - Split Sp	-	- 10 Loose 0 -		- 1	RIC#:	00000		
little	e 10 to	20%	UT - Shelby	Tube 10	- 30 Medium Dense 4 -	8 Firm	ı	Boring No			
som and	e 20 to 35 to		UP - Fixed Po C - Rock C		- 50 Dense 8 - 0 + Very Dense 15 -			Date Com	pleted: 5/	30/18	
and	55 10	55,0	O ALUCIA C	"	30			Database	ID No.:		

	C LO	G B C/T):	ayside Sewe	er System		BORING NEBC Da			Sheet _	2 of 2
MCa UC		00000	Table / W	FAP#:		Date Start		_	End: 5/	21/18
		ad #':	Bayside	кді т.		N Coord.			Ft.	
•	_	aa # : nsult C		don Archibal	d Inc	E Coord.			Ft.	
	_	nsuit C Consult			Boring Contractors	Ground S	-	v., Ft.: 0		
					Fordon Archibald	Elevation		NGVD29	-	
		Name/		all Deely / C	JOIGON ANOMORIU	- He vacion	~ ************************************	,		
)esc	riptio	Location: Bay	side Sewers	S						
amp	ler: Un	less othe	rwise noted, s	oil sampler cor	sists of a 2 in. split spoon	Data	Ground Time	lwater Obse	Casing at	Stab Tim
asin	g: Unle	iven usin ess other ng 24 in.	g a 140 lb han wise noted, ca	nmer, 30" fall. sing is driven u	sing 300 lb hammer,	<b>Date</b> 05/21/18	00:00	Depth 0	casing at	0.25 hr
asin	g Size:	3 in		HS Auger						
D E P	CB AL SO	Type &	SAMPLER Pen/ Depth Rcy.	Blows per 6 in.	SOIL AND ROCK SAMP Burmister Soil Classi	PLE DESCRIPTION fication System	I Depth of	Г	STRATUM DESCRIPTION	
T H	I W N S	Number	Core Rcy. & RQD	(Coring min/ft) [Downpress psi]		•	Stratum Change			
t.	G/Ft.	SS-1	24/12 0.0	16-15-8-10	Dry, medium dense, brown little coarse gravel.	-gray FINE SAND,	0.5	ASPHALT	ROADWAY	
5_	81 29 27 34 49 65 91	SS-2	2.0 5.0 24/14 7.0	21-34-28-29	Dry, very dense, gray MEI fine to medium gravel, little	DIUM SAND, some e fine sand.	8.0	Casing Ref		
0_										
25_										
=										
30										
	to 7 Soi	il Driven	Casing		-					
<u> </u>	MARK									
Pron	ortions	Used	Sampler 1	Гуре Соће	140# Wt x 30" fall on 2" sionless Density Co.	OD SS Sampler hesive Consister	ney			
_	e 0 to		SS - Split S UT - Shelby UP - Fixed F	Spoon 0 Tube 10	- 10 Loose ( ) - 30 Medium Dense 4	0 - 4 Soft 4 - 8 Firm 5 - 15 Stiff	RIC # Boring		0	

BIL	OT P	roject	Bayside 9	Sewer Syste	·m	BORIN	G#	: C-131	1	Sheet	2 of 2
1		C/T):		ARWICK				abase ID		Sheet _	<u> </u>
1		00000		FAP#		Date Sta	art :	5/30/1	8 Dat	e End : 5/.	30/18
Brio	lge/Ro	ad # :	Bayside			N Coord	l. :	0		Ft.	
		nsult (		don Archib		E Coord		0		Ft.	
1		onsult			Boring Contractors			face Elev		.0	· .
Insp	ector	Name/	Co.: <u>T.</u>	Plante / Go	rdon Archibald	Elevatio	n D	atum <u>N</u>	NGVD29		<del> </del>
		Locatio									
			cilla Avenu rwise noted, s		onsists of a 2 in. split spoon			Groundy	water Obse	ervations	
•	dr	iven usin	g a 140 lb har	nmer, 30" fal	l.	Date		Time	Depth		Stab. Time
Casii		ess other ng 24 in.		sing is driver	using 300 lb hammer,	05/30/18	'	00:00	10		0.25 hr
Casi	ng Size:			HS Auger							
D E P	CB AL		SAMPLER Pen/ Depth	Blows	SOIL AND ROCK SAM	PLE DESCRIPTION	ON	Depth		STRATUM	R E
P T	SO	Type & Number	Rev.	per 6 in.	Burmister Soil Class	ification System		of Stratum	Γ	DESCRIPTION	M A
H Ft.	NS G/Ft.	Number	Core Rcy. & RQD	(Coring min/fi [Downpress ps				Change			A R K S
11.	G/I t.							0.3/	\ASPHALT\	ROADWAY	<u>S</u>
-									Dry, brown	FINE SAND, tra	ace
-									coarse sand	and graver, trace	SIII.
											2
5_								5.0	Moist grav	FINE SAND, so	
-									coarse sand	and gravel, trace	silt,
_									trace weath	ered bedrock frag	griienis.
10_								10.0	Advanced a	uger to BOE	
_								12.0	Advanced a	uger to DOL	
								12.0	Bottom of E	Exploration = 12'	
15_											
-											
-											
-											
20_											
-											
-											
-											
25_											
-											
-											
-											
30							·····				
0	to <u>10 So</u>	il Augeri	ng					waamaran aa raasaa aa aa aa aa aa aa aa aa aa aa aa a			
RE	MARKS	: 1. All	samples taken	off of augers.	2. Encountered boulders 4' t	to 8 ¹					
					140# Wt x 30" fall on 2"	OD SS Sampler					
-	ortions		Sampler T	-	esionless Density Co	hesive Consiste	-				
	e 0 to 1		SS - Split Sp UT - Shelby		20	) - 4 Soft   - 8 Firm		RIC#:	00000		
som	e 20 to	35%	UP - Fixed Po	sition 3	0 - 50 Dense 8	- 15 Stiff	f	Boring No Date Con		/30/18	
and	35 to	30%	C - Rock C	оге		5 - 30		Database			

I.		roject (C/T) :		Sewer Warw VARWICK	ick RI - Various location		G#: C-13 Database III		Sheet	2_ of	2
	:#:	00000		FAP#:		Date Sta			e End: 6/	11/18	
	1.0	ad #:	Bayside			N Coord			Ft.	11/10	
	_	nsult (		rdon Archiba	ld, Inc.	E Coord	-		Ft.		
Geo	tech C	Consult	Co.: N	ew England I	Boring Contractors	Ground	Surface Ele	v., Ft.: 0	.0		
Insp	ector	Name/	Co.: <u>T.</u>	Plante / GZA	GeoEnvironmental, Inc.	<u>Elevation</u>	n Datum	NGVD29			
Des	eriptio		scilla Ave a	nd Standish A							
Samı				soil sampler co O lb hammer, 30	nsists of a 2 in. split	Date	Ground Time	water Obse Depth	rvations Casing at	Stab. 7	Fime
Casi	ıg: Unle	ess other	wise noted, c		using 300 lb hammer,	06/11/18	00:00	10	one cusing at	0.25	
Coois	falli 1g Size:	ing 24 in.	•	HS Auger	Х						
	CB	Γ	SAMPLER		Λ					L	R
D E P T	AL	m a	Pen/ Depth	Blows per 6 in.	SOIL AND ROCK SAMPL		N Depth of		STRATUM		R E M
Ť	S O I W	Type & Number		(Coring min/ft)	Burmister Soil Classific	cation System	Stratum	"	ESCRIPTION		A R K
H Ft.	NS G/Ft.		& RQD	[Downpress psi]			Change				K
		SS-1	24/16 0.0	32-13-10-9	Dry, medium dense, dark bro trace coarse sand, and gravel	own FINE SANI	D, 0.1	ASPHALT/I			Ť
=		SS-2	20/12 3.7	6-13-52-100/2"	_	FINE SAND,		1110071110			
5_		SS-3	24/18 ^{4.0} 6.0	16-16-20-16	Dry, dense, gray FINE SAN sand, trace gravel.	D, some coarse					
1		SS-4	24/18	20-20-36-23	Dry, very dense, gray FINE trace coarse sand and gravel.	SAND, some sil	t,				
10		SS-5	24/16	16-17-23-20	Moist, dense, gray FINE SAI trace coarse sand and gravel.	ND, some silt,					
10_		SS-6	24/22	40-29-37-56	Wet, very dense, gray FINE trace coarse sand and gravel.	SAND, some sil					
			12.0				12.0		ploration = 12'		1
15_											
20_											
-											
-											
25_											
0 to 12 Soil Augering											_
_											_
REN	IARKS:	•									
D	sutians 1	I lood	Romanian To	una Cahari	140# Wt x 30" fall on 2" Of						
-	ortions I 0 to 1		Sampler To SS - Split Sp		onless Density Cohes 10 Loose 0-4		-	00000			
little 10 to 20% UT - Shelby Tube 10 - 30 Medium Dense 4 - 8 Firm Region No. C 132											
some and	20 to 35 to		UP - Fixed Po C - Rock C		+ Very Dense 15 - 3	0 Very Sti	ff Date Con	npleted: 6/	11/18		
					30 +		Database	ID No.:			

RID	OT P	roject	Bayside S	Sewer Systen	1	BORING			Sheet _	of
Loca	ation (	(C/T):	Kent / W	VARWICK	ALLES CONTROL OF THE PROPERTY		atabase ID	~~~~	<u> </u>	
RIC	#:	00000		FAP#:		Date Start		8Dat		30/18
Brid	ge/Ro	oad # :		***************************************	***************************************	N Coord. :	***************************************		Ft.	
	Bridge/Road #: Bayside Design Consult Co.: Gordon Archibald, Inc. Geotech Consult Co.: New England Boring Contract T. Plante / Gordon Archibald Borehole Location Description: Priscilla Avenue  ampler: Unless otherwise noted, soil sampler consists of a 2 in. spl driven using a 140 lb hammer, 30" fall.  Casing: Unless otherwise noted, casing is driven using 300 lb hammer falling 24 in.  Casing: Unless otherwise noted, casing is driven using 300 lb hammer falling 24 in.  Casing: HS Auger  DE CB AL Type & SAMPLER Pen/ Depth Rey. Number Core Rey. & RQD  Number Core Rey. & RQD  SOIL AND RO Burmister  Core Rey. & RQD  Soll Core Rey. & RQD  Soll Core Rey. & RQD  Soll Core Rey. & RQD  Soll And Roy Burmister  Soll And Roy Burmister  To be to 10 Soil Augering  REMARKS: 1. All samples taken off of augers. 2. Encountered be					E Coord. :	*******************		Ft.	
							urface Elev	-	.0	
Insp	ector	Name/	<b>Co.:</b> <u>T.</u>	Plante / Goro	lon Archibald	Elevation	Datum <u>N</u>	NGVD29		
Bore	ehole ]	Location	on							
Desc	riptio	n: Pri	scilla Avenu				Comment	vater Obse		
Samp					isists of a 2 in. split spoon	Date	Time	Depth	Casing at	Stab.
Casin	g: Unl	ess other	wise noted, ca		ising 300 lb hammer,	05/30/18	00:00	10		0.2
Casin		_	•	HS Auger						
			SAMPLER	1					CODE LOW IL	1
Ē	ΑL	Type &	Pen/ Depth		SOIL AND ROCK SAMI Burmister Soil Classi		l Depth of	Г	STRATUM DESCRIPTION	
Ţ	I W		Core Rcv.	(Coring min/ft)			Stratum			
H Ft.			& RQD	[Downpress psi]			Change			
			1				0.3/		ROADWAY	
7								Dry, brown	gray FINE SAN and gravel, trace	ID, some e silt.
]								trace cobble	5, u v o i, u de i	,
]										
5_							5.0	Moiet aray	FINE SAND, tr	ace
-								coarse sand	and gravel, trace	silt and
4								weathered b	edrock fragmen	ls.
4										
10							10.0			
10-								Advanced a	uger to BOE	
1							12.0			
								Bottom of E	Exploration = 12	
4										
15_										
4										
4										
1										
20										
]										
4										
_										
25_										
4										
+										
4										
30										
0	to <u>10 Sc</u>	il Auger	ing							
DEN	AA DKS	Σ• 1 Δ11	samples taken	off of augers	2 Encountered houlders 5' to	n 10'				
KEN	IANN	); I. Ali	Samples taken	on or augers.	2. Encountered bounders 5 w	<i>3</i> 10				
					140# Wt x 30" fall on 2"					
_			_	~ ·		esive Consistence	-			
			SS - Split S			- 4 Soft - 8 Firm	RIC#:	00000		
som	e 20 to	35%	UP - Fixed Po	osition 30	- 50 Dense 8 -	- 15 Stiff	Boring No Date Com		/30/18	
and	35 to	50%	C - Rock C	'ore   5(	) + Very Dense 15	<ul> <li>- 30 Very Stiff</li> </ul>	Date Coll	ipicicu. J	120/10	

DIE	OT D	•	D:-1		:-l-D1 V:tt	- DODING	¬ и .	0.12	4		2
1	OT P	roject (C/T) :		Sewer warw VARWICK	ick RI - Various location	<u>s</u> BORINO RIDOT I		C-134		Sneet _	2 of 2
		00000		FAP#:		RIDOT I		6/18/1		End: 6/	18/18
	.#. lge/Ro		Bayside	FAIC# 8	·	N Coord		0	oDate	Ft.	10/10
	_	nsult (		don Archiba	ld Inc	E Coord		0		Ft. Ft.	
1	_	onsult			Boring Contractors	Ground	-		Ft.: 0.		
1		Name/			GZA GeoEnvironmental,				., 14 <u>0.</u> NGVD29	<u> </u>	***************************************
				ry rortici / C	JZA GCOLIIVII OIIII Citai,		u Dat		10 102)		
		Location: Pal	on mer Ave								
	pler: Ur	less oth	erwise noted,		nsists of a 2 in. split spoon				vater Obse		
Coni				nmer, 30" fall.	ising 300 lb hammer,	Date		ime	Depth	Casing at	Stab. Time
Casii		ess other ng 24 in.		ising is uriven t	ising 500 ib nammer,	06/18/18	UU	0:00	8		0.25 hr
Casi	ng Size:	4 in		HS Auger	<u>X</u>						
D E P	CB AL		SAMPLER Pen/ Depth	Blows	SOIL AND ROCK SAMPL	LE DESCRIPTIO	N	Depth		STRATUM	R
P T	SO	Type &	Rcv.	per o m.	Burmister Soil Classifi	cation System		of		ESCRIPTION	M A
H Ft.	I W N S G /Ft.	Number	& RQD	(Coring min/ft) [Downpress psi]				Stratum Change			A R K S
	10	SS-1	24/14 0.0	12-14-15-11	Dry, medium dense, brwon l coarse sand and gravel, trace		ce	0.3/	-\ASPHLAT-I	ROADWAY	
_	14		2.0		coarse saile and graver, nace	, Sitt.	i		Encountered	CODDITE	
-	22 35								Encountered	CODDLES	
5	40		5.0					5.0			
J_	18	SS-2	24/15	9-6-5-5	Wet, mediu dense, brwon Fl	NE SAND, some	e.	2.0		ATTION AND AND ADDRESS OF THE ADDRES	
	28		7.0		coarse sand and gravel, trace fragments.	silt, trace bedroc	ck				
_	34				3				m 1 1		
_	50								Trace bedroc	k fragments.	
10_	55 59	SS-3	24/18	12-15-12-11	Wet, medium dense, gray FI	NE SAND trace	.				
-	60	55-5	12.0	12 13 12 11	coares sadn and gravel, trace			12.0			
	00		12.0				-	12.0	Bottom of Ex	xploration 12'	
_											
15_											
-											
-											
-											
20											
_											
_											
-											
25											
25_											
_											
_											
20											
	30 0 to 12 Soil Driven Casing										
			Cusing								
RE	MARKS	•									
140# Wt x 30" fall on 2" OD SS Sampl											
	ortions		Sampler T	· -	ionless Density Cohes	sive Consister	ney				
trac little	e 0 to 1 e 10 to		SS - Split S _I UT - Shelby	oon 0 - Tube 10 -	10 Loose 0 - 4 - 30 Medium Dense 4 - 3			RIC#:	00000	·····	
som	e 20 to	35%	UP - Fixed Po	sition 30	- 50 Dense 8 - 1	5 Stiff		Boring No Date Com		18/18	
and	35 to	30%	C - Rock C	core 50	) + Very Dense 15 - 30 -			Database		10/10	

NE BOR 1215 K BROCK LOG PREPA	1, CHESTA TONIVA	TRACTOR	TOWN, S			200 Main ucket, Rhoo BORING	le Island 02860 3 LOG /arwick, Rhode	Island		SHEET: LOCATION: HOLE NO.: BORING TYPE LINE & STA.:		OF MER C-135 PROB	
CONTR.	M PLAN		PROJECT PBA NO.:	NAME:		OFFICE:	Bayside Sew	ers		OFFSET:			
GROUNDV AT	VATER OBSE FT. AFTER FT. AFTER	RVATIONS HRS.	TYPE SIZE, I.D. HAMMER HAMMER	FALL	AUGER SA 4"	CASING	SAMPLER	CORE	SURFACE I DATE STAF BORING FO INSPECTOR SOILS ENG	RTED-FINISHEI DREMAN: R:	TRE	- 78 - 19 ENTO R 1 PLAN	05
DEPTH	CASING	NEAR SAMPLE		7	6" ON SAMF	PLER	MONITORIN	FIELD IDE	NTIFICATIO	N OF SOIL &	Π	SAMPLE	
BELOW SURFACE	BLOWS PER FOOT	DEPTH FROM - TO	0-6	6-12	0M - TO	18-24	G WELL INFO.	ROCK INCL.		SS OF WASH	NO.	PEN.	REC.
8-1		0-5	FLI	6HT	DAMPLA	į.	â	DRY, GRA SOME CO. TR GRA	ARSE 8	AND,			
5-2		5-10	FLI	6HT	SAMP	£		DRY, GRA SOME 821 SAND, T	LT. TR CX	PAROE			
		10-12	ВТИ	g of l	ORING			BTW OF	BORIN	BORING 12'			
				70									
,	Groundwater Refusal (Bedi	was not obse	rved during ered at 14 i	the drilling eet below	g operation. grade. The	encountere	Approximately d bedrock appe			red prior to the	boring ad	vancemer	ıt.
P=UNDISTU	W=WASHED IRBED, PISTO		UNDISTUR	PPIT RBED. BAI	" CASING A=AUGER LL CHECK DME=20-35%	V=V/ OFR=0	NE TEST	CASING TO	F	FOOT	GE IN EA AGE IN RO OF SAMPL NO.	OCK:	2

RIDOT Project Bayside Sewer Warwick RI - Various locations Location (C/T): Kent / WARWICK BORING #: C-136 RIDOT Database ID #:	Sheet <u>2</u> of <u>2</u>
RIC #: 00000 FAP #: Date Start: 6/18/18 Date En	nd: 6/18/18
	Ft.
	Ft.
Geotech Consult Co.: New England Boring Contractors Ground Surface Elev., Ft.: 0.0	
Inspector Name/Co.: T. Plante / GZA GeoEnvironmental, Inc. Elevation Datum NGVD29	
Borehole Location	36 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
<b>Description:</b> 235 Palmer Ave	
Sampler: Unless otherwise noted, soil sampler consists of a 2 in. split spoon driven using a 140 lb hammer, 30" fall.  Groundwater Observat  Date Time Depth Ca	tions asing at  Stab. Time
Casing: Unless otherwise noted, casing is driven using 300 lb hammer, 06/18/18 00:00 7.6	0.25 hr
falling 24 in. Casing Size: HS Auger X	
CAMPLED	l R
E AL Pen Depth Blows SOIL AND ROCK SAMPLE DESCRIPTION Depth STR	ATUM E RIPTION M
H NS G/Ft. & RQD (Coring min/h) [Downpress psi]	A R K S
SS-1 24/12 0.0 75-20-13-10 Dry, dense, brown FINE SAND, some coarse 0.3 ASPAHLT-ROAL	
sand, some gravel, trace silt.	
SS-2 24/3 12-12-6-4 Dry, medium dense, gray-brown FINE SAND, some coarse sand, trace gravel.	
4.0 SS-3 24/14 12-6-5-24 Dry, medium dennse, gray-brown IFNE SAND,	
some coarse sand, trace silt, trace gravel, trace	
SS-4 24/20 45-31-32-36 Moist, very dense, gray FINE SAND, some	
SS-5 24/16 10-12-14-15 Wet, medium dense, gray FINE SAND, some	
10_ 10.0 coarse sand, trace silt, trace gravel.	
SS-6 24/18 9-13-14-19 Wet, medium dense gray FINE SAND, some silt, trace coarse sand, trace gravel.	
12.0 Bottom of Explora	ation = 12'
Bottom of Explora	attorr — 12
15	
25	
30 -	
0 to 12 Soil Augering	
REMARKS:	
140# Wt x 30" fall on 2" OD SS Sampler	
Proportions Used Sampler Type Cohesionless Density Cohesive Consistency	
trace 0 to 10%   SS - Split Spoon   0 - 10	
some 20 to 35% UP - Fixed Position 30 - 50 Dense 8 - 15 Stiff Boring No.: C-136	3
and 35 to 50% C-Rock Core 50 + Very Dense 15 - 30 Very Stiff Date Completed: 6/18/18 Database ID No.:	

Loca RIC Brid Desi Geo Insp Bord Desc Samp	#: lge/Ro gn Co tech C ector  ehole l criptio	C/T): 00000 ad #: nsult (Consult Name/ Location: Pal	Bayside Co.: Gor Co.: No Co.: T.  On mer and Co erwise noted, s ag a 140 lb har	ARWICK FAP #:  don Archiba ew England I Plante / GZA  ncord soil sampler con mer, 30" fall.	Id, Inc. Boring Contractors GeoEnvironmental, Inc	RIDOT I Date Star N Coord. E Coord. Ground S	Datab rt: : Surfa i Dat	6/18/18 0 0 oce Elev um <u>N</u>	#:Date	End: 6/ Ft.  Ft.  0	2 of 2 18/18	
		ess other ng 24 in.		sing is driven u HS Auger	ising 300 lb hammer,	06/18/18	00	00:	7.6		0.25 hr	
D E P T H Ft.	CB AL SO IW NS G/Ft.	Type & Number	SAMPLER Pen/ Depth Rcy. Core Rcy. & RQD	Blows per 6 in. (Coring min/ft) [Downpress psi]	SOIL AND ROCK SAMPL Burmister Soil Classifi			Depth of Stratum Change		STRATUM ESCRIPTION	. I N	R E M A R K S
5_		SS-1	2.0 2.3		Dry, gray-brown FINE SAN sand, trace gravel, trace silt.	D, some coarse		4.0	Dry, gray/br coarse sand,	own FINE SAN trace silt, trace g	D, some gravel.	
-		SS-2	7.0		Moist, gray FINE SAND, so trace silt trace gravel.	me coarse sand,		9.0	Moist, gray l coarse sand,	FINE SAND, so trace silt, trace g	gravel.	1
10												
20_												
25_												
30 21	o <u>9 Soil</u>	Augerin	g									-
REM	IARKS	: 1. sam	ple off of auge	r flights								
-		0% 20% 35%	Sampler T SS - Split Sp UT - Shelby UP - Fixed Po C - Rock C	000n		sive Consisten  Soft Firm Stiff Very Stif	ff I	RIC#: Boring No Date Com Database	pleted: 6/	18/18		_

		roject C/T):		Sewer Warw ARWICK	ick RI - Various location		G#: <u>C-1</u> Database II		Sheet	2 of 2
RIC	•	00000	Keilt / W	FAP#:		Date Sta		_	e End: 6	12/18
		ad #:	Bayside	FALT # :		N Coord		16 Date	Ft.	12/10
	_	au # : nsult C	_	don Archiba	ld Inc	E Coord	-		Ft.	
	_							- 104 · O	.0 Ft.	
		onsult			Boring Contractors		Surface Ele		.0	
Insp	ector.	Name/0	1.	Plante / GZA	GeoEnvironmental, Inc	<u>Elevation</u>	i Datum	NGVD29		
		Locatio n: Bur								
				soil sampler co	nsists of a 2 in. split		Ground	lwater Obse	rvations	
Casin	g: Unle	ess other		) lb hammer, 3 asing is driven	0" fall. using 300 lb hammer,	<b>Date</b> 06/12/18	Time 00:00	Depth 6.2	Casing at	Stab. Time 0.25 hr
Casin	falli g Size:	ng 24 in.		HS Auger	X					
D E P T	CB AL SO	Type &	SAMPLER Pen/ Depth Rcy.	Blows per 6 in.	SOIL AND ROCK SAMPI Burmister Soil Classifi		ON Depth of	D	STRATUM ESCRIPTION	R E M A
T H Ft,	IW NS G/Ft.	Number	Core Rcy. & RQD	(Coring min/ft) [Downpress psi]			Stratum Change			R K S
-		SS-1	24/14 0.0 2.0	37-10-8-4	Dry, medium dense, brown gravel, some coarse sand, tre		me 0.1	ASPHALT/ FINE SAND	ROADWAY	
-		SS-2	24/20 4.0	10-15-20-20	Moist, dense, brown-gray Fl coarse sand, trace gravel and	INE SAND, trace i silt.	•			
5_		SS-3	24/16 6.0	17-20-19-17	Moist, dense, brown/gray Fl coarse sand, trace gravel and	i silt.				
-		SS-4	24/24 8.0	14-13-12-15	Wet, medium dense, gray Fl coarse sand, trace silt.	•	e			
10_		SS-5	24/18 10.0	16-19-19-22	Wet, dense, gray FINE SAN sand, trace gravel, trace silt.					
-		SS-6	24/24 12.0	8-29-36-55	Wet, very dense, gray FINE coarse sand, trace gravel, tra		12.0			
-								Bottom of E	xploration = 12	
15_										
-										
-										
20				0						
1										
25_										
-										
10										
0 to 12 Soil Augering						-				
Pilin.	IARKS:	i								
Pron	ortions 1	Head	Sampler T	wne Cahasi	140# Wt x 30" fall on 2" O		nev			
-	O to 1		SS - Split Sp	· -			RIC#:	00000		
little	10 to	20%	UT - Shelby	Tube 10 -	30 Medium Dense 4 -	8 Firm	Boring !	00000 No.: C-138		
some	20 to 35 to		UP - Fixed Po C - Rock C				iff Date Co	mpleted: 6/	12/18	
					30		Databas	e ID No. :		

Location (C/T) : Kent / WARWICK   RIDOT Database ID #:   Date End : 601/18   Date En	ртп	ОТ Р	roject	Bayside (	Sawar Systa	m	BORING	7# C 13	20	Chaat	2 06 2
RIC#: 00000 FAP#: Date Start: 6//18 Date End: 6//18 Distriction of the process of						11				Sheet_	2 01 2
Bridge/Road #: Bayside   Design Consult Co.:   Gordon Archibald, Inc.   E Coord.: 0   Ft.	1									e End : 6/	1/18
Geotech Consult Co.: New England Boring Contractors Inspector Name/Co.: Bryan Deely / Gordon Archibald  Borehole Location Description: Chapin Ave  Sampler: Unless otherwise noter, sail sampler consists of a 2 in. split spoon driven using a 140 ib hammer, 30° fall.  Casing Unless otherwise note the casing is driven using 300 hammer, falling 24 in.  Casing Values otherwise note the casing is driven using 300 hammer, and the casing is driven using 300 ha						711003340					
Boyerhole   Location   Descriptions   Chapin Ave	Desi	ign Co	nsult (	Co.: Gor	don Archiba	ld, Inc.	_ E Coord.	: 0		Ft.	
Borehole Location   Description: Chapin Ave   Sampler: Consists of a 2 in. split spoon   Griven using a 140 lb hammer, 30" fall.   Date   Time   Depth   Casing at   Stab. Time   Discovery   Discov	Geo	tech (	Consult	Co.: No	ew England	Boring Contractors	Ground	Surface Ele	v., Ft.: 0	.0	
Description: Chapin Ave   Sampler: Consists of a 2 in, split spoon driven using a 140 lb hammer, 30° fall.	Insp	ector	Name	Co.: Br	yan Deely / 0	Gordon Archibald	Elevation	n Datum	NGVD29		
Description: Chapin Ave   Sampler: Consists of a 2 in, split spoon driven using a 140 lb hammer, 30° fall.	Bore	ehole i	Location	on .							
driven using a 140 th hammer, 30° fall.  Casing Universe wherewise notework enterories contension there with contension and provided in the contension of th	Desc	eriptic	n: Ch	apin Ave							
Casing Size:  HS Auger  X  D C S Type & SAMPLER  T I IV Number  T O FR. S AND S SAMPLER  R O FR. S SAMPLER	Samp						Data				Ctal Time
Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Tabl	Casin	ng: Unl	ess other	wise noted, ca							
D CB ALL P SO TYPE & Park Depth Corresponding to the Park Dept	Cosin		ng 24 in	•	LIC Augon	v					
T IW Number Core Rey. R. Off.  IN Stratum Chauge  O.5. ASPHALT/ROADWAY Dry, brown FINE SAND, some coarse sand and gravel, trace sitt, obbies.  4.0  5.0 BOULDER Moist, gray FINE SAND, trace coarse sand, and gravel, trace sitt, trace weathered bedrock fragments.  10  11  20  20  25  20  20  25  30  Q to 5 Soil Augering  REMARKS: 1. No split spoon samples, taken off of auger flights.			Ι	SAMPLER	T	<u> </u>			1	<u> </u>	R
T IW Number Core Rey. R. Off.  IN Stratum Chauge  O.5. ASPHALT/ROADWAY Dry, brown FINE SAND, some coarse sand and gravel, trace sitt, obbies.  4.0  5.0 BOULDER Moist, gray FINE SAND, trace coarse sand, and gravel, trace sitt, trace weathered bedrock fragments.  10  11  20  20  25  20  20  25  30  Q to 5 Soil Augering  REMARKS: 1. No split spoon samples, taken off of auger flights.	E	ΑL	T 6	Pen/ Depth							E
20 Os 5 Soil Augering  REMARKS: 1. No split spoon samples, taken off of auger flights.	T	I W		Core Rcy.		Duminster Son Classin	cation System	Stratum		LOCKITION	A
20_ 25_ 20_ 20   Soil Augering  REMARKS: 1. No split spoon samples, taken off of auger flights.  20   Auger Refusal, grind to 12' 120   Soil Augering  REMARKS: 1. No split spoon samples, taken off of auger flights.				& RQD	[Downpress psi]			Change			K
coarse sand and gravel, trace silt, cobbles.    10								0.5	ASPHALT/	ROADWAY	
4.0  5.0 BOULDER  6.0 Souls, gray FINE SAND, trace coarse sand, and gravel, trace sill, trace weathered bedrock fragments.  10.1 Auger Refusal, grind to 12: 12.0 Bottom of Exploration = 12 1  25.1 Bottom of Exploration = 12 1  27.1 Bottom of Exploration = 12 1  28.1 Bottom of Exploration = 12 1  29.1 Bottom of Exploration = 12 1  29.1 Bottom of Exploration = 12 1									Dry, brown	FINE SAND, so	me
5.0 BOULDER  Moist, gray FiNE SAND, trace coarse sand, and gravel, trace silt, trace weathered bedrock fragments.  10.0  Auger Refusal, grind to 12: 12.0  Bottom of Exploration = 12'  15  20  25  30  9 to \$2 Soil Augering  REMARKS: 1. No split spoon samples, taken off of auger flights.										and graver, trace	SIII,
Moist, gray FINE SAND, trace coarse sand, and gravel, trace stil, trace weathered bedrock fragments.  10.0  Auger Refusal, grind to 12'.  12.0  Bottom of Exploration = 12' 1  25								ļ	50111 555		
20	5_							5.0	' [		100
10.   10.0   Auger Refusal, grind to 12.   12.0   Bottom of Exploration = 12'   1   1   20     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25     25									coarse sand.	and gravel, trace	e silt.
Auger Refusal, grind to 12.  12.0  Bottom of Exploration = 12'  20   25   30  Q to \$\frac{5}{2}\$ Soli Augering  REMARKS: 1. No split spoon samples, taken off of auger flights.	-								trace weathe	red bedrock frag	ments.
Auger Refusal, grind to 12.  12.0  Bottom of Exploration = 12'  20   25   30  Q to \$\frac{5}{2}\$ Soli Augering  REMARKS: 1. No split spoon samples, taken off of auger flights.											
12.0  Bottom of Exploration = 12'  20	10_							10.0		1.00	
Bottom of Exploration = 12'  20  25  30  0 to 5 Soil Augering  REMARKS: 1. No split spoon samples, taken off of auger flights.									Auger Refus	sal, grind to 12'.	
20								12.0	Rottom of E	vnloration = 12	
20	-								DOMOIT OF E	xpioration – 12	1
20	15										
25											
25	]										
25											
25	20 -										
0 to 5 Soil Augering  REMARKS: 1. No split spoon samples, taken off of auger flights.  140# Wt x 30" fall on 2" OD SS Sampler	20_										
0 to 5 Soil Augering  REMARKS: 1. No split spoon samples, taken off of auger flights.  140# Wt x 30" fall on 2" OD SS Sampler											
0 to 5 Soil Augering  REMARKS: 1. No split spoon samples, taken off of auger flights.  140# Wt x 30" fall on 2" OD SS Sampler											
0 to 5 Soil Augering  REMARKS: 1. No split spoon samples, taken off of auger flights.  140# Wt x 30" fall on 2" OD SS Sampler											
0 to 5 Soil Augering  REMARKS: 1. No split spoon samples, taken off of auger flights.  140# Wt x 30" fall on 2" OD SS Sampler	25_										
0 to 5 Soil Augering  REMARKS: 1. No split spoon samples, taken off of auger flights.  140# Wt x 30" fall on 2" OD SS Sampler											
0 to 5 Soil Augering  REMARKS: 1. No split spoon samples, taken off of auger flights.  140# Wt x 30" fall on 2" OD SS Sampler											
0 to 5 Soil Augering  REMARKS: 1. No split spoon samples, taken off of auger flights.  140# Wt x 30" fall on 2" OD SS Sampler											
REMARKS: 1. No split spoon samples, taken off of auger flights.  140# Wt x 30" fall on 2" OD SS Sampler	30						PIPE-With the column and the column				
140# Wt x 30" fall on 2" OD SS Sampler	<u>0</u> t	o <u>5 Soil</u>	Augerin	g							
	REM	1ARKS	: 1. No	split spoon san	nples, taken off	of auger flights.					
						140# Wt x 30" fall on 2" O	D SS Sampler				
Proportions Used Sampler Type Cohesionless Density Cohesive Consistency	_		ľ		- 1	ionless Density Cohes	sive Consisten	cy			
trace 0 to 10%   SS - Split Spoon   0 - 10   Loose   0 - 4   Soft   RIC #: 00000				SS - Split Sp				l l			
some 20 to 35% UP - Fixed Position 30 - 50 Dense 8 - 15 Stiff Boring No.: C-139	some	20 to	35%	UP - Fixed Po	sition   30 ·	- 50 Dense 8 - 1	5 Stiff	D. A. O.		1/10	
and 35 to 50% C - Rock Core 50 + Very Dense 15 - 30 Very Stiff Date Completed: 6/1/18 30 + Hard Database ID No.:	and	35 to	50%	C - Rock C	ore   50		50 Very Sti: + Hard			1/10	

Loc RIC Brid	lge/Ro	C/T): 00000 ad #:	Bayside	/ARWICK FAP#:		Date Star N Coord	atabase ID # rt: 5/24/1		End: 5/	2 of 2 24/18
Geo	tech C	nsult C onsult Name/	Co.: No		d, Inc. Boring Contractors Bordon Archibald	E Coord. Ground S Elevation	Surface Elev	v., <b>Ft.</b> : 0.	Ft.	
Des	criptio		side Sewer							
1	dri ng: Unle	ven usin	g a 140 lb hai	nmer, 30" fall.	sists of a 2 in. split spoon	<b>Date</b> 05/24/18	Time 00:00	water Obse Depth 0	Casing at	Stab. Time 0.25 hr
Casi	ng Size:	4 in		HS Auger						
D E P T H	CB AL SO IW	Type & Number	SAMPLER Pen/ Depth Rcy. Core Rcy.	(Coring min/ft)	SOIL AND ROCK SAMP Burmister Soil Classif	LE DESCRIPTIO	of Stratum	D	STRATUM DESCRIPTION	R E M A R K
Ft.	NS G/Ft.		& RQD	[Downpress psi]			Change			S
5_ 10_ 15_ 20_	7 SS-1 5/5 0.0 100/5" Dry, very dense, gravel.  5 37 SS-2 24/15 5.0 5-7-13-44 Moist, medium of fine sand, little of SS-3 21/14 23-31-63-100/3' Wet, very dense, BEDROCK.							WEATHER	ROADWAY  ED BEDROCK  Exploration = 12	1
Programme tracelittle	O to 12 Soil Driven Casing  REMARKS: 1. Water at ground surface  Proportions Used trace 0 to 10% SS - Split Spoon little 10 to 20% UT - Shelby Tube some 20 to 35% UP - Fixed Position 3				- 10 Loose 0 - 30 Medium Dense 4 - 50 Dense 8 0 + Very Dense 15	OD SS Sampler nesive Consiste - 4 Soft - 8 Firn - 15 Stiff - 30 Very S 0 + Hare	RIC#: Boring Date Co		) 5/24/18	

'al

di s

pm	от Р	roject	Raveida 9	Sewer System		BORING	#: C-14		Shoot	2 of 2	
Ł		(C/T) :		ARWICK	11		atabase ID		SHEET _	<u> </u>	_
1		00000		FAP#:		_ RIDOT D  Date Star		-	e End: 6/	1/18	
1		ad #:		PAL # •	**************************************	N Coord.		Dati	Ft.	1/10	
				don Archiba	ld Inc	E Coord.			Ft. Ft.		
		Consult			Boring Contractors	_	. <u> </u>	Ft.: 0			
l .		Name/			Gordon Archibald	_ Ground S Elevation		NGVD29	.0		—
mst	ector	11ame/	Co.: <u>br</u>	yall Deely / C	Jordon Arcinoald	_ Elevation		NG V D29			_
		Location: Cha	on apin Ave								
	oler: U	iless oth	erwise noted, s		nsists of a 2 in. split spoon	To a late		water Obse		lo, i m	_
Casir	dr 1g: Unl	iven usir ess other	ng a 140 lb har wise noted, ca	mmer, 30" fall. Ising is driven t	ising 300 lb hammer,	<b>Date</b> 06/01/18	Time 00:00	Depth 10	Casing at	Stab. Tim 0.25 hr	
Coois	falli 1g Size:	ng 24 in.		HS Auger	Х						
			SAMPLER	no Auger				F	783-7742-1	R	R
D E P T	C B A L		Pen/ Depth	Blows per 6 in.	SOIL AND ROCK SAMPI				STRATUM	E	R E M
P	S O I W	Type & Number	Rev.	per o	Burmister Soil Classifi	ication System	of Stratum	ע	ESCRIPTION	Ä	Ä
H Ft.	NS G/Ft.	Trainiou	& RQD	(Coring min/ft) [Downpress psi]			Change			K	A R K
14.	U/I·t.						0.5	ASPHALT	ROADWAY	S 1	<u>S</u>
-							V2	Dry, brown	FINE SAND, so	me ^	•
-								coarse sand	and gravel, trace s. Boulder at ~2	silt,	
-								inbetween sa			
5							5.0				
								Moist, gray	FINE SAND, tra	ice	
1								coarse sand a	and gravel, trace edrcok fragment	siit and	
10_							10.0				
							12.0	Bottom of F	xploration = 12'		
-								Dottom of L.	Apioration 12		
1.5											
15_											
1											
1											
1											
20_				:							
											ļ
25_											-
-											
1											
-											
30											
			-		Wall and the same of the same						
DEN	4 DIZO	1 31	1'.		CC C						$\dashv$
REA	MARKS	: l. No	split spoon san	nples taken, wer	e off of auger flights.						
	<del></del>				140# W/4 w 20!! fall a= 2!! O	D CC Camples					4
Prop	ortions	Used	Sampler T	ype Cohes	- 140# Wt x 30" fall on 2" O ionless Density Cohe		:y				
	e 0 to 1	0%	SS - Split Sp	0 - 0 -	10 Loose 0-	4 Soft	RIC#:	00000			
little	10 to e 20 to		UT - Shelby	Tube 10.	- 30 Medium Dense 4 - - 50 Dense 8 - 1		Boring No	o.: C-141			-
and	35 to		C - Rock C		+ Very Dense 15 -	30 Very Stiff	Date Com		1/18		_
					30	+ Hard	Database	ID No. :			

	OT P	•			ick RI - Various location	-				Sheet _	<b>2</b> _ of _	2_
		C/T):	Kent / V	VARWICK		RIDOT			-	75 1 6/6	20/10	
	-	00000	D:-1-	FAP#:		_ Date Star		6/22/1	8Date		22/18	
	lge/Ro	aa # : nsult (	Bayside Go	don Archiba	ld Inc	N Coord E Coord		0		Ft. Ft.		
	_	onsult			Boring Contractors	Ground			., <b>Ft.</b> : 0.			
		.onsuit Name/			GZA GeoEnvironmental,				NGVD29			
				ily i ortioi / C	<u> </u>				10122	·		
		Locatio										
			apin Ave	soil sampler co	nsists of a 2 in. split spoon			Grounds	water Obse	rvations		
_	dr	iven usin	g a 140 lb ha	mmer, 30" fall.		Date		Time	Depth	Casing at	Stab. T	ime
Casir				nsing is driven ı	using 300 lb hammer,	06/22/18	(	00:00	10		0.25	hr
Casir	iaiii 1g Size:	ng 24 in.		HS Auger	X							
Ď	СB		SAMPLER	Blows	SOIL AND ROCK SAMPL	E DESCRIPTIO	NI	Depth		STRATUM		R E
D E P	A L S O	Type &	Pen/ Depth Rcy.	per 6 in.	Burmister Soil Classific		/1 V	of	D	ESCRIPTION		M
T H	I W N S	Number	Core Rcy. & RQD	(Coring min/ft) [Downpress psi]				Stratum Change				A R K S
Ft.	G /Ft.	00.1				TINIT CAND 4			A CODELA LOCA	DO A DIWAY		Š
_		SS-1	24/18 0.0	12-10-8-7	Dry, medium dense, brown f coarse sand and gravel trace	ilve sand, trac silt.	ce	0.3/	\ASPHALT/I	KOADWAY		
-		· · · · · · · · · · · · · · · · · · ·	2.0									
5_			5.0						Encountered	COBBLES		
_		SS-2	24/16	28-30-49-59	Moist, very dense, gray FINI coarse sand and gravel, trace	SAND, some silt.		6.0				
4			7.0									
-									TILL			
10			10.0					10.0				
7		SS-3	24/18	66-32-33-28	Wet, very dense, gray FINE sand and gravel, trace siolt, to		ırse		Bottom of E	xploration		
			12.0		bedrock.	auto municipu						
-												
15												
-												
-												
20												
4												
-												
25												
]			‡ 									
4												
-												
30												
	30   1 1				3.1.1.2.2.2.2.2.2.2.2.2.2.2.2.2.2.2.2.2.		·					
REN	REMARKS:											
REMARKS:												
Proportions Used Sampler Type Cohesionless Density Cohesive												
-	ortions i	[	SS - Split S	1	10 Loose 0-4		ncy	RIC#:	00000			
little	10 to	20%	UT - Shelby UP - Fixed Po	Tube 10	- 30 Medium Dense 4 - 8 - 50 Dense 8 - 1	8 Firm		Boring No				
and	35 to		C - Rock C		+ Very Dense 15 - 3	30 Very Sti	iff	Date Com	pleted: 6/	22/18		
					30 +	- Hard		Database	יסעו די			

BORING CO	NTRACTOR	,			Go		chibald, Inc.			SHEET:	_/	OF	1
	E 1308.1		-		Doug	200 Mair				LOCATION:	CHY	plu 4	
N	E DOWN	4	1 2 8 F.	3.20	Pawii	BORING	e Island 02860	Facility of the Control of the Contr	2775 CENTS	HOLE NO.: BORING TYPE:	41	143	
LOG PREPA	RED BY:		TOWN, ST	TATE:			arwick, Rhode	11/27/2003/03/03		LINE & STA.:	7.01	1010/1	20176
CONTR.		PBA	PROJECT PBA NO.:			OFFICE.	Bayside Sewe	ers		OFFSET:			
G	FORTUR	,	FBA NO.			OFFICE:							
GROUNDY	VATER OBSE	RVATIONS			AUGER	CASING	SAMPLER	CORE					
AT <u>10</u>	FT. AFTER	<u>। / ८/</u> HRS.	BAR.		45				SURFACE	ELEV.: RTED-FINISHED		1,110	
AT	FT. AFTER	HRS.	SIZE, I.D.		7				BORING FO		N.	STUPPAL	
			HAMMER HAMMER		-				INSPECTO SOILS ENG		Gil	BRAL	V_
LOCATION (	OF BORING:	CITAL	LIN A		WARWI	CK RI			30IL3 ENG		_		
DEPTH	CASING	SAMPLE		/	6" ON SAMF			FIELD IDE				SAMPLE	
BELOW	BLOWS	DEPTH			M - TO		MONITORIN G WELL			N OF SOIL & DSS OF WASH			
SURFACE	PER FOOT	FROM - TO	0-6	6-12	12-18	18-24	INFO.	WATER,	JOINTS IN F	ROCK, ECT.	NO.	PEN.	REC.
1		SOLIL	STEN	AVGE	a PRol	30	DAY	ASOIHA	NET ROA	oward			
2				-			Licy			PLG TAKEN			_
3 4								100 01	, - ,,,,	,(2,0			
5		0.5		OFF	AUGER		Moisi	Dry BE	- FINES	AND, SUME			
0							10151	COARSE	SANDS L	Ron 1-51			<del>                                     </del>
28								COARSE TR SILT	CUBBL	ध्य			
9		5-10		OFF	AVGER	_	ا ہے۔ ا						
10							WET	MOIST G	315 GA-10	S GRAVEL			
12				-				TR SILT,	WENNE	nen Berkuck			-
								ROCK FA	AG MENTS				
										,			-
								13.0	1. 8 12	2 ′			
													_
				_									-
İ													
										-			
1													
Votes:	The boring lo	cation was pr	eviously va	cuumed by	y a separate	contractor.	Approximately	1' of collapse v	was encount	ered prior to the	boring ad	vanceme	nt.
	Groundwater Refusal (Bed	was not obseinded	erved during tered at 14:	g the drillin feet below	g operation.	encountere	d bedrock appe	eared weathers	nd				- 1
	A monitoring	well was instr	alled above	the bedro	ck as shown	above.	appe		-				-
GROUND SU	REACE TO	PAFT.	USED	4	" CASING	THEN		CASING TO	1 2	T   E00T/	GE IN E	ADTU:	75
D=DRY	W=WASHED	C=CO	RED I	P=PIT	A=AUGER	\V=V	ANE TEST		0		AGE IN R		14
JP=UNDISTU	JRBED, PIST	ON UB: RACE=0-10%	UNDISTU	RBED, BAI	LL CHECK	OER=0	OPEN END RO	D		NO. C	F SAMP	LES:	F
	JULD, IT	10% TU 70	, 611166-1	U-2070, 3C	/WIE-2U-30%	0, AND 30-5	JU 70			HOLE	NU.	TYPE	

NEB	C LO	G B	ayside Sew	er System		BORING #			Sheet _	2 of 2
Loca	tion (	C/T):	Kent / W	ARWICK			abase ID#			2010
RIC		00000		FAP #	:	Date Start	-	B Date		25/18
	ge/Ro		Bayside			N Coord.:			— Ft. Ft.	
		nsult C		don Archib		E Coord.:	0 urface Elev	TEV . O	.0 .0	
		onsult			Boring Contractors Gordon Archibald	Elevation		., Ft <u></u> IGVD29	.0	
Insp	ector	Name/	Co.: BI	yan Deery /	Gordon Archibald	Elevation	Datum 1	10 102)		
Desc	riptio	Locatio n: Bay	side Sewer	S			G I	vater Obse		
Samp	ler: Un	less othe	rwise noted, : g a 140 lb hai	soil sampler c mmer 30" fal	onsists of a 2 in. split spoon	Date	Time	Depth	Casing at	Stab. Time
Casin	g: Unle	ss other	wise noted, ca	ising is driven	using 300 lb hammer,	05/20/18	00:00	8		0.25 hr
<i>a</i> .		ng 24 in.		HS Auger						
	g Size:	3 in	SAMPLER						comp + mt th 4	R
D E	CB AL	m A	Pen/ Depth	Blows per 6 in.	SOIL AND ROCK SAMP Burmister Soil Classif	LE DESCRIPTION Teation System	I Depth of	I	STRATUM DESCRIPTION	M
E P T	S O I W	Type & Number		(Coring min/fl	)		Stratum			A R
H Ft.	NS G/Ft		& RQD	[Downpress ps	i)		Change			K S
	7	SS-1	24/17 0.0	8-9-7-9	Dry, meidum dense, brown	FINE SAND, little	0.5	ASPHALT	/ROADWAY	
	8		2.0		fine gravel.					
	15									
_	28 47		5.0							
5_	49	SS-2	24/18	14-19-20-18	Moist, dense, gray MEDIU	M SAND, some fin	ie			
. 16	78		7.0		to medium gravel, little fine	e sano.				
	50									
	65									
10_	51	SS-3	10.0 24/14	15-11-18-23	Wet, medium dense, gray F	TINE SAND, some				
-		0.00	12.0		medium gravel, little silt.					
			12.0							
15_										
1										
7										
20_										
-										
25_										
-										
30										
0	to <u>12</u> So	oil Drive	n Casing							
RE	MARK	S:								
					140# Wt x 30" fall on 2"	OD SS Samoler				
Proj	ortions	Used	Sampler	V 1	hesionless Density Col	hesive Consiste	ncy			
	e 0 to e 10 to		SS - Split UT - Shelb			-4 Soft -8 Firm	RIC#:	00000 No.: C-14	14	
som	e 20 t	o 35%	UP - Fixed	Position	30 - 50 Dense 8	-15 Stiff 5-30 Very St	Boring .	mo.: C-14 ompleted:	5/25/18	
and	35 t	o 50%	C - Rock	Core		8 - 30		se ID No. :		

pm	OT Pı	ningt	Bayeide 9	Sewer War	wick RI - Various location	s BORING	<b>:#</b> :	C-145		Sheet	2 of	2
		C/T):		ARWICK		_		abase ID				
	•	00000		FAP #		Date Sta	rt :	6/4/18	Date	End: 6/-	4/18	
		ad #:	Bayside			N Coord	. :	0		Ft.		
		nsult C		don Archib	oald, Inc.	E Coord	.:	0		Ft.		
	_	onsult			Boring Contractors	Ground	Sur	face Elev	, Ft.: 0.	0		
		Name/		ry Fortier /	GZA GeoEnvironmental,	Inc.Elevation	n Da	itum <u>N</u>	IGVD29			
												_
		Locatio n: Bur	n nett Road									
Samp	ler: Ur	less othe	rwise noted,	soil sampler	consists of a 2 in. split	Date	,	Groundy Time	vater Obse Depth	rvations Casing at	Stab T	ime
Casin	sp g: Unic	oon drive ess other	en using a 140 wise noted, ca	) ID nammer, Ising is drive	n using 300 lb hammer,	06/04/18		00:00	10		0.25	
١		ng 24 in.		110 A	v							
	g Size:		SAMPLER	HS Auger	<u>X</u>		-	г — Н				R
D E P T H	CB AL		Pen/ Depth	Blows per 6 in.	SOIL AND ROCK SAMPI	LE DESCRIPTIO	NC	Depth of		STRATUM ESCRIPTION		R E M
P	SO IW	Type & Number	Rcy. Core Rcy.	Par o min	Burmister Soil Classif	ication System		Stratum	U	ESCRIPTION		A
Ĥ Ft.	NS G/Ft	1 10001000	& RQD	(Coring min/i [Downpress page 12]	si]			Change				A R K S
FL.	U/FL	SS-1	0.0		Dry, brown FINE SAND, s	ome coarse sand		0.3	ASPHALT/	ROADWAY		3
-			0.5		and gravel, trace silt.							
-												
5_		70.0	5.0		Moist, gray FINE SAND, to	maa aasse sand :	and					
		SS-2			gravel, trace silt, trace weat	hered bedrock	and					
1					fragments.			8.0				
								0.0	BOULDERS	3		
10			10.0					10.0				
10-			10.0						Trace weath	ered BEDROCI	ζ,	
								12.0	D C			1
									Bottom of E	xploration = 12		'
1												
15_												
-												
1												
20_												
-				-								
-												
25												
-												
20												
30	to 60 Sc	il Auger	ine			****						*
_				mulas talean	complete off of auger flights						***	
REI	VIAKKS	s: 1, No	spiit spoon sa	mpies taken, !	samples off of auger flights.							
Descri	anutic	Head	Sampler 7	Type Col	140# Wt x 30" fall on 2" ( hesionless Density Coh	OD SS Sampler esive Consiste	encv					
1 -	ortions e 0 to		SS - Split S	**	,	- 4 Soft	t	RIC#:	00000			
littl	e 10 to	20%	UT - Shelby UP - Fixed P	Tube		-8 Firm 15 Stiff		Boring N	o.: C-145			_
som	e 20 to 35 to	50%	C - Rock		50 + Very Dense 15	- 30 Very S	Stiff	Date Con Database		/4/18		
4		- 1			30	)+ Hare	Ų.	- munusc				

				-		DODING	и.	0.146		Ch 4	2 of 2		
	C LO	G <u>B</u> C/T):	ayside Sew	ARWICK		BORING #: C-146 Sheet 2 of 2  NEBC Database ID #:							
RIC	,	00000	Kent / W	FAP#		Date Star		5/24/18		e End : 5/2	24/18		
	π. ge/Ro		Bayside			N Coord.	-			Ft.			
	_	nsult (		don Archiba	ld, Inc.	E Coord.	: 0			Ft.			
	_	onsult	Co.: Ne		Boring Contractors	Ground S			,	.0			
Insp	ector	Name/	Co.: Br	an Deely / 0	Gordon Archibald	Elevation	Datu	m N	IGVD29				
Desc	riptio		side Sewer										
Samp	ler: Un	less othe	rwise noted,	soil sampler co nmer, 30" fall	nsists of a 2 in. split spoon	Date	- Gr Tin		vater Obse Depth	Casing at	Stab Tim		
Casin	g: Unic	ess other ng 24 in.	wise noted, ca	sing is driven	using 300 lb hammer,	05/24/18	00:		0		0.25 hr		
Casin	g Size:	4 in		HS Auger									
	СВ		SAMPLER	Blows	SOIL AND ROCK SAMPI	E DESCRIPTION	N I	Depth		STRATUM	I		
D E P T	AL SO	Type &	Pen/ Depth Rcy.	per 6 in.	Burmister Soil Classif			of	Ω	DESCRIPTION	N A		
T H	I W N S	Number	Core Rcy. & RQD	(Coring min/ft) [Downpress psi				Stratum Change			F		
Ft.	G/Ft.	00.1		5-2-2-1	Moist, loose, black MEDIU	M SAND little fir	ne	0.5	ASPHALT	/ROADWAY			
12	2 10	SS-1	24/14 0.0	3-2-2-1	to medium gravel.	wi sand, inde in	iic _	U.3/	ASITIACI	TROZED WITT			
-	16		2.0										
20	17												
5_	25	00.0	5.0	0.00.00.00	Moist, medium dense, gray	MEDILIM TO							
-	69	SS-2	24/16	8-20-22-37	COARSE SAND, some me	dium to coarse sar	nd.						
1	45 74		7.0										
	89												
10_	92		10.0	14 100/01	DIATE CONTRACTOR OF THE PROPERTY OF THE PROPER	EAND							
-		SS-3	9/8 10.8	16-100/3"	Wet, very dense, gray FINE medium sand, litle fine grav	el, cobbles.		12.0					
								12.0	Bottom of	Exploration = 12			
15_													
-													
-													
20_													
5.5													
-													
25_													
54													
1													
30													
0	to <u>8</u> Soi	Driven	Casing										
RE	MARKS	S:											
		_=			140# Wt x 30" fall on 2"	OD SS Sampler							
_	ortions		Sampler 7		esionless Density Coh	esive Consiste							
trac little	e 0 to	10%	SS - Split S UT - Shelby		20 20000	- 4 Soft - 8 Firm	.   '	RIC#:	00000				
som	e 20 to	35%	UP - Fixed F	osition 3	0 - 50 Dense 8 -	15 Stiff	.   ;	Boring N Date Cor	lo.: C-14	5/24/18			
and	55 to	50%	C - Rock	Lore :	50 + Very Dense 15 - 30 V 30 +				e ID No. :				

a

BORING CO					Go	ordon R. Ar 200 Mair		SHEET: LOCATION:	- 1	OF IN TON	1 04/1-		
/U	& BOR	NG	1		Pawti		le Island 02860			HOLE NO.:		0-19	17
LOG PREPA	RED BY:		TOWN, ST	ATE:		BORING	Varwick, Rhode	Island		BORING TYPE LINE & STA.:	_AL	1Gen	PROBL
CONTR.		PBA	PROJECT				Bayside Sewe			OFFSET:			
1 6	fort	er	PBA NO.:			OFFICE:							
GROUNDY	VATER OBSE	RVATIONS HRS.	210		AUGER	CASING	SAMPLER	CORE					
A1 _10	FI. AFIEK	<u>79</u> HRS.	TYPE		5/5				SURFACE	ELEV.: RTED-FINISHE	D	11/18	2
AT	FT. AFTER	HRS.							BORING FO	OREMAN:	N'	Sovoo	gro
1			HAMMER		+				SOILS ENG		G	FORM	n
LOCATION	OF BORING:	BOIL	170N	AVE,	Urann	110m							
DEPTH	CASING	SAMPLE	BLO		6" ON SAMF	PLER	MONITORIN	ı		N OF SOIL &		SAMPLE	
BELOW SURFACE	PER FOOT	PROM - TO	0-6	6-12	M - TO	18-24	G WELL INFO.		-	OSS OF WASH ROCK, ECT.	NO.	PEN.	REC.
<b>—</b>		50610 50		GAR		10-24				1	+	-	┿
1 2		700117 51	274 730	CARC	120.72		Da .	Asptor	F 104	may			
3340				-	-		DRY	NO 2	15 5 AM	NE TAKEN		-	-
1 3		1251		OFF	Albert		1	Day BL		on AM			
6					-			Leave	ータルき フィート・カート・フィート・	o lusbles			-
4785							Moisz	WHI. 12 C	, IL SIL	, , , , , , , , , , , , , , , , , , , ,			
5		5'-10'		OW	Ch. Kanst			COANSE	GRANT 1	lym		-	
10					- Deprice		1 1	MOIST G					
13					<u> </u>		WET	TR COAN	SE SAND	9 GRANTL			-
							WE!			ED BEDROCK			
								Kock	naquer	3			-
								_	1				
								B. o.	B. 121		-	_	-
			-										
													-
		-											
											<b>—</b>	-	
												-	
							-						
Notes: The boring location was previously vacuumed by a separate contractor. Approximately 1' of collapse was encountered prior to the boring													
	Groundwater Refusal (Bed	r was not obse	erved during tered at 14	the drillin feet below	g operation. grade. The	encounter	Approximately			ered prior to the	) boring a	Ivanceme	nt.
GROUND SU					TCASING			" CASING TO	10		AGE IN E		12
D=DRY UP=UNDISTU	W=WASHED			PEPIT	A=AUGEF		ANE TEST	ח			TAGE IN F		2
PROPORTIO	NS USED: T	RACE=0-10%	, LITTLE=1	=UNDISTURBED, BALL CHECK OER=OPEN END ROD NO. C b, LITTLE=10-20%, SOME=20-35%, AND 35-50% HOLE									0

RIT	OT P	rniect	Bayside 5	Sewer Warw	ick RI - Various locations	BORING	G#:	C-148	R	Sheet	2 of	2
I i		(C/T):		ARWICK	TOR ICE - Y CETOCOS TO CONTIONS	RIDOT				Direct _	V1_	
RIC	:#:	00000		FAP#:		Date Sta	rt:	6/12/1	8 Date	e End : 6/	12/18	
	_	ad # :	Bayside			N Coord		0		Ft.		
	_	nsult (		don Archiba		E Coord	1.7	0		Ft.		
		onsult			Boring Contractors	Ground				.0		
Insp	ector	Name/	Co.: 1.	Plante / GZA	GeoEnvironmental, Inc.	Elevation	n Dai	tum <u>r</u>	NGVD29			
		Locatio n: 44 ]										
	oler: Ur	less oth	erwise noted,		nsists of a 2 in. split				water Obse			
Casi				) lb hammer, 3 using is driven	0" fall. using 300 lb hammer,	Date	1	ime	Depth	Casing at	Stab. T	ime
<b></b>		ng 24 in.			,			- 1				
Casi	ıg Size:			HS Auger	X		L_,					р
D E	CB AL		SAMPLER Pen/ Depth	Blows per 6 in.	SOIL AND ROCK SAMPLE		NC	Depth	_	STRATUM		R E M
E P T	S O I W	Type & Number	Rcy. Core Rcy.	(Coring min/ft)	Burmister Soil Classific	ation System		of Stratum	D	ESCRIPTION		A
H Ft.	NS G/Ft.		& RQD	[Downpress psi]				Change				A R K S
		SS-1	24/14 0.0	39-19-27-15	Dry, very dense, gray-brown	FINE SAND,		0.1	\ASPHALT-I	ROADWAY		8
			2.0		some coarse sand and gravel, cobbles.	trace silt, trace	:		FINE SAND	),		
- 2					1							
_3												
5_		SS-2	24/14 5.0	36-38-54-80	Dry, very dense, gray-brown	FINE SAND,						
			7.0		some coarse sand and gravel, cobbles.	trace silt, trace						
					4000.00.							
10_		SS-3	10.0 12/10 11.0	49-95	Dry, very dense, gray-brown	FINE SAND,		11.0				
			11.0		some coarse sand and gravel, cobbles.	trace silt, trace		11.0	Bottom of Ex	ploration = 11'		
]					coboles.			1				
-												
15_								İ				
87							- 1					
1												
20_											1	
~												
]												
25_												
-											1	
]												
20												
30	n 11 Sc	l Augerin	<u>-</u>									-
			15						-			-
REN	IARKS:	d										
n	4*		o		140# Wt x 30" fall on 2" OD							
_	ortions l		Sampler Ty SS - Split Sp	- I -	onless Density Cohesive 10 Loose 0-4	ve Consister Soft	٠,	DIC "	00000			
little	10 to	20%	UT - Shelby	Tube 10-	30 Medium Dense 4-8	Firm	- 1	RIC #: Boring No	00000 C-148			
some and	20 to 35 to		UP - Fixed Po C - Rock C		+ Very Dense 15 - 30	Very Sti	iff	Date Com	pleted: 6/1	12/18		
					30+	Hard		Database !	ID No.:			

	E BOR		Gordon R. Archibald, Inc. 200 Main Street Pawtucket, Rhode Island 02860 BORING LOG							SHEET: LOCATION: HOLE NO.:		OF ENTON 2-14	9
LOG PREPA CONTR.	FURTIER	PBA	TOWN, ST PROJECT PBA NO.:			OFFICE:	Varwick, Rhode Bayside Sew	Island		BORING TYPE LINE & STA.: OFFSET:	_/+\c	er li	o BE
GROUNDW AT AT	VATER OBSE FT. AFTER FT. AFTER	RVATIONS HRS.	TYPE		AUGER	CASING	SAMPLER	CORE	SURFACE I DATE STAF BORING FO INSPECTO SOILS ENG	RTED-FINISHED DREMAN: R:	11.5	III. TUDDA ORTICA	
DEPTH BELOW	CASING BLOWS	SAMPLE DEPTH	BLC		6" ON SAMF	PLER	MONITORIN G WELL			N OF SOIL & OSS OF WASH		SAMPLE	
SURFACE		FROM - TO	0-6	6-12	12-18	18-24	INFO.		JOINTS IN R		NO.	PEN.	REC.
1234		5040	STUN		2 PROB		Day	ASPH NO 3	ns Rux	OLE BLW			
5		0'25'		OFF	AVGER		<i>p</i> .		BR FUE HRSE SAM				
ファシルル		5-10		OFF	argen		Dky	GRAVEZ	- TR SIL	Cossles			
12							WET	m Sud	· WEATH	SOND CAMEL GRED FRAGMONTS			
								0250		, , , , , , , , , , , , , , , , , , , ,			
					3								
	Groundwater Refusal (Bed A monitoring	was not obse rock) encoun	erved during tered at 14	the drilling feet below	g operation. grade. The	encounter	Approximately ed bedrock app			ered prior to the	boring ad	vancemer	nt.
GROUND SU D=DRY UP=UNDISTL PROPORTIO	W=WASHED JRBED, PIST	ON UB	-UNDISTUI	<i>5</i> 5) P=PIT RBED, BAI 0-20%, SC	# CASING A=AUGEF LL CHECK DME=20-359	R V=V	ANE TEST OPEN END RO	" CASING TO	12-F	FOOT	AGE IN EA AGE IN R DF SAMP	OCK:	19 2

Loca RIC Brid Desi Geo Insp Bord Desi Samp	ge/Ro gn Co tech C ector ehole l eriptio	C/T): 00000 ad #: nsult Consult Name/ Location: Bay less other	Bayside Co.: Gor Co.: N Co.: Br on vside Sewer erwise noted, g a 140 lb ha wise noted, c	yan Deely / rs soil sampler o mmer, 30" fa	pald, Inc.  Boring Contractors  Gordon Archibald  consists of a 2 in. split spoon	BORING NEBC Da Date Star N Coord. E Coord. Ground S Elevation  Date 05/22/18	tabase t: 5 : 0 : 0 Surface Datur	e Elev m N	:Date	Ft. 0	2 of 2 22/18 Stab. Time 0.25 hr
D E P T H Ft.	CB AL SO IW NS G/Ft.	Type & Number	SAMPLER Pen/ Depth Rcy. Core Rcy. & RQD	(Coring min/s			St	Depth of cratum hange	D	STRATUM DESCRIPTION	E M A R K
10_ 15_ 20_ 25_	A L SO Type & Pen/ Depth Rcy.   Blows per 6 in.   SOIL AND ROCK SAI Burmister Soil Cla					MEDIUM SAND, ne sand.	,	12.0		Exploration = 12	
			n Casing								
RE	MARKS	S:									
	e 20 to		Sampler SS - Split UT - Shelb UP - Fixed C - Rock	Spoon y Tube Position	0 - 10 Loose 0 10 - 30 Medium Dense 4 30 - 50 Dense 8 - 50 + Very Dense 15	OD SS Sampler esive Consiste -4 Soft -8 Firm -15 Stiff -30 Very S + Hard	tiff I			) 5/22/18	

BORING CO	NTRACTOR		Gordon R. Archibaid, I 200 Main Street Pawtucket, Rhode Island 0 BORING LOG							SHEET: LOCATION: HOLE NO.:		OF	)
LOG PREPA CONTR.		PBA	TOWN, ST PROJECT PBA NO.:				arwick, Rhode Bayside Sewe			BORING TYPE LINE & STA.: OFFSET:	A	vaen f	ROBE
GROUNDW	FULTIER VATER OBSE FT. AFTER	RVATIONS	BAR.		AUGER	CASING	SAMPLER	CORE	SURFACE	ELEV.:			
AT	FT. AFTER	HRS.	TYPE SIZE, I.D. HAMMER HAMMER		<u> </u>				DATE STAI BORING FO INSPECTO SOILS ENG	R:	N	SNOW FORTH	
LOCATION (	OF BORING:	BRIN	tan 57	, WAL	wick le	1							
DEPTH BELOW	CASING BLOWS	SAMPLE DEPTH			B" ON SAMF M - TO	PLER	MONITORIN G WELL	ROCK INCL.	COLOR, LC	N OF SOIL & OSS OF WASH		SAMPLE	
SURFACE	PER FOOT	FROM - TO	0-6	6-12	12-18	18-24	INFO.	WATER,	JOINTS IN F	ROCK, ECT.	NO.	PEN.	REC.
1		SOLID	5000	AVGO	PROP	-		ASOM	ALT RO	DADWAY			
274							DRY			ole Mkon			
454		0-5		off Ar	(NEVC		, ,	Dey BR	GNE SA	50, 60ME			
9							Dry	COARSE	•				
9/0		5-10		OF A	BER		, ,	TR SILT	COBBL	=5			
11							WET	DRY GR	ey Fines	SAND			
								TR CUAR	SE GANO	& WMIL			
									WEATH. ERAGNE	enen lock			
								FUER	MEAGAS	CV)			
										4			
								B,	0.8. 13	. /			
													=
Notes:	The haring In	ention was -	raviousla	arripa ad b	(0.00000	nomine at a	Anneadarata	41 =6 == 11===		and a death of	hader '		
	Groundwater	was not obserock) encoun	erved during tered at 14	the drillin feet below	g operation. grade. The	encountere	Approximately ed bedrock appo	•		ered prior to the	poring ad	vancemer	nt.
GROUND SU		13/FT	USED		/ CASING			CASING TO	12		AGE IN EA		12
UP=UNDISTL	W=WASHED JRBED, PIST	ON UB	=UNDISTUI	P=PIT RBED, BAI	A=AUGER	OER=	ANE TEST OPEN END RO	D			AGE IN R		2
PROPORTIO	NS USED: TI	RACE=0-10%	LITTLE=1	0-20%, SC	ME=20-359	%. AND 35-	50%				NO.		

	OT P	roject C/T) :	_		Sewer V		ck RI - Various location			: C-152		Sheet	2 of	2
1	auon ( ]#:	00000		L/ VI		P#:		Date Sta				End: 6/	11/18	
1	100	ad #:	Bay	ide		1 #.		N Coord		0	Date	Ft.	11/16	
	-	nsult (			don Arc	hibal	d Inc	E Coord		0		Ft.		
1	_	onsult	-				Boring Contractors			face Elev	., Ft.: 0.			
		Name/					GeoEnvironmental, Inc				IGVD29	.0		_
THS	Jector	( and	CO	1	i lante /	OLIT	Geolaviroinientai, inc	. Escration		atum 1	(0 1 1 2 )			
Des	criptio	Locatio n: Brit	nton Av											
Sam							nsists of a 2 in. split	7			vater Obse		10. 1 0	n
Casi	ng: Unio	ess other	wise not	a 140 ed, ca	) lb hamn sing is di	ner, 30 iven u	or 1811. Ising 300 lb hammer,	<b>Date</b> 06/11/18		Time 00:00	Depth 0	Casing at	Stab. 1	
Casi	1allı ng Size:	ng 24 in.			HS Aug	er	x							
D E P T	CB AL SO	Type &	Rcy.	Depth	Blow per 6 i		SOIL AND ROCK SAMPL Burmister Soil Classifi		ON	Depth of		STRATUM ESCRIPTION		R E M
H Ft.	I W N S G /Ft.	Number	Core Roy		(Coring n [Downpres	ss psi]		EDIC OANI		Stratum Change	3 A ODIVA I 77/			A R K S
-		SS-1	24/6	0.0 2.0	22-18-1		Dry, medium dense, dark brotrace coarse sand, trace grav	el.	υ,	0,1	ASPHALT/I		/	
1		SS-2	24/18	4.0	15-11-2		Dry, dense, gray FINE SAN sand, trace gravel,							
5_		SS-3	24/18	6.0	19-15-1		Dry, medium dense, brown le coasre sand, trace gravel.		ice					
9		SS-4 SS-5	24/20	8.0	22-30-34 34-45-10		Dry, very dense, gray FINE gravel, trace coarse sand.							
-10		22-2	15/12	9.3	34-43-10	10/3"	Dry, very dense, gray FINE coarse sand, trace gravel, tra		9.5	565516				
10_											Refusal.	RMINATED/	Auger	1
87														
15_														
3														
200														
20_														
-														
25_														
]														
20 -														
	0 to 9.2 Soil Augering													
REN	REMARKS: 1. Auger refusal at 9.5'													
•														
						140# Wt x 30" fall on 2" O	D SS Sampler						$\neg$	
-	ortions	14	Samp				onless Density Cohes	ive Consister	псу					
trace little	e 0 to 1		SS - Sp	lit Sp	oon Tube	0 - 1 10 -				RIC#:	00000			
som	ne 20 to 35% UP - Fixed Position 30 - 50 Dense							5 Stiff		Boring No		1/10		
and	35 to	50%	C-Ro	ck C	ore	50	+ Very Dense 15 - 3			Date Comp Database 1		1/18		

BORING CO					Go	- 4	SHEET: LOCATION:	BR	OF	L			
No	& BORI	16		1 1 2 5	Pawt	ucket, Rhoo	ie Island 02860	Committee		HOLE NO.:	_	-153	1/04
LOG PREPA	RED BY:		TOWN, S	TATE:			Varwick, Rhode	Island		BORING TYPE: LINE & STA.:		45,00	-
CONTR.		_ PBA	PROJECT	NAME:		OFFICE:	Bayside Sew	ers		OFFSET:			
GA	rether	-	FDA NO			OFFICE:							
GROUNDW	VATER OBSE	ERVATIONS HRS.			AUGER	CASING	SAMPLER	CORE	T				
ATE_	FI. AFIER	HRS.	TYPE			1w	5/5		SURFACE E	LEV.: TED-FINISHED		11/1	6
AT	FT. AFTER	HRS.		14.77		4"	2"		BORING FO	REMAN:	-AL	52100	me
1			HAMMER HAMMER		-	300	140		INSPECTOR		_6	FURT	m
LOCATION O	OF BORING:	BR	WIN	AVEI	Withou	20K R	T						
DEPTH	CASING	SAMPLE	BLC	WS PER	6" ON SAMI	PLER	MONITORIN	FIELD IDE	NTIFICATION	OF SOIL &		SAMPLE	
BELOW	BLOWS	DEPTH		FRO	M - TO		G WELL	ROCK INCL	COLOR, LO	SS OF WASH			Τ
SURFACE	PER FOOT	FROM - TO	0-6	6-12	12-18	18-24	INFO.		JOINTS IN RO		NO.	PEN.	REC
1	8	4 2	12	15	10	12		" ASPH	ALT ROI	spersy	J.	- Ou	
23	18	0-2	1.5	-/3	13	-	Pry +	,	MED DENS		51	24	15
345	33						/						
30	20.	5-7	9	11	14	15	_ 4	SANOS	GEAVEL,	ME COURT	52	74	K
]	59	-				-	40,51		•				
COROL	40						LAS	OR 4015	T MED. 6	PAUSE BE/61			
	75	10-17	19	21	35	41	8	SAUD	MD TR LA	NE CORSE RANGE	<b>43</b>	24	11
17	116			0.1		7/	WET	WET FINE S	4.4	ME SILT	32	07	16
							7/4	FWES	mo IK	const	_		-
							20	SAND 5	Grazz,	TRSILT			
										_			-
								BI	0.8 12	'			
								//	vsmu à	3, W.			
										l			
										l			
										,			
										Ì			
										}			
										1			
l l										}			
<b>.</b>										1			
t										1			
F													
										1			
Notes:	The boring lo	cation was pi	eviously va	cuumed by	/ a separate	contractor.	Approximately	1' of collapse	was encounte	red prior to the	boring ad	vancemer	nt.
1	Refusal (Bed	was not observed was not observed was not observed was instructional was instructional was instructional was not observed was	tered at 14	feet below	grade. The	encounter	ed bedrock app	eared weathere	ed.				
GROUND SU	RFACE TO	LALFT.	USED	Joh.	✓" CASING	3. THEN	5/5	" CASING TO	12 F	r I FOOTA	GE IN EA	RTH-	12
D=DRY	W=WASHED	C=CO	RED I	P=PIT	A=AUGEF	? V=V	ANE TEST		10	FOOTA	GE IN R	OCK:	
UP=UNDISTU PROPORTIO	NS USED: TR	CN UB:	=UNDISTUI , LITTLE=1	KBED, BAI 0-20%. SC	LL CHECK ME=20-359	OER= 6. AND 35-	OPEN END RO 50%	D		NO. C	F SAMPL	ES: TYPE	3
										. 100		* * I I	

C-153/OW CASED

				. ,	·····								
1		roject				ick RI - Various location					Sheet _	<b>2</b> _ of _	2_
		<b>C/T)</b> :	Kent / \				RIDOT						
	-	00000			<b>AP#:</b>		_ Date Sta			8Date		18/18	
	_	ad # :	Bayside		1 ** 1	11.7	_ N Coord		0		Ft.		
	_	nsult (		rdon Aı			E Coord		0	1774	Ft.		
		onsult				Boring Contractors	_ Ground			/ <b>., Ft. :</b> <u>0.</u> NGVD29	U		
ınsp	ector	Name/	Co.: <u>G</u>	iry Fort	ier/O	ZA GeoEnvironmental,	inc.Elevatio	נו נו	atum <u>T</u>	NG V D29			
		Locatio											
			mer Ave										
Samp			erwise noted, g a 140 lb ha			nsists of a 2 in. split spoon	Date	Ι	Groundy Time	water Obse Depth		Stab. T	ima
Casin						sing 300 lb hammer,	06/18/18		00:00	10		0.25 h	
		ng 24 in.											
	g Size:	3 in	SAMPLER	HS Au	ger_	X				F			R
D E P T	CB AL		Pen/ Deptl	Blo per 6		SOIL AND ROCK SAMPL		N	Depth		STRATUM		Ë M
PT	SO IW	Type & Number	Rcy.	(Coring		Burmister Soil Classifi	cation System		of Stratum	D.	ESCRIPTION		A
H Ft.	NS G/Ft.		& RQD	(Coring	min/it) ress psi]				Change				R K S
	6	SS-1	24/14 0.0	7-10	-6-7	Dry, medium dense, brown-	ray FINE SANI	D,	0.3/	∖ASPHALT-I	ROADWAY		S
-	17		2.0			some coarse sand and gravel	trace silt.	•			***		
1	25		1										
	35									Encountered	BOULDERS		
5_	38	SS-2	5.0 24/14	8-12-1	17.16	Moist, medium dense, browr	arov COADSE		5.0				
4	21 45	33-2		0-12-	17-10	SANÓ AND GRAVEL, trac							
-	58		7.0			silt.							
1	59									Coarse GRA	VEL layer.		
10_	60		10.0					10.0					
		SS-3	24/16	17-19-	21-25	Wet, dense, gray FINE SAN sand and grave, trace silt.	D, trace coarse			Bottom of Ex	kploration = 10'		
			12.0			Said and Brand, have shin					•		
-													
15													
4													
20													
20													
1													
]													
4			:										
25_													
1													
1	-												
]												İ	Ì
30												1	
<u>0</u> t	0 to 12 Soil Driven Casing												
REM	IARKS:												
						140# Wt x 30" fall on 2" O	D SS Sampler						
_	ortions		Sampler 7	i i		onless Density Cohes	ive Consiste	ncy					
trace little						10 Loose 0 - 4 30 Medium Dense 4 - 8	Firm		RIC#:	00000		w	_
some and	20 to 35 to		UP - Fixed P C - Rock C	osition	30 - 50			iff	Boring No Date Com		18/18		-
anu	JJ 10	50 /0	C - MUCK		 	30 +		***	Database				

						poppio		0.166		Obast	2 of	1
	OT Pr	-			ck RI - Various locations	BORING RIDOT I			<del> </del>	Sneet	of	<u></u>
	ation (		Kent/ w	ARWICK FAP#:		Date Star		6/4/18	-	End: 6	/4/18	
	_	00000	Davaida	PAF#:		N Coord.		0	Date	Ft.	77710	
	ge/Ro		Bayside	don Archiba	d Inc	E Coord.		0		Ft.		1
	_	nsult C				Ground S			. Ft.: 0.			
		onsult	Co.: Ne	England E	Boring Contractors ZA GeoEnvironmental, I				IGVD29	<u> </u>		
Insp	ector	Name/	Co.: Gai	ry Fortier / C	ZA Geognymonmental, i	ilic.Elevation	ı Da	tum _r	101027		10.0	
Bore	ehole I	Locatio	n									1
Desc	riptio	n: Bur	nett Road					C )	4 01	4.0		
Samp	ler: Un	less othe	erwise noted,	soil sampler co Ib hammer, 3	nsists of a 2 in. split	Date		Grounay Iime	vater Obse Depth	Casing at	Stab. T	ime
Casin	spo o: Unle	on arive	en using a 140 wise noted, ca	sing is driven	using 300 lb hammer,	06/04/18		0:00	10		0.25	
<b>V</b>		ng 24 in.										
Casin	g Size:			HS Auger	X							R
Ď	СB		SAMPLER	Blows	SOIL AND ROCK SAMPL	E DESCRIPTIO	N	Depth		STRATUM		E
D E P T H	AL SO	Type &	Pen/ Depth Rcy.	per 6 in.	Burmister Soil Classific	cation System		of Stratum	D	ESCRIPTION		M A
H	IW NS	Number	Core Rcy. & RQD	(Coring min/ft) [Downpress psi]			- 1	Change				R
Ft.	G/Ft.			[DOMINICSS bei]	DINE CAND			0.2	ASPHALT/I	OADWAY		S
		SS-1	0.0		Dry, brown FINE SAND, so and gravel, trace silt.	me coarse sand	Ì	0.3/	ASFRALIT	CADWAI		
-												
5_		SS-2	5.0		Moist, gray FINE SAND, tra	ce coarse sand a	and					
1					gravel, trace silt, trace weath	ered bedrock.	1					
1								8.0				
1									BOULDER			
10			10.0					10.0		1000000	212	
									Trace weath	ered BEDRO	.K	
							+	12.0	Bottom of F	xploration = 1	21	1
									Dottom of L	Apioration i	_	1.
							-					
15_												
-							1					
Ī							1					
							1					
20_												
-												
-												
25												
4												
30		<u> </u>										-
	_	il Auger										
RE	MARKS	: 1. No	split spoon sar	mples taken, sar	nples off of auger flights.							
			_		140# Wt x 30" fall on 2" O							n
	ortions		Sampler T	**	sionless Density Cohe		1		00000			
	e 0 to 1		SS - Split S UT - Shelby		- 30 Medium Dense 4 -	8 Firm	1	RIC#: Boring N	00000 o.: C-155			
som	e 20 to	35%	UP - Fixed P	osition 30	-50 Dense 8-1 0+ Very Dense 15-			Date Con		/4/18		
and	35 to	50%	C - Rock C	Lure 5	0 + Very Dense 15 - 30			Database				

_										
		roject			ick RI - Various location				Sheet	2 of 2
1		(C/T): 00000		VARWICK FAP#:		Bate Star	<b>Database ID</b> 't: 6/13/1		e End: 6/	13/18
	dge/Ro		Bayside	PAL # 4	(	N Coord.		o Dai	Ft.	13/16
T.	_	nsult (		rdon Archiba	ld, Inc.	E Coord.			Ft.	
Geo	tech C	onsult	Co.: N	ew England I	Boring Contractors	Ground S	Surface Elev	., Ft. : 0	0.0	
		Name/		Plante / GZA	GeoEnvironmental, Inc	. Elevation	Datum 1	NGVD29		
Des	criptio	Location: Bur	nett			,				
Sam				soil sampler co O Ib hammer, 3	nsists of a 2 in. split	Date	Ground Time	water Obso Depth	Casing at	Stob Tim
Casi	ng: Unl	ess other	wise noted, c		using 300 lb hammer,	06/13/18	00:00	0		0 hr
Casi	falli ng Size:	ng 24 in.		HS Auger	x					
D E P	CB AL		SAMPLER Pen/ Depth	Blows	SOIL AND ROCK SAMPL	E DESCRIPTION	N Depth		STRATUM	R E M
P T	SO	Type & Number	Rcy.	per o m.	Burmister Soil Classifi	cation System	of Stratum	Ε	ESCRIPTION	M A
Ĥ Ft.	NS G/Ft	1 (dilliou)	& RQD	(Coring min/ft) [Downpress psi]	N.		Change			A R K S
	Ont	SS-1	24/16 0.0	58-13-8-7	Dry, medium dense, gray-br	own FINE SAND	0.2/	\ASPHALT/	ROADWAY	S
1 2			2.0		some coarse sand, some grav			FINE SANI		
-					H.					
_			5.0							
5_		SS-2	5.0 24/16	20-15-21-17	Dry, dense, brown/gray FIN			ľ		Ï
			7.0		coarse sand, some gravel, tra	ice cobbles.	1			
10			100				10.0			
10_		SS-3	10.0 4/2 10.3	21-100/0"	COBBLES		10.0	COBBLES		
1								Bottom of E	xploration = 10.3	3
23										
15				ĺ						
13=										
: T										
-										
20										
-										
25										
1										
4										
-										
30										
<u>0</u> 1	to <u>10.3 S</u>	oil Auge	ring							
REM	IARKS:									
					140# Wt x 30" fall on 2" Ol					
	ortions l e 0 to 1		Sampler Ty SS - Split Sp	-	onless Density Cohes 10 Loose 0-4		-			
little	10 to	20%	UT - Shelby	Tube 10 -	30 Medium Dense 4 - 8	Firm	RIC#: Boring No	00000 .: C-156		
some and	20 to 35 to 3		UP - Fixed Po C - Rock C		+ Very Dense 15 - 3	30 Very Stiff	Date Com	pleted: 6/	13/18	
					30 +		Database	ID No.:		

DID	OT Pr	nigot	Daveida S	lewer Warw	ick RI - Various locations	BORING	·#:	C-157		Sheet	2 of 2
		C/T):		ARWICK	ICK ICI - VAIIOUS IOUAIIOII			base ID			
RIC	•	00000	TEOLET 11	FAP#		Date Sta	rt :	6/4/18	Date	End: 6/	4/18
	ge/Ro		Bayside			N Coord	.:	0		Ft.	
		nsult C		don Archiba	ld, Inc.	E Coord	. :	0		Ft.	
	_	onsult	Co.: Ne	w England	Boring Contractors	Ground			, Ft.: 0.	0	
		Name/	***	y Fortier / C	GZA GeoEnvironmental, l	nc.Elevation	ı Da	tum N	GVD29		
		ocatio									
		n: Sur									
Samp	ler: Un	less othe	rwise noted, s	soil sampler co	onsists of a 2 in. split				vater Obse		Stab. Time
Casin	g: Unle	oon drive ess other ng 24 in.	wise noted, ca	lb hammer, 3 sing is driven	o" fall. using 300 lb hammer,	<b>Date</b> 06/04/18		00:00	Depth 10	Casing at	0.25 hr
Casin	g Size:	ng 24 m.		HS Auger	x						
D	ÇВ		SAMPLER	Blows	SOIL AND ROCK SAMPL	E DESCRIPTIO	N	Depth		STRATUM	R E M
D E P T H	AL SO	Type &	Pen/ Depth Rcy.	per 6 in.	Burmister Soil Classific	cation System	- 1	of Stratum	D	ESCRIPTION	A
	I W N S	Number	Core Rcy. & RQD	(Coring min/ft) [Downpress psi]				Change			A R K
FL	G/Ft.	CC 1	0.0		Dry, brown/gray FINE SAN	D. some coarse		0.3	ASPHALT/	ROADWAY	S
1-		SS-1	0.0 0.4		sand and gravel, trace silt, tra	ace cobbles.					
-								1			
5 ]			5.0		Wat a DESIGNATION took			5.0	BOULDER		
		SS-2	5.8		Wet, gray FINE SAND, trace gravel, trace silt, trace weath	ered bedrock	iu	[	BOOLDER		
7-					fragments.						
2-4								l			
10								10.0			
									Weathered E	BEDROCK frag	ments.
								12.0	Bottom of E	xploration = 12	1
:=									D000011 01 22	p	
15											
13-											
											i i
00-											
20_											
-											
-											
25_											
S-											
12-											
30											
<u> </u>		il Auger					-				
RE	MARKS	8: 1. No	split spoon saa	mples taken, sa	mples off of auger flights.						
		T			140# Wt x 30" fall on 2" O	D SS Sampler					
	ortions		Sampler T	**	sionless Density Cohe						
	e 0 to e 10 to		SS - Split S UT - Shelby	P	- 10 Loose 0 - ) - 30 Medium Dense 4 -			RIC#:	00000 c.: C-157		
som	e 20 to	35%	UP - Fixed P	osition 30	) - 50 Dense 8 -	15 Stiff		Boring No Date Con		/4/18	
and	35 to	50%	C - Rock (	ore :	50 + Very Dense 15 - 30			Database			

		roject		Sewer System	m	BORING			Sheet _	2_ of _
	,	(C/T):		ARWICK	40.00.00	RIDOT Da		***************************************		- 40 -
	-	00000		FAP #	***************************************	Date Start		8Date	***************************************	2/18
	_	ad # :	Bayside	1 4 1 11	1 1 Y	N Coord. :			Ft.	
	_	nsult C Consult		don Archiba		E Coord. : Ground St		1F+	.0 Ft.	
		Name/			Boring Contractors  ordon Archibald	Elevation		., Ft. : <u> </u>	.0	
	ector	1 value/		III I Iaint / GC	Juon Alemoaid	Elevation		10 1027		
		Locatio								
			f Avenue	soil sampler co	nsists of a 2 in. split spoon		Groundy	vater Obse	ervations	***************************************
-	dr	iven usin	g a 140 lb hai	nmer, 30" fall		Date	Time	Depth	Casing at	Stab. T
Casin		ess otner ng 24 in.		ising is ariven	using 300 lb hammer,	05/31/18	00:00	10		0.25 l
Casin	g Size:	,		HS Auger						
D E	C B A L		SAMPLER Pen/ Depth	Blows	SOIL AND ROCK SAMI		Depth		STRATUM	
D E P T	S O I W	Type & Number	Rev	per o min	Burmister Soil Classi	fication System	of Stratum	D	ESCRIPTION	
H Ft.	NS G/Ft.	1 various	& RQD	(Coring min/ft) [Downpress psi]			Change			
1 1.	U/FL						0.3/	¬ASPHALT/	ROADWAY	
+								Dry, brown	FINE SAND, so	me
1								trace cobble	and gravel, trace s.	3111,
_										
5							5.0	Moist, gray	FINE SAND, tra	ice
+								coarse sand	and gravel, trace edrock fragments	silt and
1								camerea o		
							100			
10							10.0	Advanced a	lger to BOE	
1							12.0			
一								Bottom of E	xploration = 12'	
15										
+										
]			:							
20										
20										
4										
]										
_										
25										
4										
]										
-										
30	- 10 C	:1 A ·								
		il Augeri								
REM	1ARKS	: 1. All	samples taken	off of auger.	2. Boulders encountered 5' to	8'				
					140# Wt x 30" fall on 2"	OD SS Samulas				<u> </u>
Prop	oportions Used Sampler Type			ype Cohe		OD SS Sampler lesive Consistenc	,			
trace	ce 0 to 10% SS - Split Spoon		poon 0	- 10 Loose 0	- 4 Soft	RIC#:	00000			
	10 to 20 to		UT - Shelby UP - Fixed Po	rupe   10		- 8 Firm - 15 Stiff	Boring No			_
Some			C - Rock C			- 30 Very Stiff	Date Com	141 /	/12/18	

RID	OT Pı	oject	Bayside S	Sewer Warw	ick RI - Various location	s BORING	3#:	C-159		Sheet _	2 of 2	
		C/T):	Kent / W	ARWICK				base ID				_
RIC	#:	00000		FAP#:		Date Sta		6/4/18	Dat		4/18	_
Brid	ge/Ro	ad # :	Bayside			_ N Coord	• • •	0		Ft.		
Desi	gn Co	nsult C	o.: Gor	don Archiba	ld, Inc.	E Coord.		0		Ft.		
Geo	tech C	onsult	Co.: Ne	w England I	Boring Contractors			face Elev.	, Ft.: <u>0</u>	.0		
Insp	ector	Name/	Co.: Ga	ry Fortier / C	ZA GeoEnvironmental,	Inc.Elevation	n Da	tum N	IGVD29			
		4.										
		ocatio n: Sur										
Samp	ler: Ur	less othe	erwise noted,	soil sampler co	nsists of a 2 in. split	D.4.			vater Obse	rvations Casing at	Ctal Time	
Casin	spe or: Unite	oon drive ess other	en using a 140 wise noted, ca	lb hammer, 3 sing is driven	using 300 lb hammer,	Date 06/04/18		Cime 00:00	Depth 10	Casing at	0.25 hr	
		ng 24 in.			•							
Casin	g Size:			HS Auger	<u>X</u>						1 0	D
Ď	CB		SAMPLER Pen/ Depth	Blows	SOIL AND ROCK SAMPI	LE DESCRIPTIO	N	Depth		STRATUM	į	R E
D E P T	AL SO	Type &	Rcv.	per 6 in.	Burmister Soil Classif	ication System		of Stratum	D	ESCRIPTION		M A
T	I W N S	Number	Core Rcy. & RQD	(Coring min/ft) [Downpress psi]				Change			F	A R K S
Ft.	G /Ft.	70.1		(DOMINICAS PSI)		AID come coarse		0.2	- ACDUALTA	ROADWAY	S	S
12		SS-1	60/0 0.0		Dry, brown, gray FINE SAl sand and gravel, trace silt, to	race cobbles.	Î	0.3	ASFRALII	ROADWAI		
12												
-												
5			5.0					5.0				
		SS-2	60/0		Dry, gray FINE SAND, trace gravel, trace silt, trace weat	ce coarse sand and	d		Trace cobbl	es.		
		3			fragments.	nered bedrock						
								1				
١., ١			100					10.0				
10_			10.0	=:			Ì	10.0		ered BEDROCK	<b>C</b>	
-								12.0	fragments.			
									Bottom of E	xploration - 12'	1	1
15_												H
-												
1			<b>\</b>									
]												
20_												
-								i				
-												
-												
25												i
4												
30												
	to 10 Sc	il Augeri	ing	h								
-			nples taken off	auger flights								٦
KE	VIARA.	. i. San	ihies raveii oii	anger mgms.								
_			• • •		140# Wt x 30" fall on 2" (							
	ortions e 0 to		Sampler T SS - Split S	**	sionless Density Coho - 10 Loose 0 -		- 1	DIO#:	00000			
little	e 10 to	20%	UT - Shelby	Tube 10	- 30 Medium Dense 4 -	8 Firm	.	RIC#: Boring No	00000 D.: C-159			-
som	e 20 to	35%	UP - Fixed P	osition 30	- 50 Dense 8 - 0 + Very Dense 15 -			Date Con	ipleted:	/4/18		
and	JJ ((	3070	C - ROCK (	7016 3	30 very Dense			Database				

				-114114								
	OT P	roject C/T) :		Sewer Warw /ARWICK	rick RI - Various location	mas .		C-160		Sheet _	2_ of _	2
						Date Sta				. T	10/10	
		00000		FAP #		_		6/12/1	8 Date		12/18	_
	lge/Ro		Bayside	1 4 1 11	11.1	N Coord		0		Ft.		
	~	nsult (		don Archiba		E Coord		0		Ft.		
		onsult			Boring Contractors			face Elev		.0		
Insp	ector.	Name/	Co.: <u>T.</u>	Plante / GZA	A GeoEnvironmental, Inc	Elevation	n Da	itum <u>N</u>	NGVD29			
D	1 1 T	4.*										
		ocatio	n f and Bridge	Δ.								
					onsists of a 2 in. split			Groundy	water Obse	rvations		
Danie	spe	oon driv	en using a 140	) lb hammer, 3	0" fall.	Date		Cime	Depth	Casing at	Stab. Ti	ime
Casir				asing is driven	using 300 lb hammer,	06/12/18	0	00:00	Ô	0	0 hr	
		ng 24 in.			7/							
Casir	ng Size:		T a	HS Auger	X		L ,				L.,,	D
D	CB AL		SAMPLER Pen/ Depth	Blows	SOIL AND ROCK SAMPL	E DESCRIPTIO	NC	Depth		STRATUM		R
D E P T	SO	Type &	Rcy.	per 6 in.	Burmister Soil Classifi			of	D	ESCRIPTION		MA
H	I W N S	Number	Core Rcy. & RQD	(Coring min/ft)				Stratum Change				A R K S
Ft.	G /Ft.			[Downpress psi]								Š
		SS-1	24/18 0.0	38-27-15-10	Dry, dense, gray-brown FIN coarse sand, trace silt, trace	E SAND, some		0.3	ASPHALT-			
			2.0		coarse said, trace sit, trace;	graver.			FINE SAND	,	1	
5_		SS-2	24/16 5.0	37-38-100	Dry, very dense, gray FINE	SAND some						
-		33-2		37-36-100	coarse sand, trace silt, trace							
-			7.0			50						
-							- 1	i				
			100								1	
10_		SS-3	24/18 10.0	47-27-38-60	Dry, very dense, gray FINE	SAND, some						
		55 5		1, 2, 50 00	coarse sand, trace silt, trace	gravel.		12.0				
	1		12.0		0		1	12.0	Bottom of Ex	xploration 12'		
25	1									•		
15												
							- 1					İ
											1	
20_								1				
-											1	
								1			1	
4												
4												
25_												
-												-
-												
4												3
30												1
	to 12 Sc	il Augeri	na				_				l	
<u>u</u>	14 <u>30</u> 1	· VnRciji	rig									_
REN	ARKS:	:										
		-			140# Wt x 30" fall on 2" O	n ee eamalaa						-
Prop	ortions	Used	Sampler T	ype Cohes	ionless Density Cohes		ncy					
_	0 to 1		SS - Split Sp	0 - 0 -	10 Loose 0 - 4	Soft S	- 1	RIC#:	00000			
little	10 to	20%	UT - Shelby	Tube 10	- 30 Medium Dense 4 - 8			Boring No				-
some	20 to 35 to		UP - Fixed Po C - Rock C		- 50 Dense 8 - 1 ) + Very Dense 15 - 3			Date Com	pleted: 6/	12/18		7.7
	30 10				30 -			Database	ID No. :			

**												
NEE	BC LO	G B	ayside Sew	er System		BORING	`#:	C-161	OW	Sheet	2 of	2
		C/T):		ARWICK		NEBC Da		-		_		
RIC	,	00000		FAP#:		Date Star		5/25/18		e End : 5/2	25/18	
	lge/Ro		Bayside			N Coord.	. :	0		Ft.		
	_	nsult (		don Archiba	ld, Inc.	E Coord.	:	0		Ft.		
	Ų.	onsult		ew England l	Boring Contractors	Ground S	Sur	face Elev	., Ft.: 0	.0		
Insp	ector	Name/	Co.: Bry	an Deely / C	Gordon Archibald	Elevation	ı Da	tum N	IGVD29			
D	shala I	Locatio										
			n side Sewer	S								
	ler: Un	less othe	rwise noted,	soil sampler co	nsists of a 2 in. split spoon				vater Obse			
Cacir	dri ar Unk	iven usin	g a 140 lb har wise noted ca	nmer, 30" fall.	using 300 lb hammer,	Date	1	Гime	Depth	Casing at	Stab. 1	ime
Casii		ng 24 in.	Wisc notcu, ca	ang a arren	asing over to manimier,							
Casir	ng Size:	3 in		HS Auger	1							l p
D	C B A L		SAMPLER Pen/ Depth	Blows	SOIL AND ROCK SAMPL	E DESCRIPTIO	)N	Depth		STRATUM		R E
D E P T	SO	Type &	Rcv.	per o m.	Burmister Soil Classifi	cation System		of Stratum	Ε	ESCRIPTION		M A
H	I W N S	Number	Core Rcy. & RQD	(Coring min/ft) [Downpress psi]				Change				A R K
Ft.	G/Ft.	SS-1	24/13 0.0	6-7-5-5	Dry, medium dense, black N	FDILIM SAND		0.5	ASPHALT/	ROADWAY		S
-	2 8	25-1	24/13 0.0	0-7-5-5	little medium gravel.	EDICIN DI LI ID,	'	U.S.	/ ISITII ILLI	KO/LD W/II	/	
1	17		2.0									
	10											
5_	4	00.0	5.0		West to an Alexander MCDU DA	CANID same for						
-	3	SS-2	24/6	1-1-1-1	Wet, loose, black MEDIUM to medium gravel, little fine	sand.	ic					
-	12 18		7.0									
-	25											
10_	27		10.0									
		SS-3	24/12	4-3-4-6	Wet, loose, black FINE SAN some coarse sand.	ND and loose grav	vel,					
			12.0					12.0	Bottom of F	Exploration = 12'		+ 1
=										1		
15												
-												
20_												1 8
-												
-												
25												
-												
-												
-												
30												
0	to <u>12 So</u>	il Driven	Casing									
REI	MARKS	:										
					140# Wt x 30" fall on 2" (							
_	ortions e 0 to 1		Sampler T SS - Split S		sionless Density Cohe - 10 Loose 0 -		_	Dia:	00000			
little	e 10 to	20%	UT - Shelby	Tube 10	- 30 Medium Dense 4 -	8 Firm	1	RIC#: Boring N	00000 lo.: C-161	OW		
som and	e 20 to 35 to	35% 50%	UP - Fixed P C - Rock (		0 - 50 Dense 8 - 60 + Very Dense 15 -	30 Very St	tiff	Date Cor	npleted:	5/25/18		
					30			Database	ID No.:			

RE			samples off au  Sampler 7 SS - Split S	Type Cohe		OD SS Sampler hesive Consiste	-					_
20_								12.0	Bottom of I	Exploration = 12		
5_	SS-1 0.0 Dry, brown/gray FINE S					ace coarse sand an thered bedrock	d	5.0 8.0 10.0	Boulders	les and shells.  BEDROCK frag	ments	
T I W NS Ft. G/Ft. SS-1		Type & Number	SAMPLER Pen/ Depth Rcy. Core Rcy. & RQD	Blows per 6 in. (Coring min/ft) [Downpress psi]	SOIL AND ROCK SAMF Burmister Soil Classi Dry, brown/gray FINE SA sand, and gravel, trace silt.	fication System  ND, some coarse	N	Depth of Stratum Change		STRATUM DESCRIPTION /ROADWAY		
Casin	sp g: Unle	oon drive	en using a 140 wise noted, ca	lb hammer, 30	nsists of a 2 in. split or fall. using 300 lb hammer,	Date 06/04/18		Cime 00:00	vater Obse Depth 10	Casing at	Stab. T 0.25	hr
Geot Insp Bore	ector I	nsult Consult Name/Cocation: Ogd	Co.: No	don Archibal w England E ry Fortier / G	d, Inc. Boring Contractors ZA GeoEnvironmental	Ground S	Surf 1 Da	face Elev. stum _N	IGVD29	.0		_
RIC Brid	#: ge/Ro		Bayside	FAP#:		RIDOT I Date Star N Coord E Coord	rt : . :		-	e End :6/4 Ft. Ft.	4/18	

RIE	от Р	roiect	Bayside :	Sewer Warw	ick RI - Various location	s BORING	#: C-16	3	Sheet	2 of 2
		(C/T) :		ARWICK	1011 111 111111111111111111111111111111		atabase ID		Sheet _	VI
RIC		00000		FAP#	,	Date Star			e End: 6/	13/18
Bric	lge/Ro	ad # :	Bayside			N Coord.	: 0		Ft.	
	_	nsult (		don Archiba	ld, Inc.	E Coord.	: 0		Ft.	
Geo	tech C	onsult	Co.: No	ew England	Boring Contractors	Ground S	urface Elev	., Ft.: 0	0.0	
Insp	ector	Name/	Co.: T.	Plante / GZA	GeoEnvironmental, Inc	. Elevation	Datum ]	NGVD29		
Dow	ahala l	Locatio								
			on Ogden							
	oler: U	iless oth	erwise noted,	soil sampler co	nsists of a 2 in. split			water Obse		
Contr				) lb hammer, 3		Date	Time	Depth	Casing at	Stab. Time
Casii		ess otne ng 24 in		ising is driven	using 300 lb hammer,	06/13/18	00:00	0		0 hr
Casir	ng Size:			HS Auger	X		8			
D	CB		SAMPLER	Blows	SOIL AND ROCK SAMPL	E DESCRIPTION	N Depth		STRATUM	RE
D E P T H	AL SO	Type &		per 6 in.	Burmister Soil Classifi		of	D	ESCRIPTION	l M
H	I W N S	Number	Core Rcy. & RQD	(Coring min/ft) [Downpress psi]			Stratum Change			A R K S
Ft.	G /Ft.	00.1				NIP BANID		- A COLL 1 (O)	200 ( 2011 ) 11	S
-		SS-1	24/16 0.0	40-15-11-11	Dry, medium dense, gray Fl coarse sand, some silt, trace	NE SAND, some gravel.	0.2/	FINE SANI	ROADWAY	
-			2.0		,			1 1112 51 1112	-	
:=										
5			5.0							
		SS-2	24/20	12-17-15-20	Dry, dense, FINE SAND, so trace silt, trace gravel.	me coarse sand,				
			7.0		dace siit, dace graver.					
-										
10			10.0							
10-		SS-3	24/18	12-27-35-47	Dry, very dense, gray FINE	SAND, some				
			12.0		coarse sand, some silt, trace	gravel.	12.0			
								Bottom of E	xploration = 12'	
2										
15_										
-										
1										
]										
20_										
-										
-										
=										
25										
-										
-										
30										
	o 12 Soi	l Augeri	nσ					===		
REM	IARKS:	:								
Prope	ortions l	hasi	Sampler Ty	On Coher	140# Wt x 30" fall on 2" Ol onless Density Cohes					
_	0 to 1		SS - Split Sp		•		RIC#:	ስበስስስ		
little	10 to	20%	UT - Shelby	Tube   10 -	30 Medium Dense 4 - 8	8 Firm	Boring No	00000 C-163		
some and	20 to 35 to		UP - Fixed Po C - Rock C		+ Very Dense 15 - 3	80 Very Stiff	Date Com	pleted: 6/	13/18	
					30+		Database	ID No. :		

DID	OT Pı	roject	Rayside S	Sewer War	wick RI - Various location	s BORING	3#:	C-164		Sheet	2 of 2	
	ation (	•		ARWICK		RIDOT						_
RIC	•	00000	TEGILI W	FAP		Date Sta	rt :	6/4/18	Dat	e End: 6	/4/18	
	ge/Ro		Bayside			N Coord		0		Ft.		
		nsult C		don Archi	pald. Inc.	E Coord		0		Ft.		
		onsult			d Boring Contractors	Ground	Surf	ace Elev.	, Ft.: 0	.0		
		Name/	Co.: Ga	v Fortier	GZA GeoEnvironmental,				GVD29			
												-
		ocatio	n len Ave									
Samr	der: Un	less othe	rwise noted,	soil sampler	consists of a 2 in. split				vater Obse			
_	SD	oon drive	en using a 140	lb hammer	, 30" fall.	Date		l'ime	Depth	Casing at		
Casin		ess other ng 24 in.		ising is drive	en using 300 lb hammer,	06/04/18	U	00:00	10		0.25 hr	
Casir	iain 18 Size:	ng 24 m.		HS Auger	X							
	СВ		SAMPLER	Blows	SOIL AND ROCK SAMPI	E DESCRIPTIO	INC	Depth		STRATUM	R	R E
D E P	AL SO	Type &	Pen/ Depth Rcy,	per 6 in.	Burmister Soil Classif	cation System	ואל	of	Γ	ESCRIPTION	N _A	E M
Ť H	IW	Number	Core Rcy.	(Coring min/	ft)			Stratum Change			A R K	R
Ft.	NS G/Ft.		& RQD	[Downpress p	si]			Change			S	S
		SS-1	60/0 0.0		Dry, gray FINE SAND, son	ne coarse sand ar	nd	0.3	ASPHALT	ROADWAY		
1					gravel, trace silt, trace cobb	les.	- 11					
1												
5_			5.0		DD ID GAND A		-	5.0	Boulders er	aguntarad		
		SS-2	60/0		Moist, gray, FINE SAND, t and gravel, trace silt, trace	race coarse sand weathered bedroo	k		Doniners er	Countered		
					fragments.							
1												
14								10.0				
10_			10.0				ŀ	10.0	Weathered	BEDROCK frag	gmetns.	
							- 1	12.0				
									Bottom of I	Exploration $= 12$	2' 1	1
15_												
-												
-												
1												
20_												
1 2												
1 4												
-												
25_												
1 -												
-												
30												_
0	to <u>10 Sc</u>	il Auger	ing									
RE	MARKS	: 1. All	samples off a	uger flights.								
-					140# Wt x 30" fall on 2" (	OD SS Sampler						_
Prop	ortions	Used	Sampler 7	**	hesionless Density Coh	esive Consist	- 1					
	e 0 to		SS - Split S UT - Shelby	poon		- 4 Sofi - 8 Firm		RIC#:	00000			_
	e 10 to ie 20 to		UP - Fixed P	osition	30 - 50 Dense 8 -	15 Stiff	f	Boring N Date Con		6/4/18		-
and		50%	C - Rock	Core		- 30 Very S ) + Har		Date Con Database		U TI 1U		

RIE	OT P	roject	Bayside	Sewer System	1	BORING	#: C-16	5	Sheet	2 of 2
1		(C/T):		WARWICK			Database ID			
RIC	:#:	00000		FAP # :			<b>::</b> 6/11/1	8 Dat	e End : 6/	11/18
Brio	lge/Ro	ad # :	Bayside	!		N Coord.	: 0		Ft.	
Des	ign Co	nsult (	Co.: Go	rdon Archiba	ld, Inc.	E Coord.	: 0		Ft.	
Geo	tech (	Consult	Co.: N	lew England I	Boring Contractors	Ground S	Surface Elev	/., Ft. : (	0.0	
Insp	ector	Name/	Co.: $\overline{T}$	om Plant / Go	rdon Archibald	Elevation	Datum 1	NGVD29		
D	_11	T 4° -								
1		Locatio	on den Avenu	Δ						
					nsists of a 2 in. split spoon		Ground	water Obs	ervations	
	dr	iven usin	g a 140 lb ha	mmer, 30" fall.		Date	Time	Depth		Stab. Time
Casir		ess other ng 24 in.		asing is driven u	sing 300 lb hammer,	06/11/18	00:00	10		0.25 hr
Casir	ıanı 18 Size:	ng 24 m. 3 in		HS Auger	X					
	C B	<u> </u>	SAMPLER							R
D E P T	AL SO	Type &	Pen/ Deptl	RIOWS	SOIL AND ROCK SAMPL Burmister Soil Classifi		N Depth of		STRATUM DESCRIPTION	R E M
	I W	Number	Core Rcy.	(Coring min/ft)	Durinster Son Classin	cation System	Stratum	1	DESCRI HON	A
H Ft.	NS G/Ft.		& RQD	[Downpress psi]			Change			A R K S
	18	SS-1	24/14 0.0	11-10-16-20	Dry, medium dense, brown-	gray FINE SAND	0.3/	ASPHALT	ROADWAY	7 3
	22		2.0	1	some coarse sand, trace grav shells.	el, trace silt, trace	;			
	28	SS-2	24/18	25-51-53-61	Moist, very dense, brown-gra	ay FINE SAND,				
	41		4.0		trace coarse sand, and gravel weathered bedrock.	, trace silt and				
5_	50									
	33 45									
-	66									
	90									
10	133		10.0							
		SS-3	24/12	18-44-52-71	Wet, very dense, gray FINE	SAND, some	4			
			12.0		coarse sand and gravel, trace bedrock fragments.	siit and weathere	12.0			
-					-			Bottom of E	Exploration = 12'	
١ ,										
15_										
1 -										
20_										
-										
-										
25										
20										
30	- 12 C-	11 D.:	Ci	<u> </u>						
<u> </u>	.0 12 30	il Driven	Casing							
REN	1ARKS	<b>!</b>								
			~ · -		140# Wt x 30" fall on 2" Ol					
-	ortions		Sampler 7		onless Density Cohes 10 Loose 0 - 4		•			
	0 to 1 10 to	20%	SS - Split S UT - Shelby	Tube   10 -	30 Medium Dense 4 - 8	Firm	RIC#: Boring No	00000 C-165		
some and	20 to 35 to		UP - Fixed P C - Rock C	osition 30 -			D. A. O.		/11/18	
4114			- ALUCIA (	50	30 ±		Database			

NEE	C LO	G B	ayside Sev					ORING #			Sheet	2 of 2
		<b>C/T)</b> :	Kent / V	VARWI					abase ID#		70 1 6"	24/10
RIC	-	00000	D '1	FA	P#:			te Start		Date		24/18
1	_	ad #:	Bayside		-1- :1 1	d Inc		Coord.:	0		Ft.	
		nsult ( Consult		rdon Arc		Goring Contractors			rface Elev	Et · 0	.0	
		onsuu Name/				Fordon Archibald		evation I		IGVD29	.0	
^				yan Doc	лул	ordon / tremoute				10122		
		Locatio	n side Sewe	ra								
					ler con	sists of a 2 in. split spoon			Groundy	vater Obse		
	dr	iven usin	g a 140 lb ha	mmer, 30	" fall.			ate .	Time	Depth		Stab. Time
Casin		ess other ng 24 in.		asing is di	riven u	sing 300 lb hammer,	05/2	4/18	00:00	0		0.25 hr
Casin	g Size:	3 in		HS Au	ger							
D	CB AL		SAMPLER	Blov		SOIL AND ROCK SAMP	LE DESC	CRIPTION	Depth		STRATUM	R E
D E P T	SO	Type & Number	Pen/ Depti Rcy.	per o		Burmister Soil Classi			of Stratum	Ε	DESCRIPTION	M A
H	I W N S	Number	Core Rcy. & RQD	(Coring )	min/ft) ess psil				Change			R K
Ft.	G /Ft.	SS-1	24/10 0.0			Dry, loose, brown FINE SA	AND, little	e coarse	0.5	_ ASPHALT/	ROADWAY	S 1
-	5		2.0			sand.	,					
]	9											
	25											
5_	89	SS-2	2/0.1 5.2		2"	WEATHERD BEDROCK			5.0	WEATHER	ED BEDROCK	
=												
10_									10.0	Bottom of I	Exploration	
-											•	
-												
15_												
1												
20_												
-												
25_												
20												
30	to 7 Soi	Driven	Casino									
_				4								=
REF	MARKS	6: 1. Wa	ter was at gro	und surfac	æ							
						140# Wt x 30" fall on 2"	OD SS S	ampler				
	oportions Used Sampler Type					ionless Density Col	hesive	Consistenc	•			
trac little	e 0 to e 10 to	10% 20%	SS - Split : UT - Shelb	y Tube	10	- 30 Medium Dense 4	) - 4   - 8	Soft Firm	RIC #: Boring N	00000 to.: C-166	,	
	e 20 to		UP - Fixed I	Position			- 15 3 - 30	Stiff Very Stiff	Date Cor	npleted :	5/24/18	
and	JJ 10	. 50 /0	C - MUCK	2016	50		0 +	Hard	Database	iD No. :		

	BON WI				Pawti	200 Mair ucket, Rhod	e Island 02860			SHEET: LOCATION: HOLE NO.:		OF 184 R	
LOG PREPA CONTR.		PBA	TOWN, ST PROJECT	TATE:		M	LOG /arwick, Rhode Bayside Sew	Island		BORING TYP LINE & STA.: OFFSET:	E: AUG	en Pec	BE
6-	FORTIER	e e	PBA NO.:			OFFICE:							
	VATER OBSE FT. AFTER		BAR.		AUGER	CASING	SAMPLER	CORE	SURFACE	ELEV.:			
AT	FT. AFTER	HRS.	TYPE SIZE, I.D.		5/5				DATE STAI BORING FO	RTED-FINISH! OREMAN:	The second second	/31 / 18 5tvan	
			HAMMER HAMMER		=				INSPECTO SOILS ENG			FORTH	
LOCATION	OF BORING:	CL		7	RWICK								
DEPTH BELOW SURFACE	CASING BLOWS PER FOOT	SAMPLE DEPTH FROM - TO	BLC		B" ON SAMF M - TO	PLER	MONITORIN G WELL INFO.	ROCK INCL.	COLOR, LC	N OF SOIL & OSS OF WASH		SAMPLE PEN.	Τ-
OOI TAGE	LATOO		0-6	6-12	12-18	18-24	IINFO.		JOINTS IN F		NO.	PEN.	REC.
2		Solis	SIBM	AUGE	2. Pro	50	pey		NA RO				
34							JE9			LES TAKEN			
5		0.51		DPF A	SGER			DRy 13e	FINE 9	land sou			
67							Moisi	COMSE	SAND S	unn			
7/89				- P				COARSE	GRANT	Lawr			
10		5/10		OFFI	NUER								-
12							Wes	MOIST G	LEY FANS. SE SANS.	2 4 Grant			
								M silt,	WEATHE	ness lock			
								Rock	FRAUME	205			
								^		,			
								B.	0, B. Y	<b>)</b> '			
	Groundwater	was not obserock) encount	erved during tered at 14	g the drilling feet below	g operation. grade. The	encountere	Approximately ed bedrock appo	-		ered prior to th	e boring ac	Ivanceme	nt.
GROUND SU D=DRY		FT.,	USED		" CASING			CASING TO	12 F		TAGE IN E		12
JP=UNDISTL	W=WASHED JRBED, PIST	ON UB:	=UNDISTUI	P=PIT RBED, BAI	A=AUGER L CHECK	OER=	ANE TEST OPEN END RO	D		NO	TAGE IN F		2
PROPORTIO	NS USED: TF	RACE=0-10%	, LITTLE=1	0-20%, SC	ME=20-35%	%, AND 35-	50%			HOL	E NO.	TYPE	

RII	OT P	roject	Bayside	Sewer Systen	n	BORING	G#:	: C-16	8	Sheet	2 of	2
l.		(C/T):		VARWICK		RIDOT	Dat	abase ID				
1		00000		FAP#:		_ Date Sta			<u>8</u> Dat		11/18	
1	_	oad #:				N Coord		0		Ft.		
1	_	nsult (	•	don Archiba		_ E Coord		0		Ft.		
1 '		Consult			Boring Contractors	_ Ground				.0		
rusi	pector	Name	Co.: 10	m Plant / Go	rdon Archibald	_ Elevation	n Da	atum <u>r</u>	NGVD29			
		Location	on ff Road									
				soil sampler cor	sists of a 2 in. split spoon			Ground	water Obse	ervations		
Ci				mmer, 30" fall.	-! 200 lb b	Date		Time	Depth	Casing at		
Cash		ess otner ng 24 in.		ising is ariven u	sing 300 lb hammer,	06/11/18	(	00:00	10		0.25	hr
Casi	ng Size:	3 in		HS Auger	<u>X</u>							
D E P T	CB AL SO	Type &	SAMPLER Pen/ Depth	Blows per 6 in.	SOIL AND ROCK SAMPL Burmister Soil Classifi		)N	Depth of	r	STRATUM DESCRIPTION	Law de la constantina de la constantina de la constantina de la constantina de la constantina de la constantina	R E M
H	I W N S	Number	Rcy. Core Rcy. & RQD	(Coring min/ft) [Downpress psi]	Burmister 30ff Classiff	cation system		Stratum Change		ESCRIPTION		A R K
Ft.	G /Ft.	SS-1	24/14 0.0	10-15-13-7	Dry, medium dense, brown I	FINE SAND, trad	ce	0.3/	¬ASPHALT/	ROADWAY		S
-	15		2.0		coarse sand and gravel, trace	silt.	-		\		/	
-	28											
	44											
5_	49	SS-2	24/15	18-25-57-61	Moist, very dense, gray COA	DCE CAND co	ma		Encountered	l boulder areas 4'	to 7'	
	27 35	33-2		10-23-37-01	fine sand, trace gravel, trace	silt and weathere	d	7.0				
	60		7.0		bedrock.			7.0				-
-	89											
10_	120	00.0	10.0									
		SS-3	24/12	11-77-29-59	Wet, very dense, gray FINE sand and gravel, trace silt and	SAND, trace coa I weathered	ırse					
			12.0		bedrock.			12.0	Bottom of F	xploration = 12		-
									Bottom of E	Aproration 12		
15_												
_								i				
-												
-												
20_												i
_												
25_												
1												
]												
20												
30 [ 01	to <u>12 Soi</u>	il Driven	Casing Casing									
	/ARKS									73		
REI	CARARAS.	•										
					140# Wt x 30" fall on 2" Ol							
_	ortions l e 0 to 1		Sampler Ty SS - Split Sp	- 1	onless Density Cohes 10 Loose 0 - 4		icy	n	00077			
little	10 to	20%	UT - Shelby	Tube 10 -	30 Medium Dense 4 - 8	Firm		RIC#: Boring No	00000 .: C-168			
some	20 to 35 to		UP - Fixed Po C - Rock C				ff	Date Com	pleted: 6/	11/18		
					30 +			Database	ID No. :			

RIDO		-				ick RI - Various location	BORING RIDOT				Shee	et _2	of _2_
Locat	•	-	Kent	/ WA	RWICK		_				T	CICITO	
RIC #	¥: _	00000			FAP#:		_ Date Sta		6/6/18	Date	End:	6/6/18	
Bridg	re/Roa	nd #:	Baysi	ie _			N Coord		0		Ft.		
Desig	n Coi	sult C	o. : (	ordo	on Archibal	ld, Inc.	_ E Coord		0		Ft.		
		onsult (	Co.:	New	England F	Boring Contractors	Ground			, Ft.: 0.	0		
		Name/C		Garv	Fortier / C	ZA GeoEnvironmental,	Inc.Elevatio	n Da	tum N	IGVD29			
				-									
		ocatio											
Descr	1ptio	n: Cliff	Moau	ad ea	il compler co	nsists of a 2 in. split			Groundy	vater Obse	rvations		
Sample	er: UN enc	iess otne on drive	rwise not en using 8	140 II	b hammer, 3	0" fall.	Date		Time	Depth	Casing		b. Time
Casing	: Unle	ss other ng 24 in.	wise note	l, casi	ing is driven	using 300 lb hammer,	06/04/18	0	00:00	10		(	).25 hr
Casing	Size:				HS Auger	<u>X</u>		L.,					I R
g	СВ		SAMPLI		Blows	SOIL AND ROCK SAMP	LE DESCRIPTION	NC	Depth		STRATUM		RE
D E P	AL SO	Type &	Rcv.	epth	per 6 in.	Burmister Soil Classif	ication System		of	D	ESCRIPTION OF THE PROPERTY OF	N	MA
T	IW	Number	Core Rcy.		Coring min/ft)				Stratum Change				R
H Ft.	NS G/Ft.		& RQD	[[1	Downpress psi]								S
		SS-1	60/0	0.0		Dry, brown FINE SAND, s	ome coarse sand		0.3/	ASPHALT/	ROADWA	Y	
-						and gravel, trace silt, trace	copples.						
-								ļ	4.0				
5				5.0				.		Boulders en	countered		
	i	SS-2	60/0			Dry, gray FINE SAND, trace gravel, trace silt, trace weat	ce coarse sand at	nd					
-						fragments.	nered bedrock						
									8.0		SBBBOOK	10	
1										Weathered I	BEDROCK	atragme	1ts.
10			1	0.0									
			1										
									12.0	Datte CE		- 12	
										Bottom of E	xpioration -	- 12	1
			1										
15_				-									
			1	- 1									
1				- 1									
				1									
20_			1										
				- 1									
25_													
-				1		1							
-													
-				- 1									
30													
30	0 10 90	il Augeri	ng										
REM	REMARKS: 1. Bottom of Exploration = 12'												
						440030 300 50 50	OD 66 61						
Dean	ortions	Head	Samp	or Tu	ne Cohe	140# Wt x 30" fall on 2" ( sionless Density Coh	OD SS Sampler esive Consist						
1 -	e O to		SS - Sp	-	•		- 4 Soi	•	RIC#:	00000			
little	10 to	20%	UT - Sh	elby T	Tube 10	- 30 Medium Dense 4	-8 Fire	m	Boring N				
	20 to	35%	UP - Fix				- 15 Stir - 30 Very :		Date Cor	npleted: 6	/6/18		
and	22 K	3070	C-RO	un VI			) + Hai		Database	ID No.:			

DIE	OTR	• .			~ .	WY MANAGER MALE		~					
,		roject (C/T) :		Sewer WARV		<u>n</u>	BORING		: <u>C-17</u> tabase ID		Sheet _	of _	2_
1		00000			FAP # :	1	_ RIDO1   Date Sta				e End : 6/	12/18	
1		ad # :	Baysid		. ZXX. II e	The second secon	N Coord		0	Dati	Ft.	12/10	
I .	_	nsult (			Archiba	ld, Inc.	E Coord		0	***************************************	Ft.		
	0	Consult				Boring Contractors	Ground			v., Ft.: 0			
Insp	ector	Name/				Gordon Archibald	Elevation			NGVD29			
Ror	ehole ]	Locatio	\n										
			den Ave										
Sam			erwise noted ig a 140 lb l			nsists of a 2 in. split spoon	D-4-			water Obse		0, 1, 0	
Casi						ising 300 lb hammer,	<b>Date</b> 06/13/18		Time 00:00	<b>Depth</b> 10	Casing at	0.25	
		ng 24 in.		***								0.20	•
	ng Size:	4 in	SAMPLE	HS A	uger	X				1			l R
D E P T	CB AL	m .	Pen/ Den	,   B	lows r 6 in.	SOIL AND ROCK SAMPL		N	Depth		STRATUM		R E M
	S O I W	Type & Number			ng min/ft)	Burmister Soil Classific	cation System		of Stratum	D	ESCRIPTION		A R K
H Ft.	NS G/Ft.		& RQD		press psi]				Change				K
	12	SS-1	24/15 0.	0 6-8	8-4-6	Dry, medium dense, brown F		ce	0.3	ASPHALT/I	ROADWAY		-
	27		0% 2.	0		coarse sand and gravel, trace	SHT.						
_	59 60												
5	70		5.	n						Encountered	cobbles and bou	ılders	
<i></i>	41	SS-2	24/15	24-40	5-37-57	Dry, very dense, gray FINE S	SAND, some			from 4' to 9'			
	52		0% 7.	0		coarse sand and gravel, trace	silt.						
-	41												
10	102 141		10						9.0		-6-5		
10_	141	SS-3	10. 24/15		5-48-71	Moist, very dense, gray FINE	SAND, trace						
			0% 12.	)		coarse sand and gravel, trace bedrock fragments.	silt and weather	ed	12.0				
										Bottom of Ex	xploration = 12'		1
ا ۾ ا													
15_													
]													
-													
20													
20_													
]													
_													
25													
25_													
_													
30													
	to 12 Soi	l Driven	Casina Casina	1	i	· · · · · · · · · · · · · · · · · · ·				The second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second secon			
													_
REN	IARKS:	1											
					T	140# Wt x 30" fall on 2" OL	SS Sampler						
_	ortions l		Sampler		1	onless Density Cohesi		ıcy					
little		20%	SS - Split UT - Shelb	y Tube	0 - 10 -	30 Medium Dense 4 - 8	Firm		RIC#:	00000 C 170			
some and	20 to 35 to		UP - Fixed : C - Rock		30 - 50			ff	Boring No Date Com		12/18		
			- 1.001			30+			Database				

1	OT Pr	-			lewer Wa ARWICI		k RI - Various locations	RIDOT	Data	base ID	#:			2_ of _	<u>2</u>
RIC	-	00000			FAP	#:		_ Date Sta		_	Date	End:	6/6	18	
Brid	ge/Ro	ad #:	Bays	side				N Coord		0		Ft.			
		asult C	0. :	Gore	don Arch	ibalc	l, Inc.	_ E Coord		0		Ft.			
Geot	ech C	onsult :	Co.:	Ne	w Englar	nd Be	oring Contractors	Ground				0			
Insp	ector l	Name/(	Co. :	Gar	y Fortier	r / G2	ZA GeoEnvironmental,	Inc.Elevation	n Da	tum <u>l</u>	NGVD29				
Bore	hole I	ocatio	n.												
Desc	riptio	n: Ogd	en Av	3			sists of a 7 in split			Ground	water Obse	rvations			
_	spe g: Unle	oon drive ss other	n using	a 140	lb hamme	er, 30'	sists of a 2 in. split '' fall. sing 300 lb hammer,	Date 06/06/18	3	<b>Γime</b> 00:00	Depth 10	Casing	at	Stab. T 0.25	<b>'ime</b> hr
Casin	g Size:	ng 24 in.			HS Auger	r	X								
	СВ	_	SAMP	LER		$-\tau$		D DEGODIETI	221	Doub		STRATUM	•		R E M
D E P T H	AL	m e	Pen/	Depth	Blows per 6 in		SOIL AND ROCK SAMPL Burmister Soil Classifi	LE DESCRIPT Recent of the control of	NC	Depth of	D	ESCRIPTION			M
P	SO IW	Type & Number	Rcy. Core Rc	y.	(Coring min	n/ft)		,		Stratum					A R
H Ft.	NS G/Ft.		& RQD		[Downpress					Change					K
	J/14	SS-1	5/0	0.0		-	Dry, brown FINE SAND, tr	ace coarse sand	and	0.3	ASPHALT/	ROADWAY	<u> </u>		
1-				0.4			gravel, trace silt.								
-											-				
-										4.0	D. 11				4
5		_		5.0		- 1			10		Boulders an	d coarse gra	ivel 18	yer,	
1		SS-2	10/0	5.8			Moist, gray-brown FINE TO AND GRAVEL, trace weath	) COARSE SAI hered bedrock	עא						
							fragments, grind to depth.								
										8.0	Weathered I	BEDROCK	fragn	ents.	1
													•		1
10_															
1						- 1				12.0					
$\vdash$											Bottom of E	xploration =	= 12'		1
(e															
15															1
						1									1
20_															
-															
-			ļ												
-															
25															
30											1	-	-		
0	to <u>10 Sc</u>	oil Auger	ing												
REMARKS: 1. All samples taken off auger flights.															
-		- 1					140# Wt x 30" fall on 2" (	OD SS Sampler							
Pro	portions	Used	Sam	pler 1	Гуре С	Cohesi		esive Consis	tency						
trac	e O to	10%	SS - 5	Split S	рооп		10 220020	- 4 Sot - 8 Fir		RIC#:	00000				
	e 10 to		UT - S	shelby ixed F	Tube Position		- 50 Dense 8 -	15 Sti	ff	Boring i				11-11-	
and		50%		Rock			+ Very Dense 15	- 30 Very			mpleted :( se ID No. :	6/6/18			
							30	) + Hai	ū	Databas	- ALP 1100 A		_		

RID	OT Pr	oject			wick RI - Various locations	BORIN				Sheet _	2 of 2	2_
		C/T):	Kent / W	ARWICK		_		base ID		TO 1 44	C/10	
RIC	#:	00000		FAP #		Date St		6/5/18	Date		5/18	-
Brid	ge/Ro	ad #:	Bayside			N Coor		0		Ft.		
		nsult C		don Archib		E Coor		0		Ft.		
		onsult	Co.: Ne	w England	l Boring Contractors			face Elev		0		
		Name/(		y Fortier /	GZA GeoEnvironmental,	Inc.Elevation	on Da	itum 1	NGVD29			
		Locatio										
Desc	ripuo.	n: Can	pot	oil sampler	consists of a 2 in. split			Ground	water Obse	rvations		
	en	nan drive	n using a 140	lb hammer	, 30" fall.	Date		Time	Depth	Casing at	Stab. Ti	me
Casin	g: Unle	ess other	wise noted, ca	sing is drive	n using 300 lb hammer,	06/05/18	(	00:00	10		0.25 h	ır
		ng 24 in.			v			- 1				
Casin	g Size:			HS Auger	<u>X</u>							R
D	CB		SAMPLER	Blows	SOIL AND ROCK SAMPL	E DESCRIPT	ION	Depth		STRATUM		R E M
P	AL SO	Type &	Pen/ Depth Rcy.	per 6 in.	Burmister Soil Classifi	cation System		of Stratum	D.	ESCRIPTION		A R K
D E P T H	I W N S	Number	Core Rcy. & RQD	(Coring min/	ft)			Change				K
Ft.	G/Ft.			(Downpress p			4 000	0.0	ACDALIATT	'/ROADWAY		S
		SS-1	60/0 0.0		Dry, brown FINE SAND, tra gravel, trace silt	ace coarse san	DIN L	0.3	APLAUAL	WOUND ALVE		
					Processi sense area				1			
											1	
-									1			
5_		00.0	5.0		Moist, brown-gray FINE SA	ND, trace coa	rse					
9		SS-2	60/0		sand and gravel, trace silt.	,	77		Coarse GRA	VEL layer.		
								8.0				
								8.0				
-					<b>\</b>							
10_			10.0		1							
-								12.0				
-									Bottom of E	xploration = 12	!	1
(4		-										
15												
1.5												
1												
			1									
20_												
		1										
		1										
25_												
1												
30												_
-	to 10 S	oil Auger	ring									
				m =	*-1.4-							
RE	MARK	S: 1. Al	I samples take	n off auger fl	ights.							
					140# Wt x 30" fall on 2"	DD SS Sample esive Cons	er istency	,				
	portion		Sampler '	72	ALLOS A TITLE		istency oft	I E0	Λοοοο			
tra	ce 0 to e 10 t	10%	SS - Split S UT - Shelby	y Tube	10 - 30 Medium Dense 4	-8 F	rm	RIC#:	00000 No.: C-172			
son	ie 20 f	to 35%	UP - Fixed I	Position	30 - 50 Dense 8-		tiff y Stiff	Date Co	mpleted:	5/5/18		
and	1 351	to 50%	C - Rock	Core			ard		se ID No.:			

RID	OT P	roject	Bayside	Sewer Warw	ick RI - Various location	s BORING	G#:	C-173	}	Sheet	2 of	2
	,	(C/T):		VARWICK		RIDOT						
RIC		00000		FAP # :	:	Date Sta	( <del>-</del>	6/13/1	8 Date	_	13/18	
		ad # :	Bayside			N Coord				Ft.		
	_	nsult (		don Archiba		E Coord				Ft.		
		onsult	-		Boring Contractors	Ground				.0		
Insp	ector	Name/	Co.: <u>T.</u>	Plante / GZA	GeoEnvironmental, Inc.	Elevation	n Datu	m <u>N</u>	IGVD29			
		Location: 24 (	on Camp Stree	t								
					nsists of a 2 in. split		G	roundy	vater Obse	rvations		
				lb hammer, 3		Date	Tir		Depth	Casing at		
Casin		ess other ng 24 in.		asing is driven	using 300 lb hammer,	06/13/18	00:	00	8.5		0.25	hr
Casin	g Size:	ng 24 m.		HS Auger	X							
	СВ		SAMPLER									R E
D E P	ΑL	Time &	Pen/ Depth	Blows per 6 in.	SOIL AND ROCK SAMPL Burmister Soil Classifi		ון אכ	Depth of		STRATUM ESCRIPTION		M
T	S O I W	Type & Number	Rcy. Core Rcy.	(Coring min/ft)	Durinsier 3011 Classifi	cation system		tratum	D	ESCRIFTION		
H Ft.	NS G/Ft.		& RQD	[Downpress psi]			C	hange				A R K S
		SS-1	24/16 0.0	30-8-7-12	Dry, medium dense, brown l	FINE SAND, soi	me	0.2	\ASPHALT/I	ROADWAY		2
-			2.0		coarse sand, trace gravel.				FINE SAND	)		
1												
								- 1				
5_			5.0					1				
-		SS-2	24/12	2-1-2-3	Dry, very loose, gray-brown silt.	FINE SAND, to	ace	1				
			7.0		311.							
=								1				
10												
10_		SS-3	10.0 6/4 10.5	100	Weet, very dense, gray FINE	SAND, trace		10.0	Auger Refus	al / COBBLES	7.5	
-		000	1 0/1 10.5	100	gravel, trace silt, trace cobble	es.		10.0		xploration = 10.	5	
-												
-												
15												
7												
-												
20_												
-				8				- 1			1	
+												
1								i				
25												
J												
1											1	
4												
20												
30	- 10 - 7	*1 4										
<u>0</u> t	o <u>10.5</u> S	oil Auge	ring									
REM	IARKS:											
					140# Wt x 30" fall on 2" OI	n SS Samalar						
Propo	ortions \	Used	Sampler T	ype Cohesi	onless Density Cohes		ncy					
trace	0 to 1	0%	SS - Split Sp	000n 0 -	10 Loose 0-4		R	IC#:	00000			
little some	10 to 20 to		UT - Shelby UP - Fixed Po		30 Medium Dense 4 - 8 50 Dense 8 - 1		Be	oring No	.: C-173			
and	35 to		C-Rock C		+ Very Dense 15 - 3	0 Very Sti		ate Com		13/18		
					30 +	- Hard	D	atabase l	ID No.:			_

ents

Loca RIC Bridg Desig Geot Inspe Bore Desc	#: ge/Ro gn Co ech C ector hole I	C/T): 00000 ad #: nsult Consult Name/ Location: Bay	Bays Co.: Co.: Co.:	ide Gord Ne Bry	an Deely / G	ld, Inc. Boring Contractors Gordon Archibald	BORING # NEBC Dat Date Start N Coord.: E Coord.: Ground St Elevation	abase ID a 5/24/1 0 0 urface Electron	# :   8	e End :5/. Ft. Ft.	2 of 2 24/18
Sampl					oil sampler co amer, 30" fall.	nsists of a 2 in. split spoon	Date	Time	Depth		Stab. Time
	g: Unle falli	ess other ng 24 in. 3 in	wise note	d, ca	sing is driven HS Auger	using 300 lb hammer,					
D E P T H Ft.	CB AL SO IW NS G/Ft.	Type & Number	SAMPI Pen/ I Rcy. Core Rcy & RQD	Depth	Blows per 6 in. (Coring min/ft) [Downpress psi]	SOIL AND ROCK SAMPL Burmister Soil Classifi	E DESCRIPTION cation System	Depth of Stratum Change	I	STRATUM DESCRIPTION	R E M A R K
-	3 5 27 33	SS-1	24/14	0.0 2.0	5-6-9-11	Dry, medium dense, brown l trace of fine gravel.	MEDIUM SAND,	0.5	ASPHALT	ROADWAY	
5	46 52 39 73 62 71	SS-2		5.0 7.0	11-16-20-26	Moist, dense, gray FINE SA medium gravel.					
20_	62 71 SS-3 24/16 12.0					Moist, very dense, gray ME	DIUM SAND.	12.0	Bottom of	Exploration = 12	
30  Q r  REM  Prop  trace little	AARK	s Used 10% o 20%	Samp SS - S UT - S UP - F	plit S helby	Spoon C Tube 1	0 - 10 Loose 0 - 30 Medium Dense 4	DD SS Sampler esive Consisten - 4 Soft - 8 Firm 15 Stiff	RIC#		75 5/24/18	

	OT Pi	roject C/T) :			wer War	wick RI - Various locatio	RIDOT	Data	abase ID	#:	Sheet _		2
		00000			FAP:		Date Sta	art :	6/6/18	Date	End: 6/	6/18	
1	5.4	ad #:	Bays	de		-	N Coord	l. :	0		Ft.		
	_	nsult C	_		on Archil	pald, Inc.	E Coord		0		Ft.		
	_		-			d Boring Contractors			face Elev.	. Ft.: 0.			
		onsult		New	v England	Boring Contractors				IGVD29	0		
Insp	ector.	Name/	Co.:	Gary	Fortier /	GZA GeoEnvironmenta	i, inc. Lievatio	מע מי	itum <u>r</u>	NG V DZ9			
		Locatio	n len Ave										
Some	der Ile	less othe	erwise no	ted, so	il sampler	consists of a 2 in. split				vater Obse	rvations		
_	SD	oon driv	en using :	140 I	b hammer	, 30" fall.	Date		Time	Depth	Casing at	Stab. T	<u>'ime</u>
	ıg: Unl falli	ess other ng 24 in.	wise note	d, casi	ing is drive	en using 300 lb hammer,	06/06/18	1	00:00	10		0.25	hr
Casir	ig Size:				HS Auger	X							R
D	СВ		SAMPL		Blows	SOIL AND ROCK SAM	PLE DESCRIPTI	ON	Depth		STRATUM		I E
D E P T H	AL SO	Type &	Pen/ D Rcy.	epth	per 6 in.	Burmister Soil Class	ification System		of		ESCRIPTION		M
Ť	I W	Number	Core Rcy		(Coring min/	ft)			Stratum				R
H Ft.	NS G/Ft.		& RQD	[t]	Downpress p	si]			Change				A R K S
	O ra ti	SS-1	60/0	0.0		Dry, brown FINE SAND,	some coarse sand	ı	0.3/	ASPHALT/	ROADWAY		1
-		35-1	30,0	0.0		and gravel, trace silt.							
-													
-													
5_		SS-2	60/0	5.0		Moist, gray FINE SAND,	trace coarse sand	and	60				
-		33-4	00/0			gravel, trace silt.			6.0	Coarse GRA	VEL laver.		1
-										000000			
-													
									,,,,				
10_			1	10.0					10.0	Weathered F	EDROCK frag	ments	-
			1							W Callicica 1	DDROCK Hag	michilia.	
						1			12.0	Dettem of F	xploration = 12		1
						1				Bottom of E	xpiotation – 12		1
15_													
						1							
		1	1										
20													
-		İ											
1				-			8						
]			1										
25			T										
	ĺ	1											
1													
1													
1													
30	1	1											
0 to 10 Soil Augering													
REMARKS: 1. All samples off of auger flights													
						140# Wt x 30" fail on 2"	' OD SS Sampler						
Pro	ortions	Used	Samn	ler Tv	pe Co		hesive Consis						
1 1							0 - 4 So:	-	RIC#:	00000			
littl	ace 0 to 10% SS - Split Spoon tle 10 to 20% UT - Shelby Tub					10 - 30 Medium Dense	4-8 Fir	m	Boring N				
	e 20 to		UP - Fix	ed Pos	sition		8 - 15 Sti 5 - 30 Very		Date Cor		/6/18		
and	35 to	0 50%	C-R	ock Co	ore		5 - 30		Database				

RIDOT Project   Bayside Sewer Warn/wick RI - Various locations   RIC #:   One   Consult Co.   Sem   FAP #:   Date Start:   G/13/18   Date End:   6/13/18	RIT	ОТ Р	roject	Bayside !	Sewer Warw	ick RI - Various location	s BORING	C#:	C-177	7	Shoet	2 of	2
Bridge Road #	l .					iox ita - various iocation					Sheet _	01	
Design Consult Co. :   Gordon Archibald, Inc.   Ecoards.   Gordon Consult Co. :   The Regland Boring Contractors   Inspector Name/Co. :   T. Plante / GZA GeoEnvironmental, Inc.   Elevation Datum   NGVD29					FAP # :		Date Sta	rt:	6/13/1	8 Date	e End : 6/	13/18	
Repector Name	I.	_							0		Ft.		
Borehole Location   Description: 1 To gleen and Sable   Sampler: Unless otherwise noted, soil sampler consists of a 2 in. split   Spoon orderwise using a 140 bh namer, 30" fall.   Casing: Unless otherwise noted, soil as in price using 300 lb hammer, 30" fall.   Casing: Unless otherwise noted, soil gis ordered using is driven using 300 lb hammer, 30" fall.   Casing: Size:		_											
Borchole Location   Description: 17 Ogden and Sable   Sampler tonsists of a 2 in. split spood driven using a 140 lb hammer, 30° fall   Date   Time   Depth   Casing at   Stab. Time   Of/12/18   O0:00   7.8     0.25 hr   Casing size:											.0		
Description: 17 Ogden and Sable   Sampler tubes of the vise noted, sulting a 140 lb hammer, 30° fall   Date   Time   Depth   Casing at   Stab. Time   O6/12/18   00:00   7.8   - 0.25 hr   Casing Staze   Sampler tubes   Sa	insp	ector	Name/	Co.: <u>T.</u>	Plante / GZA	GeoEnvironmental, Inc	. Elevation	n Dat	um N	IGVD29		-	
Sampler   Unless otherwise noted, soil sampler consists of a 2 in split   Date   Time   Depth   Casing at   Stab. Time   Casing side of the noted, casing is driven using 300 lb hammer, of fall   Date   Time   Depth   Casing at   Stab. Time   Casing size:					Sable								
Casing: Size:    HS Auger   X		ler: Ur	less oth	erwise noted,	soil sampler co								
Proportions Used   Samplar Type   Cohesion System   Samplar Type   Cohesion System   Samplar Type   Cohesion System   Samplar Type   Cohesion System   Samplar Type   Cohesion System   Samplar Type   Cohesion System   Samplar Type   Cohesion System   Samplar Type   Cohesion System   Samplar Type   Cohesion System   Samplar Type   Cohesion System   Samplar Type   Cohesion System   Samplar Type   Cohesion System   Samplar Type   Cohesion System   Samplar Type   Cohesion System   Samplar Type   Cohesion System   Samplar Type   Cohesion System   Samplar Type   Cohesion System   Samplar Type   Cohesion System   Samplar Type   Cohesion System   Samplar Type   Cohesion System   Samplar Type   Cohesion System   Samplar Type   Cohesion System   Samplar Type   Cohesion System   Samplar Type   Cohesion System   Samplar Type   Cohesion System   Samplar Type   Cohesion System   Samplar Type   Cohesion System   Samplar Type   Cohesion System   Samplar Type   Cohesion System   Samplar Type   Cohesion System   Samplar Type   Cohesion System   Cohesion System   Cohesion System   Cohesion System   Cohesion System   Cohesion System   Cohesion System   Cohesion System   Cohesion System   Cohesion System   Cohesion System   Change	Casir										Casing at		
Depth   STRATUM   Depth   STRATUM   Depth   STRATUM   Depth   STRATUM   Depth   STRATUM   Depth   STRATUM   Depth   STRATUM   Revenue   Per in International Properties   Per	Cubii						00/12/10	"	7.00	7.0		0.23 1	.11
No.   Number   Circ Rev.   Corning min/ft    No.   Number   Circ Rev.   Corning min/ft    No.   Number   Circ Rev.   Corning min/ft    No.   Number   Circ Rev.   Corning min/ft    No.   Number   Circ Rev.   Corning min/ft    No.   Number   Circ Rev.   Corning min/ft    No.   Number   Circ Rev.   Corning min/ft    No.   Number   Circ Rev.   Corning min/ft    No.   Number   Circ Rev.   Number   Circ Rev.   Number   Circ Rev.   Number   Circ Rev.   Number   Circ Rev.   Number   Circ Rev.   Number   Circ Rev.   Number   Circ Rev.   Number   Circ Rev.   Number   Circ Rev.   Number   Circ Rev.   Number   Circ Rev.   Number   Circ Rev.   Number   Circ Rev.   Number   Circ Rev.   Number   Circ Rev.   Number   Circ Rev.   Number   Circ Rev.   Number   Circ Rev.   Number   Circ Rev.   Number   Circ Rev.   Number   Circ Rev.   Number   Circ Rev.   Number   Circ Rev.   Number   Circ Rev.   Number   Circ Rev.   Number   Circ Rev.   Number   Circ Rev.   Number   Circ Rev.   Number   Circ Rev.   Number   Circ Rev.   Number   Circ Rev.   Number   Circ Rev.   Number   Circ Rev.   Number   Circ Rev.   Number   Circ Rev.   Number   Circ Rev.   Number   Circ Rev.   Number   Circ Rev.   Number   Circ Rev.   Number   Number   Circ Rev.   Number		g Size:			HS Auger	X							l n
No.   Number   Circ Rev.   Corning min/ft    No.   Number   Circ Rev.   Corning min/ft    No.   Number   Circ Rev.   Corning min/ft    No.   Number   Circ Rev.   Corning min/ft    No.   Number   Circ Rev.   Corning min/ft    No.   Number   Circ Rev.   Corning min/ft    No.   Number   Circ Rev.   Corning min/ft    No.   Number   Circ Rev.   Corning min/ft    No.   Number   Circ Rev.   Number   Circ Rev.   Number   Circ Rev.   Number   Circ Rev.   Number   Circ Rev.   Number   Circ Rev.   Number   Circ Rev.   Number   Circ Rev.   Number   Circ Rev.   Number   Circ Rev.   Number   Circ Rev.   Number   Circ Rev.   Number   Circ Rev.   Number   Circ Rev.   Number   Circ Rev.   Number   Circ Rev.   Number   Circ Rev.   Number   Circ Rev.   Number   Circ Rev.   Number   Circ Rev.   Number   Circ Rev.   Number   Circ Rev.   Number   Circ Rev.   Number   Circ Rev.   Number   Circ Rev.   Number   Circ Rev.   Number   Circ Rev.   Number   Circ Rev.   Number   Circ Rev.   Number   Circ Rev.   Number   Circ Rev.   Number   Circ Rev.   Number   Circ Rev.   Number   Circ Rev.   Number   Circ Rev.   Number   Circ Rev.   Number   Circ Rev.   Number   Circ Rev.   Number   Circ Rev.   Number   Circ Rev.   Number   Number   Circ Rev.   Number	D E	ΑL						ON					E
Fig.   Color	T			Rcv.	1	Burmister Soil Classifi	cation System			D	ESCRIPTION		A
SS-1   24/12   0.0   2-8-8-5   2-8-8-5   24/16   2.0   3-10-12-14   2.0   3-10-12-14   2.0   SS-2   24/16   17-20-18-20   SS-3   24/16   17-20-18-20   SS-4   24/14   2.0   14-15-33-33   10-2   SS-5   24/16   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10-2   10	H			& RQD				1	Change				K
SS-2   24/16   3-10-12-14   4.0   17-20-18-20   SS-3   24/16   6.0   17-20-18-20   Moist, dense, gray FINE SAND, some coarse sand, some silt, trace gravel.   Moist, dense, gray FINE SAND, some coarse sand, some silt, trace gravel.   Moist, dense, gray FINE SAND, some coarse sand, some silt, trace gravel.   Moist, dense, gray FINE SAND, some coarse sand, some silt, trace gravel.   Moist, dense, gray FINE SAND, some coarse sand, some silt, trace gravel.   Moist, dense, gray FINE SAND, some coarse sand, some silt, trace gravel.   Wet, wery dense, gray FINE SAND, some coarse sand, trace silt, trace gravel.   Wet, wery dense, gray FINE SAND, trace coarse sand, trace silt, trace gravel.   Wet, werdium dense, gray FINE SAND, trace coarse sand, trace silt, trace gravel.   Wet, medium dense, gray FINE SAND, trace coarse sand, trace silt, trace gravel.   Wet, medium dense, gray FINE SAND, some coarse sand, trace silt, trace gravel.   Wet, medium dense, gray FINE SAND, some coarse sand, trace silt, trace gravel.   Wet, medium dense, gray FINE SAND, some coarse sand, trace silt, trace gravel.   Wet, medium dense, gray FINE SAND, some coarse sand, trace silt, trace gravel.   Wet, medium dense, gray FINE SAND, some coarse sand, trace silt, trace gravel.   Wet, medium dense, gray FINE SAND, some coarse sand, trace silt, trace gravel.   Wet, medium dense, gray FINE SAND, some coarse sand, trace silt, trace gravel.   Wet, medium dense, gray FINE SAND, some coarse sand, trace silt, trace gravel.   Wet, medium dense, gray FINE SAND, some coarse sand, trace silt, trace gravel.   Wet, medium dense, gray FINE SAND, some coarse sand, trace silt, trace gravel.   Wet, medium dense, gray FINE SAND, some coarse sand, trace silt, trace gravel.   Wet, medium dense, gray FINE SAND, some coarse sand, trace silt, trace gravel.   Wet, medium dense, gray FINE SAND, some coarse sand, trace silt, trace gravel.   Wet, medium dense, gray FINE SAND, some coarse sand, trace silt, trace gravel.   Wet, medium dense, gray FINE SAND, some coarse sand,			SS-1	24/12 0.0	52-8-8-5			me	0.1				3
SS-3   24/16   17-20-18-20   Moist, dense, gray FINE SAND, some coarse sand, sme silt, trace gravel.   Wet, very dense, gray FINE SAND, some coarse sand, sme silt, trace gravel.   Wet, very dense, gray FINE SAND, some coarse sand, sme silt, trace gravel.   Wet, very dense, gray FINE SAND, some coarse sand, sme silt, trace gravel.   Wet, very dense, gray FINE SAND, some coarse sand, trace silt, trace gravel.   Wet, very dense, gray FINE SAND, some coarse sand, trace silt, trace gravel.   Wet, very dense, gray FINE SAND, some coarse sand, trace silt, trace gravel.   Wet, very dense, gray FINE SAND, some coarse sand, trace silt, trace gravel.   Wet, very dense, gray FINE SAND, some coarse sand, trace silt, trace gravel.   Wet, very dense, gray FINE SAND, some coarse sand, trace silt, trace gravel.   Wet, very dense, gray FINE SAND, some coarse sand, trace silt, trace gravel.   Wet, very dense, gray FINE SAND, some coarse sand, trace silt, trace gravel.   Wet, very dense, gray FINE SAND, some coarse sand, trace silt, trace gravel.   Wet, very dense, gray FINE SAND, some coarse sand, trace silt, trace gravel.   Wet, very dense, gray FINE SAND, some coarse sand, trace silt, trace gravel.   Wet, very dense, gray FINE SAND, some coarse sand, trace silt, trace gravel.   Wet, very dense, gray FINE SAND, some coarse sand, trace silt, trace gravel.   Wet, very dense, gray FINE SAND, some coarse sand, trace silt, trace gravel.   Wet, very dense, gray FINE SAND, some coarse sand, trace silt, trace gravel.   Wet, very dense, gray FINE SAND, some coarse sand, trace silt, trace gravel.   Wet, very dense, gray FINE SAND, some coarse sand, trace silt, trace gravel.   Wet, very dense, gray FINE SAND, some coarse sand, trace silt, trace gravel.   Wet, very dense, gray FINE SAND, some coarse sand, trace silt, trace gravel.   Wet, very dense, gray FINE SAND, some coarse sand, trace silt, trace gravel.   Wet, very dense, gray FINE SAND, some coarse sand, trace silt, trace gravel.   Wet, very dense, gray FINE SAND, some coarse sand,				2.0					- 1	FINE SAND	)		
SS-3   24/16   17-20-18-20   Moist, dense, gray FINE SAND, some coarse sand, some silt, trace gravel.	-		SS-2		3-10-12-14	Dry, medium dense, brown l coarse sand, trace gravel, tra	FINE SAND, so: ice silt.	me					
SS-5 24/16	5		SS-3		17-20-18-20	Moist, dense, gray FINE SA	ND, some coars	e					
SS-5   24/16   SS-5   24/16   SS-5   24/16   SS-5   24/12   10.0   18-16-12-22   Wet, very dense, gray FINE SAND, some coarse sand, trace silt, trace gravel.   Wet, medium dense, gray FINE SAND, trace crarse sand, trace silt, trace gravel.   Wet, medium dense, gray FINE SAND, trace crarse sand, trace silt, trace gravel.   12.0   Bottom of Exploration = 12	,		SS-4		14-15-33-33			e					
10						sand, some silt, trace gravel.							
10	]		SS-5		7-28-27-38	Wet, very dense, gray FINE coarse sand, trace silt, trace	SAND, some gravel.						
12.0	10_		SS-6		18-16-12-22		_						
Bottom of Exploration = 12'	-					coarse sand, trace silt, trace	gravel.		12.0				
20										Bottom of Ex	cploration = 12'		
20								1					
25  Q to 12 Soil Augering  REMARKS:  Proportions Used trace 0 to 10% little 10 to 20% UT - Shelby Tube some 20 to 35% and 35 to 50% C - Rock Core  O to 12 Soil Augering  140# Wt x 30" fall on 2" OD SS Sampler Cohesionless Density Cohesive Consistency 0 - 10 Loose 0 - 4 Soft little 10 to 20% UT - Shelby Tube 30 - 50 Dense 4 - 8 Firm 30 - 50 Dense 50 + Very Dense 15 - 30 Very Stiff  All C#: 00000  Bring No.: C-177 Date Completed: 6/13/18	15_							- 1	1				
25  Q to 12 Soil Augering  REMARKS:  Proportions Used trace 0 to 10% little 10 to 20% UT - Shelby Tube some 20 to 35% and 35 to 50% C - Rock Core  O to 12 Soil Augering  140# Wt x 30" fall on 2" OD SS Sampler Cohesionless Density Cohesive Consistency 0 - 10 Loose 0 - 4 Soft little 10 to 20% UT - Shelby Tube 30 - 50 Dense 4 - 8 Firm 30 - 50 Dense 50 + Very Dense 15 - 30 Very Stiff  All C#: 00000  Bring No.: C-177 Date Completed: 6/13/18	-												- 1
25  Q to 12 Soil Augering  REMARKS:  Proportions Used trace 0 to 10% little 10 to 20% UT - Shelby Tube some 20 to 35% and 35 to 50% C - Rock Core  O to 12 Soil Augering  140# Wt x 30" fall on 2" OD SS Sampler Cohesionless Density Cohesive Consistency 0 - 10 Loose 0 - 4 Soft little 10 to 20% UT - Shelby Tube 30 - 50 Dense 4 - 8 Firm 30 - 50 Dense 50 + Very Dense 15 - 30 Very Stiff  All C#: 00000  Bring No.: C-177 Date Completed: 6/13/18	]												
25  Q to 12 Soil Augering  REMARKS:  Proportions Used trace 0 to 10% little 10 to 20% UT - Shelby Tube some 20 to 35% and 35 to 50% C - Rock Core  O to 12 Soil Augering  140# Wt x 30" fall on 2" OD SS Sampler Cohesionless Density Cohesive Consistency 0 - 10 Loose 0 - 4 Soft little 10 to 20% UT - Shelby Tube 30 - 50 Dense 4 - 8 Firm 30 - 50 Dense 50 + Very Dense 15 - 30 Very Stiff  All C#: 00000  Bring No.: C-177 Date Completed: 6/13/18													
The latest continuous continuou	20_												
The latest continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuou	7												
The latest continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuou	1											1	
The latest continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuous continuou									1				
0 to 12 Soil Augering            REMARKS:           Proportions Used trace 0 to 10% Itle 10 to 20% of little 10 to	25											1	
0 to 12 Soil Augering            REMARKS:           Proportions Used trace 0 to 10% Itle 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to	1												
0 to 12 Soil Augering            REMARKS:           Proportions Used trace 0 to 10% Itle 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to													
0 to 12 Soil Augering            REMARKS:           Proportions Used trace 0 to 10% Itle 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to 20% of little 10 to	20												
Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Table   Tabl		o 12 Soi	l Augeria	10									-
The late				-0									-
Proportions Used trace 0 to 10% SS - Split Spoon little 10 to 20% Some 20 to 35% UP - Fixed Position and 35 to 50% C - Rock Core Cohesionless Density Cohesive Consistency 0 - 10 Loose 0 - 4 Soft 10 - 30 Medium Dense 4 - 8 Firm 30 - 50 Dense 8 - 15 Stiff Date Completed: 6/13/18	KISIV	iakks:	i										
Proportions Used trace 0 to 10% SS - Split Spoon little 10 to 20% Some 20 to 35% UP - Fixed Position and 35 to 50% C - Rock Core Cohesionless Density Cohesive Consistency 0 - 10 Loose 0 - 4 Soft 10 - 30 Medium Dense 4 - 8 Firm 30 - 50 Dense 8 - 15 Stiff Date Completed: 6/13/18													
trace 0 to 10%   SS - Split Spoon   0 - 10   Loose   0 - 4   Soft   RIC #: 00000	Prop	rtions l	Used	Sampler To	pe Cohesi			nev					
some 20 to 35% UP - Fixed Position and 35 to 50% C - Rock Core 10 - 30 Medium Dense 4 - 8 Firm Stiff Date Completed: 6/13/18	trace	0 to 1	0%	SS - Split Sp	000 0 -	10 Loose 0 - 4	4 Soft	1	RIC#:	00000			
and 35 to 50%   C-Rock Core   50 + Very Dense 15-30 Very Stiff   Date Completed: 6/13/18								1	Boring No.	: C-177			_
	and					+ Very Dense 15 - 3	30 Very Sti	_			13/18		

LOG PREPA CONTR. GROUNDW AT	CNG CONT CHESTNI N. MATORED BY: WATER OBSE FT. AFTER	KHOTORS UT 8T. 12501	TYPE		Pawti	200 Mair ucket, Rhod BORIN W	e Island 02860	Island	SURFACE I	RTED-FINISHED	SA	OF -178 -178 -178 -15.18	
LOCATION	OF BORING:		HAMMER HAMMER		- NG				INSPECTOR SOILS ENG			1 PLAN	
DEPTH BELOW SURFACE	CASING BLOWS PER FOOT	SAMPLE DEPTH FROM - TO	BLO	WS PER 6	8" ON SAMF PM - TO	PLER	MONITORIN G WELL INFO.	ROCK INCL.	COLOR, LO	N OF SOIL & SS OF WASH	NO.	SAMPLE PEN.	REC.
00/11/102	LICTOOT	THOMPS	0-6	6-12	12-18	18-24	HVFO.	WATER,	JOINTS IN R	OUR, EU1.	140.	PEN.	REC.
5-1		0-5	PL	LGH T	SAMP	LE.	-	DR4, GRA SOME C TR, SUT,	DARSE	SAM),			
5-2		5-10	FUL	GHT [*]	8MPC	E_		MDIST, D SOME-CE TR 876t,	ARSE S	/			
		10-17	· 1877	y DF	BOILIN	Ġ		BOT. OF	BURZNG	12'			
	Groundwater Refusal (Bed	was not obse	erved during tered at 14 f	the drilling eet below	g operation. grade. The	encountere	Approximately  ed bedrock app			ered prior to the	boring ad	vancemen	nt.
D=DRY UP=UNDIST	W=WASHED JRBED, PIST	ON UB:	RED   =UNDISTUR	P=PIT RBED. BAI	" CASING A=AUGER LL CHECK	V=V OER≃	ANE TEST	* CASING TO	F	FOOT	AGE IN EA AGE IN R	OCK:	$\equiv$
PROPORTIO	NS USED: TR	RACE=0-10%	, LITTLE=1	0-20%, SC	ME=20-359	6, AND 35-	50%			HOLE		TYPE	

		roject		Sewer Syster	n	BORING #			Sheet _	2 of 2	
		(C/T):	Kent / W	ARWICK		_ RIDOT Da					
RIC	-	00000		FAP # :		_ Date Start	E1-018-1	8 Date		12/18	
	_	ad # :	Bayside			_ N Coord.:	0		Ft.		
	_	nsult C		don Archiba		_ E Coord.:	0		Ft.		
		onsult			Boring Contractors	_ Ground Su		-	0		
Insp	ector	Name/	Co.: <u>Ga</u>	ry Fortier / C	Fordon Archibald	_ Elevation I	Datum <u>N</u>	IGVD29			
Rore	ahola l	Locatio	n								
			nning Stree	et							
					nsists of a 2 in. split spoon		Groundy	vater Obse	rvations		
<u> </u>				nmer, 30" fall.	1 200 11 1	Date	Time	Depth	Casing at		
Casin		ess other ng 24 in.	wise noted, ca	ising is driven i	ising 300 lb hammer,	06/12/18	00:00	10		0.25 hr	
Casin	g Size:	3 in		HS Auger	X						
	СВ		SAMPLER	Blows						R E	
D E P T	A L S O	Type &	Pen/ Depth	per 6 in.	SOIL AND ROCK SAMPL Burmister Soil Classifi		Depth of		STRATUM ESCRIPTION	M	
	I W	Number	Rcy. Core Rcy.	(Coring min/ft)			Stratum			AR	
H Ft.	NS G/Ft.		& RQD	[Downpress psi]			Change			A R K S	
	10	SS-1	24/15 0.0	6-10-14-11	Dry, medium dense, brown-		0.3	\ASPHALT/I	ROADWAY	/	
1	25		2.0		some coarse sand and gravel	, trace silt.		Encountered	cobble layer I'	o 4'	
]	27										
]	46						4.0		****		
5_	50	SS-2	5.0 24/18	25-28-35-37	Majet war dance brown EU	NIC CANID two as					
4	18	55-2		23-28-33-37	Moist, very dense, brown FII coarse sand and gravel, trace	silt and bedrock					
-	39 60		7.0		fragments.						
-	82			-							
10	101		10.0								
		SS-3	24/15	13-24-35-22	Wet, very dense, gray-brown						
7			12.0		trace coarse sand and gravel,	trace silt.	12.0				
								Bottom of Ex	ploration = 12'		
15_											
4											
4											
+											
20											
]											
4											
25											
4											
4											
1											
30											
	o <u>12 So</u> i	l Driven	Casing	. '							
REN	EMARKS:										
					140# Wt x 30" fall on 2" O						
_	ortions		Sampler Ty	_	ionless Density Cohes	•					
trace little	0 to 1 10 to		SS - Split Sp UT - Shelby		10 Loose 0 - 4 - 30 Medium Dense 4 - 8		RIC#:	00000			
some	20 to	35%	UP - Fixed Po	sition 30	• 50 Dense 8 - 1	5 Stiff	Boring No Date Com		12/18		
and	35 to	50%	C - Rock C	ore 50	) + Very Dense 15 - 3 30 +		Database		12/10		
							1				

BIL	от р	roject	Rayside :	Sewer Warwi	ck RI - Various location	s BORING	2#•	C-18		Sheet	2 of	
1		(C/T) :		VARWICK	ck id - various location	RIDOT				Sheet _	01	
		00000		<b>FAP#:</b>		Date Sta		6/18/1		e End : 6/	18/18	
Brie	lge/Ro	ad # :	Bayside			N Coord	.: _	0		Ft.		
Des	ign Co	nsult (		don Archibal	d, Inc.	_ E Coord.	.: [	0		Ft.		
Geo	tech (	Consult	Co.: N	ew England E	Boring Contractors	Ground	Surfa	ce Elev	v., Ft.: <u>0</u>	0.0		
Insp	ector	Name/	<b>Co.:</b> <u>T.</u>	Plante / GZA	GeoEnvironmental, Inc	_ Elevation	n Dati	um <u>]</u>	NGVD29			
Des	eriptio	Location: Pal	mer	10 N MAT 2011 20 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1								
Sam				soil sampler con mmer, 30'' fall.	sists of a 2 in. split spoon	Date		round me	water Obso Depth	ervations Casing at	Stab.	Time o
Casi					sing 300 lb hammer,	06/18/18		:00	<u> </u>		0.25	
Casii	falli 1g Size:	ng 24 in.		HS Auger	<u>X</u>				•			
D	СВ		SAMPLER	Blows	SOIL AND ROCK SAMPL	E DECOMBEIO	NI	Douth		OTED ATELINA		R
D E P	A L S O	Type &	Pen/ Depth Rcy.	per 6 in.	Burmister Soil Classific		NIN	Depth of	E	STRATUM DESCRIPTION		M
Ť H	I W N S	Number	Core Rcy. & RQD	(Coring min/ft)				Stratum Change				A R K S
Ft.	G/Ft.		læ nqb	[Downpress psi]				Change				K S
		SS-1	24/10 0.0	55-11-9-8	Dry, medium dense, brown I coarse sand, some gravel, tra		ne	0.3	ASPHALT/	ROADWAY	/	4
-			2.0		coarse saile, some graver, tra	cc siit.						
-												
			5.0									
5_		SS-2	24/16 5.0	22-43-29-35	Dry, very dense, gray FINE	SAND, some						
_			7.0		coarse snad, and gravel, trace	e silt.						
10_		SS-3	24/20	9-17-18-21	Wet, medium dense, gray FI	NE CAND gome						
-		22-2		9-17-18-21	coarse sand, trace gravel, trace	ne sand, some ce silt.						
			12.0					12.0	Bottomof E:	xploration = 12'		-
-										•		
15												
_												}
4												
-												
20												
_												
ا ء												
25_	;											
-												
]												
]												
30	to 12 So	il Augeri	] na						<del></del>			
	12 <u>30</u> 1ARKS		iig -									
AEN	CAMAL	•										
					140# Wt x 30" fall on 2" Ol			***************************************				
-	ortions	- 1	Sampler T	-	onless Density Cohes		١ .					
trace little	e 0 to 1 10 to		SS - Split Sp UT - Shelby	Tube 10 -	10 Loose 0 - 4 30 Medium Dense 4 - 8	Firm		RIC#:	00000			
some and		35%	UP - Fixed Po C - Rock C	sition 30 -				Boring No Date Com		18/18		
and	<i>33</i> 10	JU /0	C - ROCK C	50	+ very Dense 15 - 3			Database				

RII	OT P	roject	Bayside S	Sewer Warwi	ck RI - Various location	s BORING	#: C-1	81	Sheet	2 of 2
1		(C/T):		/ARWICK			Database I		<del></del>	
l		00000		<b>FAP#:</b>		Date Star	r <b>t:</b> 6/18	/18 <b>Dat</b>	e End : 6/	18/18
Brio	lge/Ro	oad # :	Bayside	N. C. C. C. C. C. C. C. C. C. C. C. C. C.		N Coord.	: 0		Ft.	
		nsult (		don Archibal	d. Inc.	E Coord.	: 0		Ft.	
		Consult			Boring Contractors		Surface El	ev., Ft. : (	0.0	
		Name/			ZA GeoEnvironmental,			NGVD29		
						<del></del>				
		Location								
			mer Ave			1	C	dwater Obse	4	
Sam				son sampier con nmer, 30" fall.	sists of a 2 in. split spoon	Date	Time	Depth	Casing at	Stab. Time
Casii	ng: Uni	ess other	wise noted, ca		sing 300 lb hammer,	06/18/18	00:00	10		15 hr
		ng 24 in.								
Casi	ng Size:		T	HS Auger	<u>X</u>			1,	<u> </u>	
D	C B A L		SAMPLER Pen/ Depth	Blows	SOIL AND ROCK SAMPI	LE DESCRIPTIO	N Depth		STRATUM	R E M
D E P T	SO	Type &	Rev	per 6 in.	Burmister Soil Classif	ication System	of		DESCRIPTION	M A
H	I W N S	Number	Core Rcy. & RQD	(Coring min/ft) [Downpress psi]			Stratun Change			l R
Ft.	G /Ft.			[Downpless psi]			_			K S
_		SS-1	0.0		Dry, brown to dark brown F coarse sand and gravel, trace	INE SAND, trace	: \0	3/\ASPHALT	ROADWAY	
					combo said mid graver, tract	J. J.III.		р.	DOLII DDD	
_									BOULDER	
_							4	.0		
5_		SS-2	5.0		Moist, gray FINE SAND, so	ome coarse sand				
-		33-2			trace gravel, trace silt, trace	weathered bedroc	k.			
-										
-										
10			10.0				10.	0		
10_			10.0				10.		Exploration = 10	
									•	
_										
15_										
-										
4										
4										
20_										
4										
-										
-										
25										
]										
30										
0	to <u>10 So</u>	il Augeri	ng							
DEA	/ARKS	•						-1 (1001000-000-0		
ALI	CARRIE	•								
				T T	140# Wt x 30" fall on 2" O	D SS Sampler				
Prop	ortions	Used	Sampler T	ype Cohesi	onless Density Cohe		cy			
trac	e 0 to 1	0%	SS - Split Sp	oon 0-	10 Loose 0 -		RIC#:	00000		
	10 to 20 to		UT - Shelby 'UP - Fixed Po		30 Medium Dense 4 - 50 Dense 8 - 1		Boring	No.: C-181		
and	35 to		C - Rock C		+ Very Dense 15 - 1	30 Very Sti			/18/18	
		- 1			30 -	+ Hard	- ⊢ Databa	se ID No.:		

BORING CO	NTRACTOR:					200 Mair	chibaid, Inc. Street le Island 02860		1	SHEET: LOCATION: HOLE NO.:		OF 4LMER -182	1 Ave
LOG PREPA CONTR.	RED BY:	PBA	TOWN, ST PROJECT PBA NO.:		1 0714	BORING				BORING TYPE: LINE & STA.: OFFSET:		SING	104)
6	FORTH	L	DA NO.			0.1100							
AT	ATER OBSE FT. AFTER FT. AFTER	HRS.	TYPE		AUGER	CASING    Hw     4"   300   30	\$AMPLER 5/5 740 30	CORE	SURFACE E DATE STAR BORING FO INSPECTOR SOILS ENG	TED-FINISHED REMAN: R:	N.	121   18 2 N 00A FOLTIL	RO
LOCATION	OF BORING:			140 CCD 4		21.50	T				_	SAMPLE	
DEPTH BELOW	CASING BLOWS	SAMPLE DEPTH	BLO		" ON SAME	-LEK	MONITORIN G WELL		NTIFICATION	OF SOIL &		JAWIFLE	
SURFACE	PER FOOT		0-6	6-12	M - TO 12-18	18-24	INFO.		JOINTS IN R		NO.	PEN.	REC.
1	10	0-21	10	12	9	15	4"	ASONAL	T ROAPU	VAY	51	24	18
734	37	000	10	18	7	7,	DRY	DRYME	DENSE	BRUWN		-2-1	-
4	20						31	1	ND, SOME	COMSE		77	
00	25	500	/.3	29	33	35	MOST COMES	80	GRANT	•	52	24	18
567 20	58						5	Morte 6	Bug bear	st Be/62 Coarst TR 51UT			
10	69	7.7.7			-		8	SAND S	Gense.	THE SILT	5.3	24	1.7
11	25	10'-12'	35	30	18	22	WET COME					24	14
13	-						10	THE CHA	USE AND 1	FUESAND FGRANT	_		
							114	M 412	7	, 4,2,770			
							1		•	,			
1								$\mathcal{B}_{\cdot}$	b.B. 12				
			-				- 1	12/3	me o	W	_		
							1						
							1						
							1				_		
l													
							j						
											-		
							1						-
							1						
							1						
							1 1						
						-	1						-
						-							
							1						
Notes:	The boring le	ocation was r	reviously va	cammed b	v a senarata	e contractor	. Approximately	/ 1' of collapse	was encount	ered prior to the	boring a	ivanceme	nt.
	Groundwate Refusal (Bed	r was not obs	erved during ntered at 14	g the drillin feet below	g operation grade. The	e encountei	ed bedrock app			ered print or tile			
GROUND S				-1/2		G THEN		" CASING TO	10 F		AGE IN E		12
D≃DRY UP=UNDIST	W=WASHE URBED, PIS			P=PIT RBED. BA	A=AUGE LL CHECK		ANE TEST OPEN END RO	)D			AGE IN F		3
PROPORTIC	ONS USED: T	RACE=0-109	6, LITTLE=1	10-20%, SC	DME=20-35	%, AND 35	-50%			HOLE		TYPE	

Loc	OT Pa	(C/T) :	Ken		Sewer S	ICK		RIDOT	Dat	abase ID	#:		2 of 2
RIC	-	00000			F	<b>AP#</b> :		_ Date Sta			8Date		14/18
ł	lge/Ro							_ N Coord		0		Ft.	
	ign Co		-		rdon Ar			_ E Coord		0	<b>T</b>	Ft.	
1			t Co.:		<del>-</del>		Boring Contractors			face Elev		0	
Insp	ector	Name	/Co.:	_Ga	ry Fort	ier/C	Gordon Archibald	_ Elevatio	n Da	atum <u>N</u>	NGVD29		
Des		n: Me	elrose St										
Samı							nsists of a 2 in. split spoon		7		vater Obse		
Casir	ig: Unle						ising 300 lb hammer,	<b>Date</b> 06/14/18		Time 00:00	Depth 10	Casing at	Stab. Time 0.25 hr
Casir	ıg Size:	4 in		_	HS Au	ger	<u>X</u>						
D E P T H	CB AL SO IW NS	Type & Number		Depth v.	Blo per 6 (Coring [Downpr	in. min/ft)	SOIL AND ROCK SAMPI Burmister Soil Classifi		ON	Depth of Stratum Change		STRATUM ESCRIPTION	R E M A R
Ft.	G /Ft.												K S
-	sand and gravel, trace 2.0							ND, trace coarse	2	0.3	∖ASPHALT/I	ROADWAY	
-	45												
5	59			5.0									
	25 SS-2 24/18 12-15-16-17 Moist, dense, brown I							AND, trace coar	se		Encountered	boulder layer	
-	3 41 7.0 sand and gravel, trace												
4	59									8.0			
10	69 115			10.0									
10_	60	SS-3	24/18	10.0	18-21-	14-21	Wet, dense, gray FINE SAN	D, trace coarse					
	93			12.0			sand and gravel, trace silt and bedrock.	d weathered		12.0			
							bedrock.			3=10	Bottom of Ex	ploration = 12'	1
]													
15_													
-													
4													
4													
20													
]													
_													
4													
25 }													
25_													
-									1				
]													
1													
30								# <del>,                                    </del>					
<u>0</u> 1	to <u>12 Soi</u>	l Driven	Casing										
REM	1ARKS:	: 1. Mo	nitoring w	vell in	nstalled at	12'							
D		Uaa-l	O-	la com		C-1- '	140# Wt x 30" fall on 2" O						
_	ortions l	1	Samp.			Cohesi	onless Density Cohes  10 Loose 0 - 4		ncy	DIG "	00000		
little						10 -	30 Medium Dense 4 - 8	8 Firm		RIC # : Boring No	00000 .: C-183	- Literal	
some	20 to 35 to		UP - Fix			30 - 50			iff	Date Com		4/18	
unu	22 10	-0,0	- M	, cn C		50	30 -			Database l			

RID	OT Pr	roject			vick RI - Various location	s BORING				Sheet	2 of 2
Loca	tion (	C/T):	Kent / W	ARWICK		RIDOT				. F.J. 6	16/10
RIC		00000		FAP#		Date Sta		6/6/18	Date	End: <u>6</u> Ft.	/6/18
	ge/Ro		Bayside			N Coord		0		Ft.	
		nsult C		don Archib		E Coord Ground			. Ft.: 0		
		onsult	-	w England	Boring Contractors				iGVD29	.0	
		Name/		y Fortier/	GZA GeoEnvironmental,	Inc.Elevation		tum 1	10 1029		
Desc	riptio	Locatio n: Mel	rose St	**	i-to of a 2 in onlice	1		Groundy	vater Obse	rvations	
Samp	ler: Ur	iless othe	erwise noted, : en using a 140	son sampier o Th hammer.	consists of a 2 in. split 30" fall.	Date		Cime	Depth	Casing at	Stab. Time
Casin	g: Unl	ess other	wise noted, ca	sing is drive	n using 300 lb hammer,	06/06/18	0	00:00	10		0.25 hr
Casin	falli g Size:	ng 24 in.		HS Auger	<u>X</u>		L,				R
D	СВ		SAMPLER	Blows	SOIL AND ROCK SAMPL	E DESCRIPTION	ИС	Depth		STRATUM	R E M
E P	AL SO	Type &	Pen/ Depth Rcy.	per 6 in.	Burmister Soil Classifi	cation System		of Stratum	E	ESCRIPTION	A
D E P T H	I W N S	Number	Core Rcy. & RQD	(Coring min/fl [Downpress ps	0)			Change			A R K S
Ft.	G/Ft.			fromitiess ha	Dry, brown-gray FINE SAN	ID some coorse		0.32	ASPHALT	ROADWAY	\$
		SS-1	0.0		sand and gravel, trace silt, tr	ace cobbles.					
4									BOULDER	S	
+											
5			5.0					5.0			
7-		SS-2	1		Moist, gray FINE SAND, tr gravel, trace silt.	ace coarse sand	and		Trace cobbl	es.	
]					graver, trace site.						
]											
								10.0			
10_			10.0					10.0	Trace weath	nered BEDROC	CK
								12.0			
									Bottom of I	Exploratiotn =	12'
-											
15_											
-											
- 2					1						
-											
20											
20-											
25_											
- 1											
100	1										
30											
0	to <u>10 S</u>	oil Auger	ing								
RE	MARK	S: 1. Al	l samples off a	uger flights							
					140# Wt x 30" fall on 2"	OD SS Sampler					
Pro	portion:	s Used	Sampler '	- 7 K	hesionless Density Coh	esive Consist	tency	V.			
	ce 0 to		SS - Split S UT - Shelby	Spoon	0 10 2000	- 4 Soi - 8 Fir:		RIC#:	00000		
	ie 10 t ne 20 t	o 35%	UP - Fixed I	osition	30 - 50 Dense 8 -	15 Sti	ff	Boring N		4 6/6/18	
and	1 35 t	o 50%	C - Rock	Core		- 30 Very : ) + Hai	ouu rd		e ID No. :		

BORING CO						200 Mair				SHEET: LOCATION:	1	OF	1
	5 Bolm	٠ς				BORING	le Island 02860 3 LOG			HOLE NO.: BORING TYPE:		-185 2008	,
LOG PREPA CONTR.		₽BA .	TOWN, S	TATE:		V	/arwick, Rhode			LINE & STA.:		72000	
1			PBA NO.:			OFFICE:	Bayside Sew	ers		OFFSET:	_		
	A. FORT				ALIOED	010010	O A L I I I I I I I I						
AT 10	FT. AFTER	HRS.	BAR.		AUGER	CASING	SAMPLER	CORE	SURFACE 6	ELEV.:			-
AT	FT. AFTER	/ ' HRS.	TYPE SIZE, I.D.		79				DATE STAF	RTED-FINISHED		17/1 ENVOCA	
	•		HAMMER		#				INSPECTO	₹:		EVER	
LOCATION	OF BORING:	PMa	HAMMER		Waser	nex			SOILS ENG	R,:			
DEPTH	CASING	SAMPLE			6" ON SAMF		MONITORIN	EIE! D IDE	NTIFICATION	LOE COIL S		SAMPLE	
BELOW	BLOWS	DEPTH			M - TO		G WELL	ROCK INCL.	COLOR, LO	N OF SOIL & SS OF WASH			-
SURFACE	PER FOOT	FROM - TO	0-6	6-12	12-18	18-24	INFO.	WATER,	JOINTS IN R	OCK, ECT.	NO.	PEN.	REC.
1		SOLIO S	Terry	hour	PRUB	5	4	ASPHAL	T ROAM	avoy			
34							PRY 7	NO 91	3 SAMP	CES THERN			
4		0-51		OFF	Alsen	_	4						
547							Some Co.	ARSE SAN	so flams				
N N							Moiss 5	CREARE	See Co	HAZE A			
		,										- 8	
10		5-10		041	Flore		,8	HOHT G	e/32 Fr	UC SAMO			
17							WET 10	TR SILT	GE TAND WCF1H	FLINANEL DED BEMA	_		
1								,.					-
							THE	В	D.B. 12	e'			
								<i>&gt;.</i> ·					
										-			-
										1			
										ļ			
										}			-
										Ī			=
										ļ			
										t			-
										F			
										t			$\dashv$
										F			
										E			
1										F			
-													
Notes: The boring location was previously vacuumed by a separate contractor. Approximately 1' of collapse was encountered prior to the boring ac													
1	Groundwater	was not obse	rved during	a the drilling	operation.					red prior to the b	oring ad	vancemen	
1	Refusal (Bed	rock) encount well was insta	ered at 14	feet below	grade. The	encountere	d bedrock appe	eared weathere	d.				
GROUND SU		12 FT.,	USED	490	" CASING			CASING TO	12 F		GE IN EA		A
UP=UNDISTU	W=WASHED IRBED, PIST	ON UB	UNDISTU	P=PIT RBED, BAL	A=AUGER L CHECK	OFR=0	ANE TEST OPEN END RO	D			GE IN RO		2
PROPORTION	NS USED: TF	RACE=0-10%	LITTLE=1	0-20%, SO	ME=20-35%	, AND 35-5	50%			HOLE		TYPE	-

C-185 peobé

NOISE THE borng location was previously uncurred by a segarate contractor. Approximately 1'of collapse was encountered prior to the Joing adveroament.  NOISE THE BORNE CORT OF THE BORNE CORT O	BORING CO	NTRACTOR	3.			Go	ordon R. Aı 200 Mai	rchibald, Inc.		1	SHEET: OCATION:		OF	
DOE PERPARED BY:  CONTR  PBA  PDCUEFO NAME:  PBA NO:  OFFICE:  PBA NO:  OFFICE:  DEPULISOR NAME:  PBA NO:  OFFICE:  DEPULISOR NAME:  PBA NO:  OFFICE:  DEPULISOR NAME:  PBA NO:  OFFICE:  DATE STATES OF HIS BAR.  AT	N	E BUKI	JL			Pawt								
CONTR	LOG PREDA	DED BY:		TOWAL	TATE.	11 12		The second secon					-0	Mt.
GROUNDWATER DISERRYTIONS AT JO FT AFTER MET HIS BAR AT JO FT AFTER MET HIS		INCO DI.	₽BA .				v							SAPR
REPUBLICATION OF BORNO.  AT JO TI AFTER JEHRS BAR. TYPE  LIST JO TI AFTER JEHRS BAR. TYPE  LIST JO TI AFTER JEHRS BAR. TYPE  LIST JO TI AFTER JEHRS BAR. TYPE  LIST JO TI AFTER JEHRS BAR. TYPE  LIST JO TI AFTER JEHRS BAR. TYPE  LIST JEHRS BAR. TYPE  LIST JEHRS BAR. TYPE  LIST JEHRS BAR. TYPE  LIST JEHRS BAR. TYPE  LIST JEHRS BAR. TYPE  LIST JEHRS BAR. TYPE  LIST JEHRS BAR. TYPE  LIST JEHRS BAR. TYPE  LIST JEHRS BAR. TYPE  LIST JEHRS BAR. TYPE  LIST JEHRS BAR. TYPE  LIST JEHRS BAR. TYPE  LIST JEHRS BAR. TYPE  LIST JEHRS BAR. TYPE  LIST JEHRS BAR. TYPE  LIST JEHRS BAR. TYPE  LIST JEHRS BAR. TYPE  LIST JEHRS BAR. TYPE  LIST JEHRS BAR. LIST JEHRS BAR. TYPE  LIST JEHRS BAR. TYPE  LIST JEHRS BAR. LIST JEHRS BAR. LIST JEHRS BAR. TYPE  LIST JEHRS BAR. LIST JEHRS BAR. LIST JEHRS BAR. THE BAR. T	6	Can Dis	-				OFFICE:	Dayoldo Octiv	015		JITGE!,			
AT	9	•												
AT FT. AFTER HSS SIZE, 1D. HSAMER WT. HARBER	GROUNDY	VATER OBSI	ERVATIONS	DAD		AUGER	CASING	SAMPLER	CORE					
AT FT. AFTER HRS   SCE, ID.   2/4   1/4   1/2   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4   1/4		_				HSA		</td <td></td> <td></td> <td></td> <td></td> <td>1101</td> <td>7.</td>					1101	7.
LOCATION OF BORNG: PLANATE RALL  DEPTH CASING SAMPLE BLOWS PER 9° ON SAMPLE SUPERATE AND LUBBULGE  DEPTH CASING SAMPLE BLOWS PER 9° ON SAMPLE FROM 10  0.6 0.12 12-18 18-24  INFO. 10  1.4 17  1.4 17  1.5 18-24  INFO. 10  INFO. 10  INFO. 10  INFO. 10  INFO. 10  INFO. 10  INFO. 10  INFO. 10  INFO. 10  INFO. 10  INFO. 10  INFO. 10  INFO. 10  INFO. 10  INFO. 10  INFO. 10  INFO. 10  INFO. 10  INFO. 10  INFO. 10  INFO. 10  INFO. 10  INFO. 10  INFO. 10  INFO. 10  INFO. 10  INFO. 10  INFO. 10  INFO. 10  INFO. 10  INFO. 10  INFO. 10  INFO. 10  INFO. 10  INFO. 10  INFO. 10  INFO. 10  INFO. 10  INFO. 10  INFO. 10  INFO. 10  INFO. 10  INFO. 10  INFO. 10  INFO. 10  INFO. 10  INFO. 10  INFO. 10  INFO. 10  INFO. 10  INFO. 10  INFO. 10  INFO. 10  INFO. 10  INFO. 10  INFO. 10  INFO. 10  INFO. 10  INFO. 10  INFO. 10  INFO. 10  INFO. 10  INFO. 10  INFO. 10  INFO. 10  INFO. 10  INFO. 10  INFO. 10  INFO. 10  INFO. 10  INFO. 10  INFO. 10  INFO. 10  INFO. 10  INFO. 10  INFO. 10  INFO. 10  INFO. 10  INFO. 10  INFO. 10  INFO. 10  INFO. 10  INFO. 10  INFO. 10  INFO. 10  INFO. 10  INFO. 10  INFO. 10  INFO. 10  INFO. 10  INFO. 10  INFO. 10  INFO. 10  INFO. 10  INFO. 10  INFO. 10  INFO. 10  INFO. 10  INFO. 10  INFO. 10  INFO. 10  INFO. 10  INFO. 10  INFO. 10  INFO. 10  INFO. 10  INFO. 10  INFO. 10  INFO. 10  INFO. 10  INFO. 10  INFO. 10  INFO. 10  INFO. 10  INFO. 10  INFO. 10  INFO. 10  INFO. 10  INFO. 10  INFO. 10  INFO. 10  INFO. 10  INFO. 10  INFO. 10  INFO. 10  INFO. 10  INFO. 10  INFO. 10  INFO. 10  INFO. 10  INFO. 10  INFO. 10  INFO. 10  INFO. 10  INFO. 10  INFO. 10  INFO. 10  INFO. 10  INFO. 10  INFO. 10  INFO. 10  INFO. 10  INFO. 10  INFO. 10  INFO. 10  INFO. 10  INFO. 10  INFO. 10  INFO. 10  INFO. 10  INFO. 10  INFO. 10  INFO. 10  INFO. 10  INFO. 10  INFO. 10  INFO. 10  INFO. 10  INFO. 10  INFO. 10  INFO. 10  INFO. 10  INFO. 10  INFO. 10  INFO. 10  INFO. 10  INFO. 10  INFO. 10  INFO. 10  INFO. 10  INFO. 10  INFO. 10  INFO. 10  INFO. 10  INFO. 10  INFO. 10  INFO. 10  INFO. 10  INFO. 10  INFO. 10  INFO. 10  INFO. 10  INFO. 10  INFO.	AT	FT. AFTER	HRS.					<i>a.</i> .				-		
DOCATION OF BORNING:    Image:	1												_	
DEPTH CASING SAMPLE BLOWS PÉR G* ON SAMPLER FROM -TO BELOW SIDE PTH FROM -TO D-9 6-12 12-18 18-24 INC.  SIDE SAMPLE BLOWS PÉR G* ON SAMPLER FROM -TO BELOW SIDE SAMPLER FROM -TO D-9 6-12 12-18 18-24 INC.  SIDE SAMPLE BLOWS PÉR G* ON SAMPLER FROM -TO G. G. G. S. S. S. S. S. S. S. S. S. S. S. S. S.	LOCATION	OF BORING:	PATA			11/201.	1102			SOILS ENGI	<b>C.</b> :			
BELOW SLOWS SURFACE PER FOOT FROM - TO De G-12 12-18 18-24 INFO.  SURFACE PER FOOT FROM - TO De G-12 12-18 18-24 INFO.  SURFACE PER FOOT FROM - TO De G-12 12-18 18-24 INFO.  SURFACE PER FOOT FROM - TO De G-12 12-18 18-24 INFO.  SURFACE PER FOOT FROM - TO De G-12 12-18 18-24 INFO.  SURFACE PER FOOT FROM - TO De G-12 12-18 18-24 INFO.  SURFACE PER FOOT FROM - TO De G-12 12-18 18-24 INFO.  SURFACE PER FOOT FROM - TO De G-12 12-18 18-24 INFO.  SURFACE PER FOOT FROM - TO De G-12 12-18 INFO.  SURFACE PER FOOT FROM - TO De G-12 12-18 INFO.  SURFACE PER FOOT FROM - TO De G-12 12-18 INFO.  SURFACE PER FOOT FROM - TO De G-12 12-18 INFO.  SURFACE PER FOOT FROM - TO De G-12 12-18 INFO.  SURFACE PER FOOT FROM - TO De G-12 12-18 INFO.  SURFACE PER FOOT FROM - TO De G-12 12-18 INFO.  SURFACE PER FOOT FROM - TO De G-12 12-18 INFO.  SURFACE PER FOOT FROM - TO De G-12 12-18 INFO.  SURFACE PER FOOT FROM - TO De G-12 12-18 INFO.  SURFACE PER FOOT FROM - TO De G-12 12-18 INFO.  SURFACE PER FOOT FROM - TO DE G-12 12-18 INFO.  SURFACE PER FOOT FROM - TO DE G-12 INFO.  SURFACE PER FOOT FROM - TO DE G-12 INFO.  SURFACE PER FOOT FROM - TO DE G-12 INFO.  SURFACE PER FOOT FROM - TO DE G-12 INFO.  SURFACE PER FOOT FROM - TO DE G-12 INFO.  SURFACE PER FOOT FROM - TO DE G-12 INFO.  SURFACE PER FOOT FROM - TO DE G-12 INFO.  SURFACE PER FOOT FROM - TO DE G-12 INFO.  SURFACE PER FOOT FROM - TO DE G-12 INFO.  SURFACE PER FOOT FROM - TO DE G-12 INFO.  SURFACE PER FOOT FROM - TO DE G-12 INFO.  SURFACE PER FOOT FROM - TO DE G-12 INFO.  SURFACE PER FOOT FROM - TO DE G-12 INFO.  SURFACE PER FOOT FROM - TO DE G-12 INFO.  SURFACE PER FOOT FROM - TO DE G-12 INFO.  SURFACE PER FOOT FROM - TO DE G-12 INFO.  SURFACE PER FOOT FROM - TO DE G-12 INFO.  SURFACE PER FOOT FROM - TO DE G-12 INFO.  SURFACE PER FOOT FROM - TO DE G-12 INFO.  SURFACE PER FOOT FROM - TO DE G-12 INFO.  SURFACE PER FOOT FROM - TO DE G-12 INFO.  SURFACE PER FOOT FROM - TO DE G-12 INFO.  SURFACE PER FOOT FROM - TO DE G-12 INFO.  SURFACE PER FOOT FROM - TO DE G-12 INFO.  SURFACE PER FOOT F												T	0.4404	
Secure Per Foot From To  0.6 6-12 12-18 18-24  Reg Aspect - Interpreted the foot of the control							LLIX						SAMPLE	
Notes:  The boring location was previously vacuumed by a separate contractor. Approximately 1'of collapse was encountered prior to the boring advancement. Groundwaler was not observed during the drilling operation. Refused [Bederice] resourced and form growth of the contractor of t	SURFACE			0.6			40.04					NO.	PEN.	REC.
Notes:  The boring location was previously vacuumed by a separate contractor. Approximately 1' of collapse was encountered prior to the boring advancement. Groundwater was not observed during the drilling operation. Reliables (leading) anoughed above the reliable above the bedrook as shown above the reliable above the bedrook as shown above.  RECOUND SURFACE TO FFT. USED FMT. CASING TO FFT. FOOTAGE IN EARTH: 192-PUNDISTURED PISTON.			_	0-6	0-12	12-10	18-24							
Notes:  The boring location was previously vacuumed by a separate contractor. Approximately 1' of collapse was encountered prior to the boring advancement. Groundwater was not observed during the drilling operation. Particularly was not observed during the drilling operation. Particularly was not observed during the drilling operation. Particularly was not observed during the drilling operation. Particularly was not observed during the drilling operation. Particularly was not observed during the drilling operation. Particularly was not observed during the drilling operation. Particularly was not observed during the drilling operation. Particularly was not observed during the drilling operation. Particularly was not observed during the drilling operation.  Particularly was not observed during the drilling operation. Particularly was not observed during the drilling operation.  Particularly was not observed during the drilling operation. Particularly was not observed during the drilling operation.  Particularly well was installed above the bedrook as shown above.  GROUND SURFACE TO _FTT. USED _FTT. USED _FTT. FOOTAGE IN EARTH:	1 3		0'2'	7	3	6	4	2. 4	ASPHO	2+ RoA	pung	57	24	101
Notes:  The boring focution was previously vacuumed by a separate contractor. Approximately 1' of collapse was encountered prior to the boring advancement.  Groundwater was not observed during the drilling operation.  Refused (Groundwater was not observed during the drilling operation.  Refused (Groundwater was not observed during the drilling operation.  Refused (Groundwater was not observed during the drilling operation.  Refused (Groundwater was not observed during the drilling operation.  Refused (Groundwater was not observed during the drilling operation.  Refused (Groundwater was not observed during the drilling operation.  Refused (Groundwater was not observed during the drilling operation.  Refused (Groundwater was not observed during the drilling operation.  Refused (Groundwater was not observed during the drilling operation.  Refused (Groundwater was not observed during the drilling operation.  Refused (Groundwater was not observed during the drilling operation.  Refused (Groundwater was not observed during the drilling operation.  Refused (Groundwater was not observed during the drilling operation.  Refused (Groundwater was not observed during the drilling operation.  Refused (Groundwater was not observed during the drilling operation.  Refused (Groundwater was not observed during the drilling operation.  Refused (Groundwater was not observed during the drilling operation.  Refused (Groundwater was not observed during the drilling operation.  Refused (Groundwater was not observed during the drilling operation.  Refused (Groundwater was not observed during the drilling operation.  Refused (Groundwater was not observed during the drilling operation.  Refused (Groundwater was not observed during the drilling operation.  Refused (Groundwater was not observed during the drilling operation.  Refused (Groundwater was not observed during the drilling operation.  Refused (Groundwater was not observed during the drilling operation.  Refused (Groundwater was not observed during the drilling operation.  Refused	3		2/ //	/				/ //4	DRYMET	DOUSE 6	BR FINES	-21		
Notes:  The boring focution was previously vacuumed by a separate contractor. Approximately 1' of collapse was encountered prior to the boring advancement.  Groundwater was not observed during the drilling operation.  Refused (Groundwater was not observed during the drilling operation.  Refused (Groundwater was not observed during the drilling operation.  Refused (Groundwater was not observed during the drilling operation.  Refused (Groundwater was not observed during the drilling operation.  Refused (Groundwater was not observed during the drilling operation.  Refused (Groundwater was not observed during the drilling operation.  Refused (Groundwater was not observed during the drilling operation.  Refused (Groundwater was not observed during the drilling operation.  Refused (Groundwater was not observed during the drilling operation.  Refused (Groundwater was not observed during the drilling operation.  Refused (Groundwater was not observed during the drilling operation.  Refused (Groundwater was not observed during the drilling operation.  Refused (Groundwater was not observed during the drilling operation.  Refused (Groundwater was not observed during the drilling operation.  Refused (Groundwater was not observed during the drilling operation.  Refused (Groundwater was not observed during the drilling operation.  Refused (Groundwater was not observed during the drilling operation.  Refused (Groundwater was not observed during the drilling operation.  Refused (Groundwater was not observed during the drilling operation.  Refused (Groundwater was not observed during the drilling operation.  Refused (Groundwater was not observed during the drilling operation.  Refused (Groundwater was not observed during the drilling operation.  Refused (Groundwater was not observed during the drilling operation.  Refused (Groundwater was not observed during the drilling operation.  Refused (Groundwater was not observed during the drilling operation.  Refused (Groundwater was not observed during the drilling operation.  Refused	2		2-4	//	14	17	25	2	WAVEL	-, TR SILI	SANO	52	24	14
Notes: The boring location was previously vacuumed by a separate contractor. Approximately 1' of collapse was encountered prior to the boring advancement.  Refused (greater share) and the separate contractor of the separate sepa	1 %		4-6'	14	19	71	23	1 4	DRY DEN	SE BR EM	E GOND	20	24	15
Notes: The boring location was previously vacuumed by a separate contractor. Approximately 1' of collapse was encountered prior to the boring advancement. Groundwater was not observed during the drilling operation.  Refusel (Bedrock) encountered at 14 feet below grade. The encountered bedrock appeared weathered.  A monitoring well was installed above the bedrock as shown above.  GROUND SURFACE TO STT., USED ST. CASING, THEN ST. CASING TO ST. FOOTAGE IN EARTH: DO DON'T WEWAYSHED. CACRED PAPIL ARAUGER VENANCE TEST. FOOTAGE IN EARTH: DO DON'T WEWAYSHED. CACRED PAPIL ARAUGER VENANCE TEST. FOOTAGE IN EARTH: DO DON'T WEWAYSHED. CACRED PAPIL ARAUGER VENANCE TEST. FOOTAGE IN EARTH: DO DON'T WEWAYSHED. CACRED PAPIL ARAUGER VENANCE TEST. FOOTAGE IN EARTH: DO DON'T WEWAYSHED. CACRED PAPIL ARAUGER VENANCE TEST. FOOTAGE IN EARTH: DO DON'T WEWAYSHED. CACRED PAPIL ARAUGER VENANCE TEST. FOOTAGE IN ROCK:	7		116	7/		77		1 . 41		SANO S	CHANG	83.56		
Notes:  The boring location was previously vacuumed by a separate contractor. Approximately 1' of collapse was encountered prior to the boring advancement. Groundwater was not observed during the drilling operation.  Refusal (Bedrock) encountered at 14 feet below grade. The encountered bedrock appeared weathered.  A monitoring well was installed above the bedrock as shown above.  GROUND SURFACE TO JETT. USED JETT "ASJING, THEN JS "CASJING TO JET. FOOTAGE IN EARTH: DO DON'T WEWASHED CHOCKED THE PAULIFER DEAD TO DEED TO TO TO TO TO TO TO TO TO TO TO TO TO	8		0 8	17	37	41	50	40150	Day ANN	MOUNT PA	of Bever	54	04	12
Notes: The boring location was previously vacuumed by a separate contractor. Approximately 1' of collapse was encountered prior to the boring advancement. Groundwater was not observed during the drilling operation.  Refusel (Bedrock) encountered at 14 feet below grade. The encountered bedrock appeared weathered.  A monitoring well was installed above the bedrock as shown above.  GROUND SURFACE TO STI., USED STI. "CASING, THEN STY CASING TO STI. FOOTAGE IN EARTH: DO DORY WWWASHED CACORDED PAPIL ARAUGER WANNETEST FOOTAGE IN EARTH: DO DORY WWWASHED CACORDED PAPIL ARAUGER WANNETEST FOOTAGE IN EARTH: DO DORY WWWASHED CACORDED PAPIL ARAUGER WANNETEST FOOTAGE IN EARTH: DO DORY WWWASHED CACORDED PAPIL ARAUGER WANNETEST FOOTAGE IN EARTH: DO DORY WWWASHED CACORDED PAPIL ARAUGER WANNETEST FOOTAGE IN EARTH: DO DORY WWWASHED CACORDED PAPIL ARAUGER WANNETEST FOOTAGE IN ROCK:	5,		8-10	24	28	39	31		FUE DO	so the Com	LEE SAND	55	24	14
Notes: The boring location was previously vacuumed by a separate contractor. Approximately 1° of collapse was encountered prior to the boring advancement. Groundwater was not observed during the drilling operation.  Refusel (Bedrock) encountered at 14 feet below grade. The encountered bedrock appeared weathered.  A monitoring well was installed above the bedrock as shown above.  GROUND SURFACE TO PFT., USED High "CASING, THEN PS" CASING TO DFT. FOOTAGE IN EARTH: DEDENTY W=WASHED C=CORED P=PIT A=AUGER V=VANNETEST FOOTAGE IN ROCK: DESCRIPTION TO THE POOTAGE IN ROCK: DESCRIPTION TO THE POOTAGE IN ROCK: DESCRIPTION TO THE POOTAGE IN ROCK: DESCRIPTION TO THE POOTAGE IN ROCK: DESCRIPTION TO THE POOTAGE IN ROCK: DESCRIPTION TO THE POOTAGE IN ROCK: DESCRIPTION TO THE POOTAGE IN ROCK: DESCRIPTION TO THE POOTAGE IN ROCK: DESCRIPTION TO THE POOTAGE IN ROCK: DESCRIPTION TO THE POOTAGE IN ROCK: DESCRIPTION TO THE POOTAGE IN ROCK: DESCRIPTION TO THE POOTAGE IN ROCK: DESCRIPTION TO THE POOTAGE IN ROCK: DESCRIPTION TO THE POOTAGE IN ROCK: DESCRIPTION TO THE POOTAGE IN ROCK: DESCRIPTION TO THE POOTAGE IN ROCK: DESCRIPTION TO THE POOTAGE IN ROCK: DESCRIPTION TO THE POOTAGE IN ROCK: DESCRIPTION TO THE POOTAGE IN ROCK: DESCRIPTION TO THE POOTAGE IN ROCK: DESCRIPTION TO THE POOTAGE IN ROCK: DESCRIPTION TO THE POOTAGE IN ROCK: DESCRIPTION TO THE POOTAGE IN ROCK: DESCRIPTION TO THE POOTAGE IN ROCK: DESCRIPTION TO THE POOTAGE IN ROCK: DESCRIPTION TO THE POOTAGE IN ROCK: DESCRIPTION TO THE POOTAGE IN ROCK: DESCRIPTION TO THE POOTAGE IN ROCK: DESCRIPTION TO THE POOTAGE IN ROCK: DESCRIPTION TO THE POOTAGE IN ROCK: DESCRIPTION TO THE POOTAGE IN ROCK: DESCRIPTION TO THE POOTAGE IN ROCK: DESCRIPTION TO THE POOTAGE IN ROCK: DESCRIPTION TO THE POOTAGE IN ROCK: DESCRIPTION TO THE POOTAGE IN ROCK: DESCRIPTION TO THE POOTAGE IN ROCK: DESCRIPTION TO THE POOTAGE IN ROCK: DESCRIPTION TO THE POOTAGE IN ROCK: DESCRIPTION TO THE POOTAGE IN ROCK: DESCRIPTION TO THE POOTAGE IN ROCK: DESCRIPTION TO THE POOTAGE IN ROCK: DESCRIPTION TO THE POOTAGE IN ROCK:	11		10-12	70	10	13	1,=	الماستنددا	1 1200 00	<b>T</b>				
Notes:  The boring location was previously vacuumed by a separate contractor. Approximately 1' of collapse was encountered prior to the boring advancement. Groundwater was not observed during the drilling operation.  Refusal (Bedrock) encountered at 14 feet below grade. The encountered bedrock appeared weathered.  A monitoring well was installed above the bedrock as shown above.  GROUND SURFACE TO FT., USED HAT "CASING, THEN SO "CASING TO FT. FOOTAGE IN EARTH: DO DO TO WEWASHED COCRED PAPIT AFAIUSER VEVANETEST FOOTAGE IN EARTH: DO DO TO WEWASHED COCRED PAPIT AFAIUSER VEVANETEST FOOTAGE IN EARTH: DO DO TO WEWASHED COCRED PAPIT AFAIUSER VEVANETEST FOOTAGE IN EARTH: DO TO TO THE INDICATURED PRIOR DUE TO THE PROPERTY OF THE PROP	17		0 15	-70	/8	10	15	WET 10	MOIST VE	RYDENSE	BL FINE ZAM	26	34	16
Notes: The boring location was previously vacuumed by a separate contractor. Approximately 1' of collapse was encountered prior to the boring advancement.  Groundwater was not observed during the drilling operation.  Refusal (Bedrock) encountered at 14 feet below grade. The encountered bedrock appeared weathered.  A monitoring well was installed above the bedrock as shown above.  GROUND SURFACE TO JFT. USED HIM "CASING, THEN JS "CASING TO JFT. FOOTAGE IN EARTH: JO-DERY W-WASHED C-CORED P-PIT A-AUGER V-WANE TEST FOOTAGE IN PARTH: JO-DERY W-WASHED C-CORED P-PIT A-AUGER V-WANE TEST FOOTAGE IN PARTH: JO-DERY W-WASHED C-CORED P-PIT A-AUGER V-WANE TEST FOOTAGE IN PARTH: JO-DERY W-WASHED C-CORED P-PIT A-AUGER V-WANE TEST FOOTAGE IN PARTH: JO-DERY W-WASHED C-CORED P-PIT A-AUGER V-WANE TEST FOOTAGE IN PARTH: JO-DERY W-WASHED C-CORED P-PIT A-AUGER V-WANE TEST FOOTAGE IN PARTH: JO-DERY W-WASHED C-CORED P-PIT A-AUGER V-WANE TEST FOOTAGE IN PARTH: JO-DERY W-WASHED C-CORED P-PIT A-AUGER V-WANE TEST FOOTAGE IN PARTH: JO-DERY W-WASHED C-CORED P-PIT A-AUGER V-WANE TEST FOOTAGE IN PARTH: JO-DERY W-WASHED C-CORED P-PIT A-AUGER V-WANE TEST FOOTAGE IN PARTH: JO-DERY W-WASHED C-CORED P-PIT A-AUGER V-WANE TEST FOOTAGE IN PARTH: JO-DERY W-WANE TEST FOOTAGE IN PARTH: JO-DERY W-WANE TEST FOOTAGE IN PARTH: JO-DERY W-WANE TEST FOOTAGE IN PARTH: JO-DERY W-WANE TEST FOOTAGE IN PARTH: JO-DERY W-WANE TEST FOOTAGE IN PARTH: JO-DERY W-WANE TEST FOOTAGE IN PARTH: JO-DERY W-WANE TEST FOOTAGE IN PARTH: JO-DERY W-WANE TEST FOOTAGE IN PARTH: JO-DERY W-WANE TEST FOOTAGE IN PARTH: JO-DERY W-WANE TEST FOOTAGE IN PARTH: JO-DERY W-WANE TEST FOOTAGE IN PARTH: JO-DERY W-WANE TEST FOOTAGE IN PARTH: JO-DERY W-WANE TEST FOOTAGE IN PARTH: JO-DERY W-WANE TEST FOOTAGE IN PARTH: JO-DERY W-WANE TEST FOOTAGE IN PARTH: JO-DERY W-WANE TEST FOOTAGE IN PARTH: JO-DERY W-WANE TEST FOOTAGE IN PARTH: JO-DERY W-WANE TEST FOOTAGE IN PARTH: JO-DERY W-WANE TEST FOOTAGE IN PARTH: JO-DERY W-WANE TEST FOOTAGE IN PARTH: JO-DERY W-WANE TEST FOOTAGE IN PARTH: JO-DERY W-WANE TEST FOO									The corner	SE SANO)	100 110			
Notes: The boring location was previously vacuumed by a separate contractor. Approximately 1' of collapse was encountered prior to the boring advancement.  Groundwater was not observed during the drilling operation.  Refusal (Bedrock) encountered at 14 feet below grade. The encountered bedrock appeared weathered.  A monitoring well was installed above the bedrock as shown above.  GROUND SURFACE TO JFT. USED HIM "CASING, THEN JS "CASING TO JFT. FOOTAGE IN EARTH: JO-DERY W-WASHED C-CORED P-PIT A-AUGER V-WANE TEST FOOTAGE IN PARTH: JO-DERY W-WASHED C-CORED P-PIT A-AUGER V-WANE TEST FOOTAGE IN PARTH: JO-DERY W-WASHED C-CORED P-PIT A-AUGER V-WANE TEST FOOTAGE IN PARTH: JO-DERY W-WASHED C-CORED P-PIT A-AUGER V-WANE TEST FOOTAGE IN PARTH: JO-DERY W-WASHED C-CORED P-PIT A-AUGER V-WANE TEST FOOTAGE IN PARTH: JO-DERY W-WASHED C-CORED P-PIT A-AUGER V-WANE TEST FOOTAGE IN PARTH: JO-DERY W-WASHED C-CORED P-PIT A-AUGER V-WANE TEST FOOTAGE IN PARTH: JO-DERY W-WASHED C-CORED P-PIT A-AUGER V-WANE TEST FOOTAGE IN PARTH: JO-DERY W-WASHED C-CORED P-PIT A-AUGER V-WANE TEST FOOTAGE IN PARTH: JO-DERY W-WASHED C-CORED P-PIT A-AUGER V-WANE TEST FOOTAGE IN PARTH: JO-DERY W-WASHED C-CORED P-PIT A-AUGER V-WANE TEST FOOTAGE IN PARTH: JO-DERY W-WANE TEST FOOTAGE IN PARTH: JO-DERY W-WANE TEST FOOTAGE IN PARTH: JO-DERY W-WANE TEST FOOTAGE IN PARTH: JO-DERY W-WANE TEST FOOTAGE IN PARTH: JO-DERY W-WANE TEST FOOTAGE IN PARTH: JO-DERY W-WANE TEST FOOTAGE IN PARTH: JO-DERY W-WANE TEST FOOTAGE IN PARTH: JO-DERY W-WANE TEST FOOTAGE IN PARTH: JO-DERY W-WANE TEST FOOTAGE IN PARTH: JO-DERY W-WANE TEST FOOTAGE IN PARTH: JO-DERY W-WANE TEST FOOTAGE IN PARTH: JO-DERY W-WANE TEST FOOTAGE IN PARTH: JO-DERY W-WANE TEST FOOTAGE IN PARTH: JO-DERY W-WANE TEST FOOTAGE IN PARTH: JO-DERY W-WANE TEST FOOTAGE IN PARTH: JO-DERY W-WANE TEST FOOTAGE IN PARTH: JO-DERY W-WANE TEST FOOTAGE IN PARTH: JO-DERY W-WANE TEST FOOTAGE IN PARTH: JO-DERY W-WANE TEST FOOTAGE IN PARTH: JO-DERY W-WANE TEST FOOTAGE IN PARTH: JO-DERY W-WANE TEST FOOTAGE IN PARTH: JO-DERY W-WANE TEST FOO									MUISTU	Ery Dense	CATING			
Notes:  The boring location was previously vacuumed by a separate contractor. Approximately 1' of collapse was encountered prior to the boring advancement.  Groundwater was not observed during the drilling operation.  Refusel (Bedrock) encountered at 14 feet below grade. The encountered bedrock appeared weathered.  A monitoring well was installed above the bedrock as shown above.  GROUND SURFACE TO TI. USED H. "CASING, THEN SO "CASING TO TI. FOOTAGE IN EARTH: DO DERY W=WAMBED CEORED PPIT A=AUGRR V=VANE TEST FOOTAGE IN EARTH: DO DERY W=WAMBED CEORED PPIT A=AUGRR V=VANE TEST FOOTAGE IN ROCK: NO OFFICE PROPINSION DO DE NO OFFI MORES.									50 M	WHE COM	25 5/V/~			
Notes:  The boring location was previously vacuumed by a separate contractor. Approximately 1' of collapse was encountered prior to the boring advancement.  Groundwater was not observed during the drilling operation.  Refusal (Bedrock) encountered at 14 feet below grade. The encountered bedrock appeared weathered.  A monitoring well was installed above the bedrock as shown above.  GROUND SURFACE TO THI. USED WINDISTURBED BAIL CHECK OFFICEPIN END BOD.  GROUND SURFACE TO THI. USED WINDISTURBED BAIL CHECK OFFICEPIN END BOD.  TO CASING TO THI. FOOTAGE IN EARTH: TO CASING TO THI. FOOTAGE IN EARTH: TO CASING TO THIS POOTAGE IN ROCK.  PERMINENTED HISTORY USED WINDISTURBED BAIL CHECK OFFICEPIN END BOD.  NO OFFI MINISTERS HISTORY OFFI TO MODE TO THE POOTAGE IN ROCK.							_							
Notes:  The boring location was previously vacuumed by a separate contractor. Approximately 1' of collapse was encountered prior to the boring advancement. Groundwater was not observed during the drilling operation. Refusal (Bedrock) encountered at 14 feet below grade. The encountered bedrock appeared weathered. A monitoring well was installed above the bedrock as shown above.  GROUND SURFACE 10 FT., USED  "CASING, THEN SCASING TO FT. FOOTAGE IN EARTH: DEDENRY WEWASHED CECORED PEPIT A=AUGER V=VANE TEST POOTAGE IN EARTH: DEDENRY WEWASHED CECORED PEPIT A=AUGER V=VANE TEST POOTAGE IN EARTH: DEDENRY WEWASHED CECORED PEPIT A=AUGER V=VANE TEST POOTAGE IN EARTH: DEDENRY WEWASHED CECORED PEPIT A=AUGER V=VANE TEST POOTAGE IN EARTH: DEDENRY WEWASHED CECORED PEPIT A=AUGER V=VANE TEST POOTAGE IN EARTH: DEDENRY WEWASHED CECORED PEPIT A=AUGER V=VANE TEST POOTAGE IN EARTH: DEDENRY WEWASHED CECORED PEPIT A=AUGER V=VANE TEST POOTAGE IN EARTH: DEDENRY WEWASHED CECORED PEPIT A=AUGER V=VANE TEST POOTAGE IN EARTH: DEDENRY WEWASHED CECORED PEPIT A=AUGER V=VANE TEST POOTAGE IN EARTH: DEDENRY WEWASHED CECORED PEPIT A=AUGER V=VANE TEST POOTAGE IN EARTH: DEDENRY WEWASHED CECORED PEPIT A=AUGER V=VANE TEST POOTAGE IN EARTH: DEDENRY WEWASHED CECORED PEPIT A=AUGER V=VANE TEST POOTAGE IN EARTH: DEDENRY WEWASHED CECORED PEPIT A=AUGER V=VANE TEST POOTAGE IN EARTH: DEDENRY WEWASHED CECORED PEPIT A=AUGER V=VANE TEST POOTAGE IN EARTH: DEDENRY WEWASHED CECORED PEPIT A=AUGER V=VANE TEST POOTAGE IN EARTH: DEDENRY WEWASHED CECORED PEPIT A=AUGER V=VANE TEST POOTAGE IN EARTH: DEDENRY WEWASHED CECORED PEPIT A=AUGER V=VANE TEST POOTAGE IN EARTH: DEDENRY WEWASHED CECORED PEPIT A=AUGER V=VANE TEST PEOTAGE IN EARTH: DEDENRY PEOTAGE IN EARTH: DEDENRY PEOTAGE IN EARTH: DEDENRY PEOTAGE IN EARTH: DEDENRY PEOTAGE IN EARTH: DEDENRY PEOTAGE IN EARTH: DEDENRY PEOTAGE IN EARTH: DEDENRY PEOTAGE IN EARTH: DEDENRY PEOTAGE IN EARTH: DEDENRY PEOTAGE IN EARTH: DEDENRY PEOTAGE IN EARTH: DEDENRY PEOTAGE IN EARTH: DEDENRY PEOTAGE IN EARTH: DEDENRY PEOTAGE IN EARTH: DEDENRY P									WETMED	DERUSE CIT	eof Mus			-
Notes:  The boring location was previously vacuumed by a separate contractor. Approximately 1' of collapse was encountered prior to the boring advancement. Groundwater was not observed during the drilling operation. Refusal (Bedrock) encountered at 14 feet below grade. The encountered bedrock appeared weathered. A monitoring well was installed above the bedrock as shown above.  GROUND SURFACE 10 FT., USED  "CASING, THEN SCASING TO FT. FOOTAGE IN EARTH: DEDENRY WEWASHED CECORED PEPIT A=AUGER V=VANE TEST POOTAGE IN EARTH: DEDENRY WEWASHED CECORED PEPIT A=AUGER V=VANE TEST POOTAGE IN EARTH: DEDENRY WEWASHED CECORED PEPIT A=AUGER V=VANE TEST POOTAGE IN EARTH: DEDENRY WEWASHED CECORED PEPIT A=AUGER V=VANE TEST POOTAGE IN EARTH: DEDENRY WEWASHED CECORED PEPIT A=AUGER V=VANE TEST POOTAGE IN EARTH: DEDENRY WEWASHED CECORED PEPIT A=AUGER V=VANE TEST POOTAGE IN EARTH: DEDENRY WEWASHED CECORED PEPIT A=AUGER V=VANE TEST POOTAGE IN EARTH: DEDENRY WEWASHED CECORED PEPIT A=AUGER V=VANE TEST POOTAGE IN EARTH: DEDENRY WEWASHED CECORED PEPIT A=AUGER V=VANE TEST POOTAGE IN EARTH: DEDENRY WEWASHED CECORED PEPIT A=AUGER V=VANE TEST POOTAGE IN EARTH: DEDENRY WEWASHED CECORED PEPIT A=AUGER V=VANE TEST POOTAGE IN EARTH: DEDENRY WEWASHED CECORED PEPIT A=AUGER V=VANE TEST POOTAGE IN EARTH: DEDENRY WEWASHED CECORED PEPIT A=AUGER V=VANE TEST POOTAGE IN EARTH: DEDENRY WEWASHED CECORED PEPIT A=AUGER V=VANE TEST POOTAGE IN EARTH: DEDENRY WEWASHED CECORED PEPIT A=AUGER V=VANE TEST POOTAGE IN EARTH: DEDENRY WEWASHED CECORED PEPIT A=AUGER V=VANE TEST POOTAGE IN EARTH: DEDENRY WEWASHED CECORED PEPIT A=AUGER V=VANE TEST POOTAGE IN EARTH: DEDENRY WEWASHED CECORED PEPIT A=AUGER V=VANE TEST PEOTAGE IN EARTH: DEDENRY PEOTAGE IN EARTH: DEDENRY PEOTAGE IN EARTH: DEDENRY PEOTAGE IN EARTH: DEDENRY PEOTAGE IN EARTH: DEDENRY PEOTAGE IN EARTH: DEDENRY PEOTAGE IN EARTH: DEDENRY PEOTAGE IN EARTH: DEDENRY PEOTAGE IN EARTH: DEDENRY PEOTAGE IN EARTH: DEDENRY PEOTAGE IN EARTH: DEDENRY PEOTAGE IN EARTH: DEDENRY PEOTAGE IN EARTH: DEDENRY PEOTAGE IN EARTH: DEDENRY P									BRANCE	, te 516	price 7			
Notes: The boring location was previously vacuumed by a separate contractor. Approximately 1' of collapse was encountered prior to the boring advancement.  Groundwater was not observed during the drilling operation.  Refusal (Bedrock) encountered at 14 feet below grade. The encountered bedrock appeared weathered.  A monitoring well was installed above the bedrock as shown above.  GROUND SURFACE TO FT., USED #3# "CASING, THEN "CASING TO FT. FOOTAGE IN EARTH: DP-DUNDISTURBED, PISTON UB-UNDISTURBED RAIL LIFECK OFB-OPEN END POD NO CESTANDISES.									,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,		-			_
Notes: The boring location was previously vacuumed by a separate contractor. Approximately 1' of collapse was encountered prior to the boring advancement.  Groundwater was not observed during the drilling operation.  Refusal (Bedrock) encountered at 14 feet below grade. The encountered bedrock appeared weathered.  A monitoring well was installed above the bedrock as shown above.  GROUND SURFACE TO FT., USED #3# "CASING, THEN "CASING TO FT. FOOTAGE IN EARTH: DP-DUNDISTURBED, PISTON UB-UNDISTURBED RAIL LIFECK OFB-OPEN END POD NO CESTANDISES.											į			
Notes: The boring location was previously vacuumed by a separate contractor. Approximately 1' of collapse was encountered prior to the boring advancement.  Groundwater was not observed during the drilling operation.  Refusal (Bedrock) encountered at 14 feet below grade. The encountered bedrock appeared weathered.  A monitoring well was installed above the bedrock as shown above.  GROUND SURFACE TO FT., USED #3# "CASING, THEN "CASING TO FT. FOOTAGE IN EARTH: DP-DUNDISTURBED, PISTON UB-UNDISTURBED RAIL LIFECK OFB-OPEN END POD NO CESTANDISES.									B.O.	B. 12'				
Groundwater was not observed during the drilling operation.  Refusal (Bedrock) encountered at 14 feet below grade. The encountered bedrock appeared weathered.  A monitoring well was installed above the bedrock as shown above.  GROUND SURFACE TO FT., USED FFT. "CASING, THEN "CASING TO FT. FOOTAGE IN EARTH: DEDRY WEWASHED CECORED PERT A=AUGER VEVANETEST FOOTAGE IN ROCK: UP=UNDISTURBED, PISTON UB=UNDISTURBED BALL CHECK OFR=OPEN END ROD											-			$\vdash$
Groundwater was not observed during the drilling operation.  Refusal (Bedrock) encountered at 14 feet below grade. The encountered bedrock appeared weathered.  A monitoring well was installed above the bedrock as shown above.  GROUND SURFACE TO FT., USED FFT. "CASING, THEN "CASING TO FT. FOOTAGE IN EARTH: DEDRY WEWASHED CECORED PERT A=AUGER VEVANETEST FOOTAGE IN ROCK: UP=UNDISTURBED, PISTON UB=UNDISTURBED BALL CHECK OFR=OPEN END ROD														
Groundwater was not observed during the drilling operation.  Refusal (Bedrock) encountered at 14 feet below grade. The encountered bedrock appeared weathered.  A monitoring well was installed above the bedrock as shown above.  GROUND SURFACE TO FT., USED FFT. "CASING, THEN "CASING TO FT. FOOTAGE IN EARTH: DEDRY WEWASHED CECORED PERT A=AUGER VEVANETEST FOOTAGE IN ROCK: UP=UNDISTURBED, PISTON UB=UNDISTURBED BALL CHECK OFR=OPEN END ROD								- 1			-	-		-
Groundwater was not observed during the drilling operation.  Refusal (Bedrock) encountered at 14 feet below grade. The encountered bedrock appeared weathered.  A monitoring well was installed above the bedrock as shown above.  GROUND SURFACE TO FT., USED FFT. "CASING, THEN "CASING TO FT. FOOTAGE IN EARTH: DEDRY WEWASHED CECORED PERT A=AUGER VEVANETEST FOOTAGE IN ROCK: UP=UNDISTURBED, PISTON UB=UNDISTURBED BALL CHECK OFR=OPEN END ROD							AV-110-1	1			ľ			
Groundwater was not observed during the drilling operation.  Refusal (Bedrock) encountered at 14 feet below grade. The encountered bedrock appeared weathered.  A monitoring well was installed above the bedrock as shown above.  GROUND SURFACE TO FT., USED FFT. "CASING, THEN "CASING TO FT. FOOTAGE IN EARTH: DEDRY WEWASHED CECORED PERT A=AUGER VEVANETEST FOOTAGE IN ROCK: UP=UNDISTURBED, PISTON UB=UNDISTURBED BALL CHECK OFR=OPEN END ROD	1							1						
Groundwater was not observed during the drilling operation.  Refusal (Bedrock) encountered at 14 feet below grade. The encountered bedrock appeared weathered.  A monitoring well was installed above the bedrock as shown above.  GROUND SURFACE TO FT., USED FFT. "CASING, THEN "CASING TO FT. FOOTAGE IN EARTH: DEDRY WEWASHED CECORED PERT A=AUGER VEVANETEST FOOTAGE IN ROCK: UP=UNDISTURBED, PISTON UB=UNDISTURBED BALL CHECK OFR=OPEN END ROD											ŀ	-		
Groundwater was not observed during the drilling operation.  Refusal (Bedrock) encountered at 14 feet below grade. The encountered bedrock appeared weathered.  A monitoring well was installed above the bedrock as shown above.  GROUND SURFACE TO FT., USED FFT. "CASING, THEN "CASING TO FT. FOOTAGE IN EARTH: DEDRY WEWASHED CECORED PERT A=AUGER VEVANETEST FOOTAGE IN ROCK: UP=UNDISTURBED, PISTON UB=UNDISTURBED BALL CHECK OFR=OPEN END ROD														
Groundwater was not observed during the drilling operation.  Refusal (Bedrock) encountered at 14 feet below grade. The encountered bedrock appeared weathered.  A monitoring well was installed above the bedrock as shown above.  GROUND SURFACE TO FT., USED FFT. "CASING, THEN "CASING TO FT. FOOTAGE IN EARTH: DEDRY WEWASHED CECORED PERT A=AUGER VEVANETEST FOOTAGE IN ROCK: UP=UNDISTURBED, PISTON UB=UNDISTURBED BALL CHECK OFR=OPEN END ROD	1							1			-			
Groundwater was not observed during the drilling operation.  Refusal (Bedrock) encountered at 14 feet below grade. The encountered bedrock appeared weathered.  A monitoring well was installed above the bedrock as shown above.  GROUND SURFACE TO FT., USED FFT. "CASING, THEN "CASING TO FT. FOOTAGE IN EARTH: DEDRY WEWASHED CECORED PERT A=AUGER VEVANETEST FOOTAGE IN ROCK: UP=UNDISTURBED, PISTON UB=UNDISTURBED BALL CHECK OFR=OPEN END ROD											t			
Groundwater was not observed during the drilling operation.  Refusal (Bedrock) encountered at 14 feet below grade. The encountered bedrock appeared weathered.  A monitoring well was installed above the bedrock as shown above.  GROUND SURFACE TO FT., USED FFT. "CASING, THEN "CASING TO FT. FOOTAGE IN EARTH: DEDRY WEWASHED CECORED PERT A=AUGER VEVANETEST FOOTAGE IN ROCK: UP=UNDISTURBED, PISTON UB=UNDISTURBED BALL CHECK OFR=OPEN END ROD	l 1				-						-			
Groundwater was not observed during the drilling operation.  Refusal (Bedrock) encountered at 14 feet below grade. The encountered bedrock appeared weathered.  A monitoring well was installed above the bedrock as shown above.  GROUND SURFACE TO FT., USED FFT. "CASING, THEN "CASING TO FT. FOOTAGE IN EARTH: DEDRY WEWASHED CECORED PERT A=AUGER VEVANETEST FOOTAGE IN ROCK: UP=UNDISTURBED, PISTON UB=UNDISTURBED BALL CHECK OFR=OPEN END ROD								İ			ŀ	-		
Groundwater was not observed during the drilling operation.  Refusal (Bedrock) encountered at 14 feet below grade. The encountered bedrock appeared weathered.  A monitoring well was installed above the bedrock as shown above.  GROUND SURFACE TO FT., USED FFT. "CASING, THEN "CASING TO FT. FOOTAGE IN EARTH: DEDRY WEWASHED CECORED PERT A=AUGER VEVANETEST FOOTAGE IN ROCK: UP=UNDISTURBED, PISTON UB=UNDISTURBED BALL CHECK OFR=OPEN END ROD														
Groundwater was not observed during the drilling operation.  Refusal (Bedrock) encountered at 14 feet below grade. The encountered bedrock appeared weathered.  A monitoring well was installed above the bedrock as shown above.  GROUND SURFACE TO FT., USED FFT. "CASING, THEN "CASING TO FT. FOOTAGE IN EARTH: DEDRY WEWASHED CECORED PERT A=AUGER VEVANETEST FOOTAGE IN ROCK: UP=UNDISTURBED, PISTON UB=UNDISTURBED BALL CHECK OFR=OPEN END ROD											1			-
Groundwater was not observed during the drilling operation.  Refusal (Bedrock) encountered at 14 feet below grade. The encountered bedrock appeared weathered.  A monitoring well was installed above the bedrock as shown above.  GROUND SURFACE TO FT., USED FFT. "CASING, THEN "CASING TO FT. FOOTAGE IN EARTH: DEDRY WEWASHED CECORED PERT A=AUGER VEVANETEST FOOTAGE IN ROCK: UP=UNDISTURBED, PISTON UB=UNDISTURBED BALL CHECK OFR=OPEN END ROD	Notes:	The haring	ontine											
Refusal (Bedrock) encountered at 14 feet below grade. The encountered bedrock appeared weathered.  A monitoring well was installed above the bedrock as shown above.  GROUND SURFACE TO FT., USED FF. "CASING, THEN "CASING TO FT. FOOTAGE IN EARTH: DEDRY WEWASHED CECORED PERIT A=AUGER VEVANE TEST FOOTAGE IN ROCK: UP=UNDISTURBED, PISTON UB=UNDISTURBED BALL CHECK OFREODEN END ROD		rne bonng io Groundwater	cauon was pri was not obse	eviously va rved during	cuumed by the drilling	a separate	contractor.	Approximately	1' of collapse v	as encounter	ed prior to the I	ooring ad	vancemer	nt.
GROUND SURFACE TO FT., USED FT. "CASING, THEN "CASING TO FT. FOOTAGE IN EARTH: DEDRY WEWASHED CECORED PERIT A=AUGER VEVANE TEST FOOTAGE IN ROCK: UP=UNDISTURBED, PISTON UB=UNDISTURBED BALL CHECK OFREODEN END POD NO OF SAMPLES.		Refusal (Bedi	rock) encount	ered at 14 t	eet below	grade. The	encountere	ed bedrock appe	eared weathere	d.				
DEDRY WEWASHED CECORED PEPIT AFAUGER VEVANETEST FOOTAGE IN ROCK:  UPEUNDISTURBED, PISTON UBEUNDISTURBED BALL CHECK OFFEDER FOR SOME SAMPLES.	,	n monitoring	well was insta	iled above	the bedroo	k as shown	above.							
DEDRY WEWASHED CECORED PEPIT A=AUGER VEVANETEST FOOTAGE IN ROCK:  UP=UNDISTURBED, PISTON UB=UNDISTURBED BALL CHECK OFREODEN END ROD	GROUND SU	RFACE TO	1) FT.		HSA	" CASING	, THEN	1915 "	CASING TO	/ ) FT	FOOTA	GE IN FA	RTH: T	10
PROPORTIONS USED: TRACE=0-10%, LITTLE=10-20%, SOME=20-35%, AND 35-50%	D=DRY UP=UNDISTU	W=WASHED	C=COF		PEPIT	A=AUGER	V=V/	ANE TEST		1	FOOTA	GE IN R	OCK:	10
	PROPORTION	NS USED: TF	CACE=0-10%.	LITTLE=10	NBED, BAL 0-20%. SO	L CHECK ME=20-35%	OER=0	JPEN END ROI	0				ES: TYPE	6

C-186 AvGen Coust.

	OT Pr	oject C/T) :		Sewer Warv	wick RI - Various location	BORING RIDOT D	#: C-187		Sheet _	2 of 2
	-	00000	ANDIE!	FAP#	•	Date Start				6/18
	#. ge/Ro		Bayside			N Coord.	: 0		Ft.	
	_	nsult C		don Archib	ald, Inc.	E Coord.	0		Ft.	
	_	onsult			Boring Contractors	Ground S	urface Elev	., Ft.: 0.	.0	
-		Name/(		ry Fortier/	GZA GeoEnvironmental,	Inc.Elevation	Datum 1	NGVD29		
Desc	riptio	ocation: Boy	ston St					401		
Samp	ler: Ur	less othe	rwise noted,	soil sampler	consists of a 2 in. split	Date	Time	water Obse Depth	Cosing at	Stab. Time
Casin	g: Unic	oon drive ess other ng 24 in.	wise noted, c	0 lb hammer, asing is drive	n using 300 lb hammer,	06/06/18	00:00	10	0.25	0.25 hr
Casin	g Size:			HS Auger	<u>X</u> _					R
D E P T H Ft	CB AL SO IW NS G/Ft	Type & Number	SAMPLER Pen/ Depth Rcy. Core Rcy. & RQD	Blows per 6 in. (Coring min/f [Downpress pe	SOIL AND ROCK SAMPI Burmister Soil Classifi	LE DESCRIPTION ication System	Depth of Stratum Change	ם	STRATUM ESCRIPTION	R E M A R K
T.	On.	SS-1	60/0 0.0		Dry, brown FINE SAND, se	ome coarse sand,	0.3	ASPHALT/	ROADWAY	
-		55 1	0.0		some gravel, trace silt, trace	cobbles.		BOULDER	S encountered	
5			5.0				5.0			
3_		SS-2	60/0		Moist, gray, FINE SAND, trace gravel, trace silt, weat fragments.	race coarse sand, hered bedrock		Trace cobbl	es	
10_			10.0		5		10.0	Weathered 1	BEDROCK	
							12.0	Bottom of E	Exploration = 12	! 1
15_										
(4 (4										
20_										
-										
25_										
8										
30 <u>0</u>	to <u>10 S</u>	oil Auger	ing	1						
RE	MARK	S: 1. ali	samples take	n off auger flig	ghts					
					140# Wt x 30" fail on 2"		nev			
trac	portions ce 0 to le 10 to ne 20 t l 35 t	10% o 20%	Sampler SS - Split UT - Shelb UP - Fixed C - Rock	Spoon y Tube Position	0 - 10 Loose 0 10 - 30 Medium Dense 4 30 - 50 Dense 8 - 50 + Very Dense 15	esive Consiste -4 Soft -8 Firm -15 Stiff -30 Very St 0+ Hard	RIC#: Boring Date Co	No.: C-187	7 6/6/18	

DIE	OM D	• ,	D '1 (			DODDIO	0.10		<b>C</b> 1	
	OT P	•		Sewer System	<u>n</u>	BORING	G#: <u>C-18</u> Database ID		Sheet _	2 of 2
		C/T):		/ARWICK FAP#:		_ RIDOT 1 Date Star			e End : 6/	14/18
ı	-	ad #:		PAI # •		N Coord.		oDate	Ft.	14/10
E .	_	nsult (		don Archiba	ld Inc	E Coord.			Ft.	
ı	_	onsult			Boring Contractors	<del></del>	Surface Elev	v., Ft.: 0.		
		Name/			Gordon Archibald	_ Elevation		NGVD29	.0	
Des	criptio		ylston Stree			·				
Sam				soil sampler coi nmer, 30'' fall.	nsists of a 2 in. split spoon	Data		water Obse	rvations	C4-1- 70'
Casii					ising 300 lb hammer,	<b>Date</b> 06/14/18	Time 00:00	Depth 10	Casing at	Stab. Time 0.25 hr
	falli	ng 24 in.			,	00/1///0	00.00	10		0.25 m
Casir	ng Size:	4 in	<del></del>	HS Auger	X			T		
D E P T H	CB AL SO IW NS	Type & Number	Core Rcy.	Blows per 6 in. (Coring min/ft)	SOIL AND ROCK SAMPL Burmister Soil Classifi		of Stratum		STRATUM ESCRIPTION	R E M A R K
Ft.	G/Ft.	SS-1	& RQD 24/14 0.0	[Downpress psi]	Dry, medium dense, brown I	FINE SAND trac	Change 0.3	ASPHALT/	ROADWAY	K S
-	18	JU 1	2.0		corse sand and gravel, trace	silt.	- \	Coarse layer		/
1	31 26						4.0			4
5_	40 21	SS-2	24/18 5.0	9-15-16-15	Moist, dense, brown-gray Fl	NE SAND, trace				
-	31 59		7.0		coarse sand and gravel, trace	Siit.				
10	60 16		10.0							
-	57 93	SS-3	24/18	14-16-12-27	Wet, medium dense gray FIN coarse sand and gravel, trace	NE SAND, trace silt.	12.0			
	,,		12.0				12.0	Bottom of E	xploration = 12'	1
15										
13_										
=										
20_										
-										
- - -										
25_										
-										
30				1.00						
	to <u>2 Soil</u>	Driven (	Casing							
PEN	/ARKS	1 Inet	alled a monitor	ing well at 12'.						
<b>KL</b> III		. 1. 11150	anca a momeo	mg won at 12.						
					140# Wt x 30" fall on 2" O					
-	ortions		Sampler T		ionless Density Cohes  10 Loose 0 - 4					
little		20%	SS - Split Sp UT - Shelby	Tube   10 -	30 Medium Dense 4 - 8	8 Firm	RIC#: Boring N	00000 o.: C-188	****	
some and	20 to 35 to		UP - Fixed Po C - Rock C	sition 30 -			ff Date Con	pleted: 6/	14/18	
anu	JJ 10	2070	C - NUCK C	5.0	30 +		Database			

Loca RIC Brid Desig Geot Inspe Bore Desc Samp	tion (#: ge/Ro gn Co ech C ector hole I riptio ler: Un sp g: Unl	less othe	Kent / W  Bayside  o.: Gore  Co.: Ne  Co.: Gai  n  lston St  erwise noted, sen using a 140 wise noted, ca	ARWICK FAP #  don Archib w England ry Fortier /  soil sampler	bald, Inc.  Boring Contractors  GZA GeoEnvironmental,  consists of a 2 in. split	RIDOT I Date Star N Coord. E Coord. Ground S	Datab rt: .: (Surfan Data	6/6/18 0 0 ce Elev um <u>N</u>	#: Date	End: <u>6/</u> Ft Ft.	2 of 3	ime
D E P T H Ft.	CB AL SO IW NS G/Ft	Type & Number	SAMPLER Pen/ Depth Roy. Core Roy. & RQD	Blows per 6 in. (Coring min/i [Downpress p	Drv. brown FINE SAND, se	ication System		Depth of Stratum Change	D	STRATUM ESCRIPTION ROADWAY		E M A R K S
5_ 10_ 15_ 20_ 25_	SS-1 60/0 0.0  SS-2 60/0  SS-2 60/0  Dry, brown FINE SAND trace silt trace cobbles.  Moist, gray FINE SAND gravel, trace silt and wea					race coarse sand a	and	10.0	Weathered I	Sencountered  BEDROCK frag		
				uger flights								
trac	portion ce 0 to le 10 to le 20 to	10% to 20%	Sampler SS - Split : UT - Shelb UP - Fixed I C - Rock	Spoon y Tube Position	0 - 10 Loose 0 10 - 30 Medium Dense 4 30 - 50 Dense 8 50 + Very Dense 15	OD SS Sampler tesive Consist - 4 Sof - 8 Fire - 15 Stif - 30 Very 5 0 + Har	tency ft m ff Stiff			5/6/18		

				~ _								
		roject		Sewer Syste	m	BORING			***************************************	Sheet _	<u>2</u> of _	2
	,	C/T):	Kent / W	ARWICK	MANAGEM AND AND AND AND AND AND AND AND AND AND	_ RIDOT I					5410	
	_	00000	D	FAP #	•	_ Date Star		6/15/1	8 Date		5/18	
	lge/Ro		Bayside	J A1 11.	.1.1 T	N Coord		0		Ft.		
	O .	nsult C		don Archib		_ E Coord.		0	104 . 0	Ft.		
		onsult			Boring Contractors	_ Ground S				.0		
ınsp	ector.	Name/	Co.: <u>Ga</u>	ry Fortier/	Gordon Archibald	Elevation	a Da	itum <u>r</u>	NGVD29			
		Location: Boy	n slton Street	t								
Sam					onsists of a 2 in. split spoon				vater Obse		G . 1 E	
Casir	ig: Unle	ess other		nmer, 30" fal sing is driven	using 300 lb hammer,	<b>Date</b> 06/15/18		0:00	Depth 10	Casing at	0.25	
<b>.</b> .		ng 24 in.		110 4	V							
	ng Size:		SAMPLER	HS Auger	X		1					R
D E P T	CB AL		Pen/ Depth	Blows per 6 in.	SOIL AND ROCK SAMPL		N	Depth		STRATUM		E M
P T	SO IW	Type & Number	Rcy. Core Rcy.	•	Burmister Soil Classifi	cation System		of Stratum	D	ESCRIPTION		A
H Ft.	NS G/Ft.		& RQD	(Coring min/ft [Downpress ps				Change				R K S
		SS-1	24/16 0.0	10-12-12-11	Dry, medium dnese, brown I	FINE SAND, trac	ce	0.3/	¬ASPHALT/I	ROADWAY		S
-			2.0		coarse sand and gravel, trace	silt.				Spring Ald		
							-	4.0	Coarse layer	3' to 4'		
5_		SS-2	5.0 24/18	19-19-15-17	Moist, dense, brown-gray FI	NE SAND, trace						
-			7.0		coarse sand and gravel, trace bedrock.							
					bedrock.							
-												
10_		SS-3	10.0 24/15	11-20-25-33	Wet, dense, gray FINE SAN	D trace coarse						
-		55-5	12.0	11-20-25-55	sand and gravel, trace silt and			12.0				
	Ì		12.0		bedrock, till.		ŀ	12.0	Bottom of Ex	xploration = 12'		
]												
15_												
4												
-												
-	İ											
20_												
4												
-												
-							ĺ					
25												
-								İ				
-												
30												
- <del>-</del> 1	60				•						1	
DEN	ARKS:	,										-
KLI	LARNS:	•										
		I			140# Wt x 30" fall on 2" Ol	D.SS Samplar						
Prop	ortions l	Used	Sampler Ty	ype Cohe	sionless Density Cohes		ıcy					
	ace 0 to 10% SS - Split Spoo				- 10 Loose 0 - 4			RIC#:	00000			
little some			"UT - Shelby UP - Fixed Po		- 30 Medium Dense 4 - 8 - 50 Dense 8 - 1	5 Stiff		Boring No		15/10		
and	35 to		C - Rock C		0 + Very Dense 15 - 3 30 +	30 Very Sti	ff	Date Com Database		15/18		
					307	maru		~				

RID	OT Pr	oject			wick RI - Various location	s BORING		C-191		Shee	et2	2_ of _	2_
		C/T):	Kent / W	ARWICK		RIDOTI				77. 3 .	CIC	/1 0	_
RIC	#:	00000		FAP #		Date Star		6/6/18	Date	End:	6/6/	18	_
Brid	ge/Ro	ad #:	Bayside			N Coord.		0		Ft.			
		nsult C		don Archib		E Coord.		0	T54 . 0	Ft.			
Geot	ech C	onsult	Co.: Ne	w England	Boring Contractors	Ground S				.0			_
		Name/C		ry Fortier /	GZA GeoEnvironmental,	Inc.Elevation	ı Dat	um N	IGVD29				
Desc	riptio	ocation: Boy	Iston St		La Sa 2 in mile	1		Groundy	vater Obse	rvations			
Samp	ler: Un	less othe	erwise noted, en using a 140	son sampier I ih hammer.	consists of a 2 in. split	Date		ime	Depth	Casing	at		
Casin	e: Unk	ess other	wise noted, c	sing is drive	n using 300 lb hammer,	06/06/18	00	0:00	10			0.25 ł	nr
	falli g Size:	ng 24 in.		HS Auger	X								P
D	СВ		SAMPLER	Blows	SOIL AND ROCK SAMPI	E DESCRIPTIO	)N	Depth		STRATUM	4		R E
D E P	AL SO	Type &	Pen/ Depth Rcy.	per 6 in.	Burmister Soil Classifi	ication System		of	E	ESCRIPTION			M A
T	1 W	Number	Core Rcy.	(Coring min/	t),			Stratum Change					A R K
H Ft.	NS G/Ft		& RQD	[Downpress p					ADDITATE	DOADWA			S
		SS-1	60/0 0.0		Dry, brown-gray FINE SAN sand and gravel, trace silt.	ND, some coarse		0.3/	ASPHALT/	KUADWA	ľ		
-													
Ī									BOULDER	S encounter	ed.		
5_			5.0		Moist, gray, FINE SAND, t	race coarse sand			DOODDEN	.,			
		SS-2	60/0		and gravel, trace silt, trace v	weathered bedroc	:k						
4					fragments.								
-													
10			10.0				-	10.0	Weathered	BEDROCK	fraen	nents.	
-								12.0	Wouldered	000110011			
									Bottom of I	Exploration	= 12'		1
15_													
-							1						
1													
20_													
25_													
ङ													
20													
30	to 10 S	oil Auger	ring										
_			l samples take	n off auger fl	ights.								
					140# Wt x 30" fail on 2"								
	portion	- 1	Sampler	-25.		esive Consist		D/-C "	00000				
	e 0 to		SS - Split UT - Shelb	Spoon v Tube	10 - 30 Medium Dense 4	-8 Fire	m	RIC#: Boring P	00000 No.: C-19	1			
son	ie 20 t	o 35%	UP - Fixed	Position	30 - 50 Dense 8	- 15 Stif - 30 Very S				6/6/18			
and	35 t	o 50%	C - Rock	Core		- 30 Very 3 0 + Har			e ID No.:				

BURING CC	NIRACIOR				Go		chibald, Inc.			SHEET:		_ OF	1
NE	Barn	a	Pawtucket, Rhode Island 02860 HOLE NO.						LOCATION:		19:		
								s 10:1	-	BORING TYPE:	-	25 CN	
LOG PREPA CONTR.	ARED BY:	PBA .	TOWN, ST			V	Varwick, Rhode			LINE & STA.:			
1 .		-	PBA NO.:	INAMIE.		OFFICE:	Bayside Sew	ers		OFFSET:			
3	FURN												
GROUNDY	VATER OBSE	RVATIONS HRS.	DAD		AUGER	CASING	SAMPLER	CORE					
^' <del>_/</del> C	- FILAFIER	14 nks.	TYPE			NW	5/3.		SURFACE	ELEV.: RTED-FINISHED		110	110
AT	FT. AFTER	HRS.				3"	13/8		BORING FO	DREMAN:		Stund	1800
			HAMMER HAMMER			300#	140 AND		INSPECTO		0,	FIRM	ER_
LOCATION	OF BORING:	B041		371	WASI	ACK D	7		SOILS EIVE	IN			
DEPTH	CASING	SAMPLE	1	WS PER	6" ON SAME		MONITORIN	FIELD IDE	TIPLOATIO			SAMPLE	
BELOW	BLOWS	DEPTH			M - TO		MONITORIN G WELL	1		N OF SOIL & ISS OF WASH		7 000 22	т—
SURFACE	PER FOOT	FROM - TO	0-6	6-12	12-18	18-24	INFO.	I.	JOINTS IN R		NO.	PEN.	REC.
,		./ /						II de Ailes	- 0.01	2 m sa		<del></del>	
ĺź	11	0-21	Z	14	16	20	DRy 4	יוווין לביו	er Rope	as page	51	24	16
みゃからから	35						Comese	DRY DE	ISE BRI	OL COMSE		-	
5	35	//2	- //				- BR	SAND 90	MANEL,	Some his			
4	28	5-7	16	20	15	16	Moist	Smo 1			87	24	18
1	28 44						1			& harsmy			
1 9,		,					9	TR SILI	ייעדוק די באדי	CIRAL			
11		10-12	3	10	13	17	aux 8			K BO 11-	33	24	15
ia						-	13100	WET M	בט מביימ במו ל מנו	& BR/GR COMERS TR SILT			
							101	Sound & la	en M	TR SILT			
	_						10						
								B.	0,812	7			
								_					
													-
										j			
										ŀ			
										ļ			
										-	$\overline{}$		-
										ŀ			-
										1			
										ł			_
										į			
										+			
										t			
										F			
										t			
1										-			
										t			
1													
Notes:											-		
	i ne boring to Groundwater	cation was pro was not obse	eviously vac	cuumed by	a separate	contractor.	Approximately	1' of collapse w	as encounte	ered prior to the I	oring adv	/ancemen	d.
	Refusal (Bedi	rock) encount	tered at 14 t	eet below	grade. The	encountere	d bedrock appe	sared weathere	d.				
	A monitoring	well was insta	alled above	the bedroo	k as shown	above.							- 1
GROUND SU		W.FT.	USED	-Hu	J" CASING	, THEN	5/5	'CASING TO	/OLF	T. FOOTA	GE IN EA	RTH: T	12
D=DRY JP=UNDISTU	W=WASHED		RED F UNDISTUR	P=PIT	A=AUGER	V=V	ANE TEST			FOOTA	GE IN RO	OCK:	100
PROPORTIO	NS USED: TF	RACE=0-10%,	LITTLE=1	)-20%, SO	ME=20-35%	, AND 35-5	OPEN END RO	U		HOLE	F SAMPL	.ES: TYPE	9
				THE RESERVE TO A SECOND									_

BORING CONTRACTOR:	Gordon R. Archibald, Inc.  200 Main Street  Pawtucket, Rhode Island 02860  BORING LOG  BORING LOG						C	OF 450 1	no
LOG PREPARED BY: CONTR. PBA	TOWN, STATE: PROJECT NAME: PBA NO.:		3 LOG /arwick, Rhode I Bayside Sewe		(a)	NG TYPE: & STA.: ET:		2005	
GROUNDWATER OBSERVATIONS AT FT. AFTER HRS.	BAR. TYPE SIZE, I.D. HAMMER WT. HAMMER FALL	AUGER CASING	SAMPLER	CORE	SURFACE ELEV. DATE STARTED- BORING FOREM INSPECTOR: SOILS ENGR.:	FINISHED	N'S	19/18 EXEGNATOR	w n
DEPTH CASING SAMPLE BELOW BLOWS DEPTH SURFACE PER FOOT FROM - TO	BLOWS PER	6" ON SAMPLER OM - TO 12-18 18-24	MONITORIN G WELL INFO.	ROCK INCL.	NTIFICATION OF S COLOR, LOSS O JOINTS IN ROCK,	F WASH	NO.	SAMPLE PEN.	REC.
7 8 3 2 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	OFF A		Pry 2' 5' Pry 1810e 7' WES 10' NUL	No 513 Day BA COALSE TR SILT COALSE ONY CA TR COAL TR LOAD WEAT	ET RUADANS SANDIGANO SANDIGANO SANDIGANO COBBLES CLEMELL LY FINE SAN LY FINE SAN HARAD BAPA  B. J. B. J.J	MEEN  , SOME  , SOME  , SOME  MALL  LOCK			
Notes: The boring location was Groundwater was not ob Refusal (Bedrock) encou	served during the drilli intered at 14 feet belov	ng operation. w grade. The encounter				prior to the	boring ac	ivanceme	nt.
	USED P=PIT B=UNDISTURBED, B/	CASING, THEN A=AUGER V=\ ALL CHECK OER:	VANE TEST OPEN END RO	" CASING TO	<i> ∂</i> FT.	FOOT	AGE IN E AGE IN F OF SAMP NO.	ROCK:	12

C- 193 Prose

	NTRACTOR				-	200 Mai	rchibald, Inc. n Street		- 1	SHEET: LOCATION:	an	OF	
	VE BOR	124	1		Pawt		de Island 02860	o		HOLE NO.:		-194	
			DE F		21 II		G LOG			BORING TYPE		ASIN	
LOG PREPA	ARED BY:		TOWN, S			٧	Varwick, Rhode	sland	6	LINE & STA.:		-	
CONTR.		PBA	PROJECT				Bayside Sev	vers		OFFSET:			
1 6	S FOUNE	2	PBA NO.:			OFFICE:							
GROUNDV	VATER OBSE	ERVATIONS			AUGER	CASING	SAMPLER	CORE	=				
AT <u>/0</u>	FT. AFTER	/4 HRS.	BAR. TYPE			HW	5/5		SURFACE I				,
AT	FT. AFTER	HRS.				11/1	-3/3		BORING FO	RTED-FINISHEE		5000	-
	•		HAMMER			300	140	-	INSPECTO			Even	
			HAMMER	FALL		30	30		SOILS ENG				
LOCATION	OF BORING:	Par	MEN	AVE	, Wh	houles	-RI						
DEPTH	CASING	SAMPLE	BLC	WS PER	6" ON SAMP	PLER	MONITORIN	EIELD IDE	NITIEICATION	N OF SOIL &		SAMPLE	
BELOW	BLOWS	DEPTH		FRO	M - TO		G WELL			SS OF WASH		Γ	T
SURFACE	PER FOOT	FROM - TO	0-6	6-12	12-18	18-24	INFO.	1	JOINTS IN R		NO.	PEN.	REC.
				1				06016	war A 10	10.141	-	-	-
ĺź	6	0/1	- 0				n 4	1	ROA ROA				
3	20	0.5	7	11	17	20	Day 4	DRY MI	מעור נוש	se bafur	21	24	12
34.507	35	_ /					Consu	SONE	SOME S	SANO 3			
1 6	48	5-7	34	41	50	44		CRENEL	, m 516	7	52	24	13
	35					-	Moisi 5	COAR	Sr Zay	est.			-
9	60						8	Marca	Men DE	WIT GOW			
10	71	721 -77	- 00	-	//			Sam	10-10000	1 SAWN			
1/	Not.	10-17	02	20	23	21	WET BLOC	3 Games	- 1251	ER NSE MNU ! SAND LT	53	24	16
13							10'	1					
							nu	WET DE	USE GR	. ANE SAM	9		
							1	TR COA	RSE SA	SO GGRANI		_	ļ
								ne 5	11	/			
	_							1					
											-		-
									7	07/			$\vdash$
								1	O.B. 1	14			
1													$\vdash$
										ì			$\vdash$
										ļ			
										ļ			
										ŀ	-		-
										t			
										1			
Ì										}			
										Ì			
										Ţ			
										ŀ			
Notes:	The boring lo	cation was pr	eviously va	cuumed by	a separate	contractor.	Approximately	/ 1' of collapse v	vas encounte	red prior to the	boring ad	vanceme	nt.
· ·	Groungwater	was not obse	rved during	the drillin	g operation.			eared weathere					- 1
	A monitoring	well was insta	illed above	the bedro	k as shown	above.	ou bedrock app	eared weathere	G.				1
GROUND SU				1					***************************************				
D=DRY	W=WASHED	C=COF	USED 1	P-PIT	" CASING A=AUGER		ANE TEST	" CASING TO	/2 F		GE IN EA		12
JP=UNDISTL	JRBED, PIST	ON UB=	UNDISTUR	RBED, BAI	L CHECK	OFR=	OPEN END RO	DD D			F SAMPL		3
PROPORTIONS USED: TRACE=0-10%, LITTLE=10-20%, SOME=20-35%, AND 35-50% HOLE							TYPE						

C-194 CASED

	OT Pr	-					k RI - Various locat		DRING		C-195		She	et _	2_ of _	2_
	•	C/T):	Ken	t/W	ARWIC				ate Star		6/6/18		End:	616	/18	
RIC		00000		• •	FAP	7#:			Coord.		0	Date	Ft.	010	710	
	ge/Ro		Bays			11 1 1			Coord.		0		Ft.			
		nsult C	-		don Arch						ace Elev	Ft. : 0.				
Geot	ech C	onsult '	Co.:	Ne	w Engla	nd Bo	oring Contractors						<u> </u>			
Insp	ector l	Name/(	Co. :	Gai	y Fortie	r / G2	ZA GeoEnvironment	tal, Inc.El	evation	ı Da	tum <u>r</u>	NGVD29				
Desc	riptio	ocation: Med	Iford S	t							Conservation	water Obse	- votions			
Samp	ler: Un	less othe	rwise n	oted,	soil sample	er con	sists of a 2 in. split	n	ate	7	Cime	Depth	Casing	at	Stab. T	ime
Casin	g: Unle	oon drive ess other ng 24 in.	en using wise not	ed, ca		ven u	sing 300 lb hammer,		06/18		0:00	10	400	,	0.25	hr
Casin	g Size:				HS Auge	r	<u>X</u>					<u> </u>				R
D E P T H	CB AL SO IW NS	Type & Number	SAMP Pen/ Rcy. Core Rc & RQD	Depth y.	Blows per 6 in (Coring mi	in/ft)	SOIL AND ROCK SAI Burmister Soil Cla	MPLE DES	CRIPTIC System	ИС	Depth of Stratum Change		STRATUI ESCRIPTI			R E M A R
Ft.	G/Ft.		& KQD		[Downpres:	s psij		G.1315				ASPHALT/	DO A DWA	v		S
-		SS-1	60/0	0.0			Dry, brown-gray FINE sand and gravel, trace si	SAND, som ilt.	e coarse	Ì	0.3	ASPHALIM	KOADWA	LI		
						1					4.0					
5_	5	SS-2	60/0	5.0			Moist, gray FINE SAN gravel, trace silt, trace v fragments.	D, trace coa weathered b	rse sand a edrock	and		BOULDERS	S encounte	red.		
							J				10.0					
10_				10.0								Weathered F	BEDROCK	fragi	ments.	
											12.0	Bottom of E	xploration	= 12'		1
15_																
20																
20_																
25_																
<u>30</u>	to <u>10 S</u>	oil Auger	ing													J
RE	MARK	S: 1. All	sample	s take	off auger	flights	S.									
							140# Wt x 30" fall on									
tra:	portions ce 0 to e 10 to ne 20 to l 35 t	10% o 20%	SS - S UT - S UP - F	Shelby	Spoon Tube Position	0 - 10 - 30 -	ionless Density  10 Loose - 30 Medium Dense - 50 Dense ) + Very Dense	Cohesive 0 - 4 4 - 8 8 - 15 15 - 30 30 +	Consist Sof Fire Stif Very S Har	t n T Stiff			5/6/18			

BORING CO	NTRACTOR	•				ordon R. Ar 200 Maii ucket, Rhoo	n Street le Island		LOCATION: MENTO			190	2	
LOG PREPA CONTR.		PBA	TOWN, ST PROJECT PBA NO.:		: 14	OFFICE:	/arwick,	Rhode de Sew			BORING TYPE: LINE & STA.: DFFSET:		751119	
GROUNDW AT			BAR. TYPE SIZE, I.D. HAMMER		AUGER	CASING	SAMP	5	CORE	BORING FO	TED-FINISHED REMAN: k:	N.	113/1 5N/70	ARO
LOCATION O	OF BORING		HAMMER	FALL		30				SOILS ENGI	₹.:		-	
DEPTH BELOW	CASING BLOWS	SAMPLE DEPTH	BLO		6" ON SAMF M - TO	PLER	MONIT G W		1	NTIFICATION COLOR, LOS	I OF SOIL &		SAMPLE	
SURFACE	PER FOOT	FROM - TO	0-6	6-12	12-18	18-24	INF	О.		JOINTS IN RO		NO.	PEN.	REC.
1204	10	022	15	8	19	17	DRY	4	DRY MET	IT RUAL DENSE		51	24	15
547	75	3-7	19	/1	26	3%	1	ə Bux	SANO, 7 SGRAVE	COARS Ly TRS LANGEN	E SAWD	52	24	15
89101		10'-12'	27	29	25	27	Dry	L	Day DE	Day DENSE GAL HAVE SI SOME COARSE SANDS LIVE TR. SILT ROCK MAKINEW		53	24	K
17							WET	8' 10	THE GILT ROCK ENGINEERS  THET VERY DON'SE BY BIND  SOND THE CHANGE SOND  SCREET THE SILT  WEATHOREM BEDROOK				<i>2-1</i>	/X
							3	SALL	& GRANGE	the sus fenen be hainer	OROOK			
									ROCK 1	AM ME				
,	Groundwater Refusal (Bed	was not obse rock) encount	erved during tered at 14 f	the drilling eet below	g operation. grade. The	encountere			v 1' of collapse v		red prior to the	boring ad	vancemer	nt.
GROUND SU		well was insta		the bedroo										
D=DRY JP=UNDISTU	W=WASHED	ON UB:	-UNDISTUF	P=PIT RBED, BAL	" CASING A=AUGER L CHECK	V=V	S/S ANE TES OPEN E	ST	"CASING TO	/2 F1	FOOTA NO. 0	GE IN EA GE IN R F SAMPL	OCK:	3
KUPUKIIO	NS USED: TI	RACE=0-10%	, LITTLE=10	)-20%, SO	ME=20-35%	6, AND 35-5	50%				HOLE	NO.	TYPE	

C-196 CASED

DID	OT Pr	raient	Bayside S	lewer War	rwick RI - Various location	s BORING	3#:	C-197		Sheet	2 of	2
		C/T) :		ARWICK		RIDOT	Data	base ID				
		00000	Troite / 11	FAP		Date Sta	rt :	6/6/18	Date	End: 6/	6/18	
	π. ge/Ro		Bayside		***	N Coord	.:	0		Ft.		
	-	nsult C	-	don Archi	hald Inc.	E Coord.	. :	0		Ft.		
		onsult			d Boring Contractors	Ground	Surf	ace Elev	, Ft.: 0.	0		
		Vasan Name/(		ry Fortier	/ GZA GeoEnvironmental,				IGVD29			
				y 1 ditie!	, 0211000		-					
Desc	riptio	Location: Med	lford St					0 1		tiona		
Samp	ler: Ur	less othe	rwise noted,	soil sampler	r consists of a 2 in. split	Date		Groundy Time	water Obse Depth	Casing at	Stab. Ti	me
Casin	g: Unic	oon drive ess other ng 24 in.	en using a 140 wise noted, ca	) lb hammer ising is drive	r, 30" fall. en using 300 lb hammer,	06/06/18		0:00	10		0.25 h	ır
Casin	ıg Size:	ng 24 m.		HS Auger	X	1					L	R
D E P T H	CB AL SO IW NS	Type & Number	SAMPLER Pen/ Depth Rcy. Core Rcy. & RQD	Blows per 6 in. (Coring min. [Downpress]	/ft)	LE DESCRIPTIC ication System	NC	Depth of Stratum Change		STRATUM ESCRIPTION		RE MARKS
Ft.	G/Ft.	SS-1	60/0 0.0	[LOGHILP CO.	Dry, brown-gray FINE SAN sand and gravel, trace silt.	ND, some coarse		0.3/	ASPHALT/	RAODWAY		3
-					Sand and graver, trace sit.							
5			5.0					4.0	BOULDER	S encountered.		
3_		SS-2	60/0		Moist, gray FINE SAND, to gravel, trace silt.	race coarse sand	and					
10_			10.0					10.0	Weathered I	BEDROCK fra	gments.	3
								12.0	Bottom of E	exploration = 12	2'	1
15_												
-												
20_												
25_												
30	to 10.5	oil Auger	ing									
			l samples take	n off auger f	lights.							
			•	-								
-		Y13	Committee !	Tuna	140# Wt x 30" fall on 2" Cohesionless Density Coh	OD SS Sampler	tencv					
tra litt	portions ce 0 to le 10 to ne 20 t	10% o 20%	Sampler' SS - Split 5 UT - Shelb UP - Fixed 1	Spoon y Tube	0 - 10 Loose 0 10 - 30 Medium Dense 4	-4 Soi -8 Firi -15 Stii	ît m ff	RIC#:				_
and		0 50%	C - Rock		50 + Very Dense 15	15 - 30 Very Stiff Date Completed: 6/6/18  Database ID No.:						

BORING CO	NTRACTOR	•				200 Mai ucket, Rho	R. Archibald, Inc.  D. Main Street  Rhode Island 02860  DRING LOG  SHEET:  LOCATION:  HOLE NO.:  BORING TYPE:					OF EV 60 198/	1 0h)
LOG PREPA	FORTHER	PBA	TOWN, S PROJECT PBA NO.:				Varwick, Rhode Bayside Sew		l	BORING TYPE: LINE & STA.: DFFSET:	<u>CA</u>	SING	
GROUNDY	VATER OBSE				AUGER	CASING	SAMPLER	CORE	SURFACE E				_
AT _72	FT. AFTER	44 HRS.	TYPE SIZE, I.D. HAMMER HAMMER			HW 300 30	5/5, 140 3		DATE STAR BORING FO INSPECTOR SOILS ENGI	t:	N	FORTH	40
LOCATION	OF BORING:	ME	neon	51,	MARW	ver, A	7						
DEPTH BELOW SURFACE	CASING BLOWS PER FOOT	SAMPLE DEPTH FROM - TO	BLC	FRO	6" ON SAMI M - TO	PLER	MONITORIN G WELL INFO.	ROCK INCL	NTIFICATION COLOR, LOS JOINTS IN RO	SS OF WASH	NO.	SAMPLE PEN.	REC.
	177		0-6	6-12	12-18	18-24	IIII O.	WATER,	JORATO HA FA	JON, LOT.	140.	J. LIV.	ALC.
1 6	25	0/21	10	18	5	5	pen 4	" ASCHA	W ROM	way	31	24	16
SON CONOR	44 57 59						1	Day MET	0. Des 56.	BR/BR			
2	35	5-7	11	21	12	11	MUIST DANS	I	NO, the Co		62	24	10
8	50						COMPS	MOST O					
10	7/	10'-12	11	13	10	10	WET 81	TR SILT		,	53	74	18
12	100						8	WET ME KNE SAX	DO BR. C.	Coney			-
							101	FINE SAX SAMO & G	raver, 1	R SILL			
								R	18 12	,			
								INS PA	1.B 12 NL 1.	w.			
										ŀ			
										ŀ			
										F			
							1			-			
										-			
										1			
	Groundwater Refusal (Bed	was not obse	rved during ered at 14	the drilling feet below	g operation. grade. The	encountere	Approximately ed bedrock appe			red prior to the	boring ad	vancemer	nt.
GROUND SU	RFACE TO			HW	" CASING	, THEN	515	CASING TO	/2 FT		GE IN EA		12
D=DRY UP=UNDISTU	W=WASHED JRBED, PIST			P=PIT	A=AUGER L CHECK	V=V	ANE TEST OPEN END RO			FOOTA	GE IN R		7
PROPORTIO	NS USED: TR	RACE=0-10%	LITTLE=1	0-20%, SC	ME=20-359	6, AND 35-	50%	J		HOLE		TYPE	3

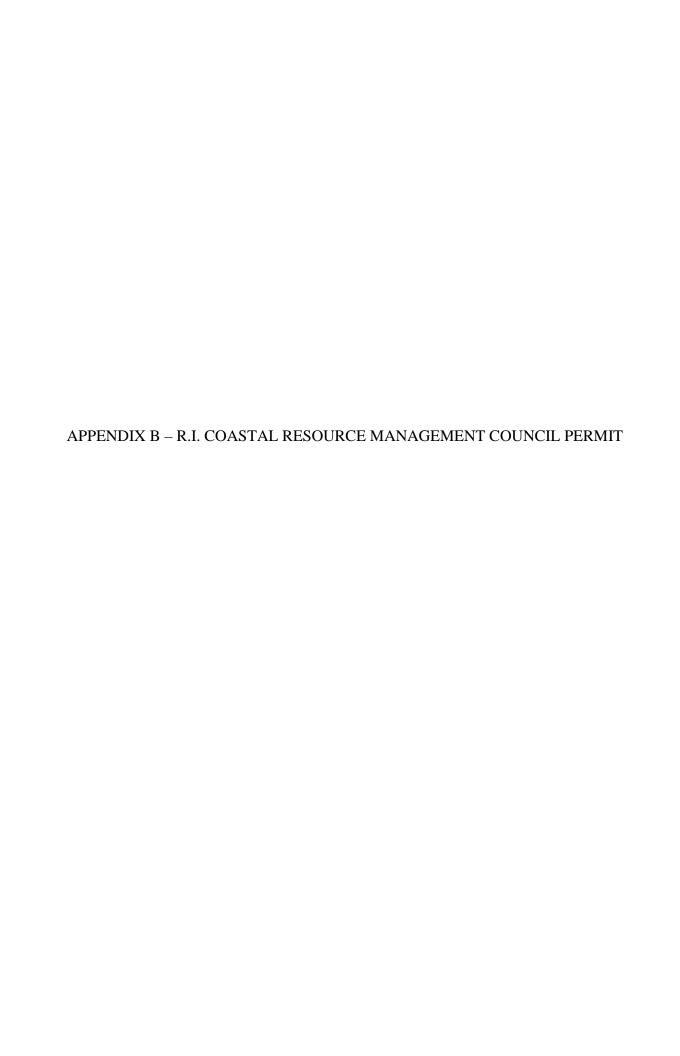
C-198 ON CASED

BORING CO	NTRACTOR:	-		Gordon R. Archibaid, Inc. 200 Main Street Pawtucket, Rhode Island 02860 BORING LOG								OF NEAR	
LOG PREPA CONTR.		PBA	TOWN, ST PROJECT PBA NO.:		± v ≥*		3 LOG /arwick, Rhode Bayside Sewe		€(	BORING TYPE LINE & STA.: OFFSET:		Robe	
GROUNDW	FORTER OBSE				AUGER	Name 1	SAMPLER	CORE	SURFACE	=1 EV :			_
AT	FT. AFTER	HRS.	TYPE		<i>\$\frac{5}{4}</i>					RTED-FINISHEI DREMAN: R:	17	19/19/19/19/19/19/19/19/19/19/19/19/19/1	ones
LOCATION			BLO	WS PER	5" ON SAME	DI FR	T				Т	SAMPLE	
DEPTH BELOW SURFACE	CASING BLOWS PER FOOT	SAMPLE DEPTH FROM - TO	0-6		M - TO	18-24	MONITORIN G WELL INFO.	ROCK INCL	NTIFICATIOI . COLOR, LC JOINTS IN R	SS OF WASH	NO.	PEN.	REC.
		501			ESPE PRO	138		V De Orto	NA ROK	PWAY			
2					-		Day 4	and the second second	55 AMD	LE MAN			
3		0-51	OFF	Bill	5R		My 2	1					
5		1725	DIE	Truc	15/2		BLAR	UNY DR	HNE SA	LANCE CARE			
9						-	Dey 4	TR SILO	LOBBE	E LANGER			
30		-1	100	ANS			my c'						
10		5-10	OFF	1709			81	Dry 61	LEY FINE	3 GRANZ			
12							wa nu	MISIL	_				
							1 ′′ .	WEI	nortens	D BEDWIX			
1			_		-		10'	ROCK	FRAGA	IENT			
							BORK		A PMO	,			
							1	13,	0, 13 18	7			
1													_
													$\vdash$
1													
						-	1						
			_										
											-	-	
							1						
							-						
Materi							1	4.6.11		1 1 -1 -4	hadaa a		
Notes:	Groundwate Refusal (Be	r was not obs	erved during ntered at 14	g the drilling feet belov	ng operation v grade. The	ı. e encounte	r. Approximately			tered prior to th	) boring a	avanceme	nt.
	URFACE TO		USED		74 " CASIN		**	" CASING TO	15.		AGE IN E		12
D=DRY UP=UNDIST	W=WASHE URBED. PIS			P=PIT RBED. BA	A=AUGE		VANE TEST OPEN END RO	OD.			TAGE IN I		2
PROPORTIC	ONS USED: 1	RACE=0-109	6. LITTLE=1	0-20%, S	OME=20-35	%, AND 35	-50%					TYPE	

HOLE NO. TYPE C-199 PROBE

BORING COI	. 0	•	Pawtucket, Rhode Island 02860 HOLE NO						SHEET: LOCATION: HOLE NO.:		0F 2040 - 70		
LOG PREPA	RED BY:		TOWN, ST		rawu	BORING			. 11 =	BORING TYPE LINE & STA.: OFFSET:		YSNG,	
CONTR.	FORTE	PBA	PROJECT PBA NO.:	NAME;		OFFICE:	bayside Sewe			OFF3E1.			
AT _ <i>[D</i> _		RVATIONS HRS.	TYPE SIZE, I.D.	A.C.	AUGER	Hw 4"	SAMPLER S/S	CORE	SURFACE DATE STAI BORING FO INSPECTO	RTED-FINISHEI OREMAN:	A):	217 18 57 DOG 10 P. TO	no
			HAMMER!	FALL		300	38		SOILS ENG			702.70	
DEPTH	CASING	SAMPLE	1	WS PER 6	" ON SAME	/	MONITORIN	FIELD IDE	NTIFICATIO	N OF SOIL &	T	SAMPLE	
BELOW SURFACE	BLOWS PER FOOT	DEPTH FROM - TO	0-6	FROI	M - TO 12-18	18-24	G WELL INFO.	ROCK INCL WATER,	COLOR, LO	OSS OF WASH ROCK, ECT.	NO.	PEN.	REC.
	16	1/2/		012	17/		- 4	11 ASPHA	UT ROI	roway	31	26	16
2345	31 26 45	0-2	12	_/(	- 7-7	2)	Dey.	DAY ME	DENSE	GREY FINE		100	
· //	51 35 53	5-7	22	24	3/	45	Day Bega		纪,加	SILT	52	24	12
1000	93							DAY VER	y DOUSE	GR COURSE PL FINE AMS			
//	105	10-12	3/	47	59	60	WET BENE	KTK 5161	, ,,,,,		53	24	13
タ		gailo					10	WET VE	control of	se long			
								TR FINE	SIND BE	TR SILT DROOK			
								Rock	FRAGALON	7)			
									ים על פו				
								110	smu a	w12'			
						-							
						-							
1				7 2 5									
						<u>†                                     </u>							
			-			-							
						<b>!</b>	1 1						
		_	-				1						
							1				_		
Notes:	Groundwate Refusal (Be	er was not ob	served durin ntered at 14	g the drillin feet below	g operation grade. Th	1. e encounte	Approximately red bedrock app			ntered prior to th	e boring a	l dvanceme	nt.
GROUND S			USED	thu		IG, THEN	69	" CASING TO	12		TAGE IN E		14
D=DRY UP=UNDIST	W=WASHE URBED, PIS	TON U	B=UNDISTU	P=PIT IRBED, BA	A=AUGE LL CHECK	OER	VANE TEST OPEN END RO	OD		NO	OF SAME	LES:	3
PROPORTIO	ONS USED:	FRACE=0-10	%, LITTLE='	10-20%, S	DME=20-35	%, AND 35	-50%			HOL	E NO.	TYPE	1 . 1.

C-200/OW





State of Rhode Island and Providence Plantations
Coastal Resources Management Council
Oliver H. Stedman Government Center
4808 Tower Hill Road, Suite 116
Wakefield, RI 02879-1900

MAR 21 2019 (401) 783-3370 WARWICK SEWER AUT (401) 783-2069

### **ASSENT**

	CRMC File No.:	2019-02-026	CRMC Assent No.:	A2019-02-026	
--	----------------	-------------	------------------	--------------	--

Whereas, of

Warwick Sewer Authority
125 Arthur W. Devine Boulevard
Warwick, RI 02886

has applied to the Coastal Resources Management Council for assent to: install a low-pressure sanitary sewer system to provide service to Bayside neighborhood using trenchless technology, and represents that they are the owner(s) of the riparian rights attached to the property involved and submitted plans of the work to be done.

Now, said Council, having fully considered said application in accordance with all the regulations as set forth in the Administrative Procedures Act does hereby authorize said applicant, subject to the provisions of Title 46, Chapter 23 of the General Laws of Rhode Island, 1956, as amended, and all laws which are or may be in force applicable thereto: install a low-pressure sanitary sewer system to provide service to Bayside neighborhood using trenchless technology; located at plat 335|355|356|380, lot |||; Bayside Sewer Systems, Warwick, RI, in accordance with said plans submitted to this Council and approved by this Council. All work being permitted must be completed on or before March 21, 2022 after which date this assent is null and void, (unless written application requesting an extension is received by CRMC sixty (60) days prior to expiration date).

Applicant agrees that as a condition to the granting of this assent, members of the Coastal Resources Management Council or its staff shall have access to applicant's property to make on-site inspections to insure compliance with the assent.

Licensee shall be fully and completely liable to State, and shall waive any claims against State for contribution or otherwise, and shall indemnify, defend, and save harmless State and its agencies, employees, officers, directors, and agents with respect to any and all liability, damages (including damages to land, aquatic life, and other natural resources), expenses, causes of action, suits, claims, costs (including testing, auditing, surveying, and investigating costs), fees (including attorneys' fees and costs), penalties (civil and criminal), and response, cleanup, or remediation costs assessed against or imposed upon Licensee, State, or the Property, as a result of Licensee's control of the Property, or Licensee's use, disposal, transportation, generation and/or sale of Hazardous Substances or that of Licensee's employees, agents, assigns, sublicensees, contractors, subcontractors, permittees, or invitees.

Nothing in this assent shall be construed to impair the legal rights of this granting authority or of any person. By this assent the granting authority by no manner, shape, or form assumes any liability or responsibility implied, or in fact, for the stability or permanence of said project; nor by this assent is there any liability implied or in fact assumed or imposed on the granting authority. Further, the granting authority by its representatives or duly authorized agents shall have the right to inspect said project at all times including, but not limited to, the construction, completion, and all times thereafter.

CRMC Assent No.: A2019-02-026

March 21, 2019 Page Two

This Assent is granted with the specific proviso that the construction authorized therein will be maintained in good condition by the owner thereof, his heirs, successors, or assigns for a period of fifty (50) years from the date thereof, after which time this permission shall terminate necessitating either complete removal or a new application.

Permits issued by the CRMC are issued for a finite period of time, confer no property rights, and are valid only with the conditions and stipulations under which they are granted. Permits imply no guarantee of renewal, and may be subject to denial, revocation, or modification.

If this matter appeared before the full Council, a copy of the legal decision from this proceeding may be acquired by contacting the CRMC office in writing.

A copy of this Assent shall be kept on site during construction.

Application for future alteration of the shoreline or other construction or alteration within the CRMC jurisdiction shall be submitted to the CRMC for review prior to commencing such activity.

All applicable policies, prohibitions, and standards of the RICRMP shall be upheld.

All local, state or federal ordinances and regulations must be complied with.

Please be advised that as a further conditions of this Assent, it is hereby stipulated that you and/or your agents shall comply at all times with Federal and State Water Quality Standards and other State standards and regulations regarding water quality, and shall exercise such supervision over and control of these facilities to prevent the dumping or discarding or refuse, sanitary wastes and other pollutants in the tidal waters, either from vessels docked at said facilities or from land adjacent thereto.

No work that involves alteration to wetlands or waters of the United States shall be done under this Assent until the required Federal Permit has been obtained.

Non-compliance with this assent shall result in legal action and/or revocation of this permit.

### **CAUTION:**

The limits of authorized work shall be only for that which was approved by the CRMC. Any activities or alterations in which deviate from this assent or what was detailed on the CRMC approved plans will require a separate application and review. Additionally, if the information provided to the CRMC for this review is inaccurate or did not reveal all necessary information or data, then this permit may be found to be null and void. Plans for any future alteration of the shoreline or construction or alteration within the 200' zone of CRMC jurisdiction or in coastal waters must be submitted for review to the CRMC prior to commencing such activity.

Permits, licenses or easements issued by the Council are valid only with the conditions and stipulation under which they are granted and imply no guarantee of renewal. The initial application or an application for renewal may be subject to denial or modification. If an application is granted, said permit, license and easement may be subject to revocation and/or modification for failure to comply with the conditions and stipulations under which the same was issued or for other good cause.

CRMC Assent No.: A2019-02-026

March 21, 2019 Page Three

ATTENTION: ALL STRUCTURES AND FILLED AREAS IN THE TIDAL, COASTAL, OR NAVIGABLE WATERS OF THE STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS ARE SUBJECT TO:

- 1. The Superior Property Rights of the State of Rhode Island and Providence Plantations in the Submerged and Submersible Lands of the Coastal, Tidal, and Navigable Waters;
- 2. The Superior Navigation Servitude of the United States;
- 3. The Police Powers of the State of Rhode Island and the United States to regulate Structures in the Tidal, Coastal, or Navigable Waters.

THE SUBMERGED AND SUBMERSIBLE LANDS OF THE TIDAL, COASTAL, AND NAVIGABLE WATERS OF THE STATE ARE OWNED BY THE STATE AND HELD IN TRUST FOR THE PUBLIC. CONVEYANCE OF THESE LANDS IS ILLEGAL; TITLES PURPORTING TO TRANSFER SUCH LANDS ARE VOID. ASSENTS THAT INVOLVE THE FILLING OR USE OF THE STATES SUBMERGED LANDS ARE GRANTED WITH THE PROVISO THAT IT IS SUBJECT TO THE IMPOSITION OF A USAGE FEE TO BE ESTABLISHED BY THE COASTAL RESOURCES MANAGEMENT COUNCIL.

The lands adjacent to tidal waters and/or access to these lands may be impacted or rendered unusable in the future due to sea level rise, storm surge, and shoreline erosion. Online resources including STORMTOOLS, Shoreline Change Maps, and Sea Levels Affecting Marshes Model (SLAMM) Maps can be accessed through the CRMC website (www.crmc.ri.gov). The Council recommends the use of these resources to evaluate the flood extent and inundation from sea level rise, storm surge and erosion and damages to land, aquatic life, loss of public access and other natural resources on and near the site of the above assent. The project life may be shortened by these processes and may require additional adaptation measure up to and including relocation of the project. By issuing this assent the granting authority neither explicitly nor implicitly assumes any liability or responsibility for the stability or permanence of said project under future climate and shoreline conditions.

### SPECIFIC STIPULATIONS OF APPROVAL

### **General Stipulations**

- A. The approved plans shall be those entitled "CITY OF WARWICK SYSTEM OF SEWERS, CONTRACT NO. 86B, BAYSIDE SEWER SYSTEM PRESSURE SEWERS..." sheet 1-48 dated January 2019 by GRA, Inc. stamped by Todd A. Ravenelle, P.E. Except as stipulated or modified herein, all details and specifications thereon shall be strictly adhered to. Any and all changes require written approval from this office.
- B. Unless specifically approved as being within the accepted limits of disturbance, no alterations or activities shall be allowed in an area of beach grass; nor shall materials be stockpiled nor disposed of on the area of beach grass, nor shall any heavy machinery operate within this area.
- C. No alterations (vegetative or otherwise) or activities are allowed on the coastal feature(s) or in the waterway adjacent to the site.

### **Earthwork Stipulations**

A. Prior to the initiation of site alterations or construction including the mobilization of construction vehicles, equipment or machinery, the Limit of Disturbance (LOD) shall be adequately delineated on site (by survey methods where appropriate). No equipment access, equipment or material storage or other activities including construction vehicle parking shall occur beyond the Limit of Disturbance, even on a temporary basis.

CRMC Assent No.: A2019-02-026

March 21, 2019 Page Four

- B. The approved Soil Erosion and Sediment Control Plan (SESCP) shall be that entitled: "SOIL AND EROSION AND SEDIMENT CONTROL PLAN FOR: BAYSIDE SEWER SYSTEM PRESSURE SEWERS, CONTRACT NO. 86B..." dated January 31, 2019.
- C. Prior to conducting earthwork and other land disturbing activities, the erosion, runoff and sediment control measures shown on the approved plan and/or those measures specified herein shall be installed and maintained in accordance with good engineering practices including the applicable details found in the manufacturer's specifications and/or in the Rhode Island Soil Erosion and Sediment Control Handbook (as amended). These measures must be maintained until the site is stabilized through the establishment of vegetative cover and/or construction of the approved facilities (buildings, roadways, parking areas, etc.) has stabilized soils sufficiently to prevent erosion and sedimentation.
- D. All excess excavated materials (soils, rock, gravel, etc.), excess construction materials, demolition debris, temporary erosion, runoff and sediment control measures, etc., shall be removed from the site for appropriate re-use and/or proper disposal at a suitable upland location or landfill. All toxic materials and waste shall be properly transported and disposed of in accordance applicable state and federal regulations.
- E. All excavated material shall be cast on the upslope side of the excavation to minimize sedimentation. No excavated material shall be stockpiled beyond the Limit of Disturbance (LOD) or in unauthorized locations.
- F. All areas of disturbed soils which are impacted by construction, site work and related activities shall be temporarily stabilized throughout the site construction period. Soil stabilization may be achieved through appropriate temporary measures as described by the Rhode Island Soil Erosion and Sediment Control Handbook (as amended). Where the season is not conducive to the establishment of vegetative cover, other temporary measures shall be employed including the application of mulch and/or use of fiber rolls (erosion control blankets, etc.). Temporary erosion, runoff and sediment controls shall be employed and maintained until temporary or permanent vegetative cover can be achieved and/or site improvements such as approved buildings, roadways and parking areas are constructed resulting in a lack of exposed soil.
- G. There shall be no discharge or disposal of toxic waste, hazardous materials, oil, grease and other lubricants, excess fertilizer, pesticides or other chemicals or controlled materials either on site or in any area which may enter a wetland, watercourse or groundwater. All spills of such materials shall be reported to the RI Department of Environmental Management for appropriate remediation. All used lubricants, excess chemicals, fertilizers, pesticides, etc., shall be removed from the site for transport, handling and disposal in accordance with all applicable state and federal regulations.
- H. Upon the successful stabilization of exposed soils, all temporary (interim) erosion, runoff and sediment control measures shall be removed from the site for re-use and/or for disposal at a suitable, legal upland location or landfill. All temporary sediment basins, sediment traps and channels, etc., shall be removed and/or restored in accordance with the approved site plans.
- I. Upon proper stabilization of the site, all temporary (interim) pollution prevention measures such as site access controls, tree-protection measures, concrete wash-out areas, waste management and fueling facilities, etc. shall be appropriately decommissioned and/or removed from the site for re-use or proper disposal of waste and other materials.

CRMC Assent No.: A2019-02-026

March 21, 2019

Page Five

### **Building Stipulations**

A. All pertinent requirements of the RI State Building Code as administered by the local building official shall be strictly adhered to.

In Witness Whereof, said Coastal Resources Management Council has hereto set their hands and seal this 21st day of March in the year two-thousand-and-nineteen.

effrey M. Willis, Deputy Director

Coastal Resources Management Council

# COASTAL RESOURCES MANAGEMENT COUNCIL NOTICE OF State of Ahode Asland and Providence Plantations

# ASSENT

Date: March 21, 2019

CRMC Assent No.: A2019-02-026

This certifies that Warwick Sewer Authority
l a low-pressure ology
situated at Bayside Sewer Systems
Plat No. 335 355 356 380 Lot No.
Said construction operations to be done in accordance with an approved assent on file in the Offices of the Coastal Resources Management Council and subject further to all the provisions of the building ordinances of the:
City/Town of Warwick
and to all the applicable State, Local and Federal provisions. This assent shall expire three (3) years from the date of this assent.

THIS CARD MUST BE DISPLAYED IN A CONSPICUOUS PLACE ON THE PREMISES. FAILURE TO DISPLAY WILL RESULT IN LEGAL ACTION.

Coastal Resources Management Council

APPENDIX C – R.I. DEPARTMENT OF ENVIRONMENTAL MANAGEMENT ORDER OF APPROVAL



### **RHODE ISLAND**

### **DEPARTMENT OF ENVIRONMENTAL MANAGEMENT**

**OFFICE OF WATER RESOURCES** 

235 Promenade Street, Providence, Rhode Island 02908

November ¹³, 2019

### **CERTIFIED MAIL**

The Honorable Joseph J. Solomon, Mayor Warwick City Hall 3275 Post Road Warwick, RI 02886

RE:

Order of Approval for Bayside Sewers (OA No. 1705; DEM File No.19-01)

Warwick, Rhode Island

### Dear Mayor Solomon:

The Office of Water Resources (OWR) has completed its review of the above referenced project as prepared by Gordon R. Archibald, Inc.

In accordance with Chapter 46-12 of the General Laws of the State of Rhode Island and the State's Water Quality Regulations, the contract documents for the subject project, as further described in the attached Order of Approval No. 1705, are hereby approved. Copies of the DEM stamped-approved contract documents will be hand delivered to staff at the Warwick Wastewater Treatment Facility.

To date, OWR has not received a Certificate of Approval (CA) application for State Revolving Fund (SRF) financial assistance. If SRF is anticipated for this project, please contact Jay Manning of this office at 222-4700 ext. 7254 for guidance in obtaining a CA. You are reminded that any costs incurred prior to obtaining the CA will not be eligible for reimbursement under the SRF program.

This approval does not waive your obligation to obtain necessary approvals from other agencies or offices. A copy of the approved plans and specifications will be forwarded to the Warwick Sewer Authority.

If you have any questions, please contact Alex Pinto at 222-4700 ext. 7227 or alex.pinto@dem.ri.gov.

Sincerely _

Angelo S. Liberti, P.E., Administrator Surface Water Protection Section

Office of Water Resources

ASL/AP:ap

Enclosure: Order of Approval No. 1705

Electronic copies:

Earl Bond, Executive Director, Warwick Sewer Authority

Todd Ravenelle, Gordon R. Archibald, Inc.

Jay Manning, OWR/SRF

# STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS DEPARTMENT OF ENVIRONMENTAL MANAGEMENT OFFICE OF WATER RESOURCES

In the Matter of the Application	)	
of the City of Warwick	)	
for Approval of a System or Means	)	No. 1705
to Prevent Pollution	ý	110. 1703

### ORDER OF APPROVAL

In the above entitled matter, wherein the City of Warwick, in Kent County, in the State of Rhode Island and Providence Plantations filed with the Department of Environmental Management contract documents marked "City of Warwick, Rhode Island, System of Sewers, Contract No. 86B, Bayside Sewer System Pressure Sewers" on the 11th day of February, 2019 and filed revisions on the 30th day of September 2019, 17th day of October 2019, and 7th day of November 2019, all defining the proposed installation of twenty-three thousand five hundred fifty-eight linear feet (23,558 l.f.) of two inch (2") HDPE pressure sewer pipe; twenty-two thousand five hundred forty-four linear feet (22,544 l.f.) of three inch (3") HDPE pressure sewer pipe; two thousand five hundred sixty-five linear feet (2,565 1.f.) of four inch (4") HDPE pressure sewer pipe; three thousand five hundred forty-two linear feet (3,542 l.f.) of six inch (6") HDPE pressure sewer pipe; one thousand four hundred twentyfive linear feet (1,425 l.f.) of eight inch (8") HDPE pressure sewer pipe; forty-five linear feet (45 l.f.) of sixteen inch (16") ductile iron gravity sewer; and appurtenances. The contract documents were prepared and signed by Gordon R. Archibald, Inc. for the City, describing a system or means to prevent pollution as described in Chapter 46-12 of the General Laws of 1956, as amended, which system or means said City desires to adopt in order to dispose of not more than two hundred eightyone thousand one hundred gallons per day (281,100 gpd) based on average daily flows.

Upon consideration thereof, the Department of Environmental Management approves this system or means to prevent pollution.

This Order of Approval shall remain in full force and effect as long as said system or means shall be operated and maintained in a condition satisfactory to the Department of Environmental Management.

The provisions of the Order of Approval shall apply to and be binding upon the owner, their agents, servants, employees, and all persons, firms and corporations acting under, through, and on behalf of them.

In the event of any change in control or ownership of facilities from which the authorized discharges originate, the owner shall notify the Department of Environmental Management with advanced written notice of such transfer. Succeeding owners shall be bound by all the conditions for this Order, unless a new or modified Order is obtained.

This Order shall be subject to modification, suspension or revocation in accordance with the law.

Entered as the Order of the Department of Environmental Management this 13⁷ day of 100 ven be 2019 A.D.

For the Director:

Angelo S. Liberti, P.E., Administrator

Office of Water Resources

Department of Environmental Management



### TECHNICAL REPORT

### **BAYSIDE SEWER PROJECT**

## DISCOVERY, EVALUATION, AND PLANNING THE MILL COVE SITE A SHAWOMET NATIVE AMERICAN VILLAGE

Warwick, Rhode Island

Alan Leveillee, RPA

with

Narragansett Indian Ethnohistorical Contributions
by

John Brown III and Nancy Brown-Garcia

Submitted to:

Warwick Sewer Authority 125 Arthur W Devine Blvd. Warwick, Rhode Island 02886

Submitted by:

The Public Archaeology Laboratory, Inc. 26 Main Street
Pawtucket, Rhode Island 02860



November 2018

PAL Report No. 3094

### PAL PUBLICATIONS

AUTOCAD SPECIALIST/CARTOGRAPHER DANA M. RICHARDI

GIS SPECIALIST JANE MILLER

EDITOR CATHY COFFIN

**PRODUCTION MANAGER** GAIL M. VAN DYKE

PRODUCTION/GIS ASSISTANT DANIELLE VERRIER

### MANAGEMENT ABSTRACT

The Public Archaeology Laboratory, Inc. (PAL) has completed Phase I archaeological assessment (2007 and 2008), feature evaluation (2015), and investigation of proposed Lateral sewer line hookup locations (2017) in roadways within the Bayside Sewer Project area in Warwick, Rhode Island. Results of the Phase I survey and feature evaluation indicated that a large and significant concentration of Native American cultural materials and features exists in the northern section of Warwick Neck, south of Mill Cove, focused around the Mill Cove Brook. Designated the Mill Cove Archaeological Site, it contains a wide range of feature and activity areas resulting from Native occupation and habitation between 3,000 and 350 years ago.

Tidewater Drive was considered a critical link in the Project because the main line that will service this portion of Warwick Neck needs to be constructed beneath the length of that roadway. In 2015, PAL conducted archaeological feature identification and evaluation by removing pavement and inspecting the exposed subsurface strata along a 6-foot-wide, approximately 4,250-foot length (0.8 mile) of Tidewater Drive from Friendship Avenue south to Arlington Avenue. Of the 84 features identified along Tidewater Drive, 78 resulted from Native American activity and 6 were determined to be of eighteenth- or nineteenth-century origins. A 39 percent sample (n = 33) of the suspected Native American features were excavated and analyzed (Leveillee 2016).

The results of archaeological investigations within the Project area have provided evidence of activities and behaviors from long-term and semi-permanent to permanent habitation by multiple families of horticulturalists and hunter-gatherers during the Archaic through Late Woodland to the Contact and English Settlement periods. Feature remnants across the Mill Cove Site have provided important data in meaningful spatial contexts, despite the greatly altered character of the landscape. Supported by historical documentation, the archaeological record confirmed the Bayside Sewer Project area as the location of the Narragansett Indian Shawomet Village.

The Shawomet Village/Mill Cove Site is eligible for listing in the National Register of Historic Places. Construction of the new sewer system in the Bayside neighborhood of Warwick should be planned and implemented to avoid impacts to significant and ceremonial cultural resources at the site.

As the pre-construction designs for the Project were being refined, archaeological investigations were conducted in 2017 in proposed construction-related locations for the Lateral sewer line hookups to identify any significant elements of the site. Where important archaeological deposits have been verified, alternative locations for the Lateral hookups will be used, and the identified remains will be avoided and preserved in place. This technical report describes the results of archaeological investigations to date, interpretations of those results, and recommendations for further consideration as the Project continues toward construction.

### TABLE OF CONTENTS

$\mathbf{M}$	ANAGEMENT ABSTRACT	i
1.	INTRODUCTION	1
1.	Project Description	
	History of Cultural Resource Services.	
	Phase I Archaeological Investigations and Archaeological Evaluation – Mill Cove Site	1
	(2007–2008)	1
	Archaeological Feature Identification and Evaluation – Tidewater Drive (2015)	
	Archaeological Feature Identification and Evaluation – Idewater Drive (2013)	
	Authority and PAL Scope	
	Personnel	
	Disposition of PAL Project Materials	
	Disposition of tAL troject Materials	/
2.	RESEARCH DESIGN AND FIELDWORK METHODS	Q
2.	Significance and Historic Contexts.	
	Archival Research	
	Site Files and State and Local Histories and Maps	
	Cultural Resource Management Reports and Related Literature Review	
	Environmental Studies	
	Archaeological Sensitivity Assessment	
	Pre-Contact Period Archaeological Sensitivity	
	Contact Period Archaeological Sensitivity	
	Post-Contact Period Archaeological Sensitivity	
	Fieldwork Methods	
	Phase I Archaeological Investigations (2007 and 2008)	
	Archaeological Evaluation – Mill Cove Site (2008)	
	Archaeological Feature Identification and Evaluation – Tidewater Drive (2015)	
	Archaeological Feature Identification and Evaluation – Lateral Hookup Locations (2017)	
	Laboratory Processing and Analyses	
	Processing	
	Cataloging and Analyses	
	Curation	
3.	ENVIRONMENTAL AND GEOLOGICAL SETTING	18
	Glacial Dynamics.	18
	Bedrock Geology and Soils	19
	Hydrology	
	Project Area Description.	
4.	PRE-CONTACT NATIVE AMERICAN CULTURAL CONTEXTAND LAND USE	
	PATTERNS FOR THE NARRAGANSETT BAY DRAINAGE AREA	21
	PaleoIndian Period (12,500–10,000 Years Before Present [B.P.])	
	Archaic Period (10,000–3000 B.P.)	
	Early Archaic Period (10,000–8000 B.P.)	
	Middle Archaic Period (8000–5000 B.P.)	

	Late Archaic Period (5000–3000 B.P.)	24
	Transitional Archaic Period (3600–2500 B.P.)	25
	Woodland Period (3000–450 B.P.)	26
	Early Woodland Period (3000–2000 B.P.)	26
	Middle Woodland Period (2000–1000 B.P.)	27
	Late Woodland Period (1000–450 B.P.)	27
5.	CONTACT AND POST-CONTACT CULTURAL CONTEXT, WARWICK, RHODE	
	ISLAND	
	Sixteenth and Seventeenth Centuries	
	English Settlement	
	Eighteenth and Nineteenth Centuries	34
6.	RESULTS: FEATURES AND CULTURAL MATERIALS	39
	Phase I Archaeological Investigations (2007–2008)	
	Archaeological Evaluation – Mill Cove Site (2008)	
	River Vue Avenue	
	Posner Avenue	
	Mill Cove Road	
	Lippitt Avenue	
	Whipple Avenue	
	Longmeadow Avenue, Ocean Avenue, and Tidewater Drive	
	Preliminary Interpretations and Recommendations (2008)	
	Archaeological Feature Identification and Evaluation – Tidewater Drive (2015)	49
	Feature 8	
	Feature 9	
	Feature 13	
	Feature 17	64
	Feature 21	64
	Feature 22	64
	Feature 23	71
	Feature 24	73
	Feature 25	73
	Feature 28	73
	Feature 29	80
	Feature 31	80
	Feature 32	85
	Feature 33	85
	Feature 34	90
	Feature 34A	90
	Feature 36	90
	Feature 38	99
	Features 39A and 39B	101
	Feature 40	105
	Feature 41	105
	Features 42A and 42B	112
	Feature 45	116
	Feature 50	116
	Features 53 and 54	116
	Feature 60	125
	Feature 61	125

	Feature 63	130
	Feature 70	130
	Feature 81	130
	Archaeological Feature Identification and Evaluation – Lateral Hookup Locations (2017)	133
	Clara Avenue	138
	Lippitt Avenue	142
	Longmeadow Avenue	146
	Lyndon Avenue	146
	Mill Cove Road	151
	River Vue Avenue	155
	Webb Avenue	155
7.	INTERPRETATIONS AND RECOMMENDATIONS	160
	Feature Characteristics, Contents, and Functions	160
	Interpretations of Activities and Evidence for Village Occupation	
	Project Area as an Archaeological and Anthropological Landscape	
	Expected Additional Data	165
AP	PPENDICES	
A.	CATALOG OF CULTURAL MATERIALS	181
n	DADYO CADDON DATEDIC	•••
B.	RADIO CARBON DATING	229
	PROJECT RELATED CORRESPONDENCE	241
C.	TRUJECI RELATED CORRESPONDENCE	241
D.	UNANTICIPATED DISCOVERIES PLAN	271

### LIST OF FIGURES

Figure 1-1.	Map of Rhode Island showing the location of the Bayside Sewer Project area in Warwick	2
Figure 1-2.	Aerial image showing the approximately 4,250-foot (0.8 mile) of Tidewater Drive from Friendship Avenue south to Arlington Avenue e in Warwick	3
Figure 1-3.	Map depicting approximate limits of the Mill Cove Site in the northern half of Warwick and the locations of the machine trenches where Native American features were identified	
Figure 3-1.	Map of Rhode Island showing glacial outwash deposits in the Bayside Sewer Project area	19
Figure 3-2.	Drainage basin map of Rhode Island showing the location of the Bayside Sewer Project area	20
Figure 4-1.	Drawing of Native American archaeological sites identified by amateur archaeologists in the vicinity of the Project area	29
Figure 5-1.	Map of southern New England showing tribal territories at the time of European contact	30
Figure 5-2.	Map of Rhode Island showing tribal territories in the seventeenth century	31
Figure 5-3.	Map of Shawomet Purchase Lands indicating the location of the Project area	32
Figure 5-4.	1871 map showing the location of the Project area	36
Figure 6-1.	Features identified in Trench 1, River Vue Road, 2008.	40
Figure 6-2.	Features identified in Trench 2, Posner Avenue, 2008	42
Figure 6-3.	Features identified in Trench 3, Mill Cove Road, 2008	43
Figure 6-4.	Features identified in Trench 4, Mill Cove Road, 2008	44
Figure 6-5.	Features identified in Trench 5, Lippit Avenue, 2008	45
Figure 6-6.	Features identified in Trench 7, Whipple Avenue, 2008	47
Figure 6-7.	Locations of trenches containing features, 2008 archaeological investigations	48
Figure 6-9a.	Location of trenches along Tidewater Drive, Friendship Street to Beatrice Avenue, 2015	51

Figure 6-9b.	Location of trenches along Tidewater Drive, Whipple Avenue to Lyndon Avenue, 2015	53
Figure 6-9c.	Location of trenches along Tidewater Drive, Riverside Avenue to Arlington Avenue, 2015	55
Figure 6-10a.	Feature 8 plan	58
Figure 6-10b.	Feature 8 profile	59
Figure 6-11a.	Feature 9 plan	60
Figure 6-11b.	Feature 9 profile	61
Figure 6-12a.	Feature 13 plan	62
Figure 6-12b.	Feature 13 profile	63
Figure 6-13a.	Feature 17 plan	65
Figure 6-13b.	Feature 17 profile	66
Figure 6-14a.	Feature 21 plan	67
Figure 6-14b.	Feature 21 profile	68
Figure 6-15a.	Feature 22 plan	69
Figure 6-15b.	Feature 22 profile	70
Figure 6-17a.	Feature 24 plan	74
Figure 6-17b.	Feature 24 profile	75
Figure 6-18a.	Feature 25 plan	76
Figure 6-18b.	Feature 25 profile	77
Figure 6-19a.	Feature 28 plan	78
Figure 6-19b.	Feature 28 profile	79
Figure 6-20a.	Feature 29 plan	81
Figure 6-20b.	Feature 29 Profile	82
Figure 6-21a.	Feature 31 Plan	83
Figure 6-21b.	Feature 31 Profile	84
Figure 6-22a.	Feature 32 Plan	86

Figure 6-22b.	Feature 32 Profile	87
Figure 6-23a.	Feature 33 Plan	88
Figure 6-23b.	Feature 33 Profile	89
Figure 6-24a.	Feature 34 Plan	91
Figure 6-24b.	Feature 34 Profile	92
Figure 6-25a.	Plan view of Feature 34A in spatial relation to Feature 34	93
Figure 6-25b.	Feature 34A Profile	94
Figure 6-26a.	Feature 36 Plan	95
Figure 6-26b.	Feature 36 Profile	96
Figure 6-27.	Feature 38 Plan	100
Figure 6-28a.	Features 39A and 39B in plan	102
Figure 6-28b.	Features 39A and 39B in profile	103
Figure 6-29a.	Feature 40 plan	106
Figure 6-29b.	Feature 40 profile	107
Figure 6-30a.	Feature 41 plan	108
Figure 6-30b.	Feature 41 profile	109
Figure 6-31.	Soil anomaly and rock near Feature 41	112
Figure 6-32a.	Features 42A and 42B in plan	113
Figure 6-32b.	Features 42A and 42B in profile	114
Figure 6-33a.	Feature 45 plan	117
Figure 6-33b.	Feature 45 profile	118
Figure 6-35.	Deer scapula bone recovered from Feature 45	119
Figure 6-34.	Scallop shell and oxidized copper fragment, 0–10 cm, Feature 45	119
Figure 6-36a.	Feature 50 plan	121
Figure 6-36b.	Feature 50 profile	122

Figure 6-37a.	Plan of Features 53 (left) and 54 (center - above menu board), and post mold (right)	123
Figure 6-37b.	Profile of Features 53 (left), 54 (center - beneath north arrow), and post mold (right)	)124
Figure 6-38a.	Feature 60 plan	126
Figure 6-38b.	Feature 60 profile	127
Figure 6-39a.	Plan view of Feature 61 60 cm below the road surface (Note the quartz Levana point in the east-central portion of the feature)	128
Figure 6-39b.	Feature 61 profile	129
Figure 6-40a.	Feature 63 plan	131
Figure 6-40b.	Feature 63 Profile	132
Figure 6-42a.	Feature 70 plan	134
Figure 6-42b.	Feature 70 profile	135
Figure 6-43a.	Feature 81 plan	136
Figure 6-43b.	Feature 81 profile	137
Figure 6-44.	Features 22, 23, 24, and 25 – Trench 1 on Clara Avenue	143
Figure 6-45.	Feature 14 – Trench 9 on Lippitt Avenue	144
Figure 6-46.	Sketch plan of Feature 10 – Trench 19 on Lippitt Avenue	145
Figure 6-47.	Feature 33 – Trench 6 on Longmeadow Avenue	147
Figure 6-48.	Feature 37 - Trench 17 on Longmeadow Avenue	148
Figure 6-49.	Features 27, 28, and 29 (north to south), Trench 4 on Lyndon Avenue	149
Figure 6-50.	Features 34, 35, and 36 – Trench 6 on Lyndon Avenue	150
Figure 6-51.	Feature 47 (south, right side) and Feature 48 (north, left) side – Trench 7 on Lyndon Avenue	152
Figure 6-52.	Features 50, 51, 52, 53, and 54 –Trench 8 on Lyndon Avenue	153
Figure 6-53.	Feature 7 – Trench 12 on Mill Cove Road	154
Figure 6-54.	Feature 12 at 50 cmbs –Trench 23 on Mill Cove Road.	156
Figure 6-55.	Feature 3 at 40 cmbs – Trench 14 on River Vue Avenue	157

### List of Figures

Figure 6-56.	Sketch plan of Feature 18 at 50 cmbs – Trench 4 on Webb Avenue with fragment of slate gorget and associated calcined bone in situ
Figure 6-57.	Sketch of slate gorget, Feature 18 – Trench 4 on Webb Avenue
Figure 6-58.	Map of Bayside Sewer Project area with locations of significant cultural features within the Mill Cove Site
Figure 7-1.	Illustration of activities at the pre-contact Mill Cove Site

### LIST OF TABLES

Table 4-1.	Pre-Contact Period Cultural Chronology for Southern New England	22
Table 6-1.	Characteristics of Shell Samples from Feature 13	57
Table 6-2.	Characteristics of Shell Samples from Feature 21	64
Table 6-3.	Characteristics of Shell Samples from Feature 22	71
Table 6-4.	Characteristics of Shell Samples from Feature 24	73
Table 6-5.	Characteristics of Shell Samples from Feature 28	80
Table 6-6.	Characteristics of Shell Samples from Feature 31	85
Table 6-7.	Characteristics of Shell Samples from Feature 32	85
Table 6-8.	Characteristics of Shell Samples from Feature 33	90
Table 6-9.	Characteristics of Shell Samples from Features 34 and 34A	97
Table 6-10.	Characteristics of Shell Samples from Feature 36	98
Table 6-11.	Characteristics of Shell Samples from Feature 38	101
Table 6-12.	Characteristics of Shell Samples from Features 39A and 39B	104
Table 6-13.	Characteristics of Shell Samples from Feature 40	110
Table 6-14.	Characteristics of Shell Samples from Feature 41	111
Table 6-15.	Characteristics of Shell Samples from Feature 42A and 42B	115
Table 6-16.	Characteristics of Shell Samples from Feature 45	120
Table 6-17.	Characteristics of Shell Samples from Feature 50	125
Table 6-18.	Characteristics of Shell samples from Feature 53	125
Table 6-19.	Characteristics of Shell samples from Feature 63	130
Table 6-20.	Bayside Sewer Project, Warwick, Rhode Island	138

### **CHAPTER ONE**

### INTRODUCTION

This report presents the results of archaeological investigations conducted by The Public Archaeology Laboratory, Inc. (PAL) for the proposed Bayside Sewer Project (the Project) in Warwick, Rhode Island. The Warwick Sewer Authority (WSA) is planning the construction of sewer lines on Warwick Neck within the Bayside community of the city (Figure 1-1).

### **Project Description**

The Bayside section of the City of Warwick is on the western margins of Narragansett Bay in Rhode Island's coastal physiographic zone. The area is suburban in character, a predominantly early to midtwentieth-century moderate-density neighborhood of single-family homes. All these homes have been serviced by individual septic systems that, in increasing numbers, have reached or surpassed their period of efficiency. The proposed Project is designed to replace the individual septic systems in the Bayside neighborhood with a newly built component of an interconnected citywide sewer network.

The Bayside Sewer Project will include the installation of approximately 44,000 linear feet (ft) of new main line sewer and 43,500 linear ft of new service main beneath existing roadways to service approximately 870 individual residential properties within the Bayside neighborhood. The Project is bounded northerly by Mill Cove, southerly by Ogden Avenue, westerly by Tidewater Drive, and easterly by Narragansett Bay. The  $\pm$  4,250-ft linear segment of sewer line that will run along and beneath Tidewater Drive, from Friendship Avenue south to Arlington Avenue (Figure 1-2), is a key component of the Project because the main line to service this portion of Warwick Neck needs be constructed beneath that section of Tidewater Drive. The sewer design also includes lateral hookups along roadways where connections will be made from the main line into adjacent homes.

### History of Cultural Resource Services

Phase I Archaeological Investigations and Archaeological Evaluation Mill Cove Site (2007–2008)

In 2007–2008, under contract with Gordon R. Archibald, Inc. (GRA), the Project engineering firm, PAL conducted an archaeological excavation and analyses to identify and evaluate potential historic properties within the Project's Area of Potential Effects (APE). The investigations identified the Mill Cove Site that occupies the northern half of Warwick Neck (Figure 1-3).

PAL completed Phase I archaeological assessment within the Bayside I, Bayside II, Bayside III, and Longmeadow sewer segments from March 2007 to July 2008. Areas of high and moderate sensitivity to contain archaeological deposits in meaningful contexts were recommended for further investigation. Phase I archaeological survey, including selective machine trenching, along existing roadways sampled areas of sensitivity and determined the presence/absence and range of any features and site types that exist under the roadways within the proposed sewer construction easements.

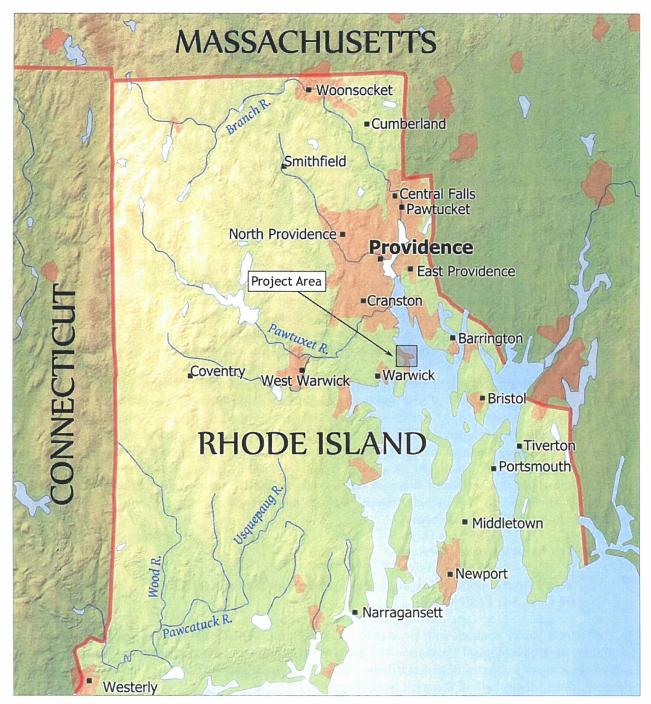


Figure 1-1. Map of Rhode Island showing the location of the Bayside Sewer Project area in Warwick (source: www.freeworldmaps.net/unitedstates/rhodeisland/map.html (May 2017).



Figure 1-2. Aerial image showing the approximately 4,250-foot (0.8 mile) of Tidewater Drive from Friendship Avenue south to Arlington Avenue e in Warwick.

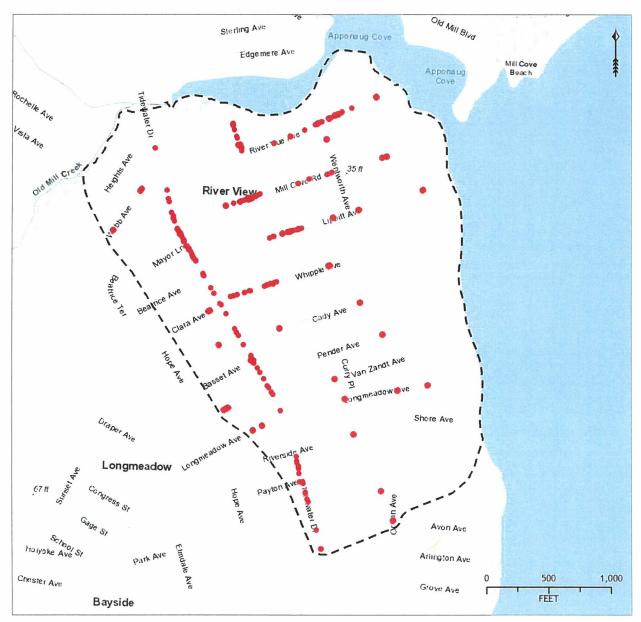


Figure 1-3. Map depicting approximate limits of the Mill Cove Site in the northern half of Warwick Neck and the locations of the machine trenches where Native American features were identified.

The results of the Phase I survey indicated that a large and potentially significant concentration of Native American cultural materials and features existed in the northern section of Warwick Neck, south of Mill Cove and focused around the Mill Cove Brook (see Figure 1-2). Designated the Mill Cove Site, the site contained a wide range of feature and activity areas resulting from Native occupation and habitation approximately 3,000 to 350 years ago (Leveillee 2008a, 2008b; PAL 2008). A working hypothesis was that the Mill Cove Site reflects the remnants of Pomham's seventeenth-century Shawomet Village, a documented location of armed conflict during King Philip's War (Leveillee 2009).

The initial evaluation of features began in May 2008, but was suspended in June 2008 when human skeletal remains and high concentrations of features were identified. From 2008 to 2015, GRA, the Environmental Protection Agency (EPA), the Rhode Island Historical Preservation and Heritage Commission/State Historic Preservation Office (RIHPHC/SHPO), and the WSA, in consultation with the Narragansett Indian

Tribal Historic Preservation Office (NITHPO), deliberated on design and construction options for the Project.

In 2012, the EPA determined that the Mill Cove Site is eligible for listing in the National Register of Historic Places (National Register) (EPA to RIHPHC May 16, 2012) and that archaeological investigations should be conducted along the length of Tidewater Drive to determine the number and types of cultural features beneath the roadway and those that could be project construction. Tidewater Drive is a design and construction keystone link in the proposed sewer line for the Bayside Segment of the Project, as the main line that services this portion of Warwick Neck will need to be constructed beneath this roadway.

# Archaeological Feature Identification and Evaluation Tidewater Drive (2015)

From September 4 to October 28, 2015, PAL conducted archaeological feature identification, including pavement removal and inspection of the exposed subsurface strata, along a 6-ft-wide and approximately 4,250-ft length of Tidewater Drive from Friendship Avenue south to Arlington Avenue.

A flat-bladed backhoe was used to open a continuous machine trench, north to south, along Tidewater Drive at consecutive lengths of approximately 100 ft. At the rate of approximately 100 ft per day, the subsoils were systematically exposed and suspected features were investigated by shovel and trowel. Confirmed features were documented with sketch plans and digital photography. Excavations were coordinated with the RIHPHC/SHPO and NITHPO. NITHPO representatives were on site to observe and to participate as research team members, providing insights and opinions about the features as they were encountered.

Of the 84 features identified along Tidewater Drive, 78 were considered to have resulted from Native American activity and 6 were determined to be of eighteenth- or nineteenth-century origins. Features were numbered consecutively as they were discovered (or rediscovered in the 2007-2008 trenches) from north to south. On October 21, 2015. PAL presented the results of the in-progress survey to the WSA, GRA, RISHPO, and NITHPO.

From October 21 to November 5, 2015, the WSA, GRA, EPA, RIHPHC/SHPO, NITHPO, and PAL discussed the results of the Tidewater Drive feature identification and PAL developed a scope of work to evaluate a representative sample of the 84 archaeological features. The consensus was that a 35 percent sample of the suspected Native American features would be excavated and analyzed. Diffuse and apparent shallow anomalies and small-diameter soil stains (including post molds) were not selected for further excavation. Instead, features with larger diameters (approximately 1 meter [m] or greater), with welldefined edges, and those suspected to be deeper purposefully dug pits and their deposited contents, were given excavation priority because they most likely would contain classes of data in meaningful contexts. If burials were among the identified features, they likely would be among the larger-diameter anomalies. A total of 30 of the features (Features 8, 9, 13, 17, 21–25, 28, 29, 31–34, 36, 38–42, 45, 50, 53, 54, 60, 61, 63, 70, and 81) were targeted for excavation and analyses. While in the field, 3 more features were determined by PAL and NITHPO to warrant excavation, resulting in a total of 33 features selected for further excavation and documentation.

From November 17 to December 14, 2015, PAL archaeologists, accompanied by NITHPO representatives, re-exposed the 30 targeted features and conducted systematic excavation and documentation.

#### Lateral Hookup Locations (2017)

From June 12 to December 14, 2017, PAL archaeologists, accompanied by Tribal monitors, completed machine-assisted survey of approximately 650 locations (lateral hookups) where individual homes will be connected to the primary sewer lines installed beneath and along the neighborhood streets. At each planned hookup location, indicated on Project plans, an approximately 8-x-8-ft excavation unit was established where the asphalt was saw-cut and removed. A flat-bladed backhoe was used to systematically remove remnant roadbed and disturbed fills to the depth of intact soil strata. The undisturbed soils were inspected for evidence of cultural material and potential features. Suspected features were mapped, drawn, and photographed. Features of potential significance and/or of a ceremonial nature, as determined by PAL archaeologists and Tribal representatives, were recommended for preservation in place and were not further excavated. When such features were identified, PAL, GRA field staff, and Native American monitors then worked collaboratively to identify and similarly investigate a nearby alternative lateral hookup location.

#### Authority and PAL Scope

The Bayside Sewer Project includes funding from the EPA's State Revolving Fund (SRF) Program (40 CFR 35) and is subject to review under Section 106 of the National Historic Preservation Act of 1966, as amended (54 USC 3100101 et seq.), and its implementing regulations (36 CFR 800). All tasks associated with the archaeological investigations and analyses were undertaken in accordance with the Secretary of the Interior's Standards for Archeology and Historic Preservation (48 FR 44716–44742, National Park Service 1983) and the RIHPHC's (2015) Performance Standards and Guidelines for Archaeology in Rhode Island. PAL conducted the archaeological investigations as conducted under State Archaeologist's Permit No. 15-12, issued by the RIHPHC on June 9, 2015. Key PAL personnel involved in the investigations meet the Secretary of the Interior's Professional Qualification Standards (36 CFR 61, Appendix A). Project planning included active participation of representatives of the NITHPO during design and development meetings and their monitoring and advising during the archaeological fieldwork.

#### Personnel

PAL personnel involved in the design and implementation of the archaeological studies were Deborah Cox (senior project manager), Alan Leveillee (principal investigator), and Daniel Forrest (senior operations manager). Fieldwork was conducted by Kirk Van Dyke (project archaeologist) and Alex Fleck, Sean Luttge, Colin Stevenson, Melissa Wales, Maggie Klejbuk, Michael Weaver, Sam Rousseau, Eric Lott, and Eric Fahey (archaeologists). Laboratory processing and cataloging were completed by Heather Olsen (laboratory manager), Kate Ericson, Perry Pelkey, and Danielle Cathcart, who were assisted by archaeologists Jessica Horn, Andrew Ritz, and Nate Orsi. Jessica Horn conducted the shell identification and compiled weight and relative percentage estimates by feature.

Narragansett Indian tribal representatives were John Brown III (NITHPO), Nancy Brown-Garcia (CDTHPO), Greg Stanton and Phyllis Coto-Santiago (Tribal Monitors), Max (Strongheart) Garcia, Mishi Garcia, Missesu Garcia, and Kyle Andrews. Captain Michael Stover represented the EPA; Dr. Timothy Ives and Charlotte Taylor represented the RIHPHC; Janine Burke-Wells represented the WSA; and Todd Ravenelle represented GRA.

PAL was also supported during fieldwork by members of the Warwick Police Department (Traffic Detail Department), the Rhode Island State Police, and the Rhode Island Medical Examiner's Office. Through the duration of this study, PAL supervised careful and systematic removal of pavement, fill, and topsoils via a flat-bladed backhoe operated by Francis Cox of Parker Construction.

PAL acknowledges the support of Mayor Scott Avedisian and his staff; Trish Reynolds of the Warwick Planning Department; Warwick City Councilman Ed Ladouceur; and the patient and courteous homeowners of the Bayside neighborhood.

# Disposition of PAL Project Materials

All documentation and cultural materials, field notes, maps, and photographs, are curated at PAL, 26 Main Street, Pawtucket, Rhode Island. PAL serves as a temporary curation facility until the State of Rhode Island designates a permanent repository.

## **CHAPTER TWO**

# RESEARCH DESIGN AND FIELDWORK METHODS

The goal of the archaeological survey and feature evaluation for the Tidewater Drive section of the Bayside Sewer Project was to re-locate and evaluate 33 previously identified features within the National Register-eligible Mill Cove Site. Three research strategies were used:

- archival research, including a review of historical literature and maps;
- field investigations, consisting of machine-assisted subsurface archaeological excavation and feature documentation; and
- laboratory processing and analyses of recovered cultural materials.

Archival research and review of results from previous studies (Leveillee 2008a, 2008b, 2009; PAL 2008) provided information necessary to develop research contexts for the Project area. Cultural materials recovered during the survey were analyzed to interpret the nature of past human activities they represent. The artifact analyses were correlated with the subsurface testing and other field survey data and the resulting information was interpreted within the environmental and historic contexts developed for the Project area. The result was the identification of archaeological features along Tidewater Drive that are associated with the Mill Cove Site. These features result from activities of the site's occupants and provide new data on temporality, subsistence practices, material culture, and ceremonialism. The features, individually and collectively, contribute to research related to Native American village occupation in the coastal zone during the Late Woodland Period to the Contact and Early Settlement Periods.

#### Significance and Historic Contexts

Different phases of archaeological investigation (Phase I intensive survey, Phase II site examination, and Phase III data recovery) reflect preservation planning standards for the identification, evaluation, registration, and treatment of archaeological resources (National Park Service [NPS] 1983). An essential component of this planning structure is the identification of archaeological and traditional cultural properties that are eligible for inclusion in the National Register. Archaeological properties can be a district, site, building, structure, or object, but are most often sites and districts (Little et al. 2000). Traditional cultural properties are defined generally as ones that are eligible for inclusion in the National Register because of their association with cultural practices or beliefs of a living community that (a) are rooted in that community's history, and (b) are important in maintaining the continuing cultural identity of the community (Parker and King 1998). The results of professional surveys and consultation with Native American or other ethnic communities are used to make recommendations about the significance and eligibility of archaeological and traditional cultural properties.

An archaeological property may be pre-contact, post-contact, or contain components from both periods. Pre-contact (or what is sometimes termed "prehistoric") archaeology focuses on the remains of indigenous American societies as they existed before substantial contact with Europeans and the resulting written records (Little et al. 2000). In accordance with the NPS guidelines, "pre-contact" is used, unless directly quoting materials that use "prehistoric." There is no single year that marks the transition from pre-contact to post-contact.

Post-contact (or what is often termed "historical") archaeology is the archaeology of sites and structures dating from time periods since significant contact between Native Americans and Europeans. Documentary records and oral traditions can be used to better understand these properties and their inhabitants (Little et al. 2000). Again, for reasons of consistency with the NPS guidelines, "post-contact" is used when referring to archaeology of this period, unless directly quoting materials that use "historical."

The NPS has established four criteria for listing significant cultural properties in the National Register (36 CFR 60). The criteria are broadly defined to include the wide range of properties that are significant in American history, architecture, archaeology, engineering, and culture. The quality of significance may be present in districts, sites, buildings, structures, and objects that possess integrity of location, design, setting, materials, workmanship, feeling, and association. The criteria (known by the letters A-D) allow for the listing of properties

- A. that are associated with events that have made a significant contribution to the broad patterns of our history; or
- B. that are associated with the lives of persons significant in our past; or
- C. that embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or
- D. that have yielded, or may be likely to yield, information important to prehistory or history.

Archaeological and traditional cultural properties can be determined eligible for listing in the National Register under all four criteria but must meet at least one (Little et al. 2000; Parker and King 1998). Archaeological properties listed under Criteria A or B must have a demonstrated ability to convey their associations with events, persons, or patterns significant to our history. Criterion C is intended to recognize properties that are significant expressions of culture or technology (especially architecture, artistic value, landscape architecture, and engineering) (Little et al. 2000:26). Under Criterion C, an archaeological property must have remains that are well-preserved and clearly illustrate the design and construction of a building or structure (Little et al. 2000:27).

For Criterion D, under which most archaeological properties are determined eligible for listing in the National Register, only the potential to yield important information is required (Little et al. 2000:22). However, it is important to consider whether the data derived from a site are unique or redundant, and how they relate to the current state of knowledge relating to the research topic(s). A defensible argument must establish that a property "has important legitimate associations and/or information value based upon existing knowledge and interpretations that have been made, evaluated, and accepted" (McManamon 1990:15).

Another critical component in assessing the significance of a historic property is an evaluation of its integrity. Historic properties either retain integrity (i.e., convey their significance) or they do not. The National Register criteria recognize seven aspects or qualities that, in various combinations, define integrity:

- location, the place where the historic property was constructed or the place where the historic event
- design, the combination of elements that create the form, plan, space, structure, and style of a property;
- setting, the physical environment of a historic property;

- materials, the physical elements that were combined or deposited during a particular period of time and in a particular pattern or configuration to form a historic property;
- workmanship, the physical evidence of the crafts of a particular culture or people during any given period in history or prehistory;
- feeling, a property's expression of the aesthetic or historic sense of a particular period of time; and
- association, the direct link between an important historic event or person and a historic property.

To retain historic integrity, a property will always possess several, and usually most, of these qualities. The retention of specific aspects of integrity is paramount for a property to convey its significance. Determining which of these aspects or qualities are most important to a particular property requires knowing why, where, and when the property is significant (NPS 2002). Recent systematic archaeological investigations conducted within plowed agricultural landscapes in Rhode Island demonstrate that partially truncated features can still exist in meaningful horizontal and vertical contexts below disturbed strata. These features can retain sufficient physical integrity to contribute to the significance of historic properties (Flynn et al. 2014).

The criteria are applied in relation to the historic contexts of the resources as follows:

A historic context is a body of thematically, geographically, and temporally linked information. For an archaeological property, the historic context is the analytical framework within which the property's importance can be understood and to which an archaeological study is likely to contribute important information (Little et al. 2000).

For traditional cultural properties, a historic context is further defined as follows:

A historic context is an organization of available information about, among other things, the cultural history of the area to be investigated, that identifies "the broad patterns of development in an area that may be represented by historic properties" (48 FR 44717). The traditions and lifeways of a planning area may represent such "broad patterns," so information about them should be used as a basis for historic context development. Based on federal standards and guidelines, groups that may ascribe traditional cultural values to an area's historic properties should be contacted and asked to assist in organizing information on the area (Parker and King 1998).

The formulation of historic contexts is a logical first step in the design of an archaeological investigation and is crucial to the evaluation of archaeological and traditional cultural properties in the absence of a comprehensive survey of a region (NPS 1983). Historic contexts provide an organizational framework that groups information about related historic properties based on a theme, geographic limits, and chronological periods. A historic context should identify gaps in data and knowledge to help determine what significant information may be obtained from the resource. Each historic context is related to the developmental history of an area, region, or theme (e.g., agriculture, transportation, and waterpower), and identifies the significant patterns of which a particular resource may be an element. Only those contexts important to understanding and justifying the significance of the property need be discussed.

Historic contexts are developed by

- identifying the concept, time period, and geographic limits for the context;
- collecting and assessing existing information about these time periods;
- identifying locational patterns and current conditions of the associated property types;

- synthesizing the information in a written narrative; and
- identifying information needs.

"Property types" are groupings of individual sites or properties based on common physical and associative characteristics. They serve to link the concepts presented in the historic contexts with properties illustrating those ideas (NPS 1983, 48 FR 44719).

The following historic research contexts have been developed to organize the data relating to the archaeological resources identified within the Bayside Sewer Project area:

- 1. Pre-contact Native American land use and settlement in the Western Narragansett Bay Coastal Zone circa (ca.) 12,500–450 years before the present (B.P.); and
- 2. Warwick, Rhode Island, in the Contact and English Settlement Period ca. A.D. 1640-1775.

#### Archival Research

The development of a cultural context and a predictive model of expected property types and densities within the Project area began with archival research, consisting of an examination of primary and secondary documentary sources. These sources include written and cartographic documents relating both to past and present environmental conditions and documented/recorded sites in the Project area vicinity.

## Site Files and State and Local Histories and Maps

RIHPHC and PAL databases were reviewed to locate recorded Pre-Contact, Contact, and Post-Contact Period sites within or close to the Project area, including those listed or eligible for listing in the National Register.

Rhode Island and Warwick histories and maps were also reviewed (Beers 1870; Chapin 1927, 1931; D'Amato 1992; Everts and Richards 1895; Field 1896; Fuller 1875; Potter 1835; RIHPC 1981, 1986; Rider 1889, 1904; Salwen and Mayer 1978; Stevens 1831).

#### Cultural Resource Management Reports and Related Literature Review

Cultural resource management (CRM) reports, published articles, and reports of other research conducted in the Project vicinity were reviewed: Bernstein (1990, 1992, 1993); Chapin (1927); Cook (1985); Flynn et al. (2014); Fowler (1952, 1956, 1962, 1964, 1967, 1968a, 1968b); Handsman (1995); Harrison and Leveillee (1995); Holstein and McNiff (1987); Kerber (1984, 1994, 1997); Kerber et al. (1989); Greenspan (1989); Leveillee (1993, 2001, 2005, 2008a, 2008b, 2009, 2010, 2016); Leveillee and Waller (1999, 2001); Morenon (1984, 1990); PAL (2008); Robinson et al. (1985); Simmons (1970); Smith et al. (n.d.); Taylor (1997); Waddicor (1969); Waddicor and Mitchell (1969); and Waller and Leveillee (1997,1999, 2002a, 2002b, 2002c).

#### **Environmental Studies**

Bedrock and surficial geological studies provided information about the region's physical structure and about geological resources near the Project area (Hermes et al. 1994). The United States Department of Agriculture (USDA 1981) Soil Conservation Service soil survey of Rhode Island supplied information about soil types and surficial deposits within the Project area and the general categories of flora and fauna that these soil types support. In addition, studies of past environmental settings of New England were consulted (Bernstein 1990; Boothroyd and Freeman n.d.; Braun 1974; Hasenstab 1991; Lavin 1988; Morenon 1984; Mulholland 1988; Nicholas 1991; Schoonmaker and Foster 1991).

## Archaeological Sensitivity Assessment

# Pre-Contact Period Archaeological Sensitivity

Archaeologists have documented nearly 12,000 years of pre-contact Native American occupation of the region. Prior to 7,000 years ago, peoples focused primarily on inland-based resources and on hunting and collecting along the Northeast's waterways. After 7,000 years ago, settlement became more concentrated within the region's major river drainages. By 3,000 years ago, concurrent with a focus on coastal and riverine settlement, large populations lived in nucleated settlements and developed complex social ties, with language, kinship, ideology, and trade linking peoples across the Northeast. During the centuries before European contact, these groups began to coalesce into the peoples known as Pocumtuck, Nipmuck, Massachusett, Wampanoag, Pokanoket, Mohegan, Pequot, and Narragansett.

Predictive modeling for large-scale site location in southern New England has its roots in academic research, including Dincauze's (1974) study of reported sites in the Boston Basin and Mulholland's (1984) research about regional patterns of change in pre-contact southern New England. Peter Thorbahn and others (Thorbahn et al. 1980) applied ecological modeling and quantitative spatial analysis to synthesize data from several hundred sites in southeastern New England and demonstrated that the highest concentration of pre-contact sites occurred within 300 meters (m) of low-ranking streams and large wetlands. The distribution of sites found along a 14-mile I-495 highway corridor in the same area reinforced the strong correlations between proximity to water and site locations (Thorbahn 1982). These studies and other large-scale projects provided data for developing models of Native American locational and temporal land use (MHC 1979, 1982a, 1982b, 1984; RIHPC 1982, 1986) that became the foundation for site predictive modeling used during CRM surveys.

Today, assessment of archaeological sensitivity within a given area, and the sampling strategy applied to it, takes existing physiographic conditions into consideration, including bedrock geology, river drainages, and microenvironmental characteristics. These categories of data are used to establish the diversity of possible resources through time, the land use patterns of particular cultures, and the degree to which the landscape has been altered since being occupied (Leveillee 1999a). Increasingly, social and cultural perspectives, as reflected in both the archaeological and historical records (Johnson 1999), and as expressed by representatives of existing Native American communities (Kerber 2006), are considered when assessing archaeological sensitivity. Archaeological sampling strategies have also been evaluated and refined through applications of quantitative analyses (Kintigh 1987, 1992).

Geologic data provide information about lithic resources and current and past environmental settings and climates. Bedrock geology helps to identify where pre-contact Native Americans obtained raw materials for stone tools and indicates how far from their origin lithic materials may have been transported or traded. The variety and amount of available natural resources depend on soil composition and drainage, which also play a significant role in determining wildlife habitats and forest and plant communities.

Geomorphology assists in reconstructing the paleoenvironment of an area and is particularly useful for early Holocene (PaleoIndian and Early Archaic) sites in areas that are different physically from 10,000 years ago (Simon 1991). Recent landscape changes, such as drainage impoundments for highways and railroads, the creation of artificial wetlands to replace wetlands affected by construction, or wetlands drained for agricultural use, can make it difficult to assess an area's original configuration and current archaeological potential (Hasenstab 1991:57).

Beyond predicting where sites are located, archaeologists attempt to associate cultural and temporal groups with changes in the environmental settings of sites. Changes in the way pre-contact Native Americans used the landscape can be investigated through formal multivariates such as site location, intensity of land use, and specificity of land use (Nicholas 1991:76). However, distinguishing the difference between repeated short-term, roughly contemporaneous occupations and long-term settlements is difficult, and can make interpreting land use patterns and their evolution problematic (Nicholas 1991:86).

## Contact Period Archaeological Sensitivity

The Contact Period in New England dates from about A.D. 1500 to 1650 and predates most of the permanent Euro-American settlements in the region. This period encompasses a time when Native and non-Native groups interacted with one another through trade, exploration of the coastal region, and sometimes conflict. While Contact Period sites are usually associated with Native American activity, they can also include sites such as forts, trading posts, and battlefields.

Native settlement patterns during the Contact Period are generally thought to follow Late Woodland traditions, but with an increased tendency toward fortifications and village settlements. Larger village settlements frequently occurred along the coastal zone (Leveillee et al. 2006). Inland villages were focused near river confluences and swamp systems, which were exploited both as resource areas and as places of refuge in the event of attack. Such sites would likely contain material remnants reflecting the dynamics of daily life, trade, and conflict.

The identification of Contact Period deposits is most frequently tied to the types of artifacts located within archaeological sites. Much of the archaeological data for this period in southern New England comes from analyses of grave goods within identified Native American burial grounds, rather than from habitation sites and/or activity areas (Gibson 1980; Robinson et al. 1985; Simmons 1970). The available data suggest that sites dating to this period often contain traditionally pre-contact features and artifacts (e.g., storage pits and chipped-stone tools) and non-Native trade goods and objects (e.g., glass beads, iron kettles, and hoes) (Bragdon 1996). The earliest Contact Period sites are often located at or near the coast and estuarine margin, since Europeans travelled to New England by ship. Non-Native artifacts passed from the coastal region to the interior through trade and/or seasonal travel.

#### Post-Contact Period Archaeological Sensitivity

The landscape of a given area is used to predict the types of post-contact archaeological sites likely to be present. Major locational attributes differ according to site type. Domestic and agrarian sites (houses and farms) are characteristically located near water sources, arable lands, and transportation networks. Industrial sites (e.g., mills, tanneries, forges, and blacksmith shops) established before the late nineteenth century are typically located close to waterpower sources and transportation networks. Commercial, public, and institutional sites (e.g., stores, taverns, inns, schools, and churches) are usually near settlement concentrations with access to local and regional road systems (Ritchie et al. 1988).

Written and cartographic documents aid in determining post-contact archaeological sensitivity. Historical maps are particularly useful for locating sites in a given area, determining a period of occupation, establishing the names of past owners, and providing indications of past use(s) of the property. Town histories often provide information, including previous functions, ownership, local socioeconomic conditions, and political evolution, which is used to develop a historic context and to assess the relative significance of a post-contact site.

The written historic record, however, tends to be biased toward the representation of Euro-American cultural practices and resources, particularly those of prominent individuals and families. Archival materials generally are less sensitive to the depiction of cultural resources and activities associated with socioeconomically or politically "marginalized" communities (McGuire and Paynter 1991; Scott 1994), including, but not limited to, Native Americans, African Americans, and "middling" farming or working-class Euro-Americans. Several archaeological studies conducted throughout New England have demonstrated the methodological pitfalls of relying exclusively on documentary and cartographic materials to identify potential site locations associated with these types of communities. A large-scale archaeological study by King (1988) showed that in rural areas, only 63 percent of the sites discovered were identifiable through documentary research. This suggests that approximately one-third of New England's rural Euro-American archaeological sites may not appear on historical maps or in town and regional histories.

Other archaeological and ethnohistoric studies in the region have focused on identifying other historically "invisible" communities, notably post-contact Native American communities. Several townwide surveys in southeastern Massachusetts have compiled archaeological and historical data about eighteenth- and nineteenth-century Native American and African American communities that are poorly represented or are altogether absent in written town histories (Herbster and Cox 2002; Herbster and Heitert 2004). In central Massachusetts, active and influential Native Americans have been identified through archival research, despite the recorded "disappearance" of this group in the early eighteenth century (Doughton 1997, 1999). The cultural continuity of groups such as the Aquinnah Wampanoag is more thoroughly documented in archival sources, but until recently, archaeologists focused their attention on pre-contact archaeological deposits. Relevant studies include predictive models for distinctly Native American post-contact sites and interpretations of eighteenth- through twentieth-century archaeological sites (Cherau 2001; Herbster and Cherau 2002).

Other archaeological investigations have focused on worker housing and landscape organization within mixed cultural mining communities in northern New England (Cherau et al. 2003); the social and spatial organization of a mixed racial community in western Connecticut (Feder 1994); and material culture and architectural patterns among nineteenth-century mixed African American and Native American households in central Massachusetts (Baron et al. 1996).

Information about post-contact land use within a given area can also be collected through written and oral histories passed through family members and descendant communities. These types of information sources can often fill gaps in the documentary record and provide details unavailable through more conventional archival sources. Although informants, other oral sources, and the documentary record can contradict each other, this type of information can also provide important data for identifying and interpreting archaeological sites. However, the sole use of and reliance on the written and oral historical records during archival research can underestimate the full range of post-contact sites in any given region. Therefore, walkover surveys and subsurface testing, in conjunction with the critical evaluation of available documentary and cartographic resources, are required to locate and identify under-documented post-contact sites.

#### Fieldwork Methods

#### Phase I Archaeological Investigations (2007 and 2008)

PAL conducted initial Phase I archaeological surveys within the Project area in 2007 and 2008. Because the sewer lines will be constructed beneath existing roadways, the survey methodology relied primarily on monitored excavations of machine trenches dug with a flat-bladed backhoe along and within existing paved roads. Representative areas of roadway previously assessed as archaeologically sensitive were selected for the Phase I surveys of the Bayside I, Bayside II, Bayside III, and Longmeadow sewer segments. Supplemental investigations were conducted along the Tidewater Drive sewer construction easement (Leveillee 2008a, 2008b, 2009; PAL 2008). Within those areas assessed as sensitive, streets were marked

with paint to indicate where machine trenching was planned. Following coordination with Digsafe and the Warwick Water Department, the asphalt road surface was saw cut and removed. flat-bladed backhoe was used to systematically remove the layers of underlying gravel roadbed and any fill layers to a depth where original and generally undisturbed topsoil and/or subsoil strata were observed.

Artifact concentrations or features resulting from cultural activity observed in the freshly exposed generally undisturbed topsoil and/or subsoil strata were documented (mapped and photographed) but no further excavations were completed pending consultation among the RIHPHC/SHPO, NITHPO, EPA, and WSA. Once features and material concentrations were noted, they were covered with plastic, trenches were backfilled, and the asphalt street surface was restored.

## Archaeological Evaluation - Mill Cove Site (2008)

The methodology for exposing features and material concentrations during the initial phase of archaeological evaluation of Mill Cove Site features was consistent with that employed during the earlier Phase I fieldwork. Locations beneath the roadways that were assessed as highly sensitive to contain archaeological deposits were targeted. The roadbed surface was marked with paint, saw-cut, and removed along the construction easement as indicated on Project plans. A flat-bladed backhoe was used to systematically remove the roadbed and any fill strata to the fill/subsoil interface. Exposed surfaces were cleaned by hand with shovel and trowel to determine if features were present. Any features identified through this process were documented (mapped and photographed) but no further excavations were completed, pending ongoing communication and consultation among the RISHPO, NITHPO, WSA, GRA, and EPA. Once features and material concentrations were noted, they were covered with plastic, trenches were back-filled, and the asphalt street surface was restored

#### Archaeological Feature Identification and Evaluation – Tidewater Drive (2015)

From September 4 to October 28, 2015, PAL identified and documented 84 features after payment was removed and the exposed subsurface strata was inspected along a 6-ft-wide and approximately 4,250-ft length of Tidewater Drive from Friendship Avenue south to Arlington Avenue. Seventy-eight of the features were considered to have resulted from Native American activity and six were determined to be of eighteenth- or nineteenth-century origins. Locational data for all features were collected utilizing a Trimble Geo 7X (submeter) Global Positioning System (GPS) unit, and GIS and Shape File maps were generated.

On the basis of PAL and NITHPO recommendations, a 35 percent sample (n = 30) of the features of suspected Native American origins were selected for additional study. While in the field, three more features were determined by PAL and NITHPO to warrant excavation, resulting in a total of 33 features selected for further excavation and documentation from November 17 to December 14, 2015. These features were sectioned, with half excavated in 10-cm vertical levels and the soils sifted through ¼-inch screening. Recovered cultural materials were recorded and collected by level within feature fill(s). Once the initial half was excavated and the profile drawn and photographed, soil samples were recovered from the remaining half of the feature for later flotation and processing. The remaining half of the feature was screened to recover lithics, shell, bone, and ceramics by depositional lenses recognized within the feature profile.

#### Archaeological Feature Identification and Evaluation - Lateral Hookup Locations (2017)

From June 12 to December 14, 2017, PAL archaeologists, accompanied by Tribal monitors, completed machine-assisted study of approximately 650 locations (Lateral hookups) where individual homes will be connected to the primary sewer lines to be installed beneath and along the neighborhood streets. At each planned hookup location indicated on Project plans, an approximately 8-x-8-ft excavation unit was

established where the asphalt was saw-cut and removed. A flat-bladed backhoe was used to systematically remove remnant roadbed and disturbed fills to the depth of exposing intact soil strata. The undisturbed soils were inspected for evidence of any cultural material and potential features. Suspected features were mapped, drawn, and photographed. Features of potential significance and/or of a ceremonial nature (determined by PAL archaeologists with Tribal representatives) were recommended for preservation in place and were not further excavated. Instead, PAL, GRA field staff, and Native American monitors worked collaboratively to identify and similarly investigate an alternative Lateral hookup location nearby.

## Laboratory Processing and Analyses

#### Processing

All cultural materials recovered from the archaeological investigations were organized by assigned feature number and provenience, recorded, and checked in at PAL's laboratory facility on a daily basis. Cultural materials were sorted by type and either dry brushed or cleaned with tap water depending on the material or artifact type and condition.

## Cataloging and Analyses

All cultural materials were cataloged using a customized relational database, which provides the flexibility that is needed when cataloging archaeological collections that often contain disparate cultural materials such as stone, ceramics, and/or glass. Artifacts with similar morphological attributes were grouped into lots, which allows for efficient cataloging. The artifacts were placed in 2-mil-thick polyethylene resealable bags with acid-free tags containing provenience identification information. These bags were placed in acid-free boxes that are labeled and stored in PAL's curatorial facility in accordance with current state and federal standards.

Culturally modified lithic materials, such as stone tools and chipping debris, were identified in terms of material, size (0–1 cm, 1–3 cm, 3–5 cm, etc.), and color. A lithic-type collection, maintained at PAL and containing materials from various source areas in New England and nearby regions such as New York and Pennsylvania, was used to identify all lithic materials. Chipping debris was classified as either flakes or shatter. Pieces of debitage showing evidence of a striking platform, bulbs of percussion, or identifiable dorsal or ventral surfaces were called flakes. Debitage without these attributes, and exhibiting angular or blocky forms, were classified as shatter. Lithic debris was examined for edges that had been modified by use wear or intentional retouch. Aboriginal ceramic fragments were cataloged by color, size, temper type, decoration characteristics, and when possible by body element (base, body, and rim). The species of shell, bone, and floral samples (nut and maize fragments) were identified to when possible.

Due to the focus on Pre-Contact and Contact period features, no post-contact Native American or Euro-American artifacts were recovered during the feature-specific investigations along Tidewater Drive (2015–2016) or those at the Lateral hookup locations (2017). Although post-contact domestic, utility, and road construction-related materials were found present in disturbed contexts during these investigations, they were noted but not collected.

#### Curation

All recovered cultural materials are stored in acid-free Hollinger boxes with box content lists and labels printed on acid-free paper. The cataloged artifacts and associated project documentation are stored at PAL, 26 Main Street, Pawtucket, Rhode Island, in accordance with the Secretary of the Interior's *Curation of* 

Federally-Owned and Administered Archeological Collections (36 CFR 79) and the RIHPHC Performance Standards and Guidelines for Archaeology in Rhode Island (2015) until a permanent repository is designated.

## CHAPTER THREE

# ENVIRONMENTAL AND GEOLOGICAL SETTING

An understanding of the environmental and geological characteristics of western Narragansett Bay and Warwick is important in a consideration of pre-contact and post-contact land use of the Project area and vicinity. Bedrock geology, geographic location, soil drainage, vegetation, and the relationship to river drainage systems and coastal bodies all influenced past human settlement. The Soil Conservation Service (USDA 1981) describes existing soil conditions, hydrological characteristics, vegetative communities supported by the extant soil type(s), the potential for agricultural endeavors, and associated faunal communities.

#### **Glacial Dynamics**

The topography of Rhode Island is the result of glacial, fluvial, and coastal dynamics. By approximately 17,500 years ago, massive glaciers had advanced over southern New England. The glacial advance and subsequent retreat eroded bedrock, realigned drainages, and deposited till, boulder erratics, and other material along its course. Flowing meltwaters and stationary blocks of ice created various landforms such as kames, eskers, terraces, moraines, and outwash plains that are still readily discernible on the landscape. As the glaciers melted and continued their retreat northward, the erosional forces of wind and water and glacial deposition continued to scour and transform the southern New England surface. As the glaciers continued their thaw, meltwaters slowly drained into the oceans, resulting in a gradual increase in mean sea level. Pollen studies demonstrate that saltwater inundation of Narragansett Bay occurred before 2,000 years ago along the Potowomut River at Warwick Neck (Kerber 1984) 2,210–2,040 years ago in Providence (Boothroyd and Freedman n.d.), and 1,700–1,180 years ago in the Pettaquamscutt River in Narragansett (Thorbahn and Cox 1988). A series of vegetative successions had begun by 14,000 years ago following soil deposition and development (Ogden 1977).

Glacial activity in southern New England resulted in the formation of four discrete topographic zones within Rhode Island (Figure 3-1). These topographic zones include the Upland till plains, the Narragansett till plains, the Charlestown and Block Island moraines, and Outwash deposits (USDA 1981). The Upland till plains characterize western portions of the state, away from the coast, and are composed predominantly of granite, schist, and gneiss rocks. The Narragansett till plains are common in Newport and the islands of Narragansett Bay and are primarily composed of glacial till derived from sedimentary rock, shale, sandstone, various conglomerates, and coal. The Charlestown and Block Island moraines are located along the southern portions of the state and represent areas of dense glacial buildup at the terminus of the glacier's southernmost advance. The Outwash deposits represent broad level plains of gravel, sand, silt, and clay that are found along the western edge of Narragansett Bay (USDA 1981).

The Tidewater Drive segment of the Bayside Sewer Project area is within the zone of Outwash deposits bordered to the east by Narragansett Bay and to the west by the Upland till plains. The Mill Cove Site area is characterized as glacially deposited and generally level terrain with elevations ranging from sea level in the eastern margins of the Bayside neighborhood at the shore, to 54 ft above sea level at Tidewater Drive. From Tidewater Drive moving east to the bay, the landscape can be characterized as two generally level and stepped terraces overlooking and then sloping to the shoreline of Narragansett Bay.

## Bedrock Geology and Soils

The Project area is situated along the western edge of Narragansett Bay on a series of stratified sedimentary rocks called the Esmond-Dedham Sub terrane of Pennsylvanian Age. Tidewater Drive is situated east of the Narragansett Basin Border Fault with bedrock characterized by the Rhode Island Formation of the Narragansett Bay Group. The Rhode Island Formation consists of metasandstone, meta-conglomerate, schist, and graphite (Hermes et al. 1994). The northern half of Tidewater Drive is characterized as sandy outwash with increasing shallow bedrock deposits in central and southern limits, approaching the area of Rocky Point, where surficial outcrops characterize the landscape.

## Hydrology

The Bayside neighborhood associated roadways occupy the northern half of Warwick Neck, which extends into the northern reaches of Narragansett Bay, an embayment of the Atlantic Ocean (Figure 3-2). The prominent freshwater source for the area is Old Mill Creek, which marks the northern limits of the Bayside neighborhood. Old Mill

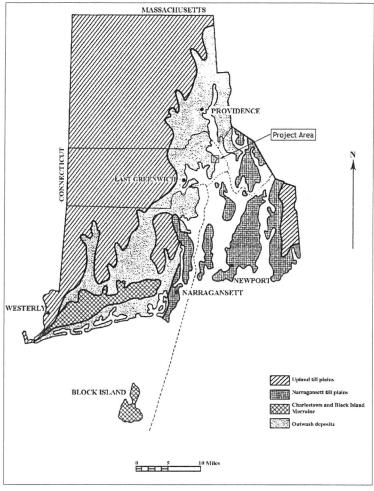


Figure 3-1. Map of Rhode Island showing glacial outwash deposits in the Bayside Sewer Project area (source: USDA 1981).

Creek and Lockwood Brook meet just south of Conimicut Point and empty into the bay. Old Mill Creek is fed by three fresh water sources (Knowles Brook, Warner Brook, and Buckeye Brook) that converge west of the bay. Buckeye Brook drains Warwick Pond and is named for the seasonal runs of river herring that have been a reliable resource for many generations. Warwick Neck was a noted pre-contact and post-contact location for the collection of saltwater, intertidal, and fresh water resources.

## Project Area Description

Tidewater Drive and the Bayside neighborhood occupy the northern half of the Warwick Neck peninsula, which extends from mainland Warwick into western Narragansett Bay. The northern peninsula is topographically characterized as generally level sloping terraces of fine textured sandy glacial outwash decreasing in elevation from Tidewater Drive east to the bay. The northern portion of Warwick Neck is characterized today as a suburban single-family home residential community. Several large nineteenthcentury agricultural estates were increasingly divided into the mid-twentieth century to form the fabric of today's Bayside community. As noted above, the proposed Bayside Sewer Project will service an estimated 870 single-family homes.

The central section of Warwick Neck is characteristically more undulating and dramatic, with granitic bedrock outcrops reaching elevations of 80 ft overlooking the rocky shores of Narragansett Bay. From the mid-nineteenth century through the late twentieth century, the Rocky Point Amusement Park was one of Rhode Island's premier recreational institutions. The park rebounded from the effects of two mid-twentieth-century hurricanes, but eventually surrendered to economic pressures and was dismantled by the end of the century. Today, it is owned and managed by the City of Warwick as open and recreational space.

The southern reaches of Warwick Neck are dominated by sloping well-drained sandy loams that supported agriculture into the early twentieth century. Today, the area supports a residential community, limited commercial enterprise, the Warwick Country Club, and the former grounds of the mid-twentieth-century Our Lady of Providence Seminary High School.

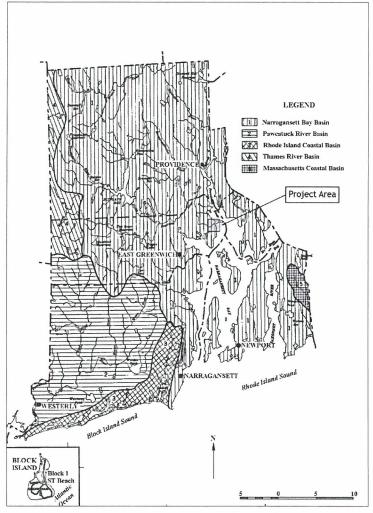


Figure 3-2. Drainage basin map of Rhode Island showing the location of the Bayside Sewer Project area (source: USDA 1981).

## CHAPTER FOUR

# PRE-CONTACT NATIVE AMERICAN CULTURAL CONTEXT AND LAND USE PATTERNS FOR THE NARRAGANSETT BAY DRAINAGE AREA

The study of Native American land use and settlement patterns in southern New England has benefitted substantially from the efforts of interested laymen, amateur societies, academic and professional archaeologists, and Native American historians and elders. Cultural preservation movements supported by federal and state legislation have resulted in systematic regional and site-specific research. The resulting data indicate almost 12,500 years of human occupation in southern New England and Rhode Island. These collections of material culture and investigated archaeological sites provide the data necessary to construct models of Native American settlement and establish chronologies that document generalized changes in peoples' technologies, land use patterns, and subsistence strategies in southern New England over time. This resulting cultural history, along with information provided by contemporary descendant tribes, provides the basis and temporal framework by which Native American sites discovered during archaeological surveys can be interpreted.

A Native American cultural history for southern New England divides the ancient past into specific periods (Table 4-1) that are distinguished on the basis of material culture, specific patterns of land use, and occasionally by social indicators.

# PaleoIndian Period (12,500–10,000 Years Before Present [B.P.])

The earliest definitive archaeological evidence for the initial peopling of the Northeast is attributed to the PaleoIndian Period and is evidenced by diagnostic fluted projectile points of the Clovis variety and its related types (Figgins 1927). Origins for the Clovis Tradition have long been thought to be associated with the initial migration(s) of people to the continent via a land bridge across the Bering Strait during the last glaciation, approximately 13,000 years ago. Recently, alternative hypotheses for waves of human exploration have been offered, including earlier crossing(s) of the Bering Land Bridge, and one or more groups of (Soultrean Culture) peoples from today's Iberian Peninsula crossing via the Atlantic along the glacial ice margin more than 20,000 years ago (Stanford and Bradley 2012). The debate over the timing and entry point of the initial peopling of the continent will continue as archaeological (material culture) and anthropological (DNA) data are collected and vetted.

By approximately 11,000 years ago, southern New England was populated by migratory bands of people collectively referred to as Paleolndians (Ogden 1977; Spiess et al. 1998). Traditionally, Paleolndians have been interpreted as representing bands of highly mobile hunters specialized in the exploitation of large game animal species such as mastodon, bison, elk, and caribou (Dragoo 1976; Snow 1980). Such a specialized subsistence model has its derivation from Midwestern Paleolndian sites that clearly contain evidence for the exploitation of large (now extinct) animal species by humans (Figgins 1927). However, there is no clear evidence for an association between large extinct animal species and PaleoIndian artifacts in southern New England. Therefore, the specialized subsistence strategy focused on the hunting of extinct megafaunal species for Paleolndian groups is not supported in the Northeast (Dincauze 1993; Ogden 1977).

Table 4-1. Pre-Contact Period Cultural Chronology for Southern New England.

<u>PERIOD</u>	<u>YEARS</u>	<b>SUBDIVISIONS</b>	CULTURAL ASPECTS
PaleoIndian	12,500—10,000 в.р.*	<ul><li>Fluted</li><li>Lanceolate</li></ul>	Migratory game animals exploited by highly mobile bands of hunter-gatherers with a specialized lithic technology.
Early Archaic	10,000—8000 в.р.	Bifurcate-Base	Few sites known, possibly because of problems with archaeological recognition. This period represents a transition from specialized hunting strategies to the beginnings of more generalized and adaptable hunting and gathering, due in part to changing environmental circumstances.
Middle Archaic	8000—5000 в.р.	<ul><li>Neville</li><li>Stark</li><li>Merrimack</li></ul>	Regular harvesting of anadromous fish and various plant resources combined with generalized hunting. Major sites located at falls and rapids along river drainages. Ground-stone technology first used. Reliance on local lithic materials for a variety of bifacial and unifacial tools.
Late Archaic	5000–3000 в.р.	<ul><li>Laurentian</li><li>Squibnocket</li><li>Small Stemmed</li></ul>	Intensive hunting and gathering in diverse environments. Evidence for shellfish exploitation. Abundant sites suggest increasing populations, and specialized adaptations to particular resource zones. Notable differences between coastal and interior assemblages.
Transitional Archaic	3600–2500 в.р.	<ul><li>Small Stemmed</li><li>Atlantic</li><li>Watertown</li><li>Orient</li></ul>	Economy similar to earlier periods, with groups migrating into New England, or local groups developing technologies different from those used previously. Trade in soapstone important. Evidence for complex mortuary rituals frequently encountered.
Early Woodland	3000–2000 в.р.	Meadowood     Lagoon	Scarcity of sites suggests population decline. Pottery first made. Little known of social organization/economy, although evidence for complex mortuary rituals is present. Influences from the mid-western Adena culture evident.
Middle Woodland	2000—1000 в.р.	<ul><li>Fox Creek</li><li>Jack's Reef</li></ul>	Economy focused on coastal resources. Horticulture appeared late in period. Hunting and gathering still important Population increased from previous low in the Early Woodland. Extensive interaction between groups throughout the Northeast and widespread distribution of non-local lithics and other materials.
Late Woodland	1000–450 в.р.	<ul><li>Levanna</li><li>Madison</li></ul>	Horticulture established in some areas. Coastal areas seem to be preferred. Large groups sometimes lived in fortified villages and organized in complicated political alliances.
ProtoHistoric and Contact	450–300 в.р.	Algonquian	Groups such as the Wampanoag, Narragansett, and Nipmus settled in the area. Complex political, social, and economic organizations, and rapid change during European colonization.

^{*}Before Present

Palynological research for southern New England demonstrates that environmental conditions somewhat similar to those of the modem tundra followed the retreat of the glaciers. Tundra-like conditions were transitionally replaced by an open spruce woodland environment as early as 10,000 years ago throughout portions of New England (Thorson and McBride 1988). Pollen grains recovered from soil sediment columns demonstrate that the biotic Paleolndian landscape was populated by mosaic clusters of jack or red pine and birch and oak tree species in addition to tundra grasses and shrubs (Schoonmaker and Foster 1991). These clustered microenvironments supported a diversity of plant and animal species available for human exploitation. Consequently, late Pleistocene/early Holocene PaleoIndians of New England were generalized in their subsistence strategies, hunting various mammal species and gathering numerous edible and useful plants.

Relatively little is known regarding PaleoIndian settlement systems in southern New England and Rhode Island. Sites are rare and often limited to isolated finds of diagnostic fluted projectile points, A small PaleoIndian component in southwestern Lincoln was recorded at the Twin Rivers Site by the Narragansett Archaeological Society (NAS). This site yielded a fluted point diagnostic of the period (Fowler 1952). Additional PaleoIndian recoveries in Rhode Island include a fluted rhyolite biface from the South Wind Site in North Kingstown (Leveillee and Van Couyghen 1990), and fluted point finds from around the shores of Chapman Pond in Westerly (D. Forrest personal communication 2010; Turnbaugh 1980), East Providence (Rhode Island Historical Society 1936), and Barrington (D. Ritchie, personal communication). Reasons for the apparent under-representation of PaleoIndian sites in Rhode Island include poor site preservation, destruction of sites by development, coastal inundation, and burial under deep layers of sediment. Research on the collections of the Haffenreffer Museum have recently provided new locational information on several previously unreported fluted point find locations, and archaeological survey near the Blackstone River has identified an in situ PaleoIndian site in the upper reaches of the formative Narragansett Bay Drainage (Smith et al. n.d.; Leveillee 2015).

## Archaic Period (10,000-3000 B.P.)

The Archaic Period was a time of colonizing and settlement of the Eastern Woodlands. The archaeological data attest to an increased diversification of food sources and generalization in human exploitation of faunal and floral species. The Archaic Period is typically subdivided into Early, Middle, and Late subperiods. In general, the Archaic concept involves primarily a hunting and gathering subsistence economy with wandering or seasonal relocations in circumscribed territories that coincide with major river drainages.

#### Early Archaic Period (10,000-8000 B.P.)

The Early Archaic Period is marked by warmer and drier conditions than those of the preceding Pleistocene epoch. A dominance of oak pollen in regional pollen cores indicates that a boreal forest was slowly replaced by a pine/oak forest (Ogden 1977). Archaeological studies demonstrate that subsistence strategies were likely similar to those of the PaleoIndians (Dumont 1981; Kuehn 1998; Meltzer and Smith 1986; Nicholas 1986). Diagnosing Early Archaic occupations typically relies on recovery of characteristic bifurcate-base projectile points.

Early Archaic settlement and resource acquisition patterns are poorly understood because sites of this age are rare in Rhode Island. Diagnostic bifurcate-base projectile points have been recovered from the Twin Rivers Site in Lincoln, find spots at RI 929 in Providence, the South Wind Site along Wickford Harbor, and the Sweet Meadow Brook Site in Apponaug (Fowler 1956). An Early Archaic Kirk point was also recorded in the assemblage from the Eastover Site (RI 1739) in Portsmouth. There are also two bifurcated points in the Gallo/Coney collection from Cedar Tree Beach (Apponaug Cove).

#### Middle Archaic Period (8000-5000 B.P.)

An increase in the distribution and density of identifiable Middle Archaic sites suggests that a Native American presence in southern New England was firmly established by about 8,000 years ago, with resident populations becoming increasingly generalized in their subsistence strategies. Middle Archaic sites have been found around falls, rapids, major river drainages, and wetlands (Bunker 1992; Dincauze 1976; Doucette and Cross 1997; Maymon and Bolian 1992; Salwen 1978, 1983). Dincauze (1976) suggests that Middle Archaic annual subsistence strategies may have focused on the harvesting of anadromous fish species and the gathering of plant resources. These subsistence activities were supplemented by generalized hunting and coastal activities of fishing and shellfishing that subsequent coastal inundation may have erased. An increase in the complexity of seasonal rounds is conjectured based on a broad range of available resources (McBride 1984a, 1984b).

Middle Archaic elements are identifiable in site assemblages through the presence of Neville, Neville-Variant, Stark, and Merrimack style projectile points (Dincauze 1976; Dincauze and Mülholland 1977; Ritchie 1971a). The Middle Archaic Period also presumably coincides with the introduction of ground-stone tool technology (Dincauze 1976). Ground-stone tools include net sinkers, gouges, plummets, and atlatl (spear thrower) weights. A preference for locally available lithic raw materials such as quartzite, argillite, and rhyolite is reflected in the collective database. A high density of local materials from Middle Archaic sites led Dincauze (1976) to theorize that Native American band or tribal territories may have been established along major river drainages by this time.

Regionally, recorded Middle Archaic deposits are more numerous and larger than those of the preceding Paleolndian and Early Archaic periods, but they remain few in number along western Narragansett Bay. The multicomponent Twin Rivers Site in Lincoln contained a substantial deposit of Stark and Neville-like projectile points, scrapers, knives, a perforator, and a hammerstone, all from reported Middle Archaic contexts (Fowler 1952). The Elmdale Rockshelter in Scituate also contained temporally diagnostic tools. Coastal and near interior sites with Middle Archaic artifacts include Sweet Meadow Brook and Locus Spring, but these sites are temporally predominated by later occupations (Fowler 1956, 1962).

#### Late Archaic Period (5000-3000 B.P.)

There is an apparent increase in the density of sites and artifacts attributable to the Late Archaic Period, which coincides with a period of climatic warming in the region about 5000 B.P. (Funk 1972). Seasonal and multicomponent campsites were used for procuring specific resources. For example, shellfish exploitation intensified as the rate of coastal inundation decreased and estuaries, salt marshes, and tidal mud flats became established (Braun 1974; Dincauze 1975; Lavin 1988).

Three archaeological "traditions" are identifiable in the regional archaeological record for the Late Archaic Period between 5,000 and 3,000 years ago: the Laurentian, Small Stemmed (aka Narrow Point), and the Susquehanna. Archaeological traditions are identifiable through specific artifact types, assemblages, or ceremonial practices. In archaeological terminology a tradition represents "a custom, concept or trait, or a combination of such units, with persistence in time" (Ritchie 1980:xxix). Laurentian Tradition occupations are diagnosed through the presence of Vosburg, Otter Creek, and Brewerton style projectile point forms that are commonly manufactured from locally available materials such as quartzites and rhyolites. Laurentian settlement systems appear to represent an essentially interior riverine adaptation in the interior uplands of southern New England (Ritchie 1971b).

Laurentian occupations are relatively frequent at sites west of Narragansett Bay. Diagnostic Brewerton and Vosburg points have been recovered from many of the known rockshelters in northern and western Rhode Island such as the Sheep Rockshelter in Scituate and the Ponagansett Rockshelter in Foster. Other sites in

northern Rhode Island with documented Laurentian components are the Twin Rivers Site in Lincoln and RI 866 in Cumberland. Additionally, artifacts morphologically similar to the Vosburg style were recovered from the Furnace Hill Brook Site in Cranston (Waddicor and Mitchell 1969) and the Phenix Avenue Site (Waller and Leveillee 1998). Laurentian style projectile points have also been recovered in low densities from coastal sites, such as the Greenwich Cove Site along the southern banks of Greenwich Cove (Bernstein 1993) and RI 196 (Waller and Leveillee 1999).

The Small Stemmed Tradition is characterized by a quartz cobble technological industry (McBride 1984b) and may be a regional development out of the Middle Archaic Neville/Stark/Merrimack sequence (Dewar and McBride 1992; Dincauze 1976; McBride 1984a). Small Stemmed Tradition materials are common at habitation and camp sites throughout the Northeast, but are rarely associated with Susquehanna Tradition habitations (McBride and Soulsby 1989).

Local artifact collections and excavated sites are dominated by quartz Small Stemmed and Squibnocket assemblages in southern New England. Small Stemmed Tradition sites include a Squibnocket complex from the Fry Brook and Double F sites in East Greenwich and the Maskerchugg, Elkhound, and Cedar Tree Beach sites in Warwick (Waller et al. 1997; Waller and Leveillee 1997).

#### Transitional Archaic Period (3600–2500 B.P.)

The Transitional Archaic Period represents a time of changing cultural dynamics. Susquehanna Tradition sites are a marker of the period and are best known from cremation cemetery complexes (Dincauze 1968; Leveillee 1999b). Other cultural identifiers are the presence of ocher deposits, steatite (soapstone) vessels, and Atlantic, Wayland Notched, and Susquehanna Broad projectile points, and later Orient Fishtail varieties. Susquehanna materials were commonly manufactured from a variety of lithic materials such as quartzites, eastern volcanics, and non-local cherts. There is a noticeable preference for non-locally available raw materials for the manufacture of these tool types during the earliest phases of the Susquehanna Tradition, with increasing reliance on local materials by the final Orient Phase.

The Transitional Archaic Period is characterized by an extensive trade network, increased burial ceremonialism, and the development of technologies strikingly different from those of the antecedent Late Archaic traditions. New technological developments included the manufacture of steatite vessels, a distinctive lithic flaking technology, and diagnostic tool forms that developed out of the local populations or were introduced to the region by new groups immigrating into the New England area (Filios 1989). Steatite technology is well-represented in the Narragansett Bay area, most notably by its use as ritual inclusions as grave goods within the cremation burials at the West Ferry Site in Jamestown (Simmons 1970). Local steatite outcrops include the Oaklawn Quarry in Cranston, the Ochee Spring Quarry in Johnston, and outcrops once exposed in the Providence area. Steatite vessel forms such as bowls and, later, smoking pipes, were used domestically, ceremonially, and likely as trade items (Waller and Leveillee 1998).

The manufacture and use of heavy vessels by Susquehanna Tradition peoples may imply a trend toward increased sedentism by resident populations. The earliest evidence for the manufacture and use of ceramic vessels in southern New England is also found during the Transitional Archaic Period (McBride 1984a). Consequently, steatite vessels are commonly viewed as a transitional step toward the manufacture of ceramic vessels (Lizee 1994). Steatite vessels were eventually replaced by the exclusive reliance on ceramic vessels during the Early Woodland Period. Steatite quarries, however, continued as important sources of raw material for the manufacture of smoking pipes well into the Contact Period (Turnbaugh 1976).

Evidence for complex mortuary ritual is frequently encountered at regional ceremonial sites such as the West Ferry cremation complex in Jamestown. Associated radiocarbon ages date the occupations to

 $3280 \pm 90$  and  $3225 \pm 100$  B.P. (Simmons 1970). Steatite vessels, drills, gorgets, pestles, and Coburn projectile points were all included with these burials. Cremation burials are also reported from Charlestown (Fowler 1964) and at the Flat River Site in Washington County (Fowler 1968) with an associated radiocarbon age of  $3430 \pm 100$  B.P.

Transitional Archaic sites are typically found in association with major river drainages, upland ponds, and lakes. The Elmdale and Sheep rockshelters contained Transitional Archaic Atlantic, Wayland Notched, and Coburn points. Susquehanna Tradition point forms were found in association with atlatl weights, steepedged and oval scrapers, and knives at the Twin Rivers Site in Lincoln. Artifact types indicate that hunting and processing were important activities at the site. Hand drills and hammerstones were also recovered, suggesting that wood or bone was processed there. Susquehanna and/or Orient style projectile points of the Transitional Archaic Period have been recovered from the coastal mainland at the Greenwich Cove and RI 196 sites in Warwick; the Campbell, Sprague, and Pasani sites along the Pettaquamscutt River; the Maskerchugg Site along the Maskerchugg River; Greene Point; and along the Hunt River drainage. The Hoskins Park Site along Mill Creek included a feature with a radiocarbon age of 3870 ± 20 B.P. associated with a Transitional Archaic occupation (Leveillee and Van Couyghen 1990).

#### Woodland Period (3000-450 B.P.)

The Woodland Period was a time of continued dynamic development for local indigenous peoples. The archaeological data suggest that a distinct but gradual diversification of food sources persisted, along with an increased prevalence of shellfish, the refinement of pottery manufacturing, and eventually year-round coastal settlement (Bragdon 1996; Braun 1974). Like the Archaic Period, the Woodland Period can be subdivided into Early, Middle, and Late subperiods. In general, the Woodland concept describes a cultural transformation from a foraging way of life toward a more sedentary existence associated with the introduction of plant cultivation and the manufacture of ceramic vessels for storage and cooking.

#### Early Woodland Period (3000-2000 B.P.)

The Early Woodland Period in southern New England is generally underrepresented in the regional archaeological record, which has led some archaeologists to suggest that a population decline occurred in the region (Dincauze 1974; Lavin 1988). However, positive identification of Small Stemmed point forms with Woodland dates suggests that Early Woodland archaeological assemblages likely have been misidentified as Late Archaic assemblages (Juli and McBride 1984; McBride 1984b). Diagnosing Early Woodland site locations has traditionally relied on the identification of Meadowood, Lagoon, and Rossville projectile points and on Vinette I ceramics. Given the problems inherent in using projectile points alone as temporal indicators, the presence of early ceramics in conjunction with point styles is used to determine Early Woodland occupation in the absence of radiocarbon dates.

Early Woodland occupations are infrequent along the interior uplands of northern Rhode Island. The Elmdale and Sheep rockshelters of Foster and Scituate contained Early Woodland Lagoon projectile points. Results of archaeological investigations along the coast strongly suggest that Woodland Period coastal adaptation coincided with the development of salt marsh estuaries (Kerber 1984). Early Woodland occupations are recorded along the coastal mainland from the Greenwich Cove, RI 253A, Sweet Meadow Brook, Locust Spring, and Hoskins Park sites (Bernstein 1993; Fowler 1956, 1962; Leveillee and Van Couyghen 1990). Early Woodland elements have also been recorded at RI 193 and RI 670 within the Hunt River drainage.

# Middle Woodland Period (2000-1000 B.P.)

The Middle Woodland Period appears to coincide with a time of far-ranging exchange networks of raw materials, finished products, and information along the entire Eastern Seaboard (Fitting 1978). Occupations appear to be marked by a high occurrence of jasper and hornfels (Luedtke 1987), and the relative frequency of exotic raw materials from Middle Woodland sites may imply the existence of long-distance exchange networks that extended from Pennsylvania to Labrador (Dragoo 1976; Snow 1980).

Horticulture began to supplement the preexisting pattern of hunting and gathering subsistence activities in the Northeast. Snow (1980) postulated that the adoption of horticulture led to changes in the Native American subsistence base, population growth, the organization of labor, and even social stratification. However, these changes during the Middle to Late Woodland transition may have occurred independently of the adoption of horticulture (McBride and Dewar 1987).

Middle Woodland components are reported from many of the sites mentioned above in the Early Woodland Period description, with significant clusters near Wickford Cove and the Pettaquamscutt River of North Kingstown and Narragansett/South Kingstown, respectively. Occupations were more common in coastal settings and have been identified at the multicomponent Joyner Site in Jamestown, the stratified Greenwich Cove Site in East Greenwich, and the Wickford Cove Site (RI 1769) in North Kingstown (Bernstein 1993; Leveillee 1997). Middle Woodland sites in the upland interior are less frequent and typically small; documented interior sites include the Walker Point Bluff Site in East Providence, and the Elmdale Rockshelter, which yielded a Greene lanceolate point. The Weaver Cove Site (RI 1745) in Portsmouth contains a substantial Middle Woodland deposit with non-local cherts and jaspers along with a Jack's Reef Corner-Notched projectile point (PAL 1989).

## Late Woodland Period (1000-450 B.P.)

The Late Woodland Period is associated with an increase in ceramic production following improvements in ceramic technology. Traditional views hold that population growth, increased sedentism, and village formation followed the adoption of horticulture. However, increased sedentism and aggregated settlements could have occurred independently of the adoption of horticulture, especially in coastal or estuarine environments that supported a reliable fish and shellfish subsistence base (McBride and Dewar 1987). Others believe that village formation and intensive maize horticulture were essentially riverine developments during the Late Woodland Period or later (Bendremer 1993; Bendremer and Dewar 1994; Bernstein 1990, 1992, 1993; Luedtke 1988). Social complexity and the formation of political alliances appear to have developed during the Late Woodland Period (Mulholland 1988).

The Late Woodland Period is well-represented along Narragansett Bay and, to a lesser degree, in the interior (Waller 2000). Diagnostic artifacts include large and small triangular Levanna and Madison style projectile points and cord-wrapped, stick-impressed, and incised ceramic vessels, and there was an increased reliance on locally available lithic materials such as quartz and argillite.

Late Woodland occupations have been identified along the Big and Flat rivers, at the Oaklawn Quarry, along the shores of Ponaganset Lake and Tarbox Pond, and within the Wickaboxet State Forest. Numerous Levanna point types were recovered at the Furnace Hill Brook Site. Additionally, the Church Brook Rock Shelter No. 1 in Cranston contained a number of Levanna points (Waddicor 1969). Coastal habitations were likely multiseasonal settlements, with sites such as Greenwich Cove, Hoskins Park, Lambert Farm, South Wind, RI 110, RI 1818, RI 974, RI 253A, RI 253B, and RI 253D yielding evidence of extensive shellfish exploitation. Domesticated cultigens made their appearance along the coast at sites such as RI 110 (Leveillee and Harrison 1996; Leveillee et al. 2006) and in the interior at RI 2050 (Handsman 1995; Waller and Leveillee 1998).

Thirteen instances of isolated and clustered human burials likely dating to the Late Woodland Period are known to surround Greenwich Bay in Warwick in Apponaug, Cowesett, Horse Neck, Woodlawn, and Warwick Neck (Cook 1985; Fowler 1956, 1962; Leveillee 2001, 2009).

Figure 4-1 is a copy of Thomas E. Greene's map (D'Amato 1991:15) shows the locations of sites identified by amateur archaeologists near the Bayside Sewer Project area. The "drum rock" in Apponaug and the "mark rock" petroglyph on the shore of Warwick Neck are also reputed to be of Native American origins.

State site files indicate numerous sites, dating from all temporal periods, clustered around the wetlands, ponds, and water courses, especially in the uplands and near interior. Scores of sites are known around steatite source areas, rockshelters, and campsites along interior and near interior feeder streams, and the importance of the falls is documented in historical records and part of Narragansett oral tradition. The Gallo/Cooney collection from the Cedar Tree beach area provides evidence that a multicomponent site spanning from Early Archaic to Woodland periods lies submerged in Apponaug Cove.

A high density of Middle Archaic through Woodland Period sites have been identified in what is now Warwick and on Warwick Neck. These documented sites include short-duration occupations of expeditious stone tool maintenance, hunting forays, and resource collection and rockshelters (Rocky Point), shell middens, and campsites. The archaeological survey associated with the Bayside Sewer Project has identified the Mill Cove Site—the Late Woodland to Contact Period village of Shawomet, a subgroup of the Narragansett.

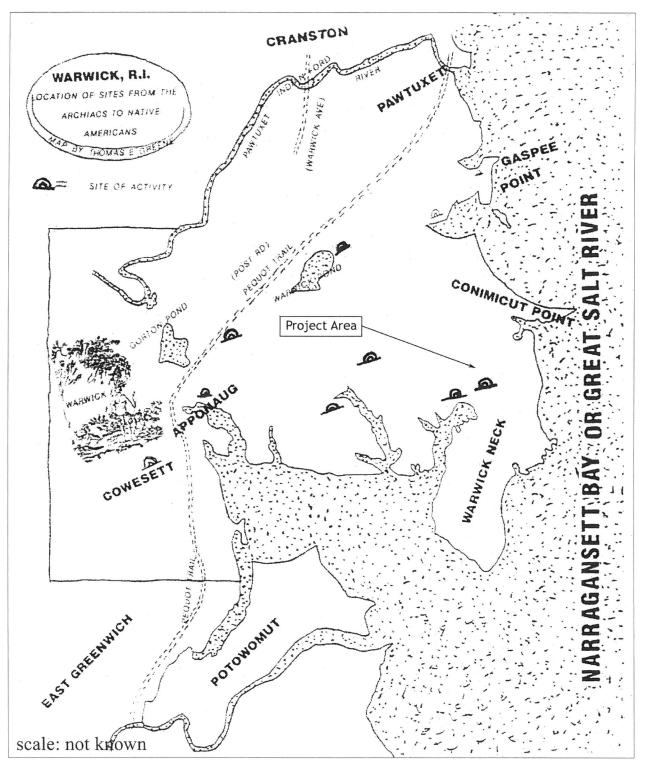


Figure 4-1. Drawing showing locations of Native American archaeological sites identified by amateur archaeologists in the vicinity of the Project area (source: D'Amato 1991).

## **CHAPTER FIVE**

# CONTACT AND POST-CONTACT CULTURAL CONTEXT, WARWICK, RHODE ISLAND

#### Sixteenth and Seventeenth Centuries

Patterns of Narragansett Indian settlement and subsistence established by the Late Woodland Period were severely disrupted in the early seventeenth century with the first wave of European settlement (Rubertone 1989, 2001). Political, social, and economic organizations underwent rapid change during initial European colonization of the region. Native settlements continued to be focused within traditional territories along coastal and interior sections (Figure 5-1). Early subsistence activities that included horticulture, supplemented by fishing, hunting, and the gathering of plants and nuts, eventually changed as a result of the increasing influence and partial adaptations of the Europeans' commodity-based economic system into the traditional Narragansett economic and social patterns. Overhunting for the fur trade led to the virtual exhaustion of beaver in the region during the early part of the seventeenth century. This overhunting and increasing English settlements and their animals transformed the local environment. Indigenous materials such as pottery vessels and lithic artifacts continued to be manufactured, but there was increasing adoption of European materials acquired through trade. Eventually, Natives began selling land to pay imposed fines and in exchange for commodities of European origin.

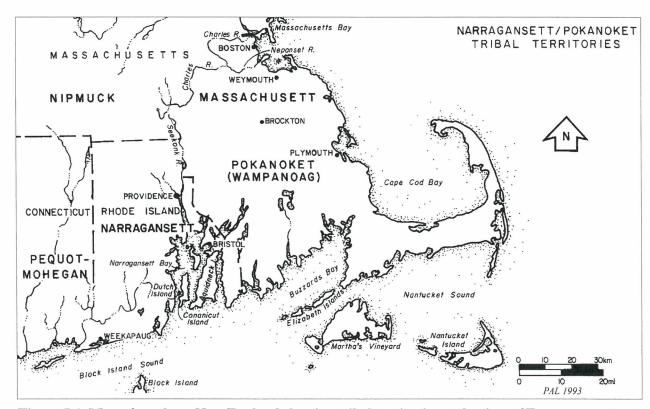


Figure 5-1. Map of southern New England showing tribal territories at the time of European contact.

Early Contact Period settlement and subsistence strategies focused on an annual round during which small groups would leave main base camps or villages to exploit various resources based on seasonal availability. The rich coastal estuaries of western Narragansett Bay served as important fishing and shellfishing localities. Other important Narragansett Indian subsistence activities included the planting of corn fields in the spring and summer with supplemental hunting and gathering activities in the peripheral zones around core settlement areas.

Known Contact Period sites around Narragansett Bay are sporadic and typically limited to cemeteries and burials, including RI 694 (Devil's Foot Cemetery) and RI 1000 in North Kingstown (Robinson et al. 1985; Rubertone 2001), the West Ferry Site in Jamestown (Simmons 1970), Burrs Hill in Warren (Gibson 1980), and specialized forts such as the Great Swamp Fort (George et al. 1993) in South Kingstown, the Queen's Fort in North Kingstown (Chapin 1931), and Fort Ninigret in Charlestown (Salwen and Mayer 1978; Solecki 1993; Taylor 1997). Many of the habitation sites that existed along the coast likely were impacted by Euro-American encroachment and settlement. Remnant seventeenth-century Narragansett burial grounds and individual burials have been rediscovered on Horseneck Road in Old Warwick, and in Cowesett, Apponaug, Woodlawn, Lakewood, and within the Bayside area of Warwick Neck (Leveillee 2001, 2008b).

The first recorded account of contact between Europeans and the Narragansett was reported Giovanni da Verrazano as he was sailing for France in 1524. At the time of initial contact between European explorers and Native American groups, southern New England Algonquian speakers known as the Narragansett inhabited all the lands bordering western Narragansett Bay. Narragansett country was bordered to the north and west by the Nipmuck; to the north and east by the Massachusett; to the east by the Pokanoket, also known as the Wampanoag; and to the west by the Pequot and Mohegan. groups tributary Smaller Narragansett influence settled within Narragansett territory during the early seventeenth century (Figure 5-2).

Lacking immunities to European disease, the Native peoples of southern New England suffered a series of epidemics. Governor William Bradford of Massachusetts noted in 1621 that while the Massachusett Indian tribes had been decimated by the first wave of epidemics about 1619, the Narragansett "had not been

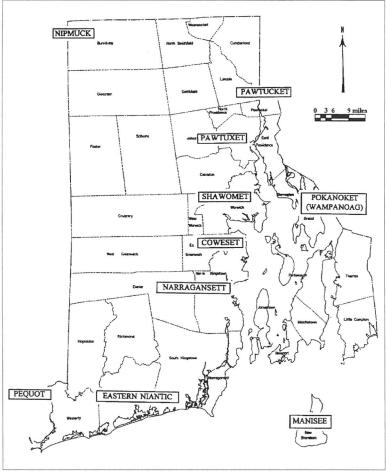


Figure 5-2. Map of Rhode Island showing tribal territories in the seventeenth century.

at all touched with this wasting plague" (Bradford 1981[1647]). A widespread settlement system may have helped spare the Narragansett during this initial wave of disease (Leveillee 1997). However, they were affected by a second wave of smallpox that was reported to have killed 700 people in 1633 (Brasser 1978:79).

By 1625, Dutch trading posts were established on Narragansett Bay and at two mainland locations nearby. Narragansett and Wampanoag access to the coast afforded them with shellfish, some of which they used for manufacturing ceremonial beads called wampum. With a relative paucity of minted coinage, wampum became a valuable transcultural medium of exchange that the Dutch and English readily adopted. The English, who had permanent settlements at the Massachusetts Bay and Plymouth colonies in Massachusetts, traded at Manomet and around Sowams (Bradford 1981[1647]). Roger Williams, banished from the Massachusetts Bay Colony in 1636, established a temporary trading post (RI 375) in North Kingstown in 1637 (RIHPHC site files).

#### **English Settlement**

Warwick originated from four land purchases made by the English from subtribes of the encompassing Narragansett: the Shawomet (aka Shawomut), Occupasstuxet, Potowomut, and Pawtuxet. The original Shawomet Purchase was obtained on January 12, 1642, by Samuel Gorton and about a dozen followers after they were banished from the Massachusetts Bay Colony (RIHPC 1981). This purchase resulted in the first English settlement in Warwick and included much of the present-day city of Warwick, excepting Potowomut and a small section along the Pawtuxet River (Figure 5-3; D'Amato 1991). Gorton and his followers established a village at the north end of Warwick Neck on Warwick Cove, beyond the limits of both Providence and the legal claim of the English charter. The village was located along what is now West Shore Road from Second Point Road to Economy Avenue (RIHPC 1981). The Bayside Sewer Project area is south of and adjacent to the initial settlement area and includes the northern section of Warwick Neck (Leveillee 2008).

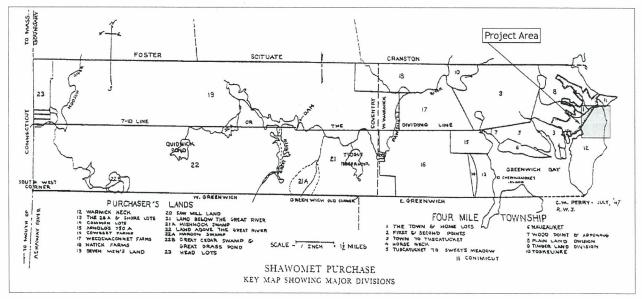


Figure 5-3. Map of Shawomet Purchase Lands indicating the location of the Project area (source: D'Amato 1991:20).

The Massachusetts Bay Colony was hostile toward the exiled dissidents who settled in Rhode Island (Fuller 1875) and claimed jurisdiction over the western shore of Narragansett Bay after receiving submissions from Pomham (also spelled as Pumham) of the Shawomets, Sacononoco of the Pawtuxets, and four of the English settlers. A contingent of 40 soldiers and three commissioners were sent by Massachusetts Bay to seize the

cattle of the Gortonists. They arrested Gorton and six followers and took them to Boston for trial on counts of heresy and sedition. After being put in irons and forced to work in various towns throughout the colony for a winter, Gorton and his followers were set free, but were banished from all territory under the jurisdiction of the Massachusetts and Plymouth colonies.

Gorton lived briefly on Aquidneck Island; in 1644-1645, he sailed to England to petition Parliament to secure his Shawomet lands. In May 1646, the Commissioners of Foreign Plantations issued an order prohibiting the Massachusetts Bay Colony from further attempting to exercise jurisdiction over the settlers of Shawomet or any other Rhode Island colony. Gorton and his followers returned to Shawomet in 1647. In 1648, Gorton changed the name of the settlement to Warwick, commemorating the supportive Earl of Warwick. Warwick was granted a charter by the General Assembly in 1648 and became one of the four original Rhode Island colonies; Providence, Newport, and Portsmouth were the other three. John Wickes, one of Gorton's followers, is reputed to have built a home in the village, "nearly opposite the Quaker Meeting House," on the corner of (today's) Warwick Neck/West Shore Road (Fuller 1875).

While Gorton was held prisoner in Massachusetts, the Narragansett Sachem Miantonomi was murdered by rival Mohegans, apparently with the support of Massachusetts Colony political factions. When the Narragansett saw that Gorton was freed by Massachusetts, they believed he had powerful allies in England and placed themselves under the "protection of the English," seeking relief against Massachusetts Colony. Pomham, however, remained allied with Massachusetts and refused to leave his Shawomet territory, which covered today's Warwick Neck and the planned Bayside Sewer Project area. He asked Massachusetts for assistance against the Gortonists and protection from the Narragansett, possibly fearing reprisals from them for a perceived role in the killing of Miantonomi. Massachusetts Colony sent 11 men to help Pomham erect a fort. Today, the intersection of Paine and Fort streets on the shore of Warwick Cove on western Warwick Neck is the reputed site of the fortification, known historically as Pomham's Fort.

By 1654, a group of Warwick settlers purchased Potowomut Neck from Sachem Taccomanan and laid claim to most of the lands surrounding Pawtuxet. For several decades, English settlement was concentrated on Warwick Neck and along Apponaug Cove.

Growing tensions between English colonists and the Native American groups throughout the seventeenth century eventually erupted into armed conflict with the advent of King Philip's War in 1675 (Leach 1958). Narragansett hegemony over the area was reversed after December 19, 1675, when colonial mistrust of the Wampanoag sachem Metacomet (King Philip) and his followers led to an all-out assault on a Narragansett fortified village in the Great Swamp in South Kingstown. On Warwick Neck, United Colony troops burned nearly 100 wigwams in Pomham's Shawomet Village (in the Project area) on December 27, 1675 (Fuller 1875; Strock 1851).

By early 1676, most of the area's English settlers fled to Portsmouth as the fighting escalated, leaving a small garrison behind at Arnold's Stone Castle on West Shore Road. On March 17, 1676, the Narragansett retaliated by burning every house and bridge in Warwick except the Stone Castle. One settler, John Wickes, left the security of the garrison and was killed by a Native raiding party. His head and body were subsequently recovered, and are reputed to have been buried in two separate graves in the Wickes/Greene Cemetery off West Shore Road in proximity to the Stone Castle garrison (D'Amato 1991).

In July 1676, a force of approximately 80 Narragansett, who had joined the Wampanoag sachem Metacomet's struggle against the English, were camped on Warwick Neck awaiting coordination for an attack on Newport. A force of 300 Colonial soldiers and Indian auxiliaries marched under the leadership of John Talcott and killed or captured 67 of the Narragansett (D'Amato 1991:29). By August 1676, Metacomet had been killed and Native military attempts to regain their former holdings ceased.

By the spring of 1677, the English returned to Warwick Neck. Throughout the course of the next year, many of the remaining Narragansett were sold into slavery by the English or bonded by indentured service and Native families were split apart. Other Narragansetts found refuge in surrounding tribal lands or in scattered and isolated margins of their former territory.

Following King Philip's War, Warwick grew quickly as settlers moved to the more remote parts of the town and began opening large tracts of land to support their agrarian subsistence base (RIHPC 1981). Between 1677 and 1750, the lands of the Shawomet and Potowomut purchases were divided and allocated among the proprietors of Warwick (D'Amato 1991). The beginnings of Warwick's characteristic mix of village settlements, surrounding agricultural lands, industries along the rivers, and coastal ports was established.

## Eighteenth and Nineteenth Centuries

Warwick's first major phase of colonial expansion took place during the early part of the eighteenth century. By 1715, a schoolhouse was built at the southwest comer of West Shore Road and Sandy Lane. Approximately a year later, resident Quakers established a meetinghouse west of West Shore Road and just opposite Warwick Neck Avenue (RIHPC 1981). Transportation and industry began to grow in the mid-to-late eighteenth century. The town at this time was agricultural. Gristmills, fulling mills, and other developments sprung up along the Pawtuxet River. Inns and taverns were established along the Pequot Trail. A major improvement in transportation occurred with the opening of a ferry service in 1742 at Warwick Neck that later became the primary form of traveling between Newport and Providence. The population rose steadily and, by 1730, a total of 1,178 people lived in Warwick. By 1774, the population had doubled to 2,438, despite Coventry being set off from the original Warwick purchase in 1741, which diminished the overall population of Warwick (RIHPC 1981).

Warwick also played an important role in the state's transformation from an agricultural to a seafaring colony. By 1770, Apponaug, Potowomut, and chiefly Pawtuxet developed into major ports. Pawtuxet was a customs port from which Rhode Island contributed to the "triangle" trade (RIHPC 1981). Incidents of illicit trading increased as Warwick became involved in a commerce economy. The occupying British responded by sending several armed revenue ships to Narragansett Bay to curtail smuggling activities. One such vessel, the H.M.S. *Gaspee*, was run aground off Warwick and burned by a group of colonists on June 9, 1772. This act is considered by some to be the first overt act of defiance to British authority in America (D'Amato 1991; Fuller 1875; RIHPC 1981).

British occupation of Narragansett Bay during the Revolutionary War impacted Warwick's economic growth. Military units such as the Kentish Guards and the Pawtuxet Rangers were established with fortifications on Warwick Neck and along Greenwich Cove on the Cowesett shore, near Tuskatucket Brook (Field 1896). British occupation of Newport and their presence on Aquidneck Island limited movement along Narragansett Bay and gave the British effective control over shipping. Consequently, ferry travel between Warwick Neck and Prudence Island was affected, and colonists created numerous overland paths during the American Revolution (Fuller 1875: RIHPC 1981); many are now roads. In particular, the traditional mail route from Westerly to Newport was altered to run along the west side of Narragansett Bay to avoid the occupying British militia, and the Pequot Path was renamed "Post Road" (RIHPC 1981).

Warwick continued primarily as an agricultural community during the early part of the nineteenth century with numerous new farmsteads. In 1794, Warwick's first cotton mill was constructed in Centerville by Job Green. Other mills followed, with approximately 10 built by 1834 (Fuller 1875; Potter 1835). Most of the industrial growth in Warwick occurred in the western third of the community, which was set off as West Warwick in 1913 (RIHPC 1981). Other industries that formed as a direct result of the mill openings

included a stone factory (1832), a bleachery (1834), and the Oriental Print Works (1850). Additionally, commercial industry received a boost as sloops and schooners were built in Apponaug and anchors were manufactured in Coventry. An extremely large increase in population coincided with the nineteenthcentury industrialization of Warwick, as did a transportation boom spurred by an increased desire for transporting goods and materials. The New London Turnpike was built in 1821 and became the quickest route between Providence and New London, Connecticut. By 1830, the turnpike came to an early demise with the advent of the Stonington Railroad.

The Civil War era was one of growth for Warwick. In 1861, a training camp near Apponaug was opened to prepare men for the Union Army. The increased demand for manufactured goods and textiles served to draw French-Canadian workers to the area and caused the town to expand. In 1862, Brigadier-General George Sears Greene, a native of Warwick, led the defense of Culp's Hill at Gettysburg, one of the decisive elements of the Union victory there. His son, Samuel Dana Greene, was the executive officer on the Monitor and took part in the historic sea battle with the Merrimac, also in 1862. Following the war, Warwick became an attractive area of settlement for English, Scottish, Welsh, Swedish, and Norwegian immigrants (D'Amato 1991; RIHPC 1981). Textile mills along the Pawtuxet River wove and printed cloth and provided jobs for the increasing population.

During the late nineteenth to early twentieth centuries, coastal areas of Warwick became focal points for summer cottages and recreational areas. Large estates were established on Warwick Neck, Potowomut, and Cowesett. In 1874, the Warwick Railroad was completed in an attempt to improve access to the shores of Warwick (D'Amato 1991; RIHPC 1981). Although it was commercially unsuccessful and closed after two years, the line was later acquired by the New York, Providence, and Boston Railroads and reopened in 1881. The rail line succeeded in drawing development to Warwick. Figure 5-4 shows the location of the Bayside Sewer Project area in the late nineteenth century.

The Bayside Sewer Project area is in the eastern and first English settlement section of the city, historically referred to first as Old Warwick and subsequently as Warwick Neck. Several large nineteenth-century agricultural estates were increasingly divided into the mid-twentieth century to form the fabric of today's Bayside community, which has remained predominantly residential since the mid-twentieth century.

Narragansett Indian Tribe Ethnohistorical Perspective of the Project Area

On March 3, 2016, Nancy Brown-Garcia (CDTHPO) sent the following message via email to the Warwick Sewer Authority. It describes the Tribe's perspective about the Bayside Sewer Project and its location (boldface added by author of this report):

This letter is to confirm the NIT Historic Preservations' concerns and acknowledgement on the extremely important and significant ancient tribal historical culture and connection to what is now known as the City of Warwick and the Narragansett Indians.

They once occupied the entirety of the present day of the City of Warwick. According to Sidney S. Rider, "In 1642 Samuel Gorton, whose dissenting religious views had made him unpopular with Massachusetts authorities, along with 11 followers, also obtained land from the Narragansett, including much of what is now Warwick, West Warwick, and Coventry. The settlers named this tract Shawomet. A few years later, the Massachusetts Bay Colony offended the Narragansett by claiming these same Shawomet lands and other lands bordering on the Pawtuxet River itself. Two lesser sachems, Pomham of the Shawomet, who lived near Warwick Cove, and Socononoco, sachem of the Pawtuxet, who lived near the mouth of the Pawtuxet River, asserted their independence from Miantonomo, who had taken over many leadership duties from the aging Canonicus.'

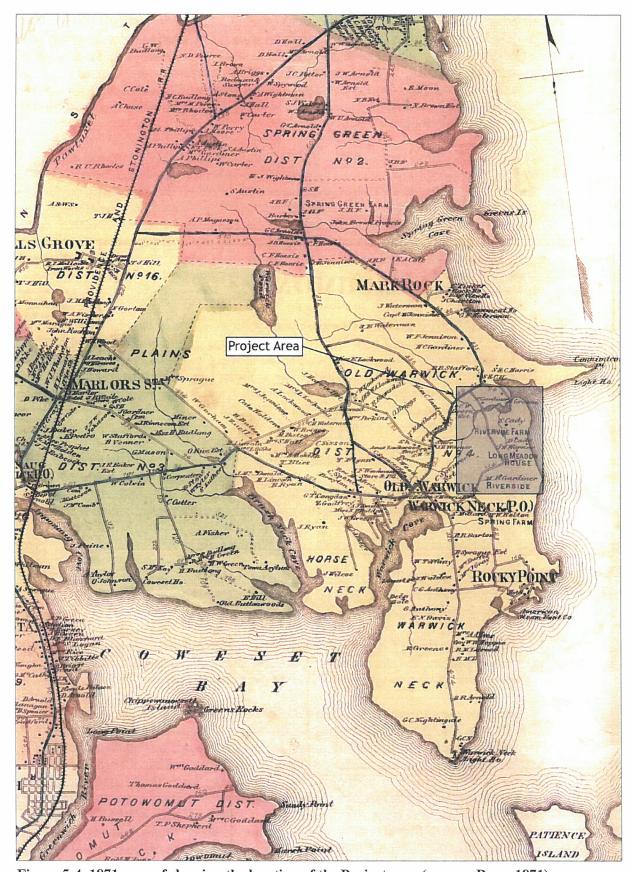


Figure 5-4. 1871 map of showing the location of the Project area (source: Beers 1871).

According to Sidney Rider 1889, in his book 'Retrospect from the Round Tower of the Pomham Club'.: Providence: Forgotten Books, 2015 p. 4). In particular, the project area which was once an ancient village occupied by the once powerful Sachemdom of the Narragansett Indians. The Shawomet Band of Indians were the ruling clans of the Narragansett Sachemdom built a fortress of security along the Warwick shores. The coves in Warwick's circular stretches pass from the Pawtuxet Cove (Myantonomo), Greenwich Bay {Canonicus}, Apponaug Cove {Shewatuck}, Buttonwoods Cove {Pomquiam}, Brushneck Cove {Auguontis}, Warwick Cove {Pomham}, Old Mill Cove {Quinimicut}, Passaeonkquis Cove (Pessacus), Occupessatuxet Cove (Maxanno)and Potowomut (Canonchet) Cove each have a Sachem attached to them. It is a strategic war offensive and defensive strategy to protect the women and children. The fort used to protect the women and children was the hiding fort at Great Swamp which would not have been used by the men, because it did not have 2 waterway exits. The fort at Great Swamp is where the Shawomet retreated to and were killed there along with remnants of the King Philip's clan who were being pursued as well.

The concerns have evolved from the current Warwick Sewer Project but where ongoing since the Airport Corporation did investigations in order to advance and expand the airport. The city of Warwick has long been known to the tribe as one of the oldest revolving villages and spoke of in our oral traditions. It is also well documented by explorers and colonists. The earliest is a letter to the King of France from Giovanni da Verrazzano in 1524.

According to Verrazzano of the Shawomett Indians he encountered in Warwick Cove, he stated, "They generally have very easy labour but have not heard or observed it, not long. For they goe a digging clams at three (3) dayes end."

The village in Warwick is again described by Roger Williams in the Middle of the sixteen hundredths. The Warwick Indians, belonging to the Narragansett Sachemdom were so large and powerful Daniel Gookin believed they were a different tribe at his first encounter. According to late Dr. Ella Thomas-Sekatau, "Warwick is where the royal Narragansett dwelled seasonally but the old ancient village had conditions for it to be utilized year round because of the productive Falls (Pawtuxet Falls)." Pomquohhamsett is the current village we are examining and the two abutting villages were the domain of Pomham and his relative Conimicut. We are in the immediate area of Quinimicut's village and it is known that her offspring were burned in the retaliation of the burning of the European settlers' first attempts at colonizing and settling in Warwick. Our great state of Rhode Island owes its chance at the separation of state and church for the first time in civilization's history to the Narragansett Sachem Miantonomo who died so we may enjoy freedom. His undaunted loyalty to Samuel Gorton, Roger Williams and others made it possible for the early settlers to fight the English thrown for their freedom and independence. Miantonomo according to Stephen Hopkins, "The only Indian Prince the colonist ever had any concern with in all of New England was Miantonomoh." Miantonomoh was the strongest force to be reckoned with because everything he had the settlers wanted. They killed him for his land, power and economics. We know this to be true because his stone thrown lined the Warwick coast and he ruled from his sacred Gaspee Village, where Namquid Drive was lined with at least 50 warriors at all times, as it was the entrance to the royal fort where Sachems, royal clans and important Paw-Waws -were protected and entertained. The entirety of Warwick is a large archaeological site with very ancient connections. The concerns for the material culture, human remains and earthly connection to this place by the tribe is to say the least a major concern.

According to Sidney S. Rider's account while standing at the Pomham Rock, "The club took its name from the rock and the rock from the Sachem, but how, or why, or when, I do not know. The ancient dominions of Pomham are now within my vision; across the bay southwesterly they lie, Shawomet then, but now they call it Warwick. It was there that Pomham dwelt, and those lands he gave a deed to Samuel Gorton in 1642, whereon he put his sign manual, an Indian pipe. From this tower I might have seen at the close of December, 1675, the blazing fires of his hundred wigwams, and himself and all his people driven to starvation in the distant woodlands..." I (A Retrospect From the Round Tower of the Pomham Club by Sidney S. Rider, Providence: Forgotten Books, 2015 p. 4)

The burning of the Indian Village in Warwick in December of 1675, can be found within the project area on Ocean Street in Warwick. Thus the cremation burials and mass common grave of those burnt are a part of the human remains known in the immediate area. We need not say more for the Narragansett Indian human remains buried of natural causes, disease or war, for their varied chronological presence speak centuries of our existence in this place once called Sachemannick, Mishowomett, Shawomet or Warwick.

#### CHAPTER SIX

## RESULTS: FEATURES AND CULTURAL MATERIALS

#### Phase I Archaeological Investigations (2007–2008)

During the Phase I archaeological surveys within the Project area in 2007 and 2008, artifact concentrations or features resulting from cultural activity were documented (mapped and photographed), but no further excavations were completed pending communication and consultation among the RIHPHC/SHPO, NITHPO, EPA, and WSA. Once features and material concentrations were noted, they were covered with plastic, trenches were back-filled, and the asphalt street surface was restored. Summary reports describing the methodology, results, and recommendations were completed for each segment (Bayside I, Bayside II, Bayside III, Longmeadow, and Tidewater Drive) (Leveillee 2008a, 2008b, 2009; PAL 2008). At the time of the 2007 and 2008 Phase I investigations, NITHPO representatives were not observers or participants. Based on results of the surveys, PAL recommended that the NITHPO be encouraged to engage in the consultation process with the EPA and WSA.

# Archaeological Evaluation - Mill Cove Site (2008)

The initial phase of archaeological evaluation of the Mill Cove Site targeted features and material concentrations beneath the roadways that were assessed as highly sensitive to contain archaeological deposits. The methods used were consistent with those used during the earlier Phase I fieldwork. The roadbed surface was marked with paint, saw-cut, and removed along the construction easement as indicated on Project plans. A flat-bladed backhoe was used to systematically remove the roadbed and any fill strata to the fill/subsoil interface. Exposed surfaces were cleaned by hand with shovel and trowel to determine if features were present. Any features identified through this process were documented (mapped and photographed) but no further excavations were completed, pending ongoing communication and consultation among the RISHPO, NITHPO, WSA, GRA, and EPA. Once features and material concentrations were noted, they were covered with plastic, trenches were back-filled, and the asphalt street surface was restored. The results, by road, are discussed below.

#### River Vue Avenue

Machine Trench 1, excavated on River Vue Avenue, extended along the roadway beginning in front of house number 110 (M.H. 4+50) and continued in the sewer easement east, terminating in front of house number 23 (M.H. 5+00). Six archaeological features (Features 1-6) were exposed (Figure 6-1). Additionally, several small concentrations of charcoal fragments and two probable post molds were noted. Some of the features were small (less than 50 cm in diameter), some were medium-sized (50-100 cm in diameter), and some were large (greater than 100 cm [1 m] in diameter) pits and material deposits readily observable within intact subsoil matrices. The pits are remnant truncated soil deposits colored by charcoal fragments and decomposed organics. Pieces of quartz chipping debris were found in association with Feature 4. Feature 6 was a concentration of fragmented mammal long bone. The soil matrix around the bone fragments appeared to be undisturbed subsoil with no evidence for an associated feature. No artifacts or other material culture were noted with the bone fragments.

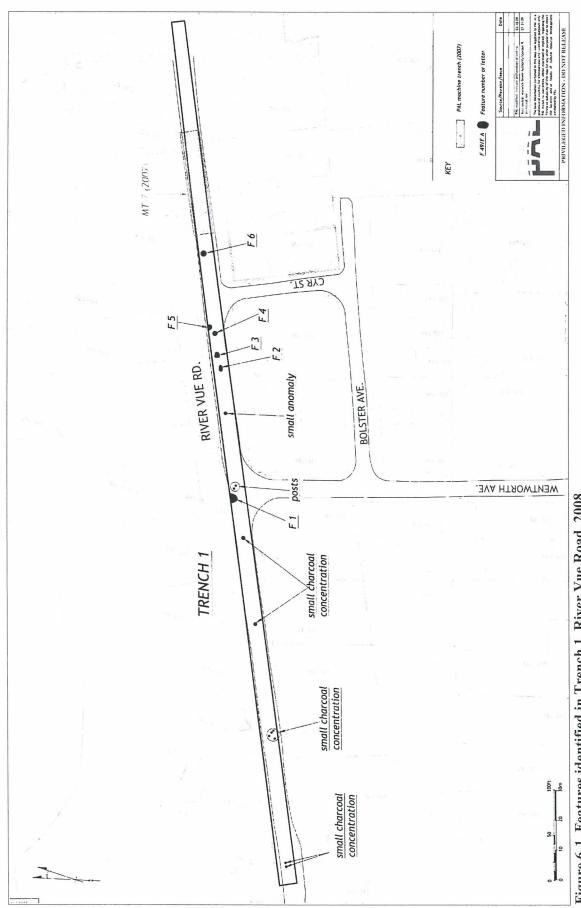


Figure 6-1. Features identified in Trench 1, River Vue Road, 2008.

#### Posner Avenue

Machine Trench 2, excavated along a section of Posner Avenue, extended from house number 11 south to a point approximately 20 ft north of the intersection of Posner and River Vue avenues. It was excavated along the sewer construction easement as marked on Project plans. The exposed features included several identified during the earlier Phase I study (MT-5, 2007) and an additional six in newly exposed soils (Figure 6-2) and include post molds marking locations where stakes or structural supports once stood and medium-sized soil stains containing charcoal fragments. Some features contained shell, lithic chipping debris, aboriginal ceramic sherds, and/or rocks fractured by heating/fire.

#### Mill Cove Road

Machine Trenches 3 and 4 were excavated along Mill Cove Road. Trench 3 extended from a point just east of the Mill Cove Stream to a point approximately 20 ft west of the intersection of Wentworth Avenue on Mill Cove Road. The trench was dug along the sewer construction easement as marked on Project plans. Seven features were exposed (Figure 6-3): four small and medium-sized generally circular truncated pits, one large pit feature, and two isolated post molds (Features 5 and 6).

Trench 4 was excavated in two segments: one from east to west beginning in front 147 Mill Cove Road and extending to the front of house number 157, and the second segment, from west to east, beginning in front of house number 176 and extending to and intersecting the remnant western limit of the initial trench in front of house number 157. More than 50 features were identified within Trench 4 (Figure 6-4). (To facilitate documentation and avoid overlapping of assigned number designations, features exposed in the eastern segment of the trench were numbered sequentially from 1 to 22 as they were encountered, and features in the western segment were given letter designations A through Z and then double letters [AA, AB, AC, and so on to AN]. As a result of this labeling, two features in the zones where the Trenches 3 and 4 intersected have double designations: Feature 22/AF and Feature 21/AE.)

The features included a high density and wide range of sizes and types, collectively characteristic of a "living surface" resulting from a mosaic of site occupation and use. Clustered post molds suggest structures and food processing. The size and composition of the features in plan reflect food processing activity (cooking, storage, and refuse disposal) and collectively indicate a domestic space.

## Lippitt Avenue

Machine Trench 5 was excavated on Lippitt Avenue west to east in two segments, facilitating the crossing of a zone dominated by wetland soils. The western segment was excavated along the sewer construction easement beginning in front of house number 148 and extended east for approximately 60 ft (where fills and wetland soils were encountered). Excavation resumed (the eastern segment) in front of house number 128 and extended east, terminating at a point along the easement parallel to the midpoint between house numbers 122 and 118 (Figure 6-5).

Three features were exposed in the western segment of the trench, and 23 features were exposed in the eastern segment. Grouped post molds were exposed, as well as small, medium, and large features of various sizes containing aboriginal ceramics, shell, lithic debitage, and animal bone. The densely concentrated features reflect an intensity of occupation and use of the area for multiple purposes. Features 1 and 15 were of particular concern because they were concentrations of bone consistent with human cranial fragments. PAL made a tentative determination in the field that the bones were human and contemporaneous with other spatially related archaeological features and likely reflect Native American burial practice and/or

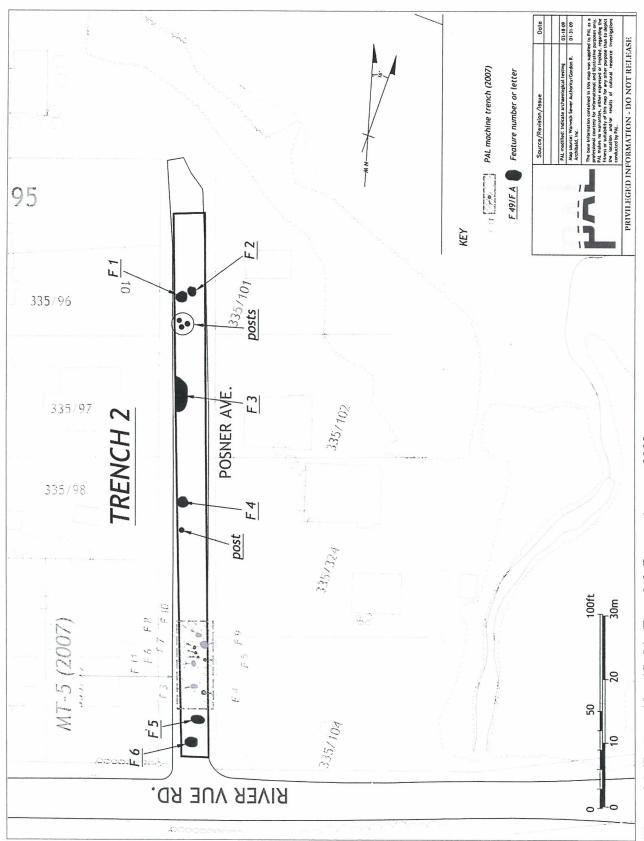
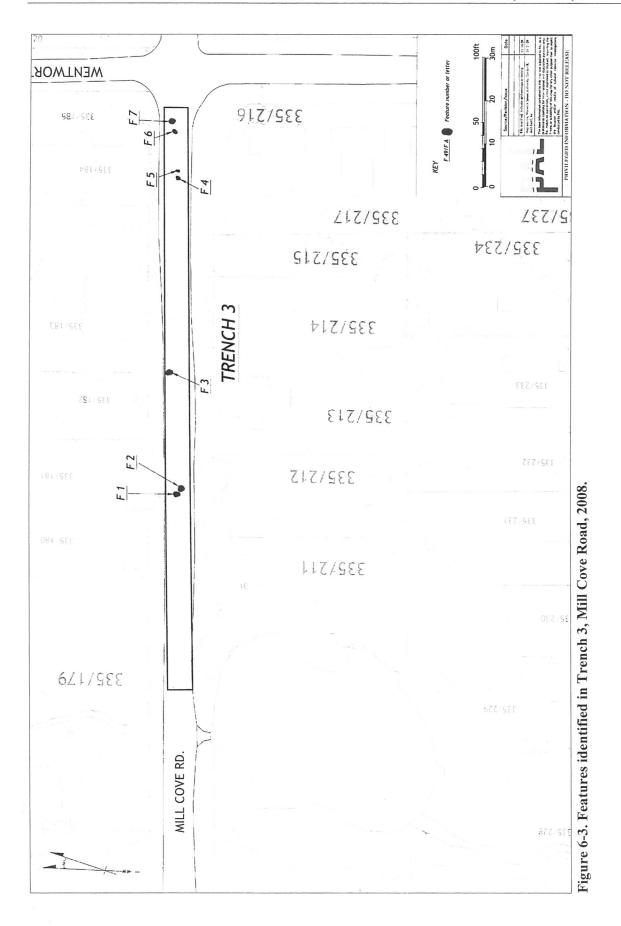


Figure 6-2. Features identified in Trench 2, Posner Avenue, 2008.



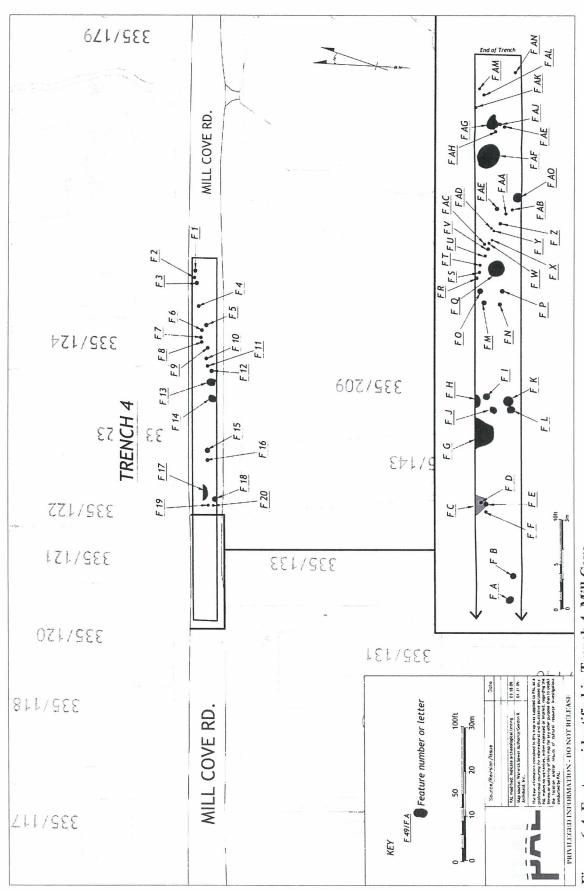
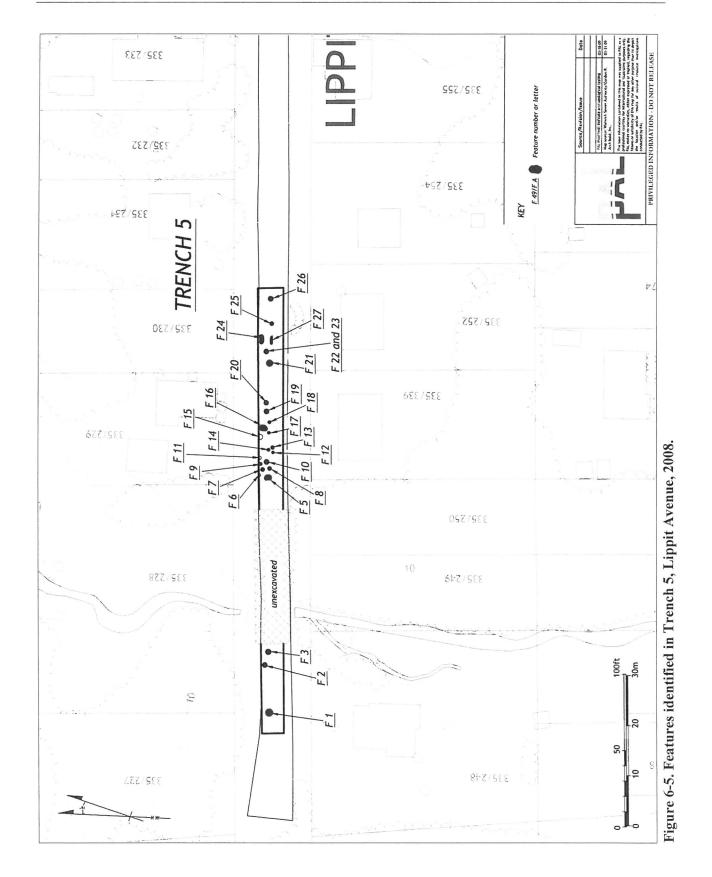


Figure 6-4. Features identified in Trench 4, Mill Cove



ceremony. After the bones were photographed, they were immediately covered, and PAL recommended that the cultural, legal, and historical implications of these suspected burials should be subjects of further consultation among the EPA, NITHPO, RISHPO, and WSA.

# Whipple Avenue

Machine Trenches 6 and 7 were excavated along two sections of Whipple Avenue. Trench 6 was dug along the sewer easement in front of and extending along the length of the lot of house number 123; its length proved to be entirely disturbed by previous street and utility work and contained no cultural features or archaeological materials. Trench 7 was excavated west of Trench 6 from west to east beginning at a point 25 ft east of the Tidewater Drive and Whipple Avenue intersection, heading east along the Whipple Avenue sewer construction easement, and terminating at the proposed manhole at station 6+45 in front of house number 143. Trench 7 contained intact subsoils and evidence of multiple cultural features. The north side of the trench displayed disturbance associated with utility installations, but the south side remained sufficiently intact to contain features in meaningful contexts.

Forty-nine features were noted within Trench 7 (Figure 6-6): small post mold impressions to large (greater than 1-m diameter) pits. Areas within the trench where features were so densely clustered were characteristic of a "living surface." Feature 5 was singularly noteworthy as a relatively recent post-contact deposit; all the other features likely were affiliated with pre-contact occupation and or habitation. Noted cultural materials and feature-associated deposits included burnt rock, shell and bone fragments, stone tool fragments (bifaces and projectile points), and chipping debris.

# Longmeadow Avenue, Ocean Avenue, and Tidewater Drive

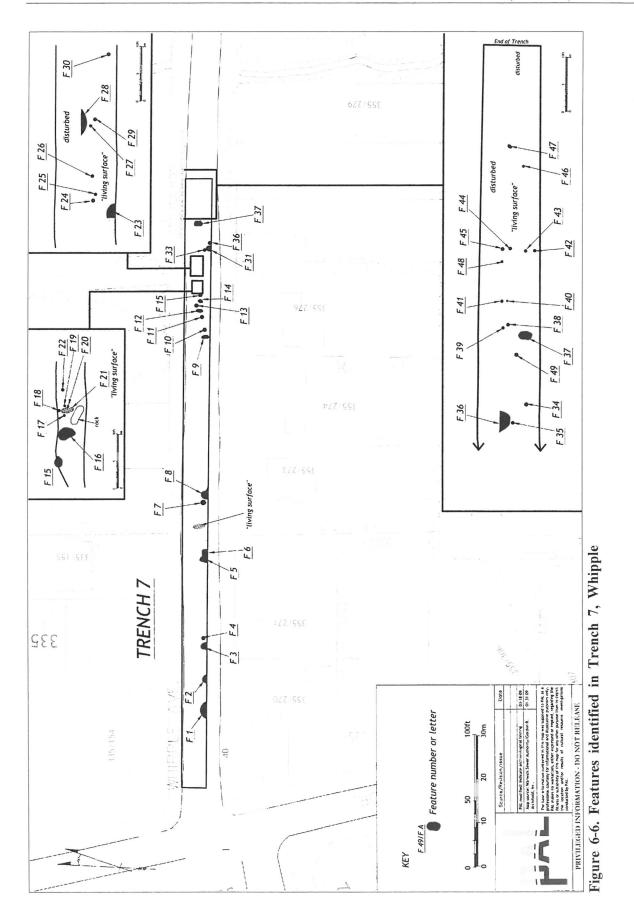
Initial archaeological survey within the Bayside II and Longmeadow sewer segments, and subsequent machine trenching along Tidewater Drive also contributed to the Mill Cove Site feature inventory (Figure 6-7). During Phase I testing, Machine Trench 2 along Longmeadow Avenue exposed intact soils. One round (35 cm in diameter) feature was found 7 m from the west end of the trench, and 7 features and 12 post molds were identified in the eastern half of the trench.

Machine Trench 3, excavated along Ocean Avenue, was extremely rocky at the north end. In the southern extent of the trench, calcined bone fragments were discovered at 30–40 cm below the surface (cmbs) immediately below the roadbed. The surrounding deposits appeared to have been truncated and compressed by the construction of the road and contains calcined human skeletal remains. The location was immediately covered with plastic and then resurfaced with gravel pending further consideration by the NITHPO RISHPO, WSA, and PAL. Quartz and Attleboro red chipping debris and some shell were observed in this feature.

In 2008, Machine Trenches 1–8 were excavated along Tidewater Drive (Figure 6-8). Features were documented in Machine Trenches 3, 4, and 7 and contained archaeological deposits that reflect Native American occupation and activity. The features confirmed that elements of the Mill Cove Archaeological Site extended into the proposed sewer construction easement(s) along Tidewater Drive.

## Preliminary Interpretations and Recommendations (2008)

The results of the 2007–2008 investigations indicated that the Mill Cove Site is a result of long-term and intensive Native American occupation of the Warwick Neck/Bayside section of the City of Warwick. As noted above, at the time of the 2007 and 2008 Phase I and initial (2008) evaluation studies, NITHPO representatives had not been observers or participants during the fieldwork nor had they participated in



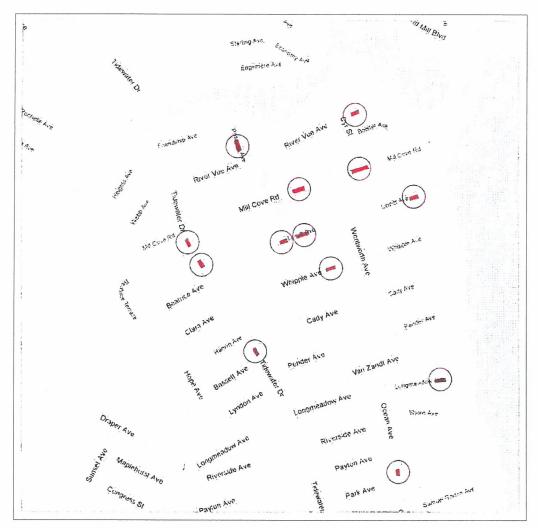


Figure 6-7. Locations of trenches containing features, 2008 archaeological investigations.

planning meetings or Project-related construction design discussions. As a result of the discoveries during the 2007–2008 studies, PAL recommended that the NITHPO be consulted (PAL 2008 communication to EPA). From 2008 to 2012, the EPA and WSA facilitated agreements with the NITHPO to actively participate in consultation and the research designs for further archaeological investigations.

In 2012, the EPA determined that the Mill Cove Site is significant and eligible for listing in the National Register. In April 2012, the RIHPHC concurred with the determination of eligibility. The site includes high densities of features reflecting domestic spaces and semi–permanent or long-term occupation and ceremony, including human burials. A working hypothesis was included that the Mill Cove Site reflects the remnants of Pomham's seventeenth-century Shawomet Village, a documented location of armed conflict during King Philip's War (Leveillee 2009).

There was a consensus recommendation that archaeological investigations, specifically along the length of Tidewater Drive, should be undertaken to determine the types of features that existed there. Tidewater Drive is a design and construction keystone link in the proposed sewer line for the Bayside Segment of the Project, as the main line that services this portion of Warwick Neck will need to be constructed beneath this roadway.



Figure 6-8. Locations of Machine Trenches 1-8 along Tidewater Drive, 2008.

# Archaeological Feature Identification and Evaluation - Tidewater Drive (2015)

From September 4-October 28, 2015, PAL conducted archaeological feature identification by removing pavement and inspecting the exposed subsurface strata along a 6-ft-wide and approximately 4,250-ft length of Tidewater Drive from Friendship Avenue south to Arlington Avenue. Consecutive lengths of approximately 100 ft were opened in a continuous north-south machine trench to expose any intact undisturbed remnant soil strata and document the presence/absence of archaeological features beneath the road. Of the 84 features identified (Figures 6-9a, 6-9b, and 6-9c), 78 were considered to have resulted from Native American activity and 6 were determined to be of eighteenth- or nineteenth-century origin. Features were numbered consecutively as they were discovered (or rediscovered in the 2007-2008 trenches) from north to south.

From November 17 to December 14, 2015, 33 of the features of suspected Native American origin (a 39 percent sample) were re-exposed, excavated, and analyzed (Leveillee 2016). The catalog of recovered cultural materials is included as Appendix A. Descriptions of the features appear below in order of their location from north to south along Tidewater Drive.

This page intentionally left blank.

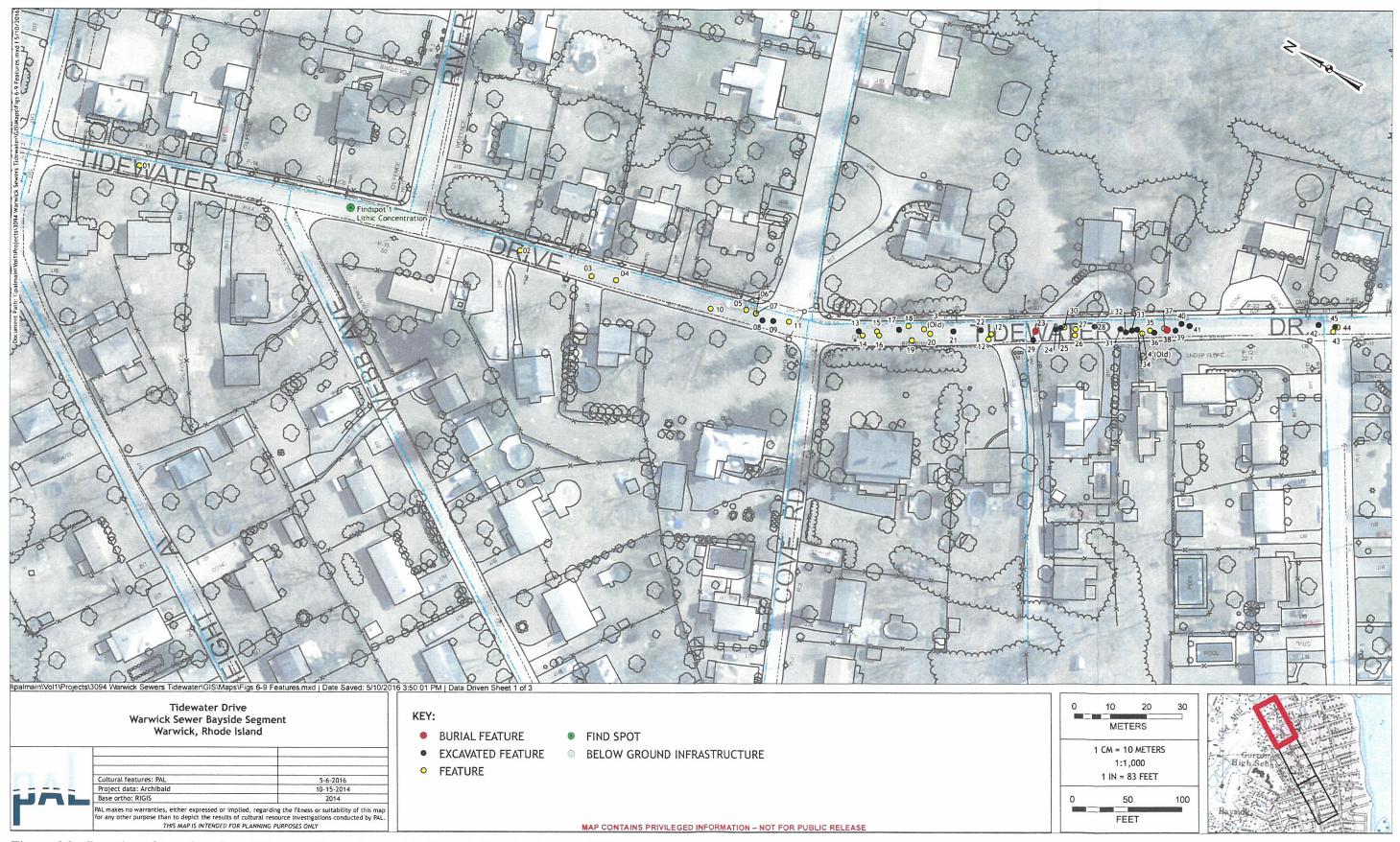


Figure 6-9a. Location of trenches along Tidewater Drive, Friendship Street to Beatrice Avenue, 2015.

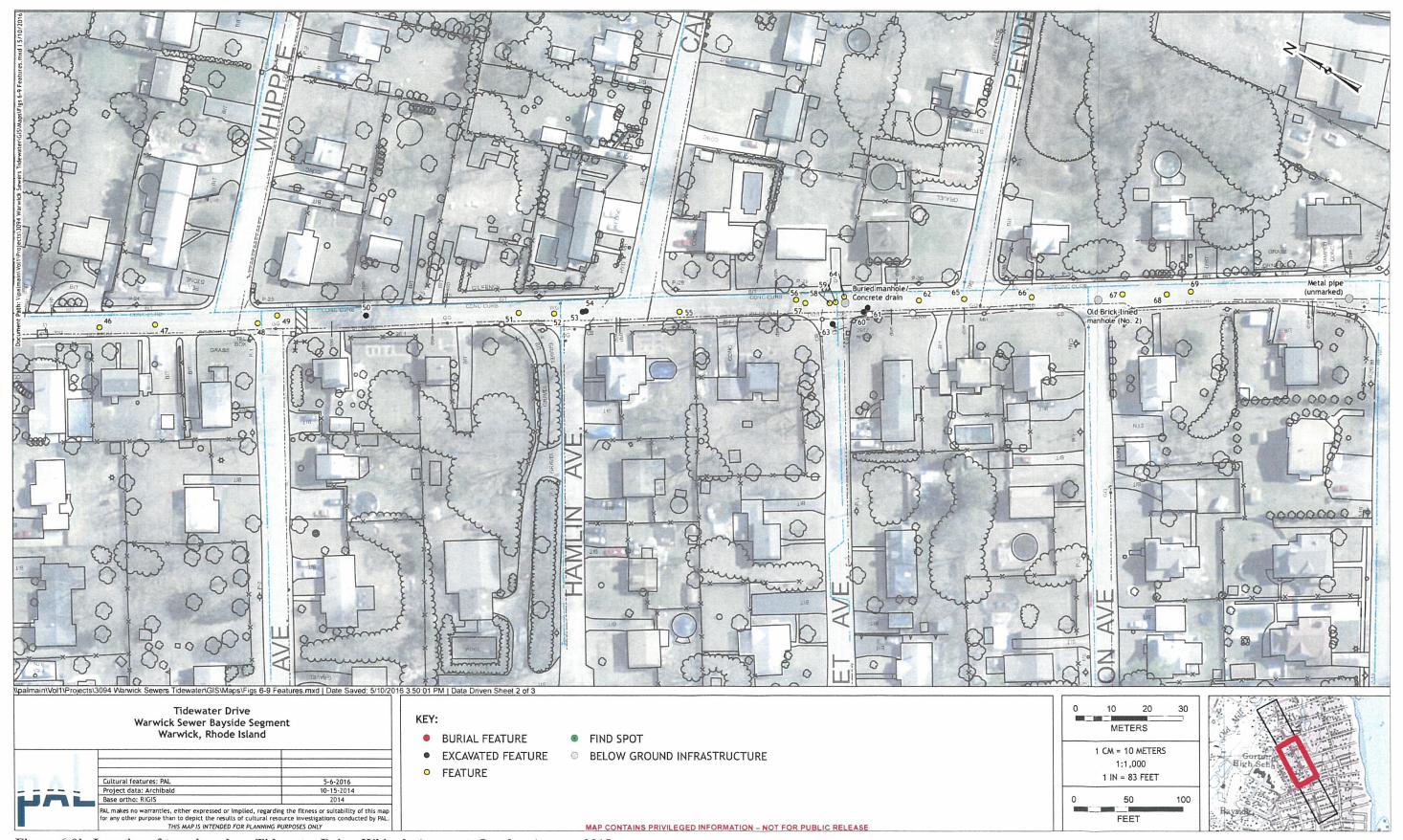


Figure 6-9b. Location of trenches along Tidewater Drive, Whipple Avenue to Lyndon Avenue, 2015.

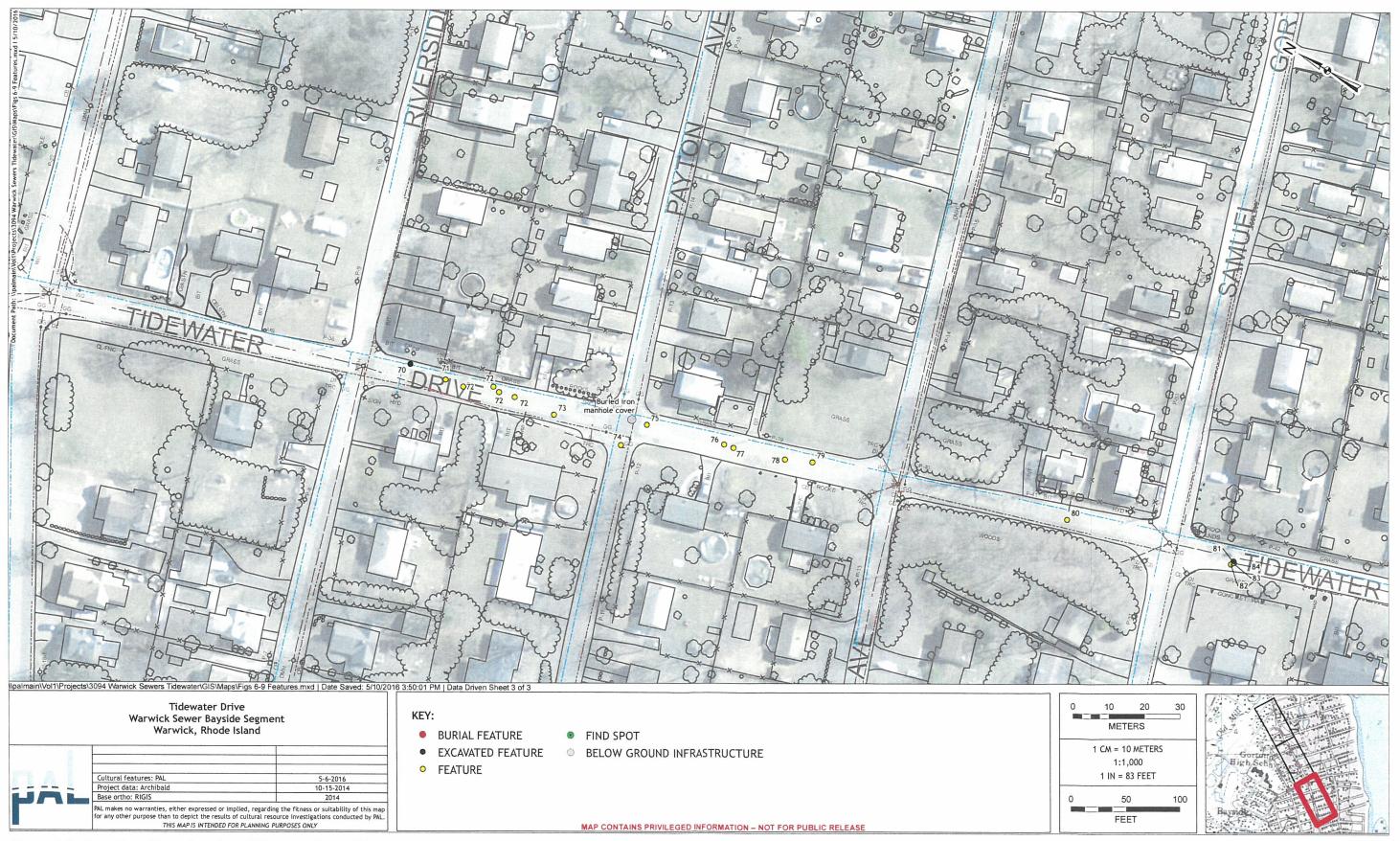


Figure 6-9c. Location of trenches along Tidewater Drive, Riverside Avenue to Arlington Avenue, 2015.

#### Feature 8

Feature 8 was a circular, 80 cm in diameter, well-defined yellow brown (10YR 5/4) and mottled dark gray brown (10YR 5/2) and yellow-brown (10YR 5/6) fine sandy silt soil discoloration, with small smears of charcoal-staining in a yellow brown (10YR 5/6) B₁ horizon soil stratum (Figure 6-10a). It was initially observed at 55 cmbs while exposing the seventh 100-ft section of Tidewater Drive (see Figure 6-9a). A cluster of five post molds associated with the feature were found to the immediate southeast. Feature 8 extended vertically for 18 cm, where it abruptly ended atop a rock. In profile, a remnant organic lens was noted at the bottom of this small intentionally bowl-shaped pit (Figure 6-10b). Two pieces of quartz chipping debris, burnt rock fragments, and charcoal fragments were recovered.

#### Feature 9

Feature 9 was initially observed at 65 cmbs while exposing the seventh 100-ft section of Tidewater Drive (see Figure 6-9a). In plan, the feature was generally ovate to circular (60 cm in diameter), primarily dark yellow brown (10YR 3/4) and banded by charcoal-colored dark brown (10YR 3/3) and black (10YR 2/1) lenses seen clearly in profile (Figures 6-11a and 6-11b). It was a bowl-shaped pit that extended 18 cm into the sterile C horizon soil stratum and contained a low density of quartz chipping debris (n = 10) and charcoal flecks.

#### Feature 13

Feature 13 was initially discovered in 2008, when it was designated as Feature 1 and considered a possible burial feature. It was re-designated as Feature 13 and re-exposed at 45 cmbs while opening the eighth 100ft section of the trench (see Figure 6-9a). In plan, the feature was ovate (80 cm in diameter), and in profile it was banded in dark yellow brown (10YR 3/4) and dark brown (10YR 3/3) and black (10YR 2/1) lenses (Figures 6-12a and 6-12b) and extended vertically for 18-20 cm. Feature 13 contained a quartz biface fragment, quartz (n = 24) and quartzite (n = 1) chipping debris, shell, animal bone fragments (n = 42), and charcoal fragments. Feature 13 was generally similar to Features 8 and 9, characterized as bowl-shaped shallow pits. Like Features 6 and 8, Feature 13 included a rock at its base (see Figure 6-12b). Four samples of shell were collected (Table 6-1).

Table 6-1. Characteristics of Shell Samples from Feature 13.

Feature Half	Feature Context	Depth (cm)	Sample Weight (g)	% of Shell by Type
13 West ½	Feature Fill Context I	0–20	4.0	100% Quahog
13 East ½	Feature Fill Context I	0-10	136.9	30% Scallop 30% Soft Shell Clam 30% Quahog 5% Oyster 5% Whelk
13 East ½	Feature Fill Context I	0-10	115.3	100% Whelk
13 East ½	Feature Fill Context II	0-10	0.2	100% Scallop

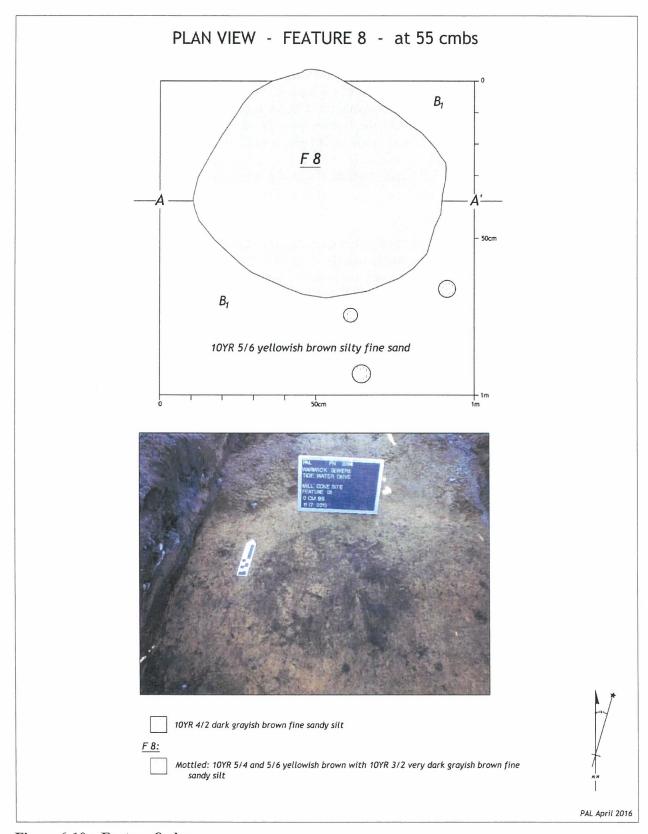


Figure 6-10a. Feature 8 plan.

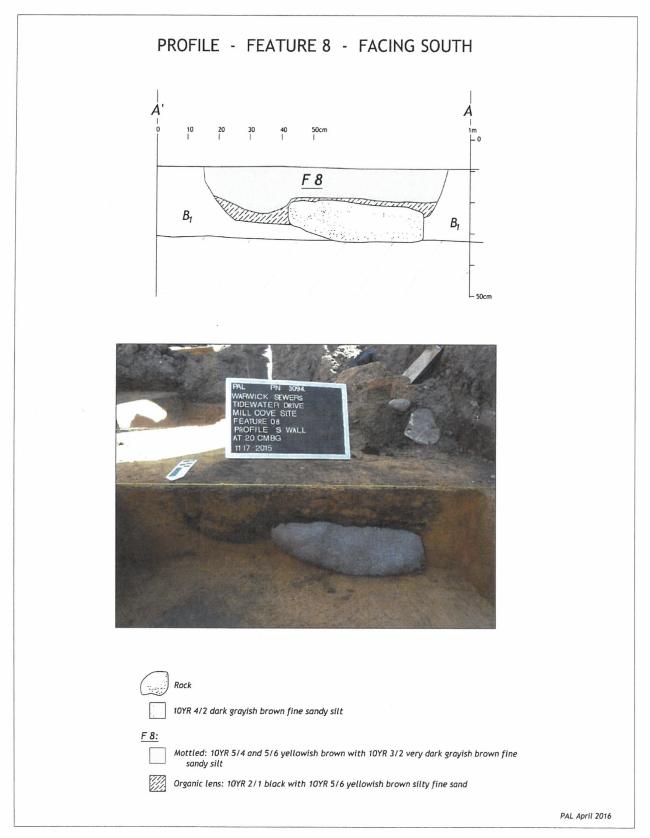


Figure 6-10b. Feature 8 profile.

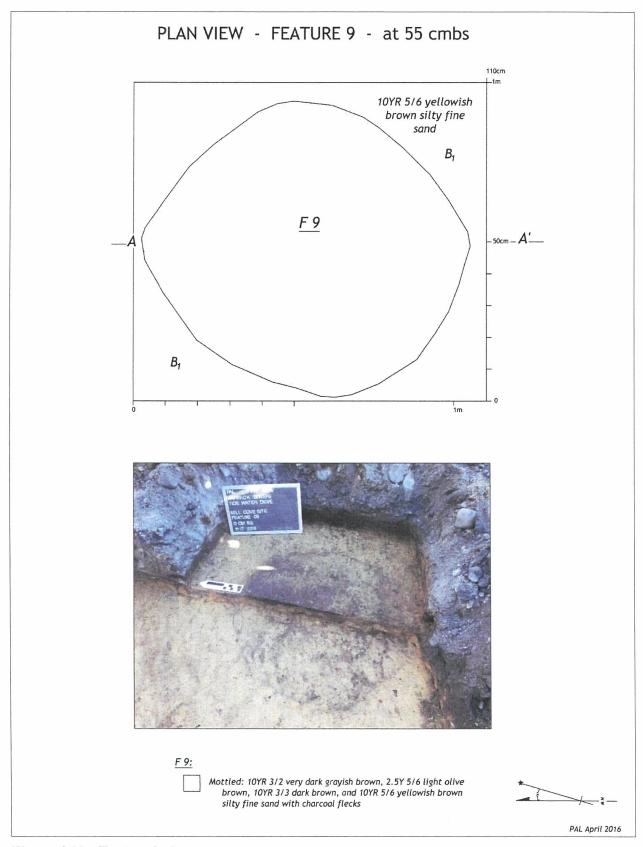


Figure 6-11a. Feature 9 plan.

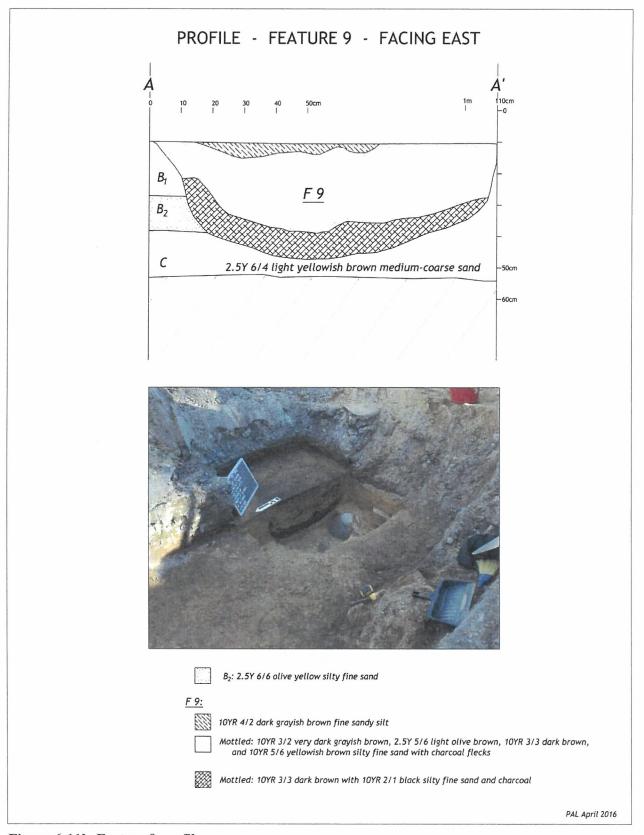


Figure 6-11b. Feature 9 profile.

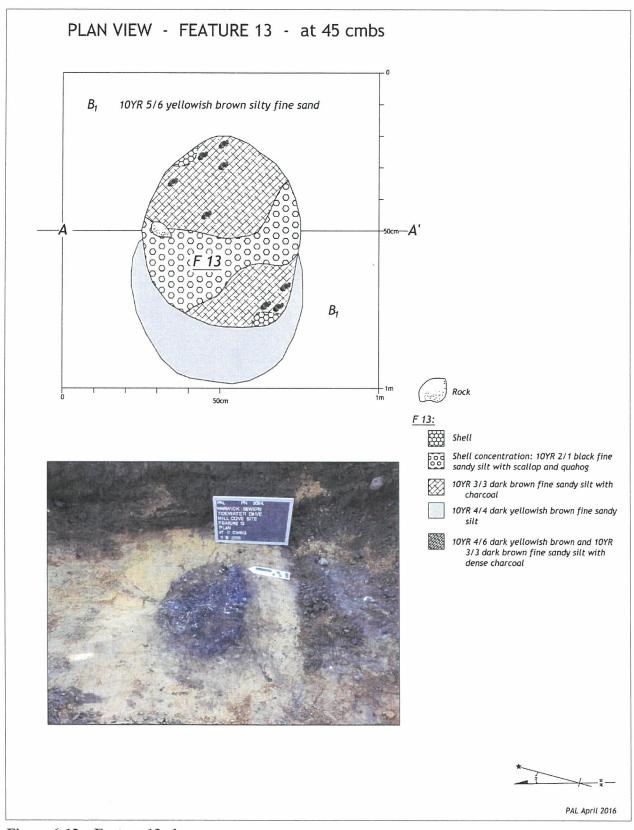


Figure 6-12a. Feature 13 plan.

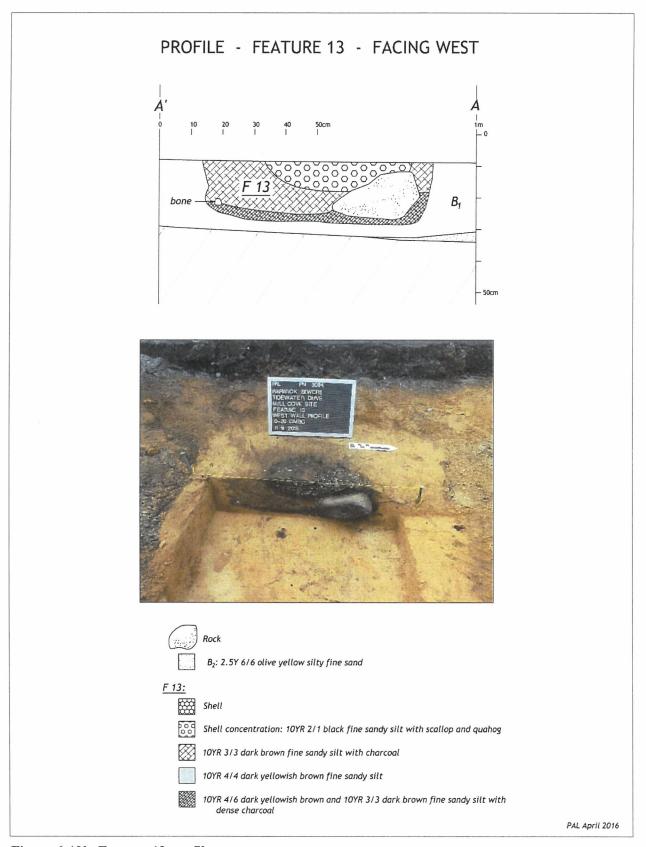


Figure 6-12b. Feature 13 profile.

## Feature 17

Feature 17 was exposed at 30 cmbs while opening the eighth 100-ft section of the trench (see Figure 6-9a). It was circular in plan with a diameter of 35 cm, very dark brown (10YR 3/2) and mottled brown (10YR 4/3), and had a concentration of shell fragments in its northern half (Figure 6-13a). In profile, Feature 17 was shallow, extending only 10 cm into the  $B_1$  (2.5YR 5/6) light olive brown subsoil (Figure 6-13b). Cultural materials in Feature 17 consisted of a quartz flake, shell fragments, and a nut shell fragment. One sample of shell was collected from within Feature 17 from the east half of the feature fill from 0 to 10 cm. The sample weighed 17.7 grams (g) and consisted of an estimated 95 percent soft shell clam and 5 percent quahog shell fragments.

#### Feature 21

As with Feature 17, Feature 21 was exposed at 30 cmbs while opening the eighth 100-ft section of the trench (see Figure 6-9a). In plan, it was irregularly ovate with a diameter of 50 cm and extended beyond the eastern trench wall (Figure 6-14a). The feature fill was mostly black (10YR 2/1) fine silty sand. In profile, Feature 21 was bowl-shaped and extended to 18 cm (Figure 6-14b). A diffuse and low-density shell fragment concentration was in the center of the features there were charcoal fragments. Representative samples of shell were collected (Table 6-2).

Table 6-2. Characteristics of Shell Samples from Feature 21.

Feature Half	Feature Context	Depth (cm)	Sample Weight (g)	% of Shell by Type
21 East ½	Feature Fill	0–20	106.1	70% Quahog 20% Soft Shell Clam 10% Scallop
21 West ½	Feature Fill	0-10	45.5	85% Quahog 10% Oyster 5% Scallop
21 West ½	Feature Fill	10–20	5.3	90% Soft Shell Clam 10% Quahog
21 East ½	Feature Fill	0–20	340.0	Mass of 100% Mussel in soil matrix

## Feature 22

Feature 22 was exposed at 35 cmbs while opening the ninth 100-ft section of the trench (see Figure 6-9a). In plan it was irregular and extended into the east wall. Its diameter extended for 1.2 m northeast—southeast into the trench wall (Figure 6-15a). Feature 22 was predominantly dark brown (10YR 3/3) sand and silt flecked by charcoal and with two concentrations of shell and one concentration of charcoal-stained black soil. As Feature 22 was excavated, it became apparent that it comprised three distinct and intersecting relatively shallow refuse pits (designated as Features 22a, 22b, and 22c); the deepest extended to 40 cmbs (Figure 6-15b). Feature 22a contained a quartz tip fragment, quartz chipping debris (n = 2), aboriginal ceramic fragments (n = 22), and shell. Feature 22b contained a quartz biface fragment, quartz chipping debris (n = 19), aboriginal ceramic fragments (n = 9), fish and mammal bone fragments, and shell. Feature 22c contained only shell. Seven samples of shell were collected (Table 6-3).

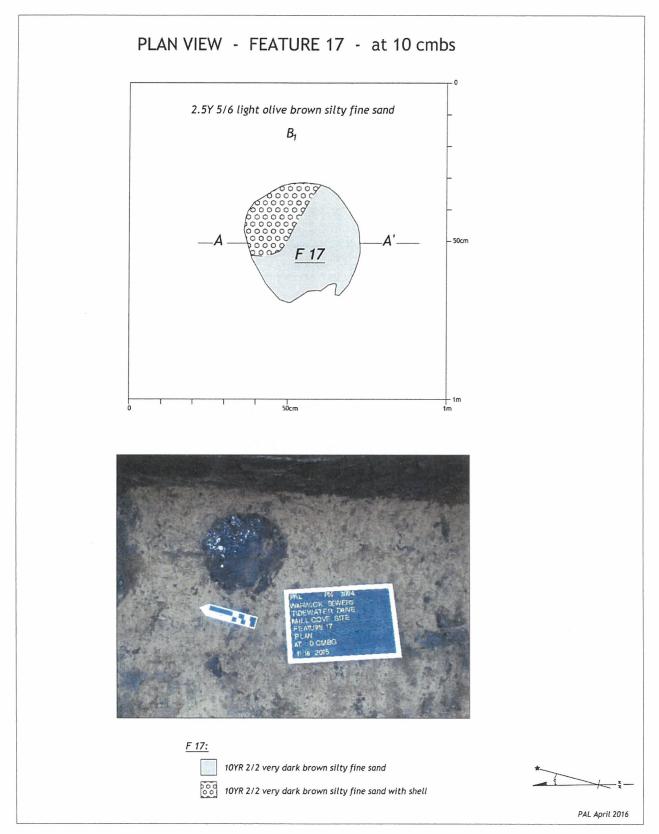


Figure 6-13a. Feature 17 plan at 40 cmbs.

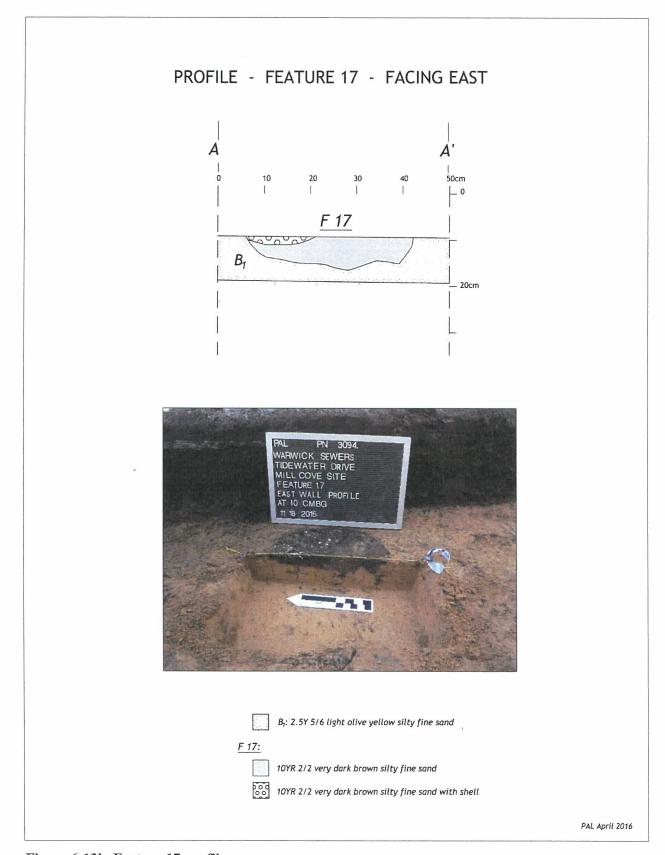


Figure 6-13b. Feature 17 profile.

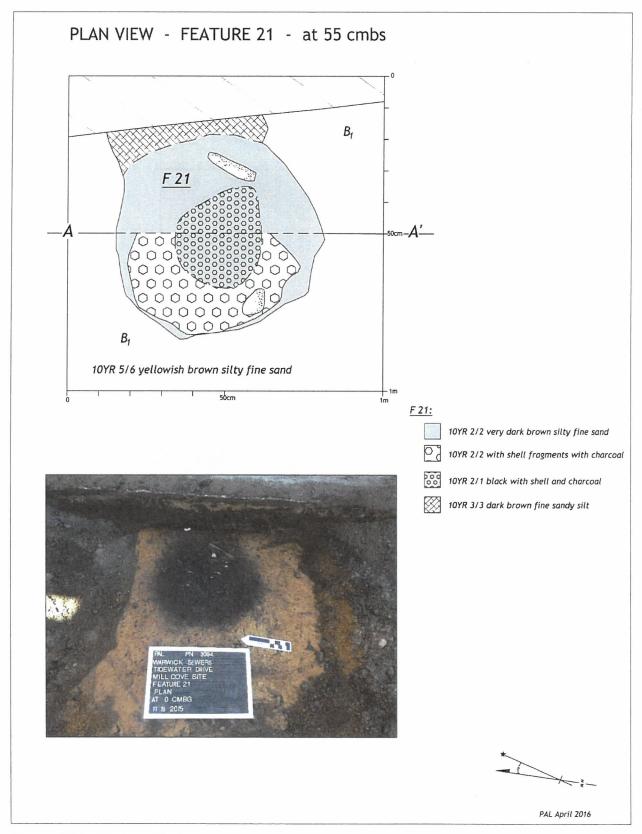


Figure 6-14a. Feature 21 plan.

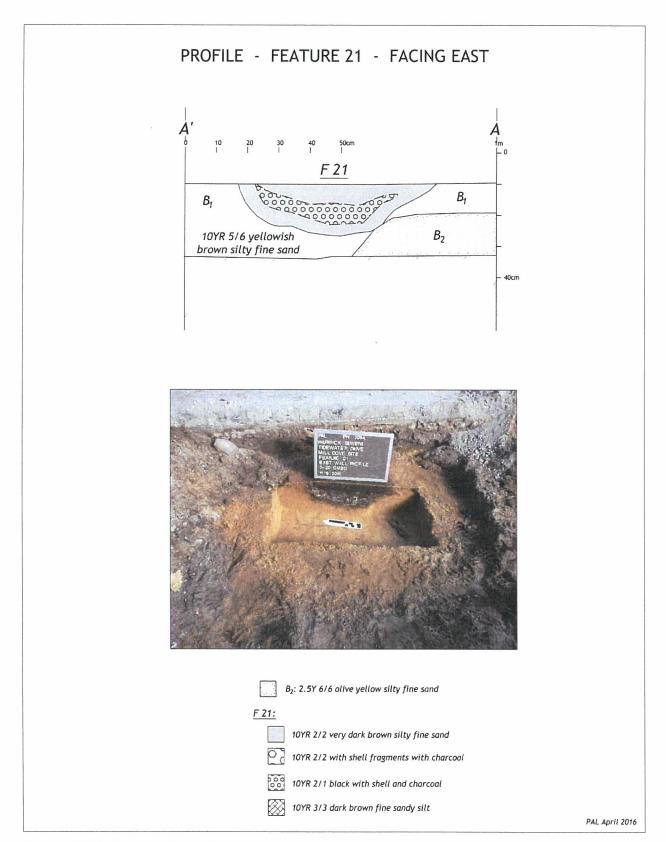


Figure 6-14b. Feature 21 profile.

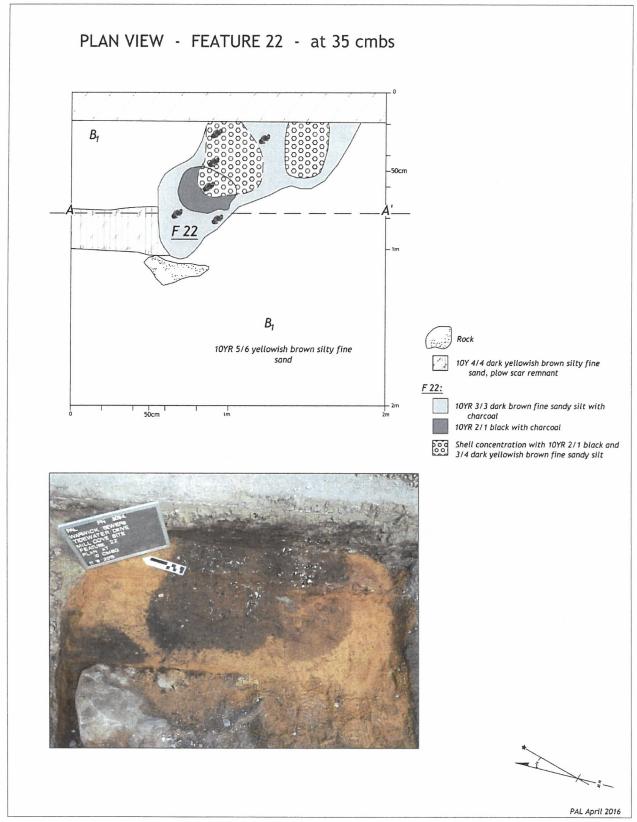


Figure 6-15a. Feature 22 plan.

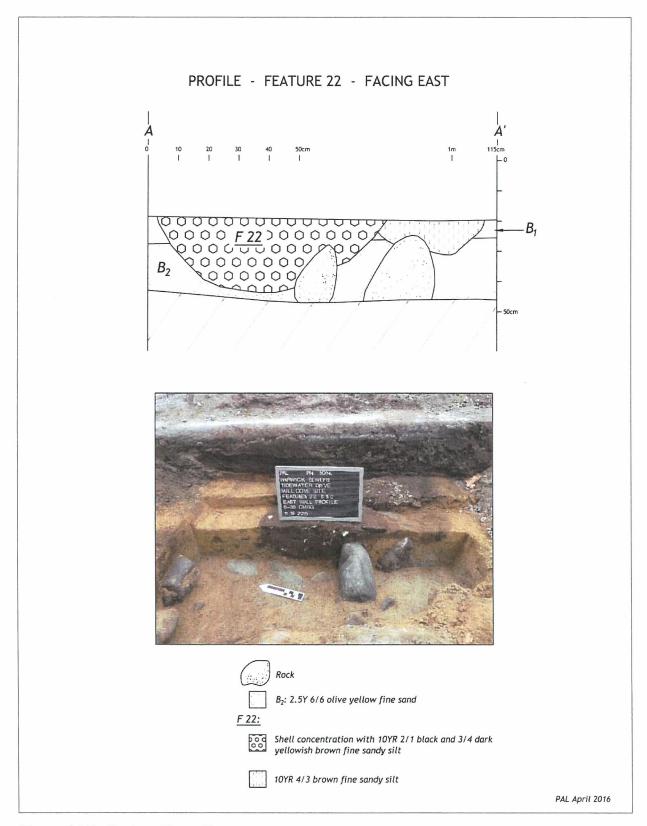


Figure 6-15b. Feature 22 profile.

Table 6-3. Characteristics of Shell Samples from Feature 22.

Feature Half	Feature Context	Depth (cm)	Sample Weight (g)	% of Shell by Type
22a North ½	Feature Fill	0–30	1.6	67% Oyster 33% Quahog
22b East ½	Feature fill	0–40	0.7	50% Quahog 30% Soft Shell Clam 10% Oyster 5% Whelk 5% Scallop
22b West ½	Feature Fill	0-10	294.2	85% Quahog 10% Soft Shell Clam 5% Whelk
22b West ½	Feature Fill	10–20	22.4	100% Quahog
22b West ½	Feature Fill	20–30	18.9	90% Quahog 10% Whelk
22b&c mix West ½	Feature Fill	0–10	99.2	100% Quahog
22c West ½	Feature Fill	10–20	0.7	Unidentified very small fragments

## Feature 23

Feature 23 was exposed at 30 cmbs while opening the tenth 100-ft section of the trench (see Figure 6-9a). It was a large irregular soil discoloration that was predominantly brown (10YR 4/3) and mottled dark gray brown (10Y 4/41) fine sand and silt with scattered medium-sized rocks within its peripheral margins. Two concentrations of diffuse small shell fragments were also mixed in the soils and centrally situated within the feature fill. In plan, Feature 23 was 1.2 m (north-south) (Figure 6-16) and a post hole was noted at its southern edge.

On November 11, 2015, human cranial and phalangeal bones were recognized during excavation of the first 10-cm level of the southern half of Feature 23. The findings are consistent with Late Woodland Period Native American human burial practices (flexed with the head facing southwest). Human burial protocols were engaged and further excavation of the feature was suspended, pending required notifications and consultation. Over the 24 hours following discovery and verification, NITHPO representatives conducted a "copper ceremony" to ensure the spiritual sanctity of the burial and, at their request, PAL collected and provided them (on May 9, 2017) with a small sample of the feature's skeletal material.

¹ Since 1998, medicine-family representatives of the NITHPO have conducted a ceremony when burials are discovered beneath existing roads and/or within residential areas during construction projects (Leveillee 2002) in which further impacts to the remains can be avoided through redesign and landscape planning, to preserve the burial(s) in place. Songs and prayers are offered while soil from immediately atop exposed remains is returned and copper sheeting is placed over this along with tobacco offerings. A woven blanket and/or a bird wing fan or other grave goods may be included. Clean fill is used to reestablish the original ground surface contours and character. If a roadway covered the feature(s) prior to discovery, the asphalt is replaced.

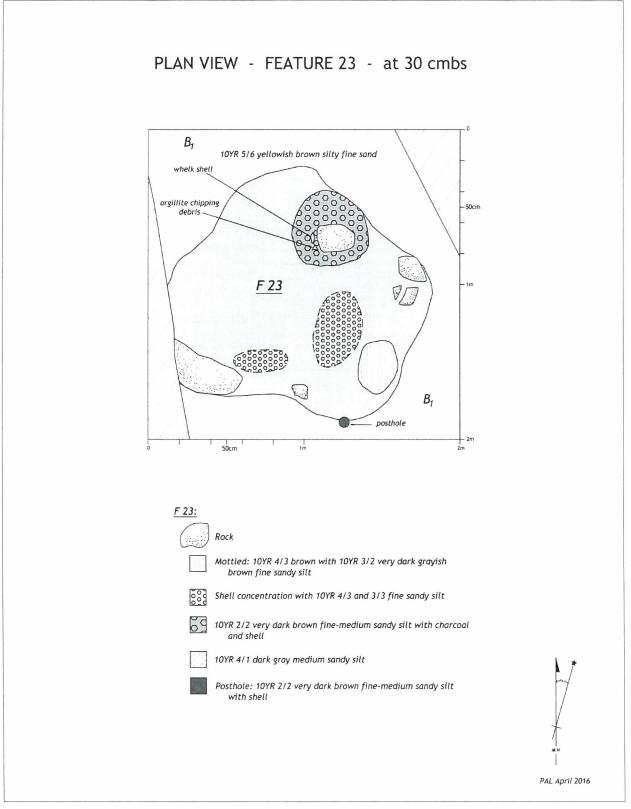


Figure 6-16. Feature 23 plan.

On November 12, 2015, following fulfillment of the NITHPO requests and completion of the copper ceremony, Feature 23 was covered and the trench was filled to its original surface level. Cultural materials recovered from Feature 23 at 0-10 cmbs before the discovery of human remains were returned to the feature and re-buried along with it. On February 23, 2016, NITHPO John Brown III said it was the preference of the Narragansett Indian Tribe to preserve and protect the Feature 23 burial in place.

#### Feature 24

Feature 24 was exposed at 30 cmbs while opening the tenth 100-ft section of the trench (see Figure 6-9a). It consisted of three separate but spatially contiguous very dark gray (10YR 3/1) soil stains and feature fill (designated as Features 24a, 24b, and 24c) and included quartz chipping debris (n = 7), mammal bone (n = 18), a single fragment of bird bone, soft shell clam fragments, quahog shell fragments, and (in Feature 24c) deer bone fragments (n = 13) (Figure 6-17a). Vertically, Feature 24 was very shallow, extending to less than 10 cm in profile (Figure 6-17b), and the three components reflect refuse disposal. Four shell samples were collected in Feature 24 (Table 6-4).

Table 6-4. Characteristics of Shell Samples from Feature 24.

Feature Half	Feature Context	Depth (cm)	Sample Weight (g)	% of Shell by Type
24a West ½	Feature Fill	0-10	7.3	50% Quahog 50% Soft Shell Clam
24b East ½	Feature Fill	0-10	17.1	80% Quahog 20% Soft Shell Clam
24b West 1/2	Feature Fill	0-10	94.7	100% Quahog
24c North ½	Feature Fill	0-10	5.5	33% Quahog 33% Oyster 33% Soft Shell Clam

#### Feature 25

Feature 25 was exposed at 30 cmbs while opening the tenth 100-ft section of the trench (see Figure 6-9a). A post mold was in close proximity to the southeast. In plan, Feature 25 was ovate, and the finely textured silty sand feature fill was colored very dark gray (10YR 3/1) against the yellow brown (10YR 5/6) B₁ subsoil matrix (Figure 6-18a). Two small stones were in the approximate center of the feature fill and a single burnt rock fragment was within its western interior margins.

In plan, the feature was shallow, extending vertically for less than 10 cm (Figure 6-18b), and a low density of cultural material, including a rhyolite flake, a quartz core, and low density of highly fragmented shell fragments, were recovered.

# Feature 28

Feature 28 was exposed at 30 cmbs while opening the tenth 100-ft section of the trench (see Figure 6-9a). In plan it appeared as ovate, becoming more circular as it was excavated vertically. Its fill was very dark brown (10YR 2/2) fine sandy silt and shell fragments were noted throughout. Feature 28 had a diameter of 90 cm (Figure 6-19a), and a post mold was in close proximity to the northwest. In profile, it was a bowlshaped pit extending for 40 cm, with clearly visible lenses of moderate densities of shell fragments. It extended vertically to the transitional interface between the B₁ and C subsoil strata (Figure 6-19b). A chert biface fragment, a quartz uniface, a quartz scraper, quartz chipping debris (n = 11), aboriginal ceramic

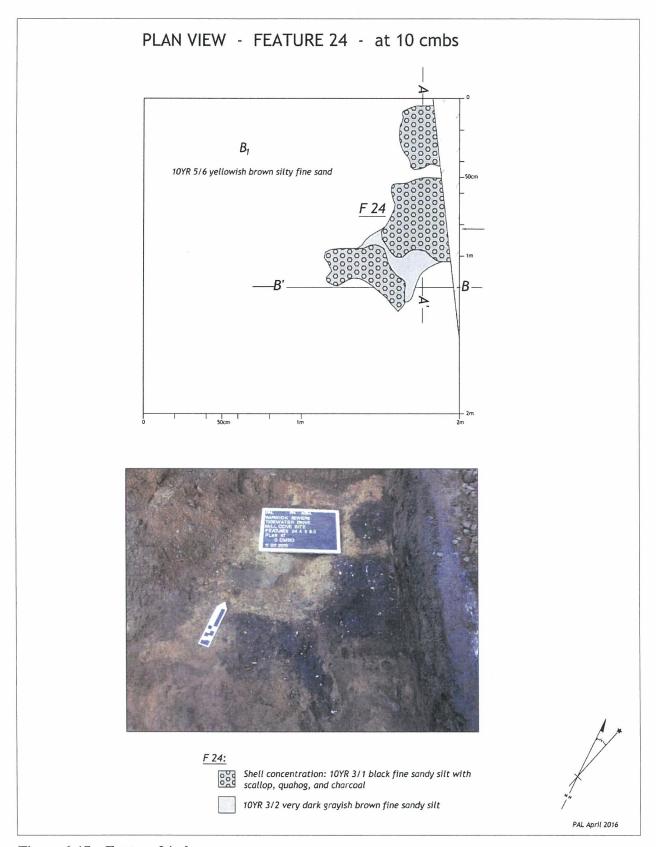


Figure 6-17a. Feature 24 plan.

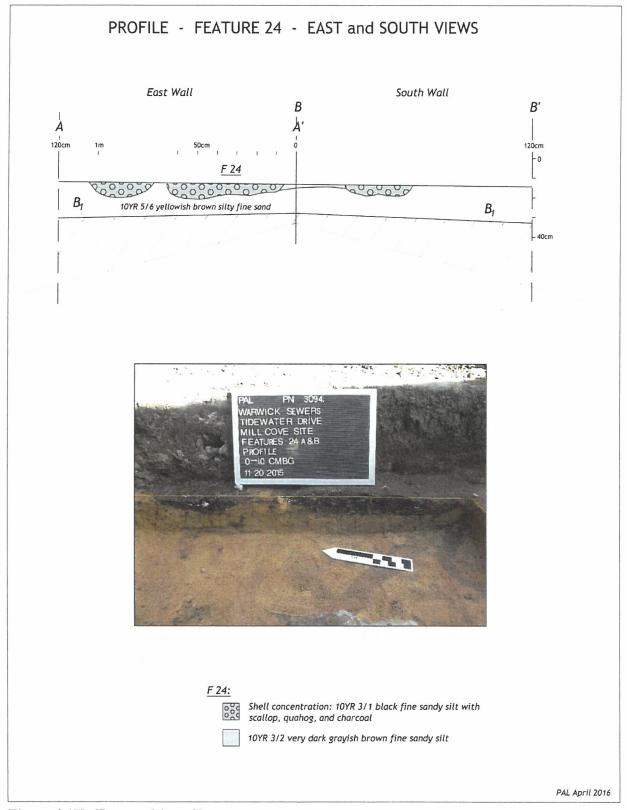


Figure 6-17b. Feature 24 profile.

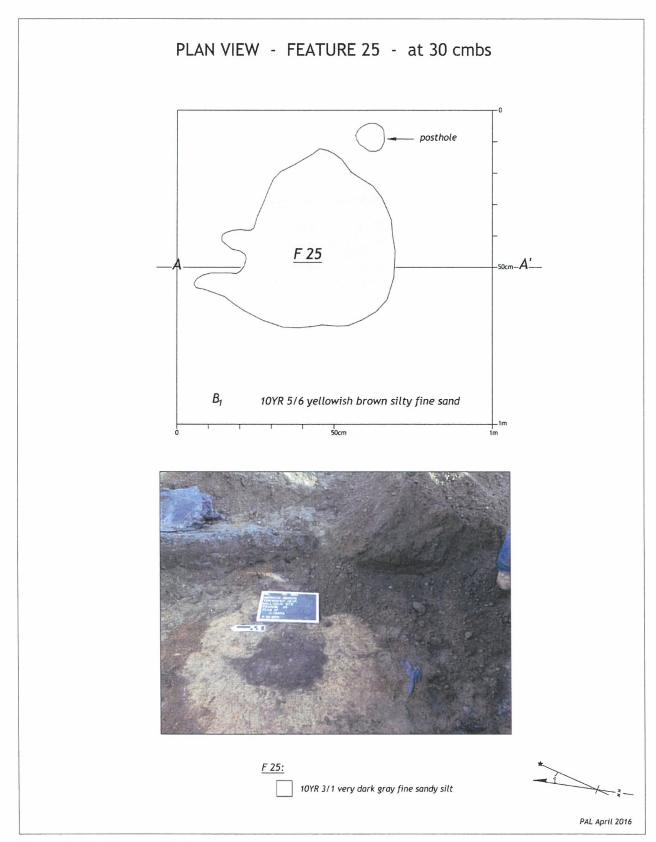
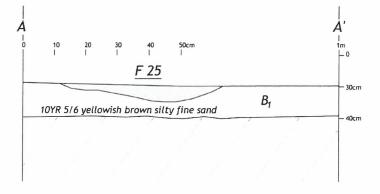


Figure 6-18a. Feature 25 plan.

# PROFILE - FEATURE 25 - FACING EAST





F 25:

10YR 3/1 very dark gray fine sandy silt

Figure 6-18b. Feature 25 profile.

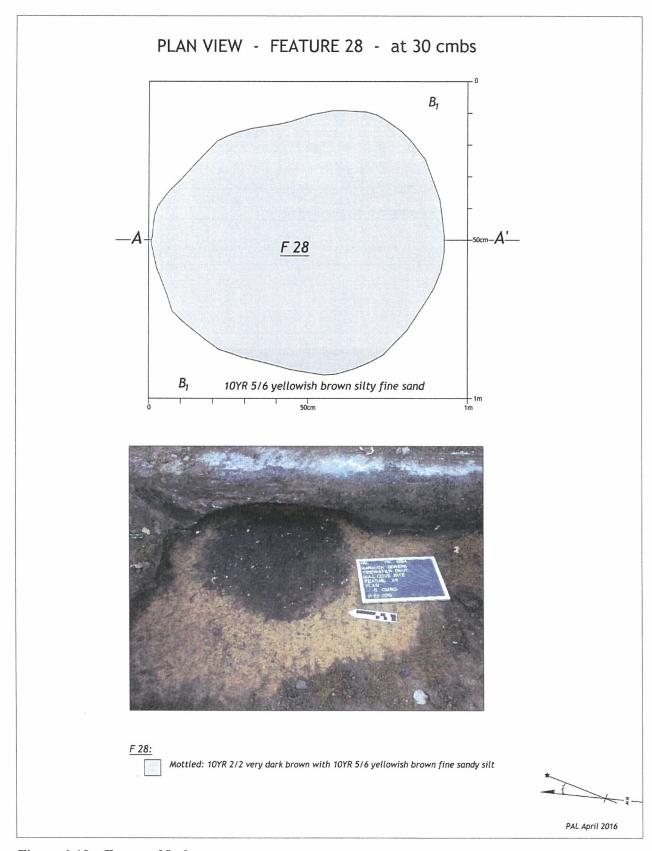


Figure 6-19a. Feature 28 plan.

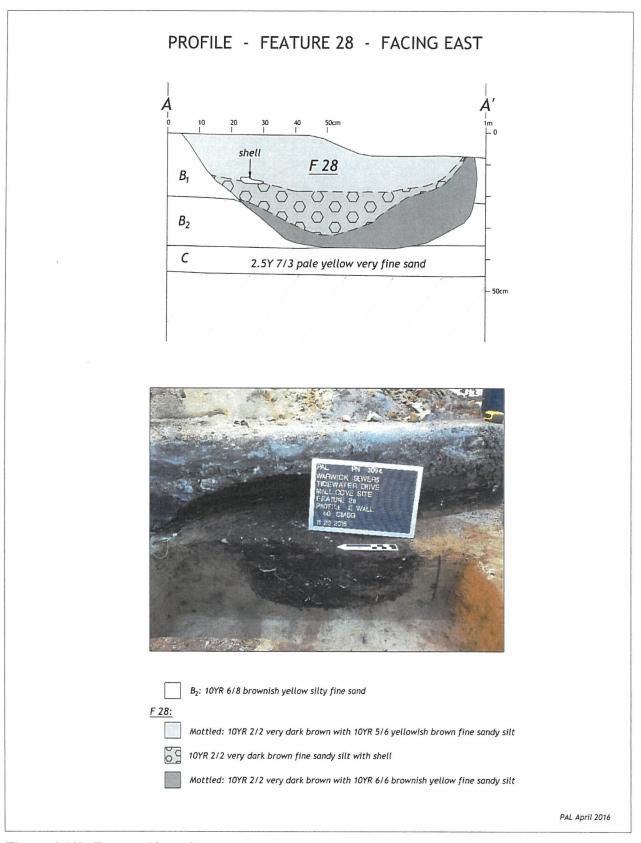


Figure 6-19b. Feature 28 profile.

fragments (n = 2), shell, and a low frequency of mammal (n = 4), fish (n = 2), and bird (n = 1) bone were recovered. Representative shell samples were collected from Feature 28 (Table 6-5).

Table 6-5. Characteristics of Shell Samples from Feature 28.

Feature Half	Feature Context	Depth (cm)	Sample Weight	% of Shell by Type
28 West ½	Feature Fill	0-10	15.4 g	50% Quahog 50% Oyster
28 West ½	Feature Fill	10–20	47 g	60% Quahog 35% Soft Shell Clam 5% Slipper
28 West ½	Feature Fill	20–30	8.9 g	70% Quahog 30% Soft Shell Clam
28 East ½	Feature Fill	0-10	148.6 g	60% Quahog 20% Oyster 10% Soft Shell Clam 10% Whelk
28 East ½	Feature Fill	10–40	1.1 kg	60% Quahog 20% Whelk 10% Soft Shell Clam 5% Oyster 5% Scallop

#### Feature 29

Feature 29 was exposed at 20 cmbs while opening the tenth 100-ft section of the trench (see Figure 6-9a). A post mold was in close proximity to the northeast of the feature. The feature appeared generally rounded in plan with a diameter of approximately 80 cm. The feature fill was very dark grayish brown (10YR 3/2) and mottled yellow brown (10YR 5/4) with charcoal flecks in the southern half and soft shell clam shell fragments concentrated in the northern half (Figure 6-20a).

In profile, Feature 29 extended vertically for 10 cm where it terminated, and the southern half came down on a rock (Figure 6-20b). The shallow pit contained shell fragments, bits of charcoal, and two small fragments of aboriginal pottery. One sample of shell was recovered from feature fill in the eastern half of Feature 29 at 0–10 cmbs. It weighed 35.7 g and consisted of an estimated 45 percent quahog, 45 percent soft shell clam, and 10 percent scallop fragments.

# Feature 31

Feature 31 was exposed at 40 cmbs while opening the tenth 100-ft section of the trench (see Figure 6-9a). The feature was generally circular, 90 cm in diameter, and colored very dark brown (10YR 2/2) with shell in its southern half. A quartz Levanna projectile point preform was found among the shell fragments in the southern margins of the feature (Figure 6-21a). Other cultural material recovered from Feature 31 were quartz chipping debris (n = 10), aboriginal pottery fragments (n = 28), and mammal bone (n = 9).

In profile, Feature 31 was relatively deep, extending to 40 cm, where it terminated on encountering rocks (Figure 6-21b). Two depositional filling events were indicated by the differential stratification of Feature 31. The bottoms lens was a thin burning event covered by dark gray brown (10YR 5/6) soil that was devoid of shell and other cultural material. This sterile fill lens was covered by a moderate-density shell-bearing deposit that was the final fill event within the feature. Seven samples of shell were collected from Feature 31 (Table 6-6).

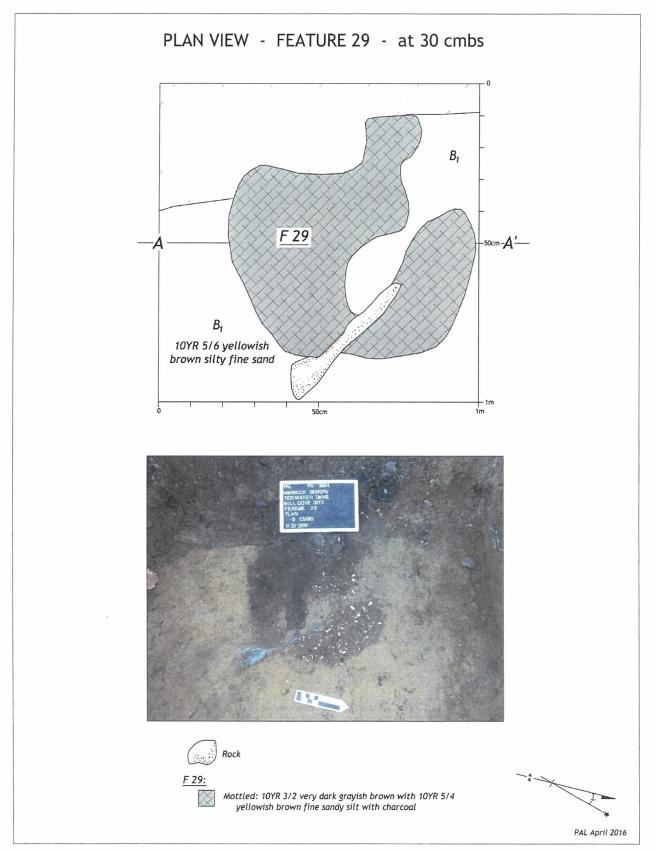


Figure 6-20a. Feature 29 plan.

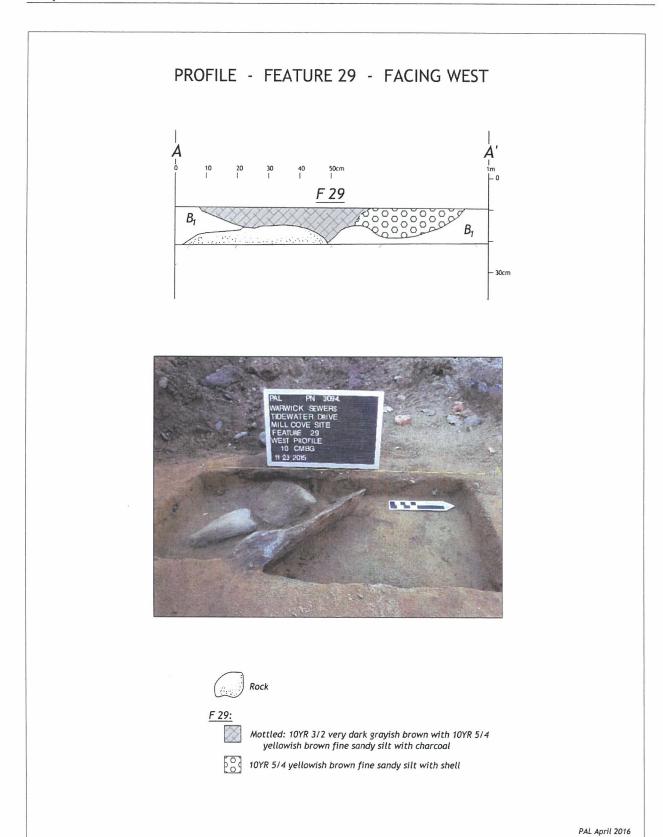


Figure 6-20b. Feature 29 Profile.

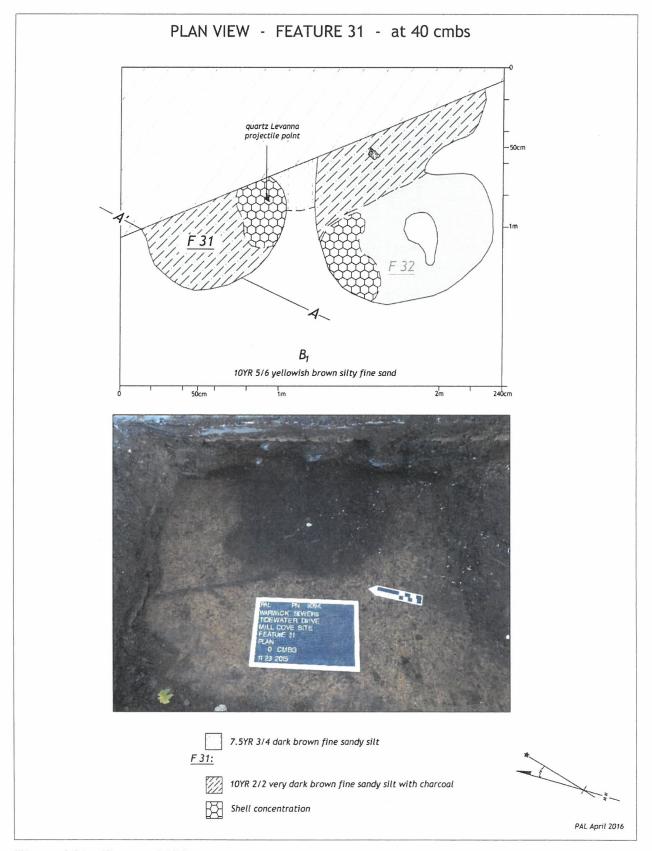


Figure 6-21a. Feature 31 Plan.

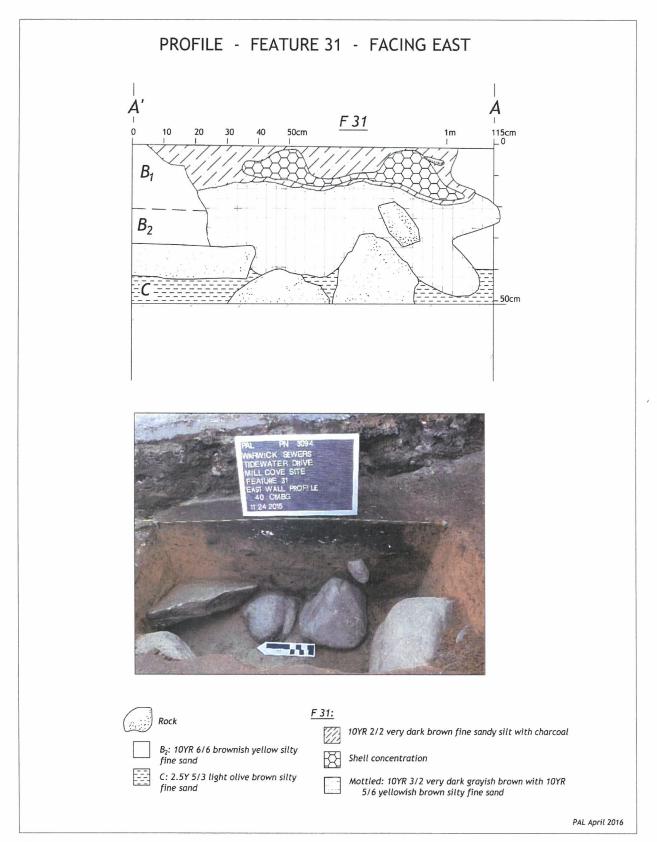


Figure 6-21b. Feature 31 Profile.

Table 6-6. Characteristics of Shell Samples from Feature 31.

Feature Half	Feature Context	Depth (cm)	Sample Weight (g)	% of Shell by Type
31 East ½	Feature Fill	0-10	33.3	45% Quahog 45% Soft Shell Clam 5% Oyster 5% Scallop
31 East ½	Feature Fill	0-40	5.7	100% Whelk
31 East ½	Feature Fill	10–20	316.4	40% Quahog 40% Soft Shell Clam 20% Whelk
31 East ½	Feature Fill	20–30	29.2	80% Quahog 20% Whelk
31 East ½	Feature fill	30–40	3.8	100% Quahog
31 West ½	Feature Fill	0-10	9.2	100% Quahog
31 West ½	Feature Fill	10–20	20.2	100% Quahog

Feature 32 was exposed at 40 cmbs while opening the tenth 100-ft section of the trench (see Figure 6-9a). Spatially, it was adjacent to, and (20 cm) south of, Feature 31. In plan, Feature 32 was irregularly ovate with a north-south diameter of 90 cm. It continued into the east wall of the machine trench and consisted of very dark brown (10YR 2/2 and 10YR 3/2) fine sandy silt with shell fragments concentrated in the northern limits of the feature (Figure 6-22a). Vertically, Feature 32 was shallow and lens shaped, extending only 5 cm into the B₁ soil stratum (Figure 6-22b). The only cultural materials recovered from Feature 32 were quartz chipping debris (n = 5) and a single fragment of aboriginal pottery. Two shell samples were collected from Feature 32 (Table 6-7).

Table 6-7. Characteristics of Shell Samples from Feature 32.

Feature Half	Feature Context	Depth (cm)	Sample Weight (g)	% of Shell by Type
32 East ½	Feature Fill	0-10	18.1	33% Quahog 33% Oyster 33% Whelk
32 West ½	Feature Fill	0-10	16.0	100% Soft Shell Clam

## Feature 33

Feature 33 was exposed at 40 cmbs while opening the tenth 100-ft section of the trench (see Figure 6-9a). It was a large, irregularly ovate light olive brown (2.5Y 5/6) silty medium-textured sand with a shell pocket in its northern limits. The western edge of the feature was defined by an intruding and partially disturbed plow scar (Figure 6-23a). Vertically, Feature 33 extended to 35 cm into C horizon subsoils (Figure 6-23b). In profile, multiple filling lenses were apparent, and associated materials from within these fill deposits contained quartz chipping debris (n = 11), a projectile point tip, 2 quartz bifacially flaked tool fragments, shell fragments, fish bones (n = 30), mammal bones (n = 20), nut fragments, aboriginal ceramic fragments (n = 13), and a small unmodified cobble of cumberlandite. Three shell samples were collected from Feature 33 (Table 6-8).

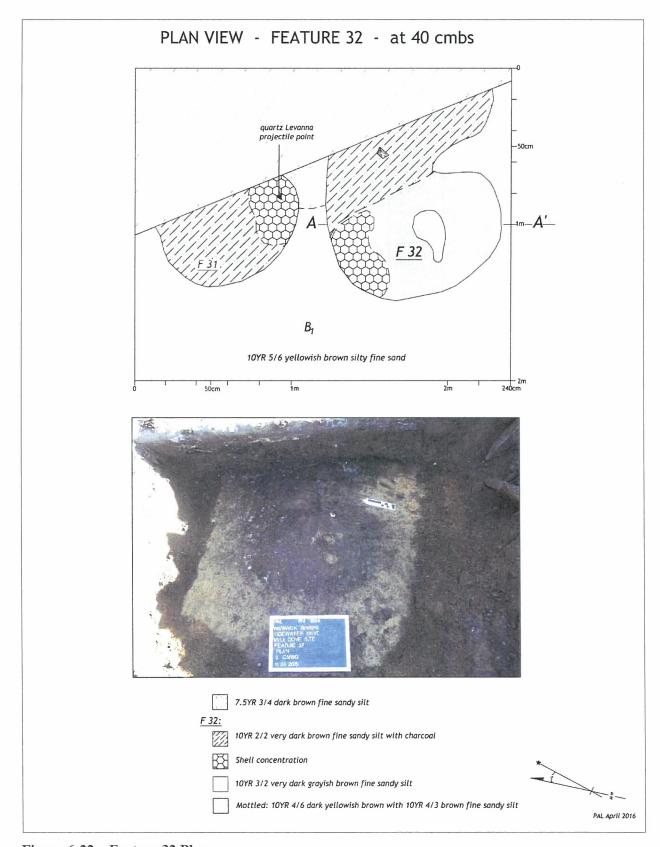


Figure 6-22a. Feature 32 Plan.

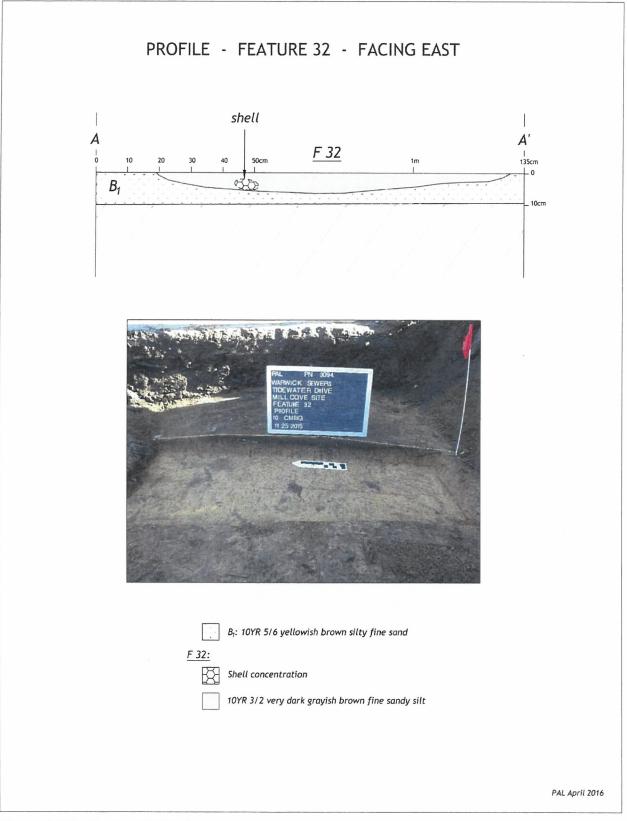


Figure 6-22b. Feature 32 Profile.

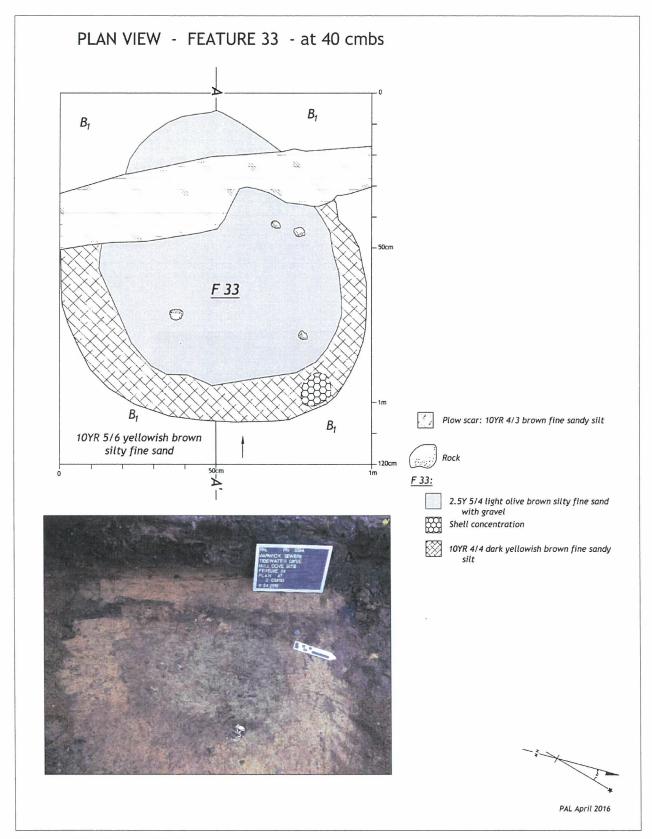


Figure 6-23a. Feature 33 Plan.

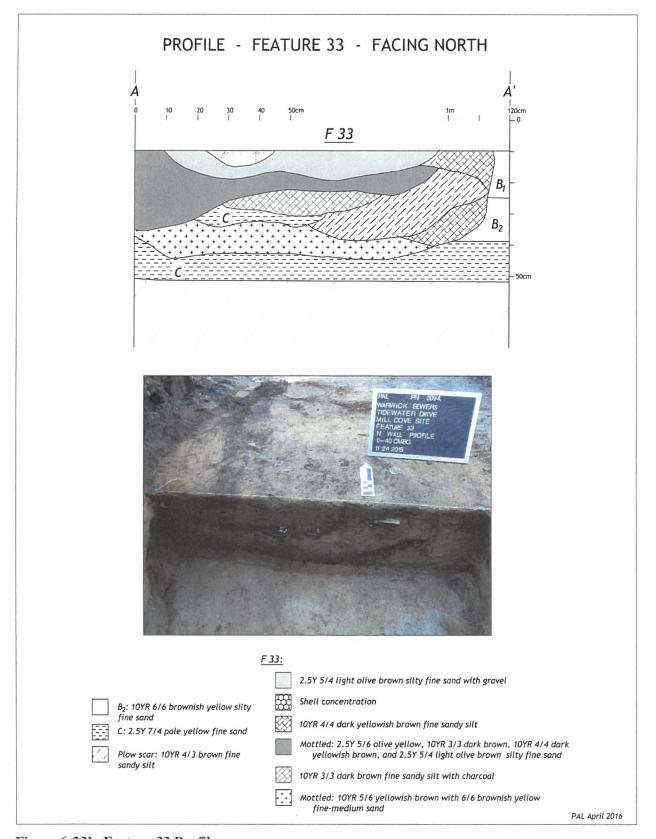


Figure 6-23b. Feature 33 Profile.

Table 6-8. Characteristics of Shell Samples from Feature 33.

Feature Half	Feature Context	Depth (cm)	Sample Weight (g)	% of Shell by Type
33	Context V	13–20	413.8	30% Quahog 30% Soft Shell Clam 30% Oyster 10% Whelk
33 South ½	Context II	0-10	0.5	Too fragmented to calculate type
33 South ½	Context III	10–20	360.0	50% Soft Shell Clam 50% Whelk

Feature 34 was exposed at 40 cmbs while opening the eleventh 100-ft section of the trench (see Figure 6-9a). It was circular and very well defined in plan with a diameter of 1.3 m. The predominant feature fill was black (10YR 2/1) and mottled very dark brown (10YR 2/2) fine silty sand with rings of dense shell fragments (Figure 6-24a). In profile, Feature 34 extended, with steeply angled vertical walls, to 55 cm into the transitional zone of  $B_2$  and C soil strata (Figure 6-24b). This deep pit feature was filled with multiple depositional sequences and the cultural materials consisted of chipping debris: quartz (n = 180), quartzite (n = 1), and rhyolite (n = 1); quartz bifacially flaked tool fragments (n = 5); a quartz core; high densities of shell (clam, quahog, whelk); a moderate quantity of animal bone (n = 31) and fish bone (n = 5); and aboriginal ceramic fragments (n = 16). This was a multilayered deep pit feature reflecting processing and refuse discard. A sample of charcoal from Feature 34 was submitted for radiocarbon analysis and yielded an age of  $860 \pm 30$  B.P. (Beta 428346).

#### Feature 34A

Feature 34A was identified immediately adjacent to and southwest of Feature 34 when that feature was excavated. It was lighter in color (10YR 4/3- brown) than Feature 34, but approximately the same size and shape (Figure 6-25a) in plan. In profile, Feature 34A proved to be a shallow lens that extended only 10 cm vertically into the  $B_2$  subsoils (Figure 6-25b). Feature 34A contained a low density of quartz chipping debris (n = 8), fragments of deer bone (n = 15) and fish bone (n = 3), a single aboriginal pottery fragments, and low frequencies of shell. Nineteen shell samples were collected from Features 34 and 34A (Table 6-9).

## Feature 36

Feature 36 was exposed at 30 cmbs while opening the eleventh 100-ft section of the trench (see Figure 6-9a). In plan it was generally large and ovate and extended into the eastern wall of the trench (Figure 6-26a). It was predominantly very dark brown (10YR 2/2) with a central pocket of yellow brown (10YR 5/6) silty fine sand. There was a cluster in the south-central portion of the feature that contained a dense concentration of mixed shell fragments (quahog, soft shell clam, and scallop) and charcoal, with small fragments of fire-cracked rock.

In profile, three major depositional events within a deep pit with steeply angled walls were visible (Figure 6-26b). The first, and deepest lens was a fill of very dark brown finely textured silt extending 45 cm vertically into the C horizon stratum. The second lens dominated the north half of the feature and contained a concentration of scallop shell fragments that extended vertically for 30 cm into the deeper and earlier fill. The third depositional lens was a characterized by concentrated soft shell clam shell fragments in soils that extended for 20 cm vertically into the initial fill lens.

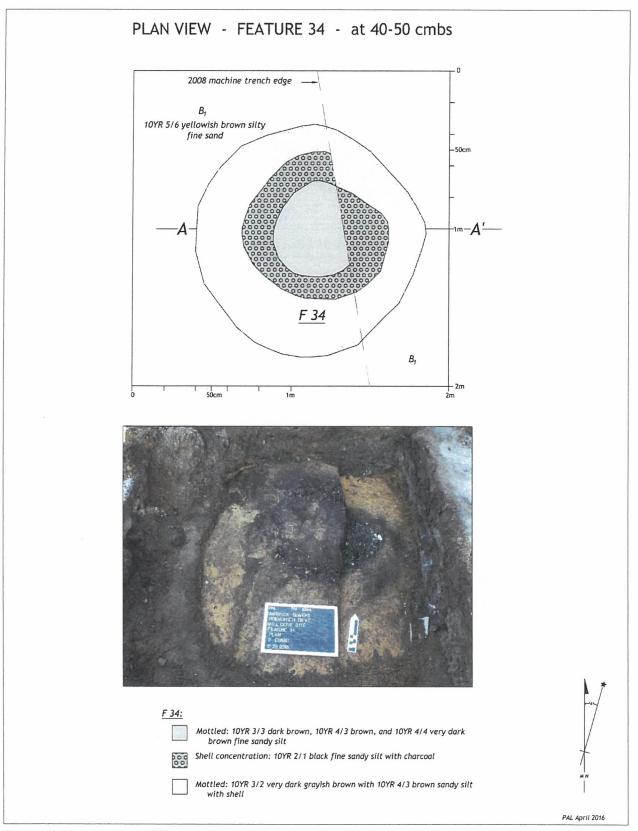


Figure 6-24a. Feature 34 Plan.

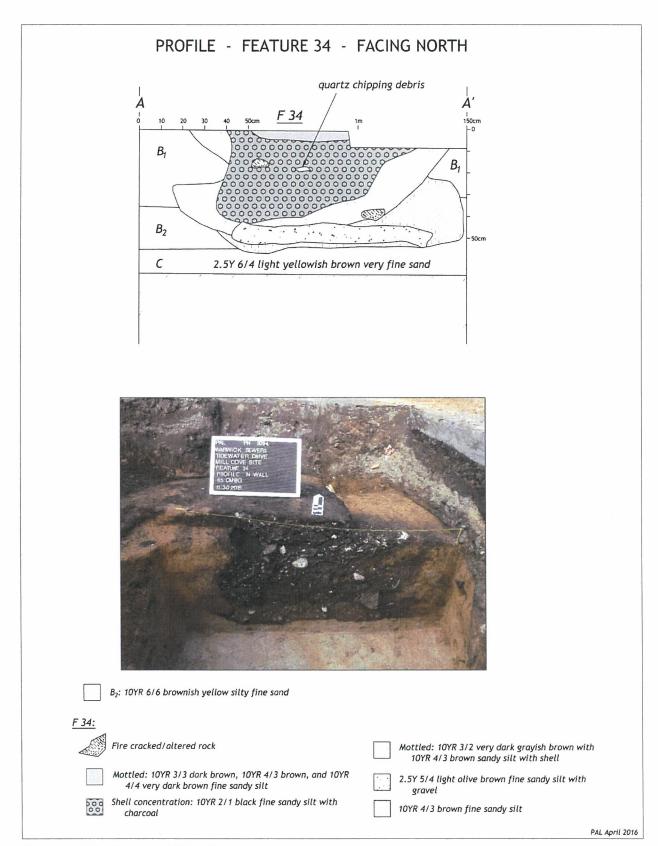


Figure 6-24b. Feature 34 Profile.

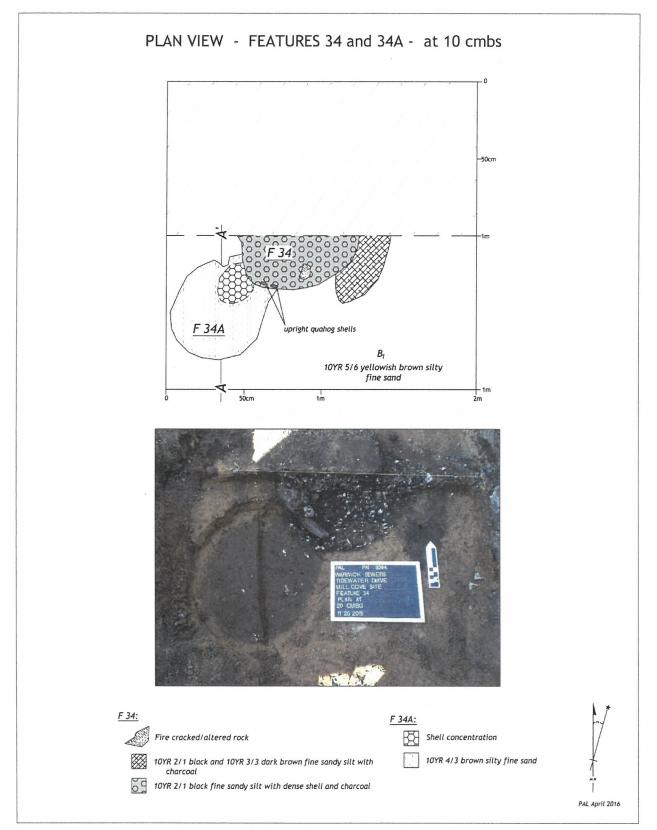


Figure 6-25a. Plan view of Feature 34A in spatial relation to Feature 34.

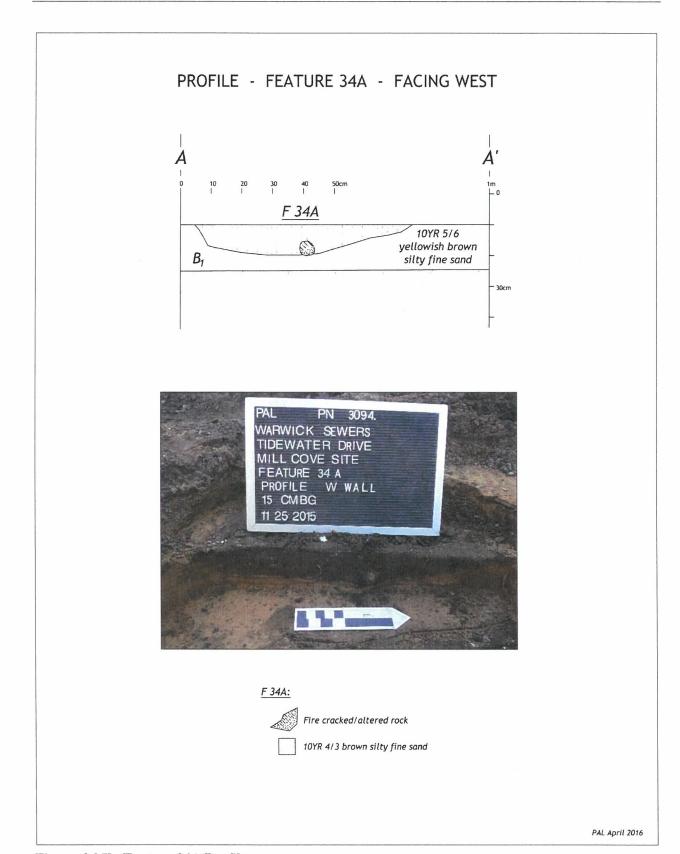


Figure 6-25b. Feature 34A Profile.

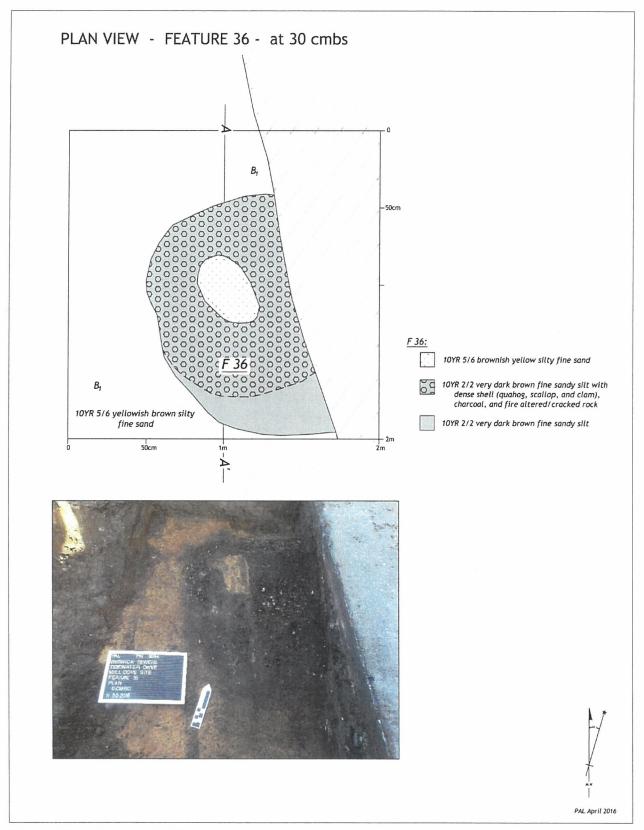


Figure 6-26a. Feature 36 Plan.

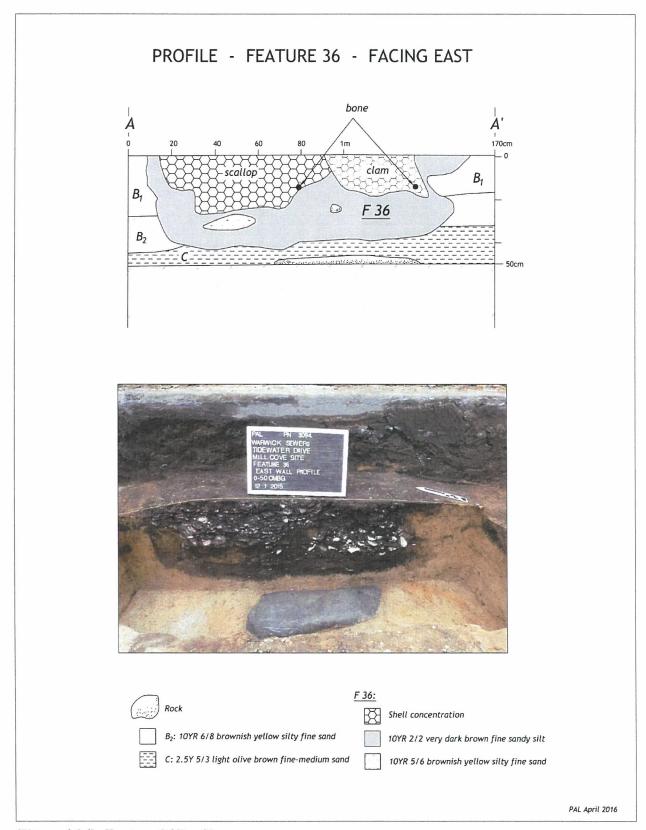


Figure 6-26b. Feature 36 Profile.

Table 6-9. Characteristics of Shell Samples from Features 34 and 34A.

Feature Half	Feature Context	Depth (cm)	Sample Weight	% of Shell by Type
34A	Feature Fill	0–5	176.1 g	80% Quahog 10% Whelk 10% Soft Shell Clam
34 North ½	Feature Fill	0–10	0.8 kg	40% Soft Shell Clam 30% Quahog 15% Oyster 5% Whelk 5% Scallop 5% Slipper
34 North ½	Feature Fill	10–20	1.3 kg	20% Oyster 20% Quahog 15% Soft Shell Clam 20% Scallop 10% Whelk 10% Slipper
34 North ½	Feature Fill	20–30	1.6 kg	40% Quahog 20% Soft Shell Clam 20% Oyster 10% Whelk 5% Scallop 5% Slipper
34 North ½	Feature Fill	30–40	0.5 kg	50% Quahog 40% Soft Shell Clam 5% Oyster 5% Whelk
34 North ½	Feature Fill	40-50	37.1 g	80% Quahog 20% Whelk
34 South ½	Feature Fill	0–3	7.5 g	90% Soft Shell Clam 10% Quahog
34 South ½	Feature Fill	0-10	0.8 kg	40% Quahog 30% Soft Shell Clam 10% Scallop 10% Slipper 5% Oyster 5% Whelk
34 South ½	Feature Fill	10–20	1.1 kg	30% Quahog 30% Soft Shell Clam 15% Oyster 15% Scallop 5% Whelk 5% Slipper
34 South ½	Feature Fill	20–30	1.45 kg	40% Soft Shell Clam 30% Quahog 10% Oyster 10% Scallop 5% Whelk 5% Slipper
34 South 1/2	Feature Fill	40-50	35.5 g	50% Soft Shell Clam 50% Quahog
34 South ½	Feature Fill	0-10	29.4 g	90% Quahog 10% Slipper

Continued on next page.

Feature Half	Feature Context	Depth (cm)	Sample Weight	% of Shell by Type
34 South ½	Feature fill	40–50	0.2 g	Too fragmented to type
34 South ½	Feature Fill	50-60	2.5 g	100% Quahog
34A East ½	Feature Fill	5–10	27.8 g	30% Quahog 30% Soft Shell Clam 30% Whelk 10% too fragmented to type
34A East 1/2	Feature Fill	10-15	13.8 g	100% Quahog
34A West ½	Feature Fill	0-15	6.1 g	100% Quahog
34 South ½	Context III	30–40	36.6 g	70% Quahog 30% Whelk
34 South ½	Context II	30–40	0.95 kg	50% Soft Shell Clam 40% Quahog 5% Oyster 5% Whelk

A variety of materials was recovered: chipping debris of quartz (n = 73), argillite (n = 2), and hornfels (n = 1); thousands of shell fragments; relatively high numbers of animal bones (mammal [n = 69], turtle [n = 3], bird [n = 1], and fish [n = 13]); aboriginal ceramics (n = 7); a rhyolite Levanna projectile point; a hammerstone; and a bone awl. A sample of charcoal from Feature 36 was submitted for radiocarbon analysis and yielded an age of  $870 \pm 30$  B.P. (Beta 428347). Seven shell samples were collected from Feature 36 (Table 6-10).

Table 6-10. Characteristics of Shell Samples from Feature 36.

Feature Half	Feature Context	Depth (cm)	Sample Weight	% of Shell by Type
36A East ½	Feature Fill	0–40	2.25 kg	65% Scallop 15% Soft Shell Clam 5% Quahog 5% Oyster 5% Scallop 5% Slipper
36B East ½	Feature Fill	0-40	0.95 kg	80% Soft Shell Clam 10% Quahog 5% Oyster 5% Whelk
36A West ½	Feature Fill	30-40	37.4 g	100% Quahog
36 West ½	Feature Fill (1 of 3)	0-10	1.76 kg	25% Scallop 25% Quahog 25% Oyster 15% Soft Shell Clam 10% Whelk
36B West ½	Feature Fill	30–40	0.85 kg	40% Soft Shell Clam 40% Quahog 15% Whelk 5% Oyster

Continued on next page

Feature Half	Feature Context	Depth (cm)	Sample Weight	% of Shell by Type
36 West ½	Feature Fill (2 of 3)	0–10	1.0 kg	60% Scallop 10% Quahog 10% Soft Shell Clam 5% Whelk 5% Oyster 5% Slipper 5% Periwinkle
36 West ½	Feature Fill	20–30	1.9 kg	40% Soft Shell Clam 30% Scallop 10% Quahog 10% Oyster 5% Whelk 5% Slipper & Mussel

Feature 38 was exposed at 45 cmbs while opening the eleventh 100-ft section of the trench (see Figure 6-9a). In plan it appeared as large, irregular (but generally rectangular bands) of dark brown (10YR 2/2) and brown (10YR 4/3) fine silty sands with noted concentrations of shell in different densities of soft shell clam, quahog, and whelk shell fragments. It measured approximately 2 m northwest-southeast by 1.4 m westeast and extended into the west wall of the machine trench (Figure 6-27). Feature 38 was a compound deposit consisting of two pits of different diameters. The northern smaller feature was originally round with a 90-cm diameter. The larger southern segment was dug into the southern portion of the initial pit, intersecting it. When the machine trench was initially opened, a 10-cm diameter post mold was noted 40 cm to the southwest of the southwest limit of Feature 38.

On December 1, 2015, vertical excavation of the eastern half of Feature 38 reached 12 cm, where a human cranium was encountered in the southeastern section of the feature. Human burial protocols were engaged and further excavation of the feature was suspended pending required notifications and consultation. Spatially, Feature 38 was approximately 36 m southeast of Feature 23, the first burial to be encountered. On December 2, 2015, NITHPO representatives conducted a copper ceremony to ensure the spiritual sanctity of the Feature 38 burial. As was the case for Feature 23, NITHPO requested that a select small sample of Feature 38 skeletal material be collected and provided to the tribe. NITHPO took possession of that sample on May 9, 2017.

During Feature 38 excavation, bird bones were noted to the immediate east of the cranium, and turtle plastron were to the immediate west. The skull was facing southwest and downward, and the mandible rested upon the lower extremity of what appeared to be a femur, consistent with a tightly flexed or bundle burial.

Feature 38 was covered and the trench was filled to its original surface level. A sample of charcoal collected and retained from the initial level (10 cm) above the human remains was submitted for radiocarbon analysis and yielded an age of 670 ± 30 B.P. (Beta 428348). Cultural materials recovered from the 10-cm level excavated above the human remains included quartz chipping debris (n = 20); reptile, fish, mammal, and bird bone; moderate densities of shell; and a deer antler tine from within a dense lens of shell fragments. Four shell samples were collected from the soil above the burial feature (Table 6-11).

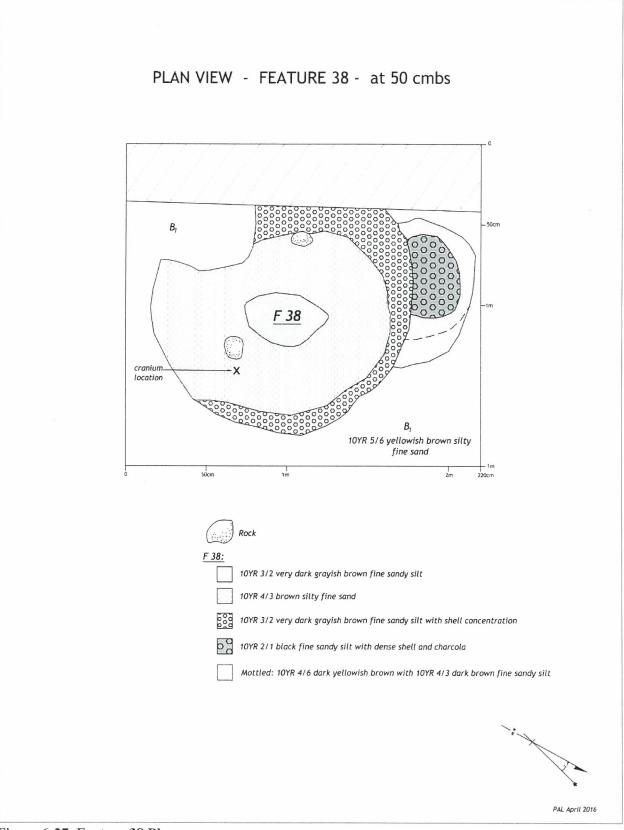


Figure 6-27. Feature 38 Plan.

Table 6-11. Characteristics of Shell Samples from Feature 38.

Feature Half	Feature Context	Depth (cm)	Sample Weight	% of Shell by Type
				75% Quahog
38 East ½	Context I	0-10	331.0 g	20% Soft Shell Clam
				5% Whelk
				50% Soft Shell Clam
38 East ½	Context II	0-10	0.65 kg	40% Quahog
				10% Oyster
38 East ½	Context III	0-10	11.0 g	50% Whelk
Jo Last /2	Context III	0-10		50% Soft Shell Clam
				60% Soft Shell Clam
38 East ½	Context IV	0–10	176.0 g	35% Quahog
				5% Whelk

On February 23, 2016, NITHPO John Brown III formally stated that it was the preference of the Narragansett Indian Tribe to preserve and protect the Feature 38 burial in place.

# Features 39A and 39B

Features 39A and 39B were exposed at 40 cmbs while opening the eleventh 100-ft section of the trench (see Figure 6-9a). They were contiguous and intersecting, both generally circular in plan, and both with diameters approximating 80 cm. Feature 39A was very dark gray brown and contained fire-cracked rock. Feature 39B was mottled dark brown (10YR 3/2) with charcoal. Both features contained shell fragments and charcoal-blackened soils in the feature fill (Figure 6-28a).

In profile, it was apparent that Feature 39B was dug first and Feature 39A was subsequently dug immediately east of Feature 39B and partially into it. In profile, both features were lensed with several distinct horizontal contexts (Figure 6-28b). Feature 39A extended vertically to 39 cm, and Feature 39B extended vertically to 35 cm below the 40-cm depth of first encounter.

Cultural materials recovered from within Feature 39A included quartz chipping debris (n = 33) and moderate densities of shell fragments, animal bone fragments (mammal [n = 8], fish [n = 3], bird [n = 2]), and aboriginal ceramic fragments (n = 3). Cultural materials collected from within Feature 39B feature fill included quartz (n = 23), rhyolite (n = 2), and argillite (n = 2) chipping debris; aboriginal ceramic fragments (n = 32); bone fragments (mammal [n = 13], fish [n = 5], bird [n = 3] turtle [n = 2]); shell fragments; a hammerstone; and a possible abrading stone. Seventeen shell samples were recovered from Features 39A and 39B (Table 6-12).

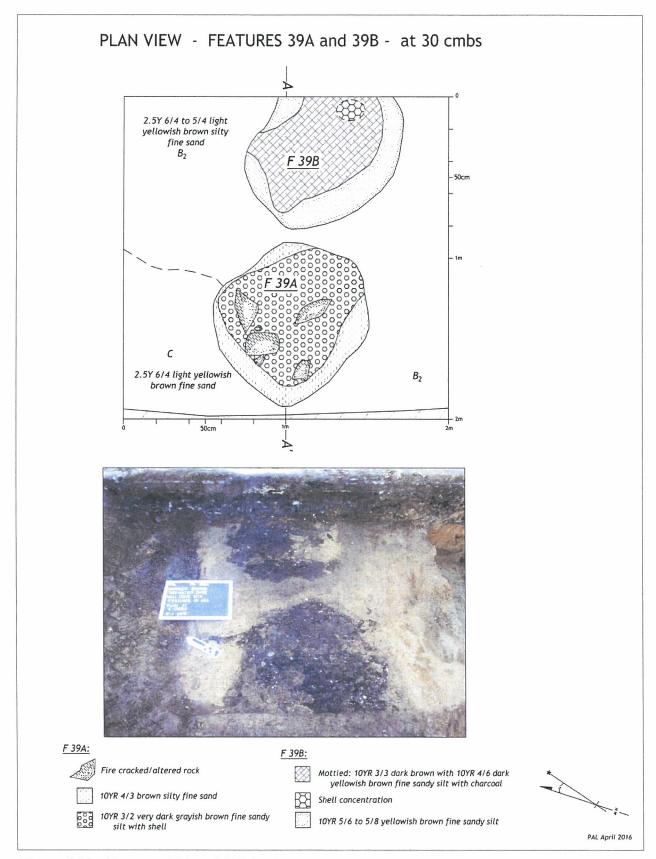


Figure 6-28a. Features 39A and 39B in plan.

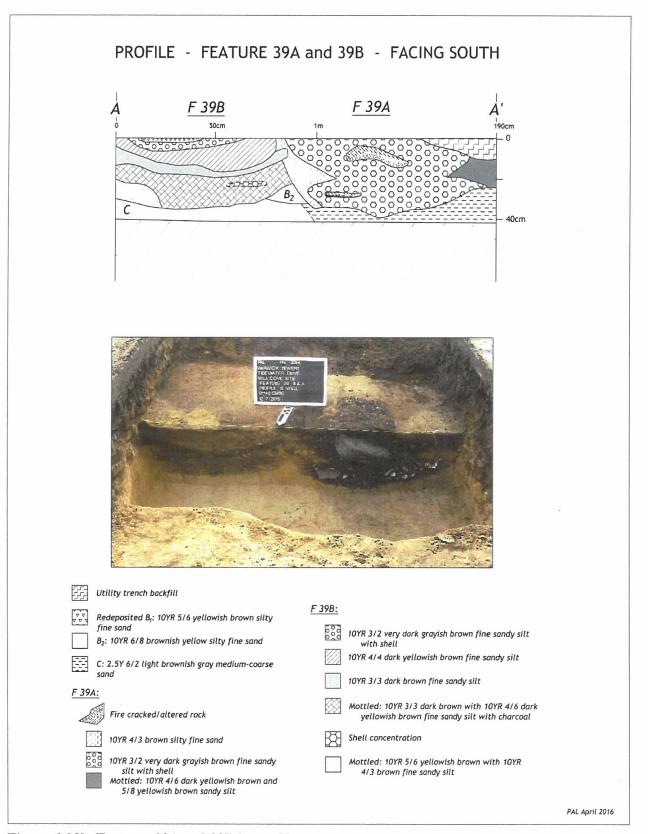


Figure 6-28b. Features 39A and 39B in profile.

Table 6-12. Characteristics of Shell Samples from Features 39A and 39B.

Feature Half	Feature Context	Depth (cm)	Sample Weight	% of Shell by Type
39A North ½	Feature Fill	20–30	2.3 kg	40% Whelk 40% Oyster 10% Quahog 5% Soft Shell Clam
39A North ½	Feature Fill	0-10	468.7 g	5% Scallop 45% Oyster 45% Quahog 5% Whelk 5% Soft Shell Clam
39A North ½	Feature Fill	10–20	208.6 g	45% Oyster 40% Quahog 5% Soft Shell Clam 5% Whelk 5% Scallop
39A North ½	Feature Fill	30–40	1.35 kg	30% Oyster 30% Quahog 30% Whelk 55% Soft Shell Clam 5% Scallop
39A South ½	Context I	30–40	0.9 kg [*]	30% Whelk 30% Oyster 30% Quahog 5% Scallop 5% Soft Shell Clam
39A South ½	Feature Fill	0–30	1.8 kg	40% Whelk 25% Oyster 25% Quahog 10% Soft Shell Clam
39A South ½	Feature Fill	30–40	2.45 kg	40% Whelk 30% Quahog 25% Oyster 4% Scallop 1% Soft Shell Clam
39B North ½	Feature Fill	0–3	61.1 g	60% Whelk 49% Quahog
39B North 1/2	Feature Fill	0-10	4.6 g	100% Soft Shell Clam
39B North 1/2	Feature Fill	10-17	0.3 g	100% Soft Shell Clam
39B North ½	Feature Fill	10–20	98.9 g	45% Oyster 45% Quahog 5% Whelk 5% Soft Shell Clam
39B South ½	Context II	0–6	16.6 g	90% Quahog 10% Whelk
39B South ½	Feature Fill	0-17	3.4 g	100% Quahog
39B North 1/2	Feature Fill	30-40	7.9 g	100% Quahog
39B South 1/2	Feature Fill	30-40	15 g	100% Quahog
39B North ½	Feature Fill	20–30	133.2 g	90% Quahog 5% Whelk 5% Soft shell Clam & Oyster

Continued on next page.

Feature Half	Feature Context	Depth (cm)	Sample Weight	% of Shell by Type
39B South ½	Feature Fill	17–30	0.55 kg	50% Quahog 20% Soft Shell clam 15% Oyster 15% Whelk

Feature 40 was exposed at 40 cmbs while opening the eleventh 100-ft section of the trench (see Figure 6-9a). It was recognized as a large ovate and distinctly edged black (10YR 2/1) and very dark gray (10YR 3/1) deposit of fine sandy silt with soft shell clam and quahog shell fragments. Approximately half of the feature was exposed, with an estimated half extended into the east wall of the machine trench. Feature 40 measured 1 m north-south and 80 cm east-west (Figure 6-29a). It was assumed that an additional 80 cm of the feature, yet unexcavated, extended easterly beyond the limits of the trench. There was a post mold to the immediate north of the feature.

In profile, Feature 40 was a purposefully dug deep pit with steeply angled walls. It exhibited a complex series of filling episodes with more than seven distinguishable lenses (Figure 6-29b). It extended vertically to 60 cm into sterile C horizon soils. Relatively high densities of cultural materials were recovered from the depositional lenses: quartz chipping debris, a quartz Levanna projectile point, a rhyolite Levanna projectile point, a hammerstone, aboriginal ceramic fragments, high densities of shell, animal bone fragments (including mammal [n = 12], turtle [n = 3], and fish [n = 4]), and a graphite fragment. A charcoal sample from Feature 40 was submitted for radiocarbon analysis and yielded an age of 860 ± 30 B.P. (Beta 428350). Fifteen samples of shell were collected from Feature 40 (Table 6-13).

# Feature 41

Feature 41 was exposed at 40 cmbs, immediately adjacent and south of Feature 40. It was recognized as a large, ovate mosaic of multiple deposits of dark brown and gray brown (10YR 3/3 and 10YR 3/2) silty soils including pockets of shell and mammal bone in overlapping contexts (Figure 6-30a). The feature extended into the east wall of the machine trench and an estimated half of the feature remains unexcavated beneath the roadway. Within the exposed machine trench, the feature measured 1.2 m southwest-northeast and 90 cm southeast-northwest.

In Profile, Feature 41 extended vertically for 23 cm into sterile glacial subsoils. The profile showed that it consisted of at least four shallow stratified conical lenses likely resulting from a succession of refuse deposits (Figure 6-30b). Cultural materials recovered from Feature 41 consisted of quartz chipping debris; a quartz bifacially flaked tool fragment; one fragment of Native American pottery; and small fragments of mammal bone (n = 3), including deer, fish bone (n = 3) and reptile bone (n = 1); and shell. Twelve samples of shell were collected from Feature 41 (Table 6-14).

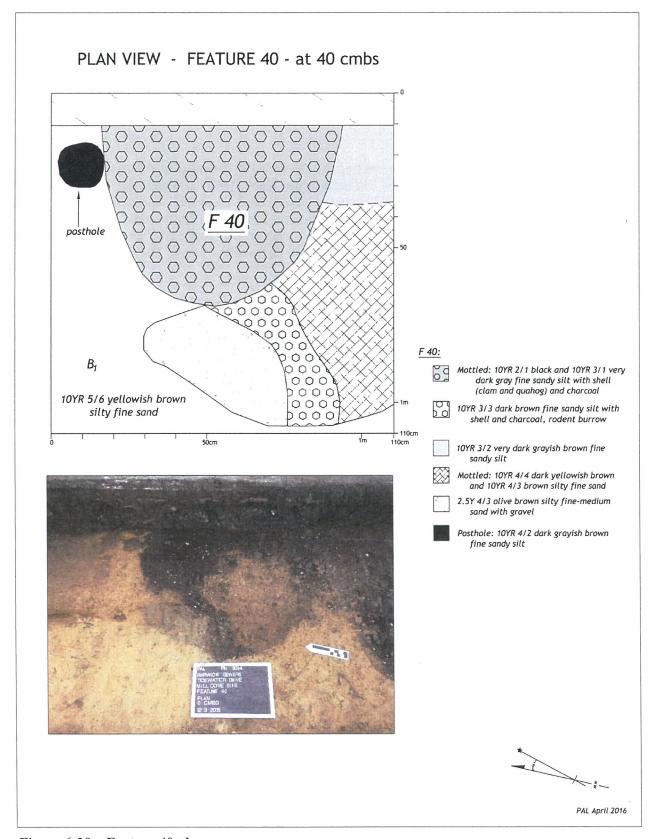


Figure 6-29a. Feature 40 plan.

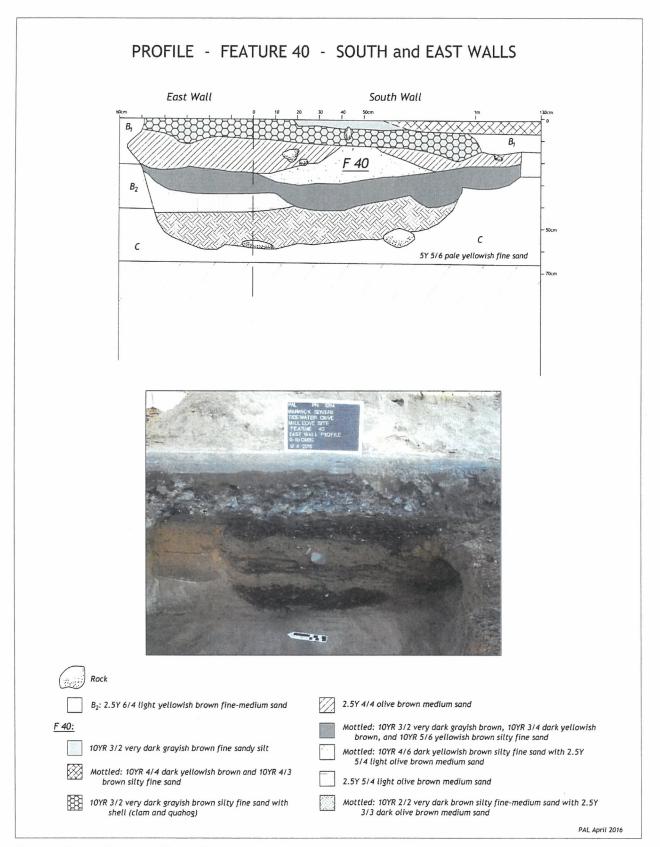


Figure 6-29b. Feature 40 profile.

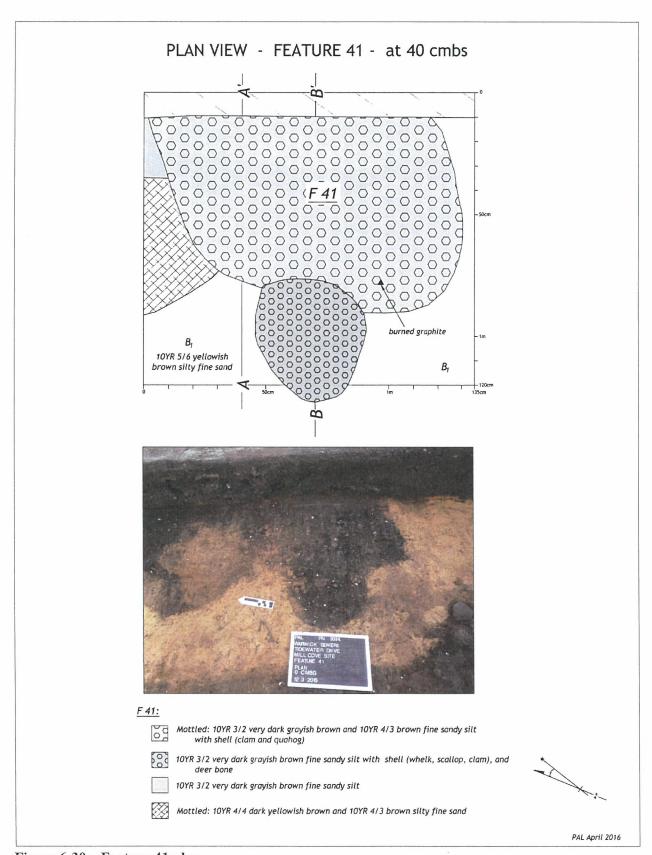


Figure 6-30a. Feature 41 plan.

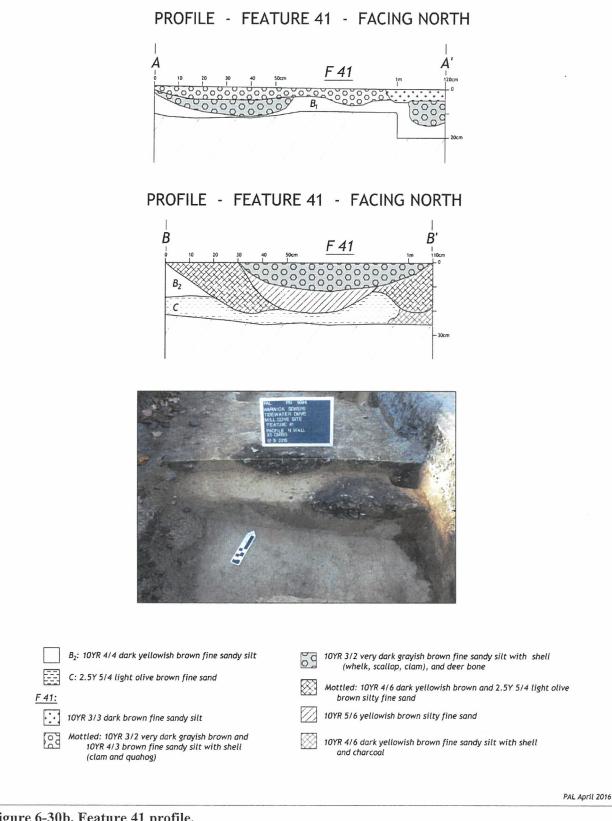


Figure 6-30b. Feature 41 profile.

Table 6-13. Characteristics of Shell Samples from Feature 40.

Feature Half	Feature Context	Depth (cm)	Sample Weight	% of Shell by Type
40 North ½	Feature Fill	50–60	361.3 g	50% Quahog 30% Soft Shell Clam 10% Oyster 10% Whelk
40 North ½	Feature Fill	20–40	327.4 g	35% Quahog 30% Soft Shell Clam 30% Whelk 5% E. Nassa
40 North ½	Context I	0-10	0.45 g	30% Soft Shell Clam 30% Whelk 25% Quahog 5% Oyster 5% Slipper 5% E. Nassa
40 North ½	Context III	0-10	25.3 g	50% Quahog 40% Soft Shell Clam 10% Whelk
40 North ½	Context III	10–20	121.5 g	40% Quahog 30% Soft Shell Clam 10% Whelk 10% Scallop 10% Oyster
40 North ½	Context III	10–20	12.1 g	50% Soft Shell Clam 25% Scallop 25% Quahog
40 North ½	Context II	20–30	27.8 g	40% Quahog 30% Whelk 30% Soft Shell Clam
40 North ½	Context II	30–40	583.8 g	35% Soft Shell Clam 30% Whelk 25% Quahog 5% Scallop 5% E. Nassa
40 North ½	Context II	20–30	45.9 g	40% Soft Shell Clam 30% Quahog 30% Whelk
40 North ½	Context II	40–50	361.6 g	40% Quahog 40% Soft Shell Clam 10% Whelk 5% Oyster 5% E. Nassa
40 South 1/2	Context III	0-4	1.6 g	100% Quahog
40 South ½	Context I	0-18	0.65 kg	40% Quahog 25% Whelk 25% Soft Shell Clam 10% mixed Oyster/E. Nassa/Slipper
40 South ½	Context I	0–20	438.7 g	40% Quahog 25% Whelk 15% Soft Shell Clam 5% E. Nassa 5% Oyster

Continued on next page

Feature Half	Feature Context	Depth (cm)	Sample Weight	% of Shell by Type
				5% Scallop
				5% Slipper
40 South ½	Context IV	10–30	18 g	33% Quahog
				33% Whelk
				33% Soft Shell Clam
40 South ½	Feature Fill	40–60	0.75 kg	40% Quahog
				25% Soft Shell Clam
				25% Whelk
				10% Oyster

Table 6-14. Characteristics of Shell Samples from Feature 41.

Feature Half	Feature Context	Depth (cm)	Sample Weight	% of Shell by Type
41 North ½	Context IV	5–15	178 g	40% Quahog 25% Soft Shell Clam 20% Whelk 10% Oyster
41 North ½	Context III	10–20	22 g	40% Quahog 20% Soft Shell Clam 20% Whelk
41 North ½	Context III	10–35	88 g	90% Quahog 10% Soft Shell
41 South ½	Context III	0-10	56 g	75% Quahog 25% Whelk
41 South ½	Context I	0-10	1.05 kg	35% Quahog 35% Soft Shell Clam 25% Whelk 5% Oyster
41 South ½	Context II	0-10	50 g	40% Whelk 30% Soft Shell Clam 30% Quahog
41 South ½	Context III	10–20	0.3 kg	40% Quahog 30% Soft Shell Clam 25% Whelk 5% Oyster
41 South 1/2	Context IV	10–20	108 g	50% Quahog 40% Whelk 10% Soft Shell Clam
41 South ½	Context IV	20–35	10 g	40% Scallop 40% Soft Shell Clam 20% Oyster
41 East ½	Context IV	0-10	31 g	30% Soft Shell Clam 30% Quahog 30% Whelk 10% to fragmented to identify
41 East ½	Context IV	10–20	35 g	50% Quahog 50% Whelk
41 West ½	Context IV	0–20	45 g	45% Quahog 45% Whelk 10% Soft Shell Clam

As Feature 41 was being excavated, it was noted that a large generally flat rock was in close proximity to the southwest. The rock was edged by mottled dark brown (10YR 5/3) soils and broken rock fragments (Figure 6-31) that extended conically to 20 cm. The anomalous soil contained a low density of shell fragments, a low density of animal bone fragments, and a possible hammerstone of cumberlandite.



Figure 6-31. Soil anomaly and rock near Feature 41.

# Features 42A and 42B

Feature 42 was exposed at 60 cmbs while opening the twelfth 100-ft section of the trench (see Figure 6-9a). In plan, it was observed as two segments that merged into a large irregular rectangular feature measuring 60 cm north-south by 80 cm east-west with very dark brown (10YR 2/2) and very dark gray brown (10YR 3/2) soils with occasional shell and fire-cracked rocks. The feature continued into the east wall of the machine trench and was flanked to the north and south by plow scars (Figure 6-32a). As Feature 42 was excavated, two distinct elements separated into a northern (42B) element and a southern element (42A) separated by a patch of B₁ horizon non-feature subsoils.

In plan, Feature 42A was characteristically very dark brown (10YR 2/2) with a high density of shell fragments throughout and extended vertically to 55 cm into C horizon soils. In profile, it was a pit feature with generally steep-sloping walls (Figure 6-32b). The bottom of the feature contained an unmodified rock that was clearly within the feature fill. Cultural materials recovered from Feature 42A included a relatively high frequency of quartz chipping debris (n = 95), a quartz projectile point, 2 hammerstones, and 2 fragments of aboriginal ceramic.

Feature 42B extended vertically to 50 cm and was lighter in color than Feature 42A, predominantly light olive brown (2.5Y 5/4), with a low frequency of shell fragments (see Figure 6-32a). Like Feature 42A,

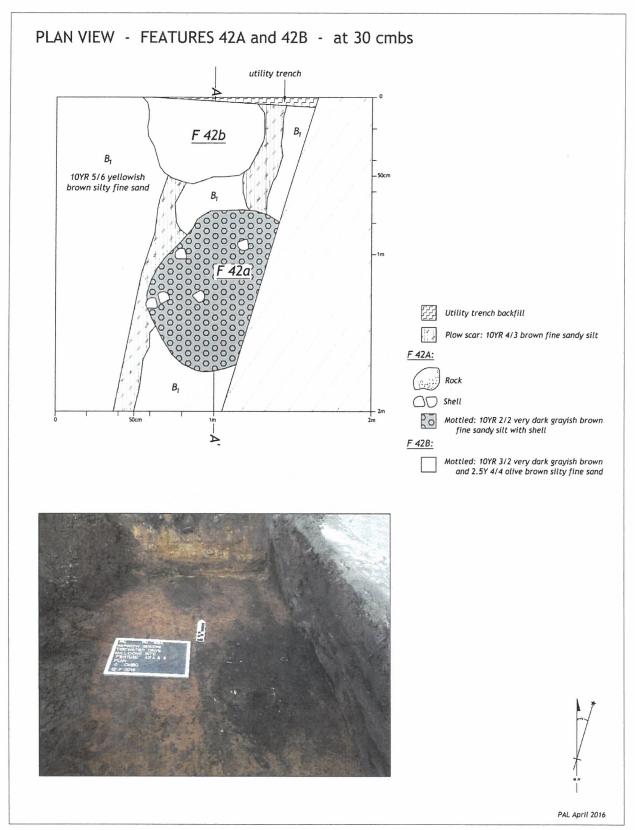


Figure 6-32a. Features 42A and 42B in plan.

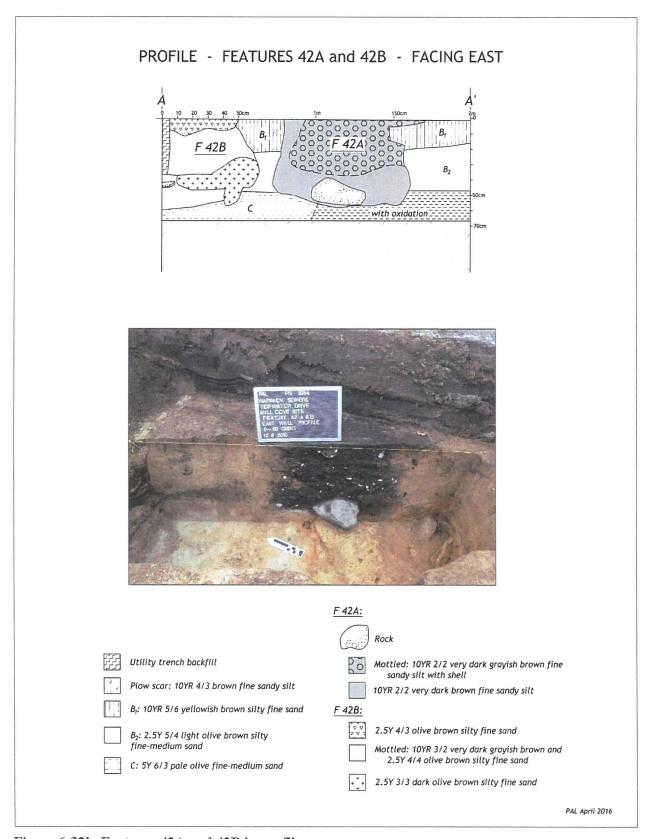


Figure 6-32b. Features 42A and 42B in profile.

Feature 42B also exhibited generally steep-sloping walls (see Figure 6-32b). Feature 42B yielded a higher frequency of aboriginal ceramic fragments (n = 20) than Feature 42A, and a low frequency of quartz chipping debris (n = 4). Nine samples of shell were collected from Feature 42A and six from 42B (Table 6-15).

Table 6-15. Characteristics of Shell Samples from Feature 42A and 42B.

Feature Half	Feature Context	Depth (cm)	Sample Weight	% of Shell by Type
42A Wall Fall	Feature Fill	0–40	0.55 kg	40% Quahog 30% Soft Shell Clam 15% Oyster 10% Scallop 5% Whelk
42A East ½	Feature Fill	0–55	3.15 kg	40% Soft Shell Clam 30% Quahog 10% Whelk 10% Oyster 5% Scallop < 5% Mussel
42A East ½	Feature Fill	0–55	2.15 kg	40% Soft Shell Clam 30% Quahog 15% Oyster 10% Whelk 5% Scallop
42A West ½	Feature Fill	0-10	74 g	80% Quahog 20% Soft Shell Clam
42A West ½	Feature Fill	10-20	56 g	90% Quahog 10% Soft Shell Clam
42A West ½	Feature Fill	20–30	236 g	50% Soft Shell Clam 30% Quahog 10% Scallop 5% Oyster 5% Whelk
42A West ½	Feature Fill	30–40	95 g	30% Quahog 30% Soft Shell Clam 20% Scallop 20% Oyster
42A West ½	Feature Fill	40–50	44 g	45% Quahog 45% Soft Shell Clam 10% Whelk
42A West 1/2	Feature Fill	50-60	< 1 g	100% Soft Shell Clam
42B East ½	Feature Fill	0–20	10 g	100% Quahog
42B East ½	Redeposited B ₂	10–35	59 g	100% Quahog
42B West 1/2	Feature Fill	0-10	11 g	100% Quahog
42B West ½	Feature Fill	10–20	3 g	50% Quahog 50% Scallop
42B West ½	Feature Fill	20-30	6 g	100% Quahog
42B West ½	Feature Fill	40-50	2 g	100% Quahog

#### Feature 45

Feature 45 was exposed at 60 cmbs while opening the twelfth 100-ft section of the trench (see Figure 6-9a). In plan, Feature 45 was generally square, 1.3 m in diameter, and consisted of very dark gray brown (10YR 2/1) and mottled black (10YR 2/1) fine sandy silt with a centrally situated concentration of high density of oyster, quahog, and soft shell clam shell fragments. A 15-cm diameter post mold was in immediate proximity to the southeast margins of Feature 45 (Figure 6-33a). Through the excavation of Feature 45, it was apparent that its contents had been added in a series of different depositional events that resulted in lenses of at least five contexts each distinguished by character and content. In plan view, these appeared as rings or pockets, and in the north wall profile they were horizontal lenses (Figure 6-33b).

The initial step in the creation of Feature 45 was the digging of a deep pit into the C horizon subsoils; it extended 20 cm into the C horizon and at the time of its initial excavation its west wall was steeply sloped but its east wall was "stepped," to allow its excavator easier exit. (If the feature initially served as a storage pit, that "step" also would have allowed easier access.) A deer scapula recovered from one of the depositional lenses was likely used as a digging tool in the feature's creation or subsequent use (see Figure 6-33b). Whatever the initial purpose of Feature 45, it ultimately served as a refuse pit for household waste.

Cultural materials recovered from Feature 45 depositional lenses consisted of a fragment of highly oxidized and decomposing copper (Figure 6-34), quartz chipping debris (n = 49), two bifacially flaked quartz tool fragments, two quartz projectile point bases, a bone awl, fragments of an aboriginal ceramic vessel(s) (n = 10), small mammal bone fragments (n = 69), and a deer scapular bone (Figure 6-35), high densities of shell fragments (scallop, oyster, quahog, soft shell clam), and several hundred small fragments of carbonized nut hulls. A charcoal sample from 60-70 cm (Context IV) within Feature 45 was submitted for radiocarbon analysis and yielded an age of  $340 \pm 30$  B.P. (Beta 428349). Sixteen shell samples were collected from within Feature 45 (Table 6-16).

# Feature 50

Feature 50 was exposed at 60 cmbs while opening the sixteenth 100-ft section of the trench (see Figure 6-6b). It was recognized as an irregular remnant of what was likely a pit dug into C horizon soils. It consisted of very dark brown (10YR 2/2) silty sand surrounded by the gray brown (2.5Y 5/2) C subsoils (Figure 6-36a). A post mold was noted at the northern limits of the feature. Disturbance of the feature was evidenced by two twentieth-century metal screws in the mottled soils atop the feature on initial exposure. In plan, the feature extended vertically for less than 10 cm (Figure 6-36b) and contained a low density of quartz flakes (n = 17), a single bone fragment, and a low frequency of shell fragments. Three shell samples were collected from Feature 50 (Table 6-17).

#### Features 53 and 54

Features 53 and 54 were exposed at 60 cmbs while opening the eighteenth 100-ft section of the trench (see Figure 6-9b). A post mold was noted to the immediate southeast of Feature 53. Feature 53 was generally round in plan (diameter of 90 cm) and consisted of very dark gray brown (10YR 3/2) and mottled brown (10YR 4/3) fine sandy silt with charcoal flecking. Feature 54 was also generally round but smaller (diameter of 55 cm) and lighter in color, consisting of olive brown fine sandy silt with a few flecks of charcoal (Figure 6-37a).

In profile, Feature 53 and 54 proved to be conical pits. Feature 53 extended into the C soil stratum and Feature 54 was 10 cm shallower, extending vertically for 15 cm into the B₂ soil horizon (Figure 6-37b). The remnant post mold extended vertically to the same depth as Feature 54. Feature 53 contained a low

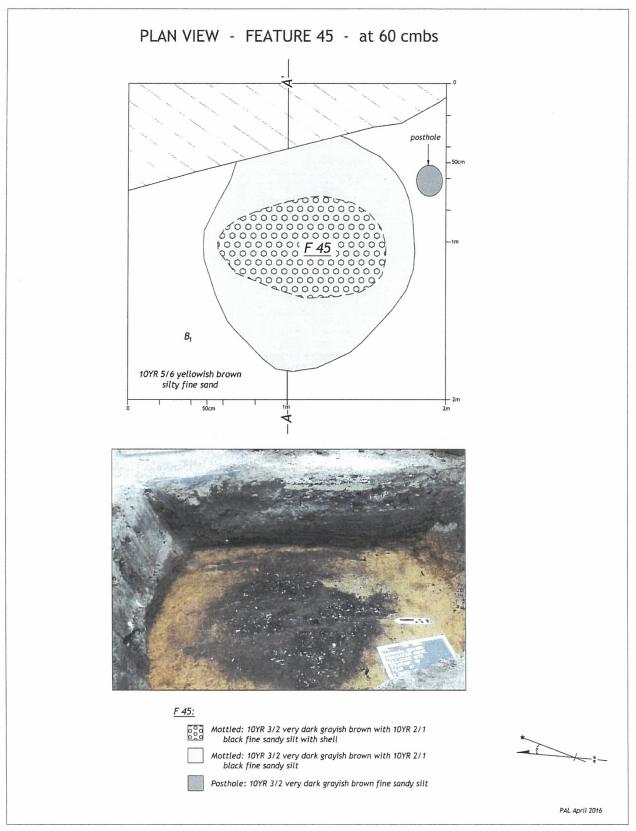
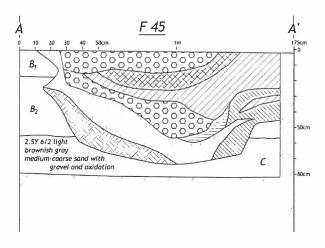


Figure 6-33a. Feature 45 plan.

# PROFILE - FEATURE 45 - FACING NORTH





	$B_2$ : 2.5Y 6/3 light yellowish brown silty fine sand		
F 45:			10YR 4/6 dark yellowish brown fine sandy silt
000	Mottled: 10YR 3/2 very dark grayish brown with 10YR 2/1 black fine sandy silt with shell	:	10YR 3/4 dark yellowish brown fine sandy silt
	10YR 6/4 light yellowish brown fine sandy silt		10YR 4/3 dark yellowish brown fine sandy silt
	10YR 4/4 dark yellowish brown fine sandy silt		10YR 6/6 brownish yellow fine sandy silt

PAL April 2016

Figure 6-33b. Feature 45 profile.

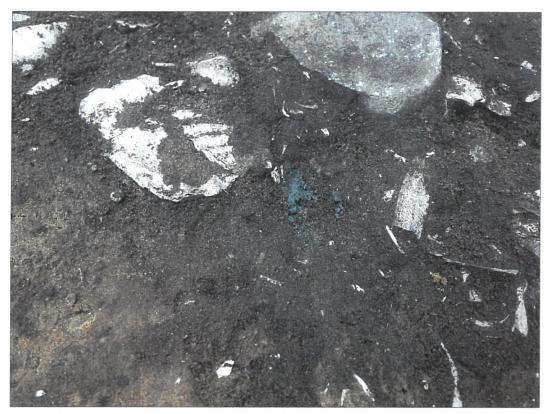


Figure 6-34. Scallop shell and oxidized copper fragment, 0-10 cm, Feature 45.



Figure 6-35. Deer scapula bone recovered from Feature 45.

Table 6-16. Characteristics of Shell Samples from Feature 45.

Feature Half	Feature Context	Depth (cm)	Sample Weight	% of Shell by Type
North ½	Context I	0–16	1.05 kg	40% Soft Shell Clam 30% Quahog 15% Whelk 10% Oyster 5% Scallop
45 North ½	Context II	16–30	0.4 kg	40% Soft Shell Clam 40% Quahog 15% Oyster 5% Whelk
45 North ½	Context III	30–50	1.35 kg	40% Quahog 35% Soft Shell Clam 15% Whelk 10% Oyster
45 North ½	Context IV	50–65	38 g	50% Quahog 50% Soft Shell Clam
45 South ½	Context I	0–10	1.75 kg	25% Soft Shell Clam 25% Quahog 25% Whelk 15% Oyster 5% Scallop < 5% E. Nassa
45 South 1/2	Context II	0-10	13 g	100% Soft Shell Clam
45 South ½	Context I	10–20	0.5 kg	45% Soft Shell Clam 35% Quahog 10% Whelk 5% Oyster 5% Scallop
45 South ½	Context II	10–20	92 g	80% Soft Shell Clam 15% Quahog 5% Oyster
45 South ½	Context I	20–30	62 g	45% Quahog 45% Soft Shell Clam 10% Whelk
45 South ½	Context II	20–30	24 g	60% Soft Shell Clam 60% Quahog
45 South ½	Context III	20–30	58 g	50% Soft Shell Clam 45% Quahog 5% Whelk
45 South ½	Context II	30–40	0.53 kg	50% Soft Shell Clam 30% Quahog 15% Whelk 5% Oyster
45 South ½	Context III	30–40	1.6 kg	50% Quahog 20% Soft Shell Clam 15% Whelk 10% Oyster 5% Mussel
45 South ½	Context III	40–50	0.85 kg	40% Soft Shell Clam 30% Whelk 20% Quahog 10% Oyster
45 South ½	Context III	50–54	14 g	70% Soft Shell Clam 30% E. Nassa
45 South ½	Context IV	50-60	17 g	100% Quahog

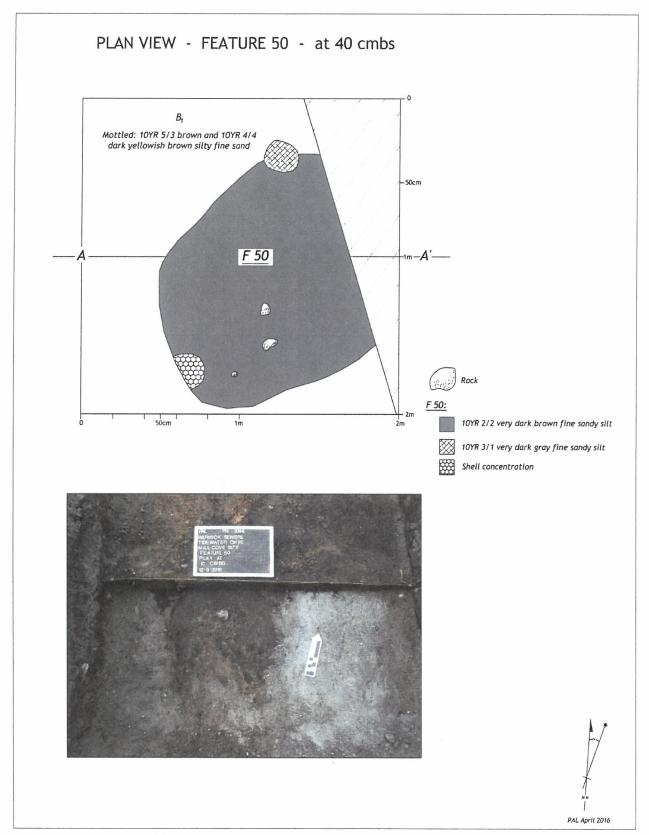


Figure 6-36a. Feature 50 plan.

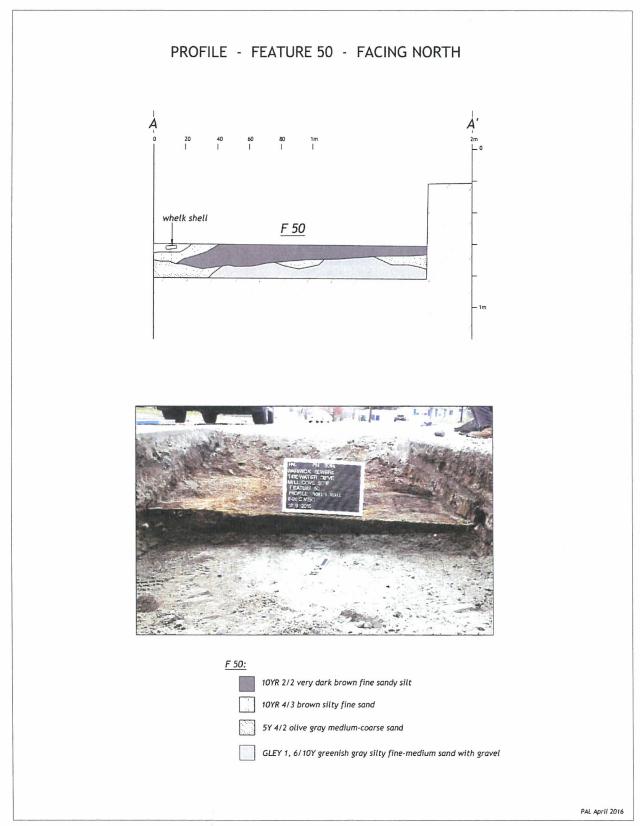


Figure 6-36b. Feature 50 profile.

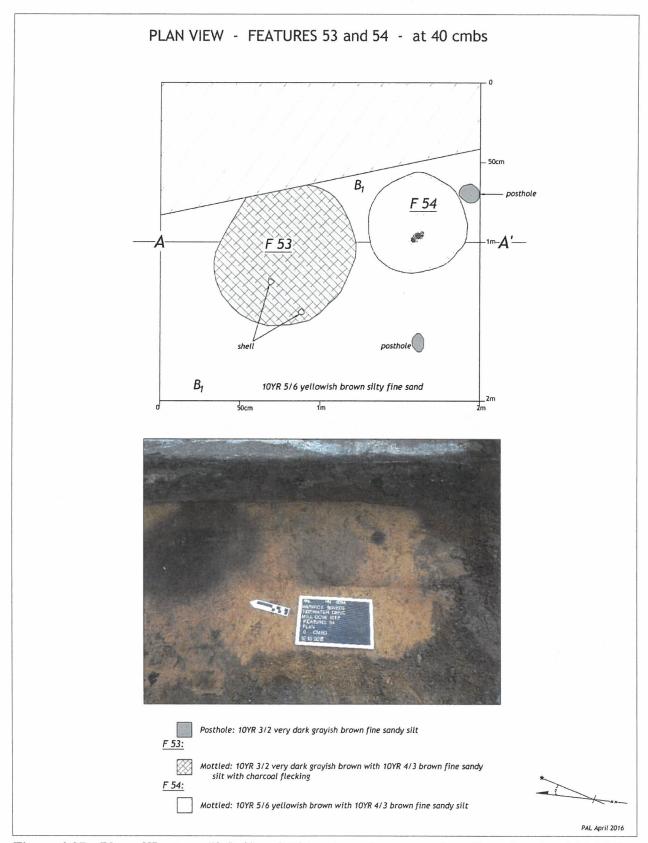


Figure 6-37a. Plan of Features 53 (left) and 54 (center - above menu board), and post mold (right).

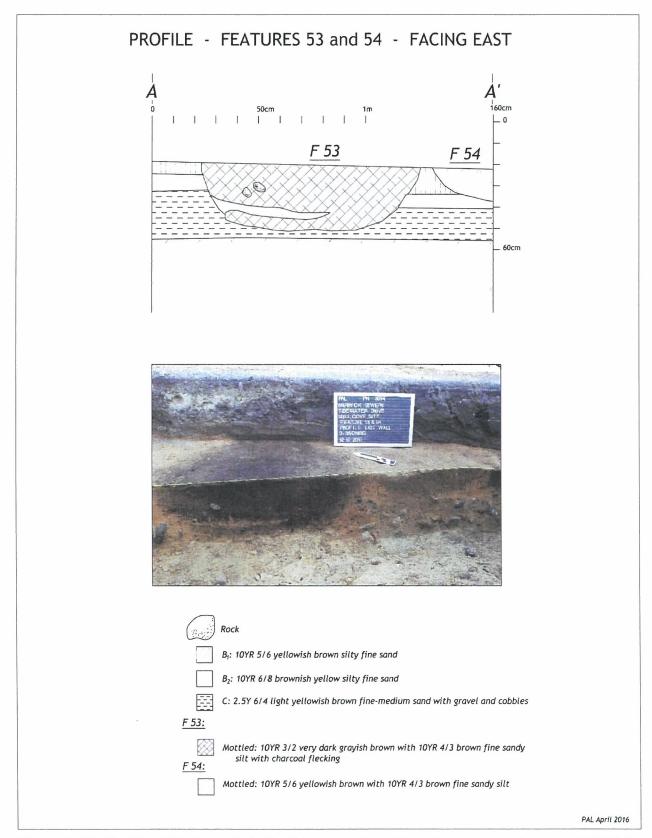


Figure 6-37b. Profile of Features 53 (left), 54 (center - beneath north arrow), and post mold (right).

Table 6-17. Characteristics of Shell Samples from Feature 50.

Feature Half	Feature Context	Depth (cm)	Sample Weight (g)	% of Shell by Type
50 North ½	Feature Fill	0-10	55	60% Quahog 20% Whelk 20% Soft Shell Clam
50 South ½	Feature Fill	0-10	161	50% Quahog 20% Whelk 10% Soft Shell Clam 10% Oyster 10% Scallop
50 South ½	Feature Fill	10-20	4	100% Soft Shell Clam

frequency of quartz chipping debris (n = 10), low frequencies of shell fragments, and 10 small bone fragments, including those of fish. Feature 54 contained a single quartz flake and one fire-cracked rock. Four shell samples were collected from Feature 53 (Table 6-18).

Table 6-18. Characteristics of Shell samples from Feature 53.

Feature Half	Feature Context	Depth (cm)	Sample Weight (g)	% of Shell by Type
53 East ½	Feature Fill	0-35	9	100% Quahog
53 West ½	Feature Fill	0-10	2	50% Quahog 50% Whelk
53 West ½	Feature Fill	10-20	21	100% Quahog
53 West ½	Feature Fill	20–30	6	50% Quahog 50% Soft Shell Clam

#### Feature 60

Feature 60 was exposed at 60 cmbs while opening the twentieth 100-ft section of the trench (see Figure 6-9b). The feature was flanked on its eastern edge by the disturbed soils within a modern utility trench. It was irregularly shaped and extended into the west wall of the machine trench. North to south, it extended for a maximum length of 1.5 m in the exposed machine trench (Figure 6-38a). It was very dark brown (10YR 3/2) with small pockets of shell and mottled charcoal flecks. Vertically, Feature 60 extended for less than 10 cm and was no longer distinguishable in the B₂ soil horizon (Figure 6-38b). Cultural materials included low densities of shell and a single fragment of aboriginal ceramic. One sample of shell recovered from feature fill (Context I) weighed 11 g and consisted entirely of soft shell clam fragments.

# Feature 61

Feature 61 was exposed at 60 cmbs while opening the twentieth 100-ft section of the trench (see Figure 6-9b). It was irregularly shaped and its western edges were defined by a disturbed historic utility trench. To the east, it extended into a machine trench wall. North to south, it extended for 60 cm. The feature fill was very dark brown (10YR 2/2) fine sandy silt with charcoal flecking throughout (Figure 6-39a). Vertically, Feature 61 extended for less than 10 cm and was not distinguishable in the B₂ soil horizon (Figure 6-39b). Cultural materials consisted of a quartz projectile point fragment, quartz chipping debris (n = 4), and a single animal bone fragment.

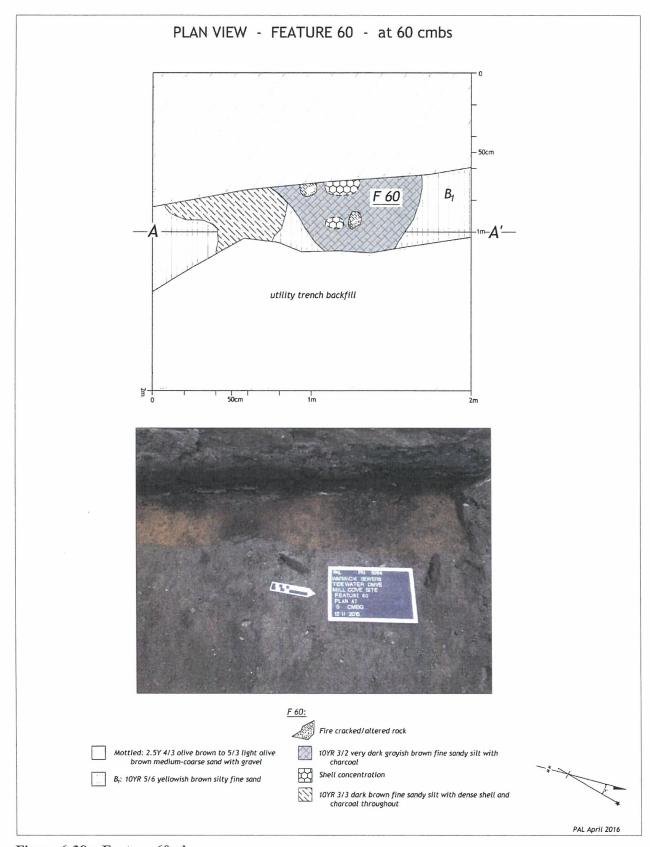


Figure 6-38a. Feature 60 plan.

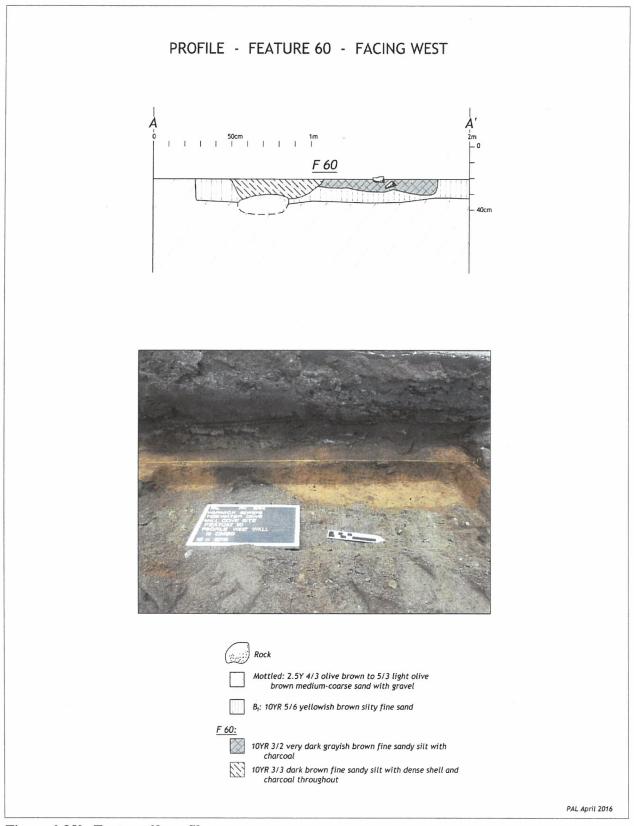


Figure 6-38b. Feature 60 profile.

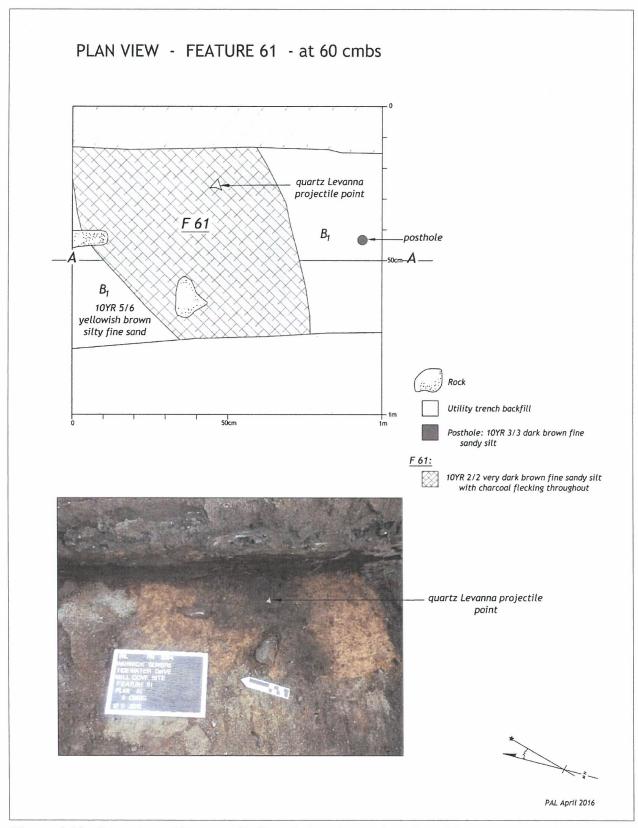


Figure 6-39a. Plan view of Feature 61 60 cm below the road surface (Note the quartz Levana point in the east-central portion of the feature).

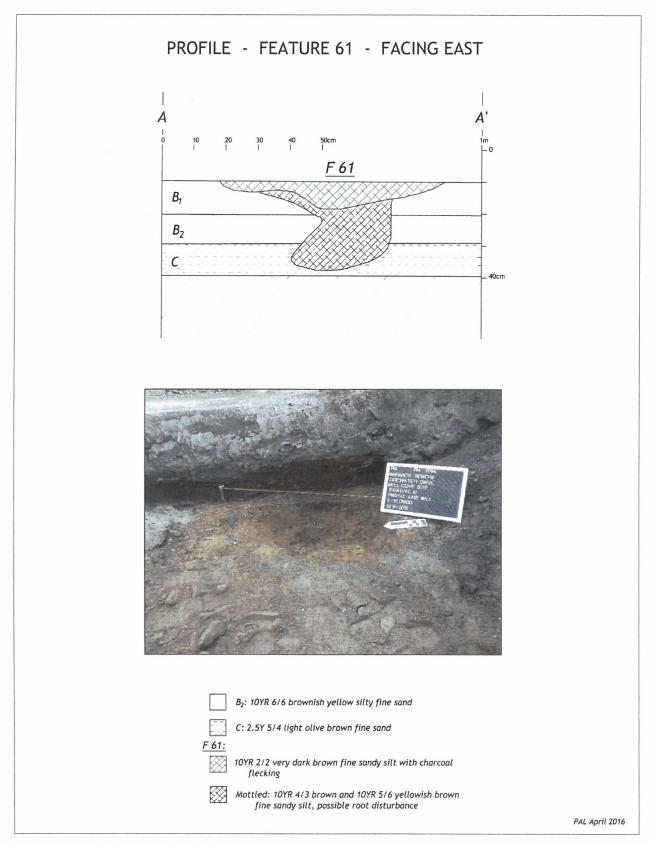


Figure 6-39b. Feature 61 profile.

#### Feature 63

Feature 63 was exposed at 60 cmbs while opening the twentieth 100-ft section of the trench (see Figure 6-9b). It was a generally circular very dark brown (10YR 2/2) soil anomaly with a diameter of 70 cm. Its central section contained a shell concentration of quahog and soft shell fragments and dense charcoal discoloration (Figure 6-40a).

In profile, Feature 63 proved to be a deep steep-sided pit that had been dug into the C subsoil horizon, extending 50 cm below the exposed surface where it was encountered. The bottom of the pit contained numerous rocks and the feature fill above them was densely packed with shell, ash, and charcoal (Figure 6-40b). Recovered cultural materials consisted of a low frequency of quartz chipping debris (n = 2), a quartz knife-like bifacially flaked tool fragment, animal bone (n = 17), and carbonized maize kernels (n = 3). Feature 63 functioned primarily as a cooking/roasting pit and secondarily as a refuse pit. One of the recovered maize kernels (Figure 6-41) was submitted for radiocarbon analysis and yielded an age of 300  $\pm$  30 B.P. (Beta 428351). Seven shell samples were collected from Feature 63 (Table 6-19).

Feature Half	Feature Context	Depth (cm)	Sample Weight (kg)	% of Shell by Type
63 West ½	Feature Fill	0–20	1.05	90% Soft Shell Clam 10% Quahog
63 East ½	Feature Fill	0-10	1.15	95% Soft Shell Clam 5% Quahog
63 East ½	Feature Fill	20-30	0.4	100% Soft Shell Clam
63 East ½	Feature Fill	30-40	0.15	100% Soft Shell Clam
63 West ½	Feature Fill	0–20	1.75	95% Soft Shell Clam 5% Quahog
63 West ½	Feature Fill	20–50	0.25	95% Soft Shell Clam 5% Whelk 5% Quahog
63A East ½	Feature Fill	10–20	0.65	95% Soft Shell Clam 5% Quahog

#### Feature 70

Feature 70 was exposed at 60 cmbs while opening the twenty-eighth 100-ft section of the trench (see Figure 6-9b). It was a black (10YR 2/1) and mottled brown (10YR 4/3) ovate anomaly surrounded by  $B_1$  subsoils (Figure 6-42a). Its longest diameter was 1 m southwest–northeast and it contained fragmented fire-cracked rocks. The soils adjacent to the feature's northwest limits were oxidized strong brown (7.5YR 5/6), reflecting alteration via heat.

In profile, Feature 70 extended vertically 20 cm into the B₁ subsoil horizon (Figure 6-42b). The bottom of the feature rested upon small and medium-sized rocks. Feature 70 was devoid of flora, fauna, and/or modified cultural materials; lacking material data, its Native American temporal affiliation and origin are tentative.

#### Feature 81

Feature 81 was exposed at 50 cmbs while opening the thirty-sixth 100-ft section of the trench (see Figure 6-9b). In plan, it appeared as generally ovate with an estimated half exposed (80 cm in diameter) in the

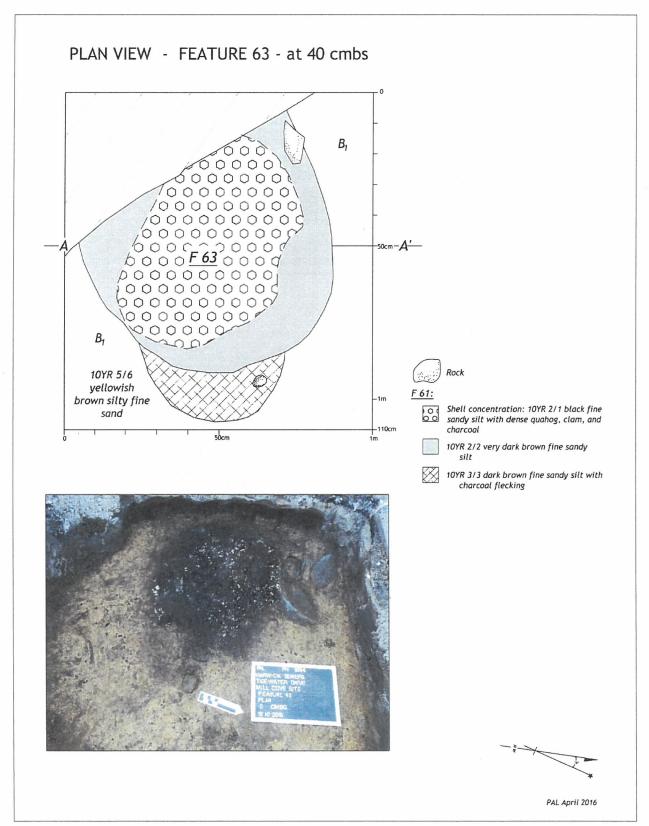


Figure 6-40a. Feature 63 plan.

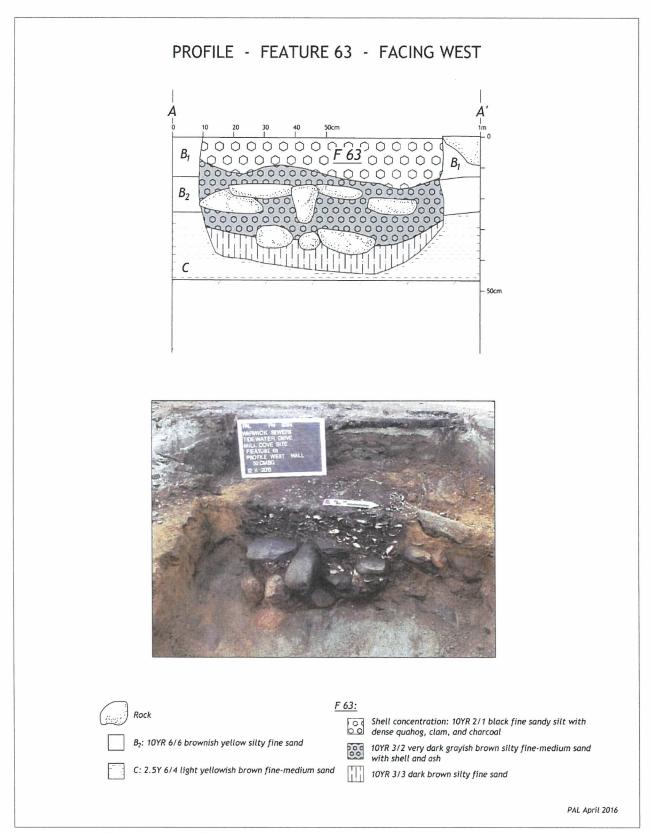


Figure 6-40b. Feature 63 Profile.

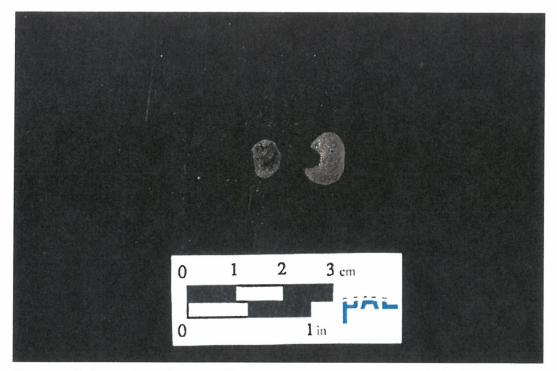


Figure 6-41. Maize from Feature 63.

machine trench while the feature extended into and beyond the trench east wall. The exposed feature fill was very dark brown (10YR 2/2) fine sand and silt with charcoal (Figure 6-43a). In profile, Feature 81 was a bowl-shaped pit extending 30 cm into the C soil horizon (Figure 6-43b). Recovered cultural materials from the medium-sized processing/refuse pit consist of one quartz projectile point tip, two fragments of aboriginal ceramics, a low density of shell fragments, and five nut hull fragments.

#### Archaeological Feature Identification and Evaluation – Lateral Hookup Locations (2017)

From June 12 to December 14, 2017, PAL archaeologists, accompanied by Native American monitors, completed machine-assisted study of approximately 650 locations (Lateral hookups) where individual homes will be connected to the primary sewer lines installed beneath and along the neighborhood streets. At each planned hookup location indicated on Project plans, an approximately 8-x-8-ft excavation unit (EU) was established where the asphalt was saw-cut and removed. A flat-bladed backhoe was used to systematically remove remnant roadbed and disturbed fills to the point of exposing intact, undisturbed soil, or subsoil.

The following identified cultural features were considered by PAL archaeologists and Tribal representatives of potential significance and/or of a ceremonial nature; they were recommended for preservation in place and were not further excavated. PAL, GRA field staff, and Native American monitors worked collaboratively to find and similarly investigate an alternative Lateral hookup location nearby. The features considered to be significant or potentially significant and/or ceremonial are described below by street (Table 6-20).

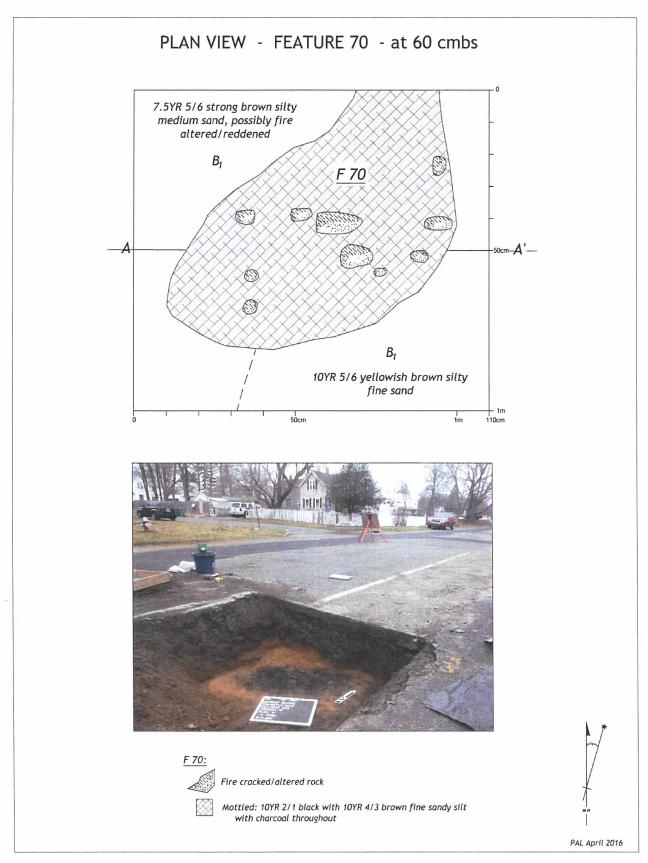


Figure 6-42a. Feature 70 plan.

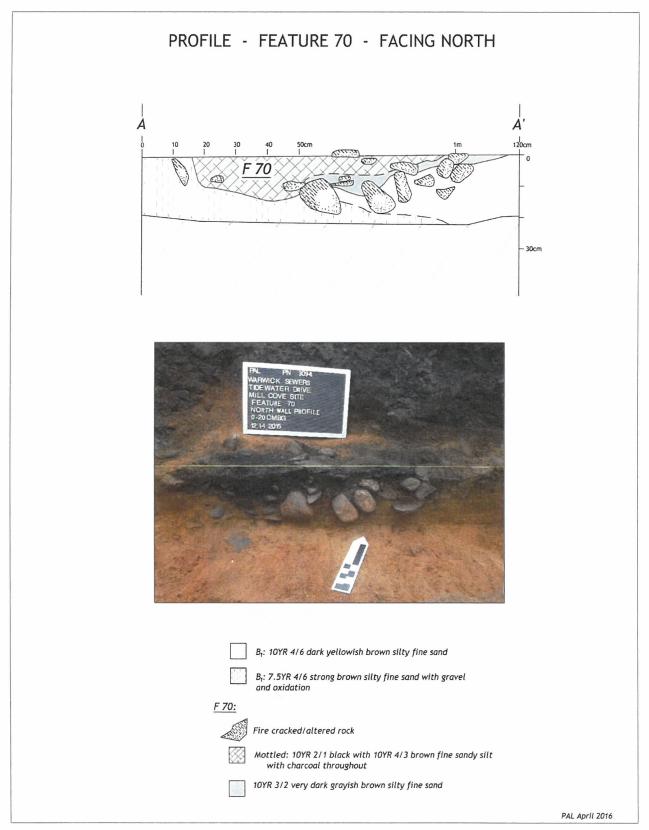


Figure 6-42b. Feature 70 profile.

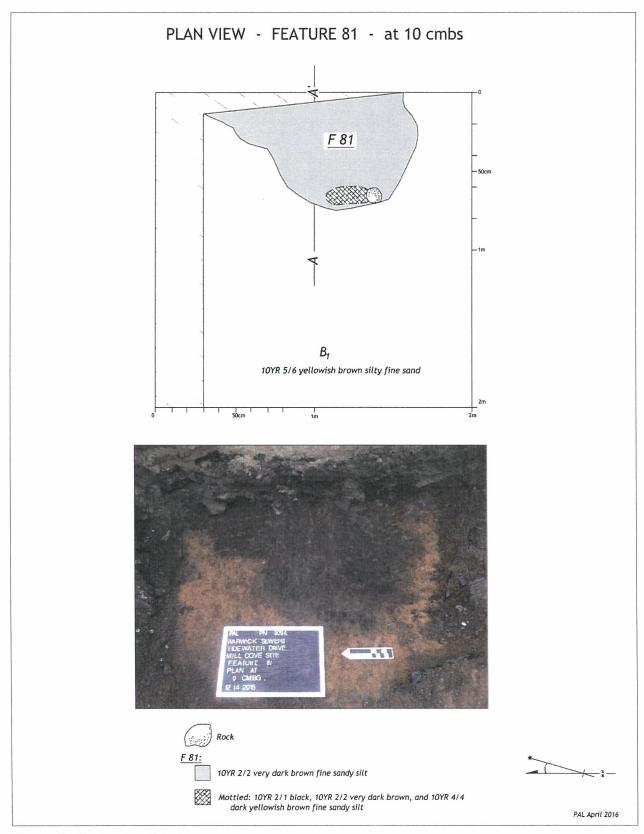


Figure 6-43a. Feature 81 plan.

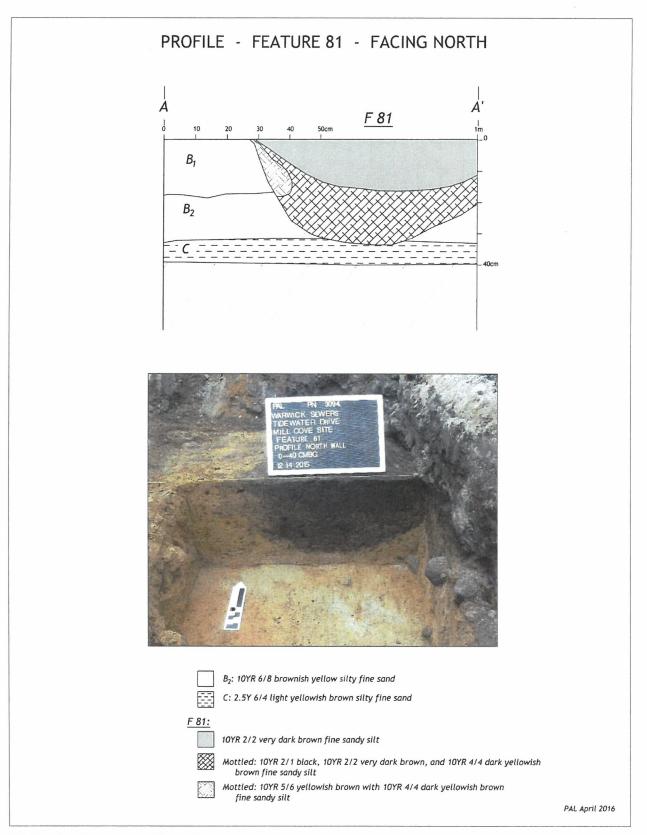


Figure 6-43b. Feature 81 profile.

Table 6-20. Bayside Sewer Project, Warwick, Rhode Island.

,					
Street	# of Machine Trenches	Trench and Feature Numbers	Action	Affected Addresses	Recommendations
Alden Avenue	19	Trench 06 – Feature 55	None Required		
Arlington Avenue	23				
Avon Avenue	8				
Bassett Avenue	8				
Beatrice Avenue	12				
Beatrice Terrace	5				
Bolster Avenue	3				
Bourne Street	2				
Boylston Street	11				
Brinton Avenue	17				
Burnett Road	=				
Camp Street	7				
Cady Avenue	21	Trench 12 – Feature 20	None Required		
		Trench 12 – Feature 21	None Required		
		Trench 21 – Feature 60	None Required		
Channing Street	4				
Chapin Avenue	14				
Clara Avenue	01	Trench 01 – Feature 22	AVOID	12 Clara Avenue	Connect through Trench 02
		Trench 01 – Feature 23	AVOID	12 Clara Avenue	Connect through Trench 02
		Trench 01 – Feature 24	AVOID	12 Clara Avenue	Connect through Trench 02
		Trench 01 – Feature 25	AVOID	12 Clara Avenue	Connect through Trench 02
		Trench 10 – Feature 46	AVOID	5 & 12 Clara Avenue	Design Review Pending
Cliff Road	6				
Concord Avenue		On Hold			Design Review Pending
Curry Place	4				
Friendship Avenue	9				
					Continued on next nage

Continued on next page

# Continued on next page

Grove Avenue	# of Machine Trenches	Trench and Feature Numbers	Action	Affected Addresses	Recommendations
	23				
Hamlin Avenue	4	Trench 02 – Feature 30	None Required		
Harborview Drive	15				
Heights Avenue	10				
Hope Avenue	12				
Lighthouse Lane	5				
Lippitt Avenue	22	Trench 19 – Feature 10	AVOID	Lot 335/228 Lot 338/249 Lot 335/250	Connect through Trench 22
-		Trench 11 – Feature 13	None Required	73 Lippitt Avenue	Connect through Trench 20
		Trench 09 – Feature 14	AVOID	73 Lippitt Avenue	Connect through Trench 20
		Trench 02 – Feature 15	None Required		
			AVOID	129 Lippitt Avenue	Connect through Trench 17
			AVOID	148 Lippitt Avenue	Connect through Trench 18
Longmeadow Avenue	32	Trench 05 – Feature 32	None Required		
		Trench 06 – Feature 33	AVOID	174 Longmeadow Ave	Connect through Trench 32
		Trench 17 – Feature 37	AVOID	107 Longmeadow Ave	Connect through Trench 31
		Trench 26 – Feature 38	None Required		
		Trench 23 – Feature 39	None Required		
Lyndon Avenue	∞	Trench 04 – Feature 27	AVOID	41 Lyndon Avenue	Design Modification - Pending
		Trench 04 – Feature 28	AVOID	41 Lyndon Avenue	Design Modification - Pending
		Trench 04 – Feature 29	AVOID	41 Lyndon Avenue	Design Modification - Pending
		Trench 06 – Feature 34	AVOID	41 Lyndon Avenue	Design Modification - Pending
		Trench 06 – Feature 35	AVOID	41 Lyndon Avenue	Design Modification - Pending
	L	Trench 06 – Feature 36	AVOID	41 Lyndon Avenue	Design Modification - Pending
		Trench 07 – Feature 47	AVOID	41 Lyndon Avenue	Design Modification - Pending

Design Modification - Pending Design Modification - Pending Design Modification - Pending Design Modification - Pending Design Modification - Pending Connect through Trench 12 on Samuel Gorton Avenue Connect through Trench 27 Connect through Trench 26 Connect through Trench 27 Connect through Trench 27 Design Review Pending Recommendations Affected Addresses 157 Mill Cove Road 157 Mill Cove Road 157 Mill Cove Road 41 Lyndon Avenue 41 Lyndon Avenue 41 Lyndon Avenue 41 Lyndon Avenue 41 Lyndon Avenue 94 Ocean Avenue 40/44 Mill Cove Road None Required None Required None Required None Required None Required None Required None Required None Required None Required None Required AVOID AVOID AVOID AVOID AVOID AVOID AVOID AVOID AVOID Action French 07 - Feature 48 French 08 - Feature 50 French 08 - Feature 52 French 08 - Feature 53 Trench 10 - Feature 06 French 12 - Feature 07 Trench 13 - Feature 08 Trench 23 - Feature 12 Trench 26 - Feature 40 Trench 25 - Feature 58 Trench 13 - Feature 43 Trench 11 - Feature 26 Trench 08 - Feature 54 Trench 13 - Feature 09 Trench 28 - Feature 62 Trench 23 - Feature 57 Trench 01 - Feature 05 French 08 - Feature 51 French 28 - Feature 61 Trench and Feature On Hold # of Machine Trenches 10 3 29 17 16  $\infty$ 2 24 22 Mayflower Avenue Lyndon Avenue Melrose Avenue Mill Cove Road Street Possner Avenue Palmer Avenue Payton Avenue Pender Avenue Medford Street Ocean Avenue Ogden Avenue Park Avenue Mayor Lane

Continued on next page

Street	# of Machine Trenches	Trench and Feature Numbers	Action	Affected Addresses	Recommendations
Priscilla Avenue	19		-		
Ridge Road	10				
River Vue Avenue	29	Trench 13 – Feature 01	None Required		
		Trench 24 – Feature 02	None Required		
		Trench 14 – Feature 03	AVOID	49 River Vue Avenue	Connect through Trench 26
		Trench 17 - Feature 04	None Required		
		Trench 26 – Feature 45	None Required		
		Trench 28 – Feature 59	AVOID	71 River Vue Avenue	Design Modification - Pending
Riverside Avenue	19	Trench 16 – Feature 41	None Required		
		Trench 16 – Feature 42	None Required		
Sable Street					
Samuel Gorton Avenue	19	Trench 10 – Feature 44	None Required		
Seacrest Lane	12	Trench 02 – Feature 49	None Required		
Shore Avenue	8				
Standish Avenue	2				
Surf Avenue	12	Trench 05 – Feature 56	None Required		
Tidewater Drive 2008 (see pages 4-5)		Multiple Features	Excavation or Avoidance	All	Directional Drill
Tidewater Drive 2015 (see page 5)		Multiple Features	Excavation or Avoidance	All	Directional Drill
Van Zandt Avenue	17	Trench 04 – Feature 31	None Required		
Webb Avenue	13	Trench 09 – Feature 16	None Required		
		Trench 03 – Feature 17	None Required		
		Trench 04 – Feature 18	AVOID	30 Webb Avenue	Connect through Trench 05
Wentworth Avenue	14	Trench 01 – Feature 11	None Required		
Whipple Avenue	28	Trench 12 – Feature 19	None Required		

#### Clara Avenue

# Features 22, 23, 24, and 25 - Trench 1

Four clustered and intersecting features (Features 22, 23, 24, and 25) were identified at 30 cmbs in Trench 1 in front of the house at 12 Clara Avenue (Figure 6-44). The features were remnant circular and ovate truncated pits that were analogous in color, shape, texture, and overall character to the confirmed human burials (2015 Features 24 and 38) discovered nearby on Tidewater Drive. The Clara Avenue Features 22 and 25 were similar in shape, color, and form; both were dark brown fine sand and silt with an outer ring of very dark brown sandy and silty soils and have associated and intersecting post molds (see Figure 6-44). Features 22, 23, 24, and 25 could be burial-related and ceremonial. PAL recommends preservation in place for these features an alternative location for the Lateral hookup planned at 12 Clara Avenue.

#### Feature 46 - Trench 10

An ovate segment of a feature was discovered in the northeastern corner of Trench at 40 cmbs in the street in front of the house at 5 Clara Avenue (see Figure 6-44). The feature (Feature 46) extended to the northeast beyond the limits of the excavated trench and consisted of charcoal-blackened soil indicating a burning event. Because the feature extends to the northeast of the trench, PAL considers it potentially significant and recommends preservation in place and an alternative location for the Lateral hookup planned at 5 Clara Avenue.

# Lippitt Avenue

# Feature 14 - Trench 9

A circular feature was exposed at 50 cmbs in the northwest corner of the EU in Trench 9 in front of the house at 73 Lippitt Avenue. Feature 14 was a black (10YR 2/1) soil stain ringed by a band of mottled dark yellow brown (10YR 4/6) soils with charcoal flecks (Figure 6-45). It was a pit that extended and expanded to the west and northwest of the EU. On the basis of its well-defined character, PAL recommends avoidance of Feature 14 during construction; expanding the EU farther east provided enough clearance to allow preservation.

# Feature 10 - Trench 19

Trench 19 along Lippitt Avenue was excavated near a stream and wetland between the houses at 148 (on the west) and 128 (on the east). Once the surface disturbance was removed, excavation continued into finely textured yellow-brown silty and sandy B horizon subsoils, into which a portion of an apparently ovate black feature was exposed in the northwestern corner of the EU at 100 cmbs. Charcoal, quartz, and quartzite chipping debris, and small fragments of calcined bone were seen in the feature fill (Figure 6-46). The large and deep pit feature (Feature 10) expanded and extended into the western and northern walls of the EU, but further inspection was not possible because the EU filled with water. Because human remains had been discovered nearby during the 2008 archaeological investigations (see Figure 6-5), PAL recommends avoidance and preservation in place for Feature 10. An alternative location (Lippitt Avenue – Trench 22) for the Lateral hookup was chosen and excavated to the west. Trench 22 had no evidence of features.

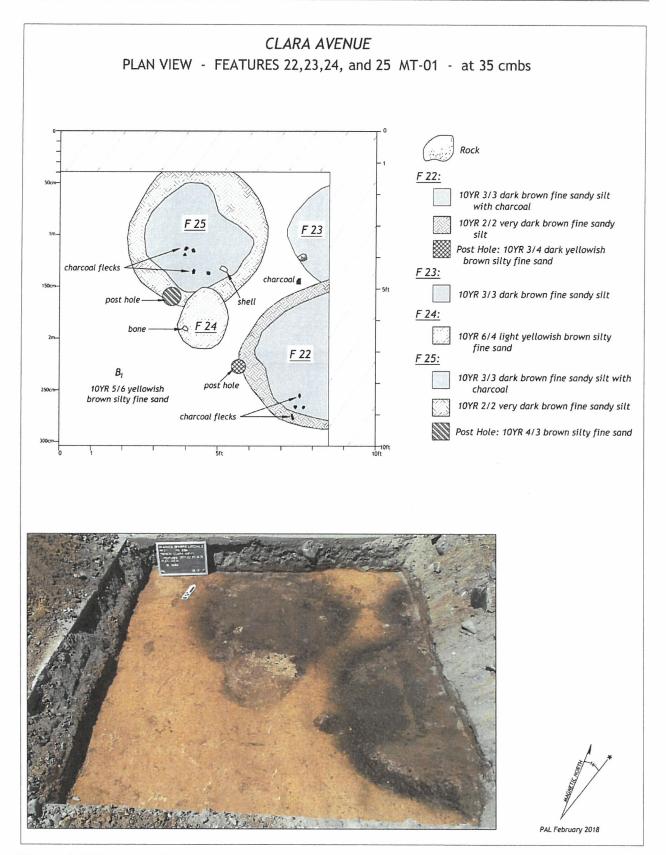


Figure 6-44. Features 22, 23, 24, and 25 – Trench 1 on Clara Avenue.

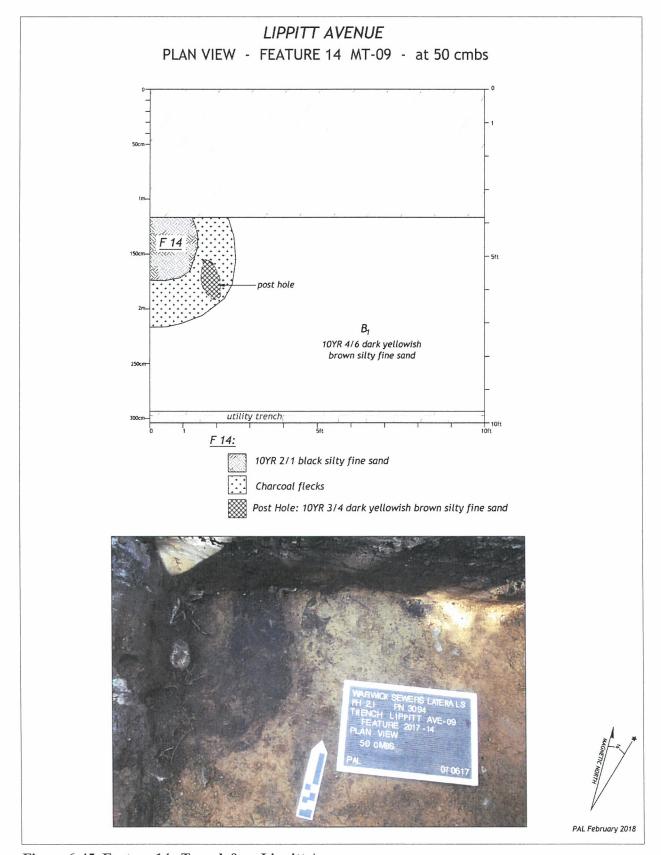


Figure 6-45. Feature 14 – Trench 9 on Lippitt Avenue.

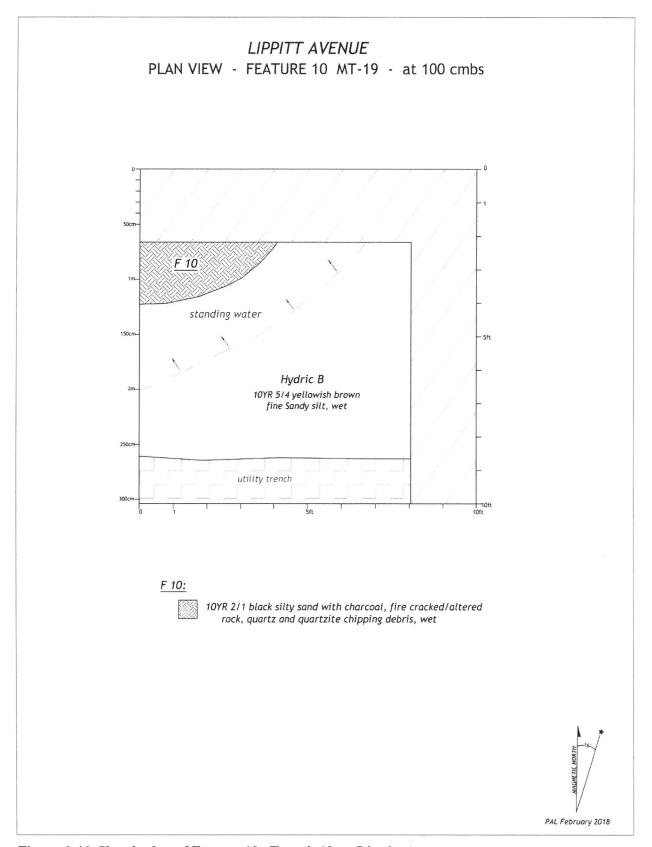


Figure 6-46. Sketch plan of Feature 10 – Trench 19 on Lippitt Avenue.

# Longmeadow Avenue

## Feature 33 - Trench 6

Trench 6 was excavated at the proposed Lateral hookup in front of and the house at 174 Longmeadow Avenue. Feature 33 was exposed at 40 cmbs in the central portion of the EU (Figure 6-47). It was circular (30 cm in diameter) and very dark brown with small stones. The surrounding soil matrix was yellow brown B₁ subsoil. No cultural materials were associated with Feature 33, but it was sufficiently distinct to consider it a small to medium-sized pit feature and was recommended for avoidance. Machine Trench 32 was dug to the east of Trench 6 as an alternative and contained no features.

#### Feature 37 - Trench 17

Trench 17 was excavated in the road in front of the house at 107 Longmeadow Avenue. A circular (75 cm in diameter) dark brown feature (Feature 37) containing shell fragments and charcoal was discovered at 50 cmbs in the northeast section of the EU (Figure 6-48). There was an associated post mold to the northeast, and a possibly associated tabular fragment of rock to the west. It was recommended for avoidance. Trench 31 was excavated to the west as an alternative Lateral hookup location, and it had no features.

# Lyndon Avenue

# Features 27, 28, and 29 - Trench 4

Trench 4 along was excavated in the street in front of the house at 41 Lyndon Avenue. Three features (Features 27, 28, and 29) were exposed at 35 cmbs in yellow brown fine sandy and silty soils in a B₁ strata that was beneath a remnant plow zone (Figures 6-49). The features were circular and had mottled dark yellow brown feature fill with charcoal fragments, low densities of quartz chipping debris, and fragments of fire-cracked rock. The two features in the northeast part of the EU were of similar size (40 cm diameter), and the westernmost feature was larger, extending into the west wall of the pit. Features 27, 28, and 29 are recommended for avoidance and preservation in place because they could represent Native American ceremonial activity at or near the location.

#### Features 34, 35, and 36 - Trench 6

Trench 6 was dug in front of the driveway for 41 Lyndon Avenue. One remnant zone of recent disturbance was noted in the northwest corner of the EU. A cluster of three other features (Features 34, 35, and 36), considered to be Native American in origin, dominated the floor of the trench at 30 cmbs (Figure 6-50). Feature 34 was in the southeast quadrant of the trench, extending into the EU's south wall, with a diameter of 100 cm at the south wall. It consisted of a dark yellow ring around an inner circle of brownish yellow sediment, with charcoal flecks at the west side of the feature's outer ring. Two small post holes extended off the northern terminus of the feature (see Figure 6-50). A small fragment of fire-cracked rock was west of Feature 34, between it and Feature 36.

Feature 35 was in the northeastern portion of the EU, circular, and extended 100 cm west of the east trench wall and 1.2 m south of the north trench wall (see Figures 6-50). Like Feature 34, Feature 35 has a darker outer ring around a brownish yellow inner circle of sediment. A single piece of quartz shatter and a single small fragment of calcined bone were noted on the feature's exposed (30 cmbs) surface.

Feature 36 was in the southwest corner of Trench 6, extending 1.2 m north from the south wall and measured 1.5 m in diameter. Similar to Features 34 and 35, Feature 36 consisted of an inner circle surrounded by an

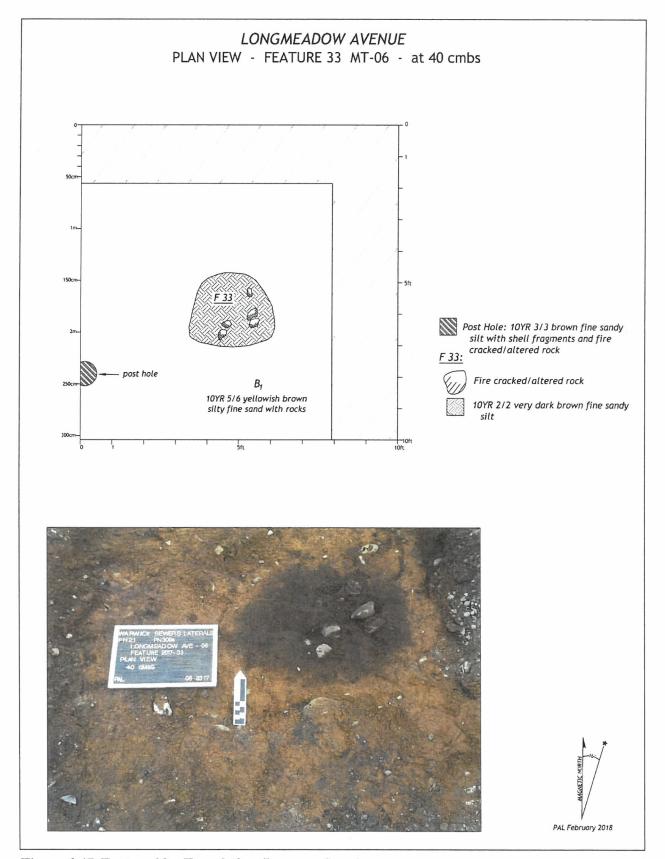


Figure 6-47. Feature 33 – Trench 6 on Longmeadow Avenue.

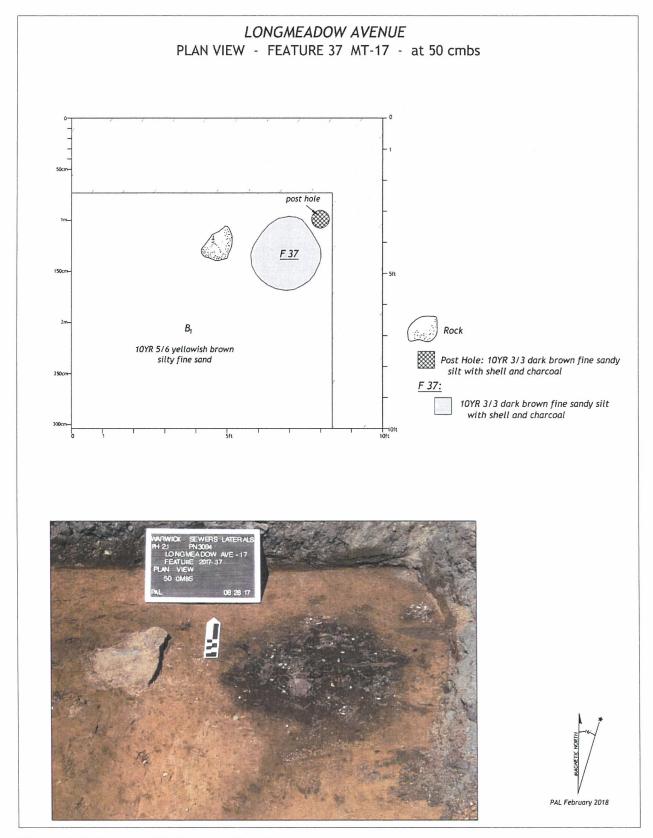


Figure 6-48. Feature 37 – Trench 17 on Longmeadow Avenue.

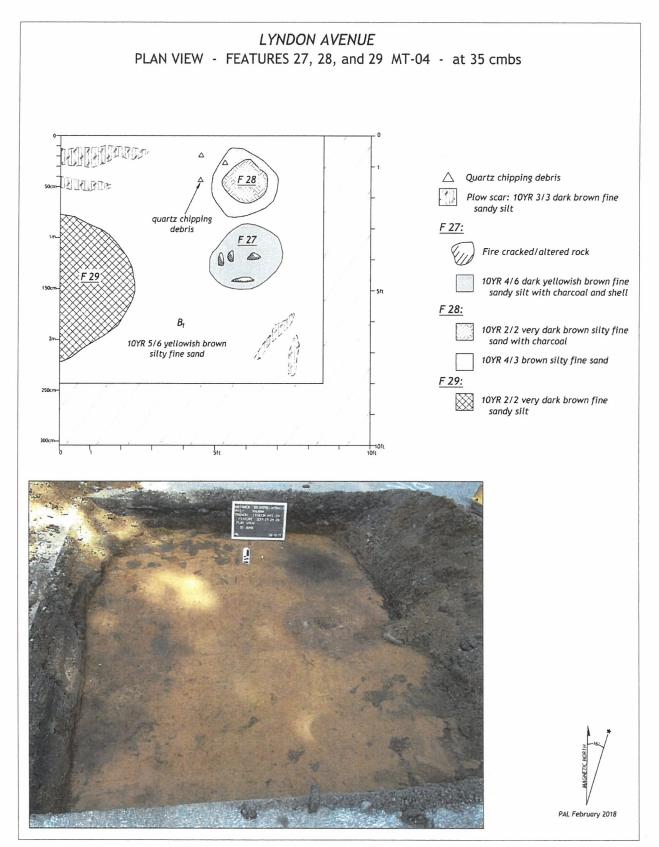


Figure 6-49. Features 27, 28, and 29 (north to south), Trench 4 on Lyndon Avenue.

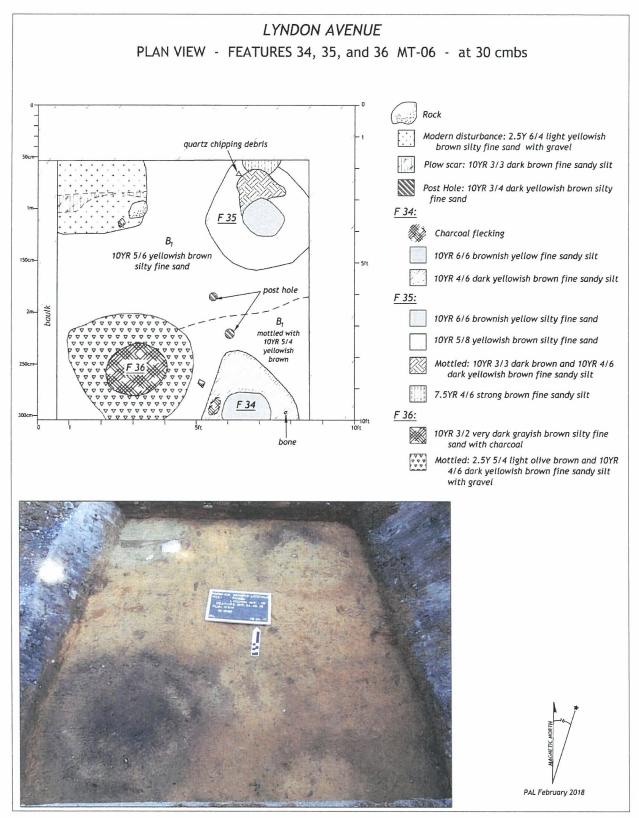


Figure 6-50. Features 34, 35, and 36 – Trench 6 on Lyndon Avenue.

outer circular ring, both darker than those of Features 34 and 35 (see Figures 6-50). The inner circle was dark grayish brown sand with charcoal flecking and was surrounded by the outer ring consisting of olive brown and yellowish brown sand with some gravel, suggesting the pit extends into C subsoils. Features 34 and 35 had associated post molds. Like the features to the north in Trench 4, the features in Trench 6 are considered ceremonial in nature and avoidance is recommended.

#### Features 47 and 48 - Trench 7

Features 47 and 48 were discovered in Trench 7 excavated in front of the house at 41 Lyndon Avenue. Feature 47 was circular and extended north from the south wall and floor into the EU. It consisted of an inner zone of dark brown soil with charcoal flecks and surrounded by an outer ring of diffuse dark vellow brown soil (Figure 6-51). A possible post mold was noted to the east of Feature 47, just north of the south wall of the EU. The surrounding matrix was yellow brown finely textured sandy B₁ subsoil. In both plan and profile, remnants of a former plow zone were evident.

Feature 48 was a thin band of brown finely textured sandy silt that extended for 10 cm into the EU from the north wall into the northeastern half of the exposed EU floor at 30 cmbs (see Figure 6-51). Features 47 and 48 were considered part of the clustered ceremony-related features surrounding this location and avoidance of impacts and preservation in place are recommended.

# Features 50, 51, 52, 53, and 54 - Trench 8

The high density of features noted along Lyndon Avenue close to house number 41 continued as PAL excavated Trench 8. Remnants of five circular and ovate features (Features 50-54) and a small post mold were exposed at 40 cmbs within Trench 8 (Figures 6-52).

Feature 50 was 80-x-100 cm and consisted of a center of brown yellow silty sand encircled by a ring of darker yellow brown soil. Feature 51 was oval and contained low density charcoal flecking. Feature 52 was circular and a mix of B2 and C subsoils. Feature 53 contained a dense charcoal center with a reddened surrounding circular area resulting from a fire-related activity. Feature 54 included a 50-cm diameter section extending into the west-central wall of the trench.

#### Mill Cove Road

### Feature 7 - Trench 12

Trench 12 excavated along Mill Cove Road was in the approximate center of the road proximal to the driveway of the house at number 150, south of the west side of the house at number 157. The EU was dug incrementally to 85 cmbs, where B₁ subsoils were beneath a well-defined plow zone that extended vertically to 80 cmbs in the trench. Feature 7 (remnant pit) was exposed as an ovate black anomaly of distinct edges that contained dense whelk and quahog shell and a low density of chipping debris (Figure 6-53) and was 110-x-80 cm. A quartz scraper, a quartz biface, a projectile point preform, and fragments of aboriginal pottery were noted in the feature fill, which were left in situ, and the feature was covered with a protective sheet of filter fabric, then backfilled. Feature 7 at the location of Machine Trench 12 on Mill Cove Road is recommended for preservation in place.

### Feature 12 - Trench 23

Trench 23 was excavated proximal to the driveway for the house at 40/44 Mill Cove Road. A remnant plow zone extended vertically beneath the road surface and underlying fills between 36 and 50 cmbs in the EU. Feature 12 was a dark brown and mottled black soil pocket at 51 cmbs in the west-central section of the pit

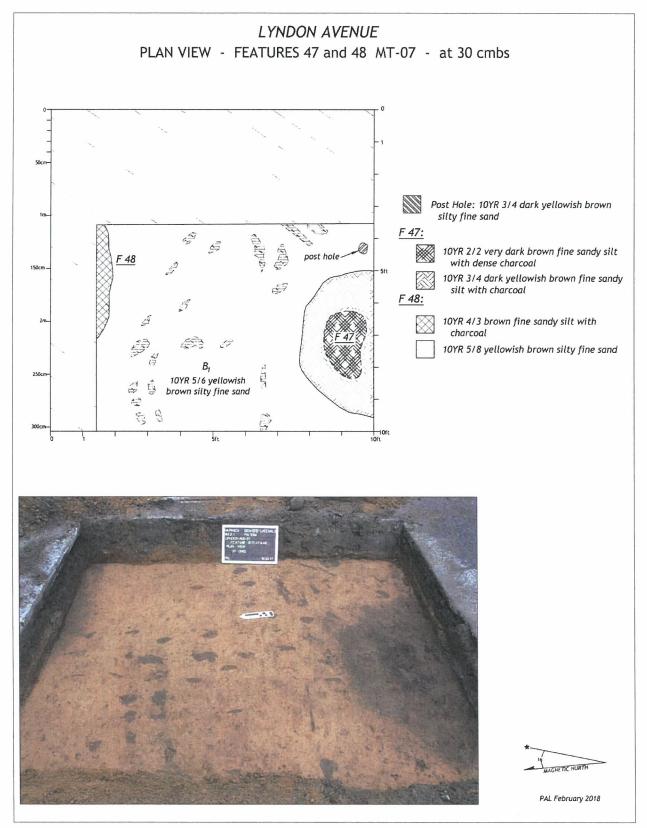


Figure 6-51. Feature 47 (south, right side) and Feature 48 (north, left) side – Trench 7 on Lyndon Avenue.

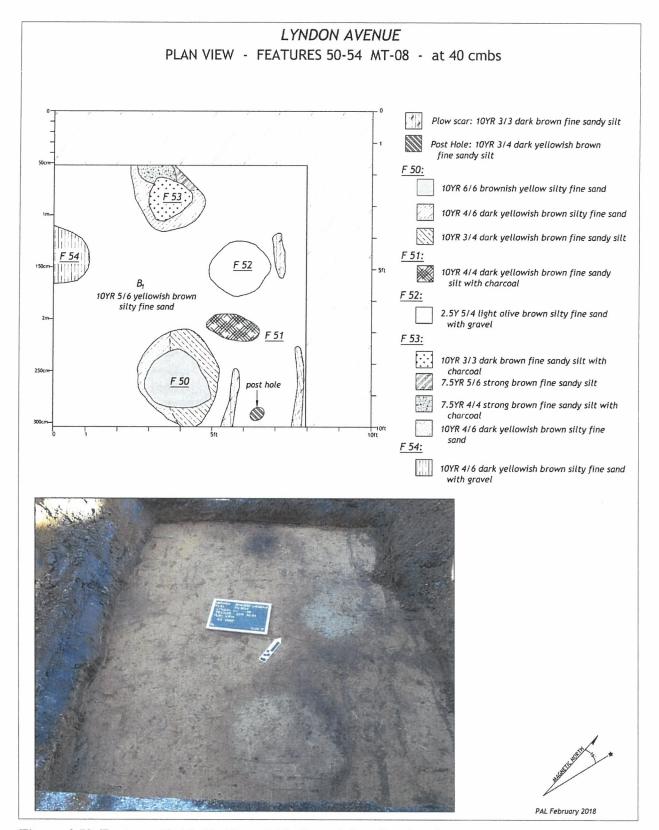


Figure 6-52. Features 50, 51, 52, 53, and 54 – Trench 8 on Lyndon Avenue

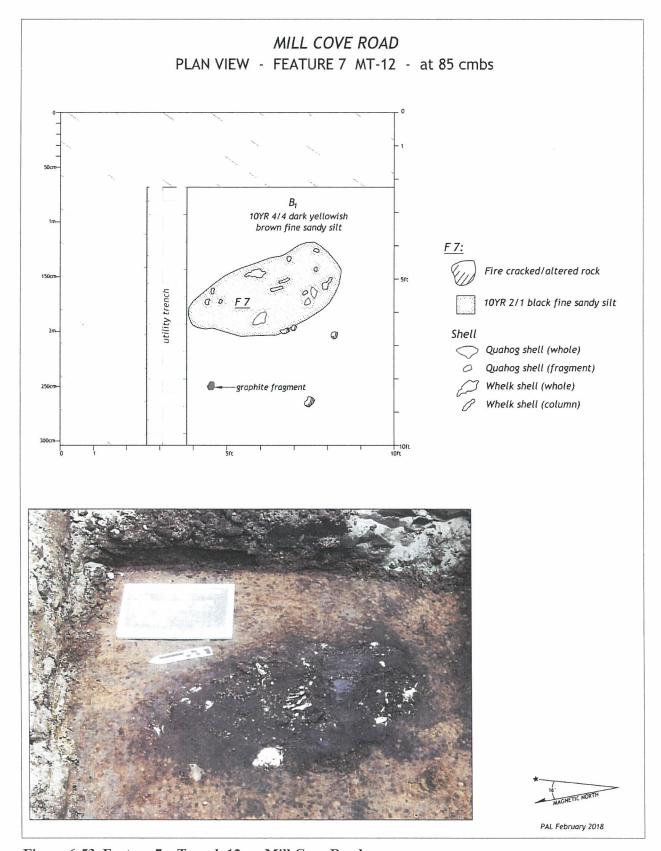


Figure 6-53. Feature 7 – Trench 12 on Mill Cove Road.

(Figure 6-54). The feature fill contained charcoal fragments, burnt rock fragments, and a piece of quartz chipping debris. Feature 12, which extended to the west and north beyond the limits of the trench, was a large pit feature that is recommended for preservation in place and avoidance during construction.

# River Vue Avenue

#### Feature 3 - Trench 14

Trench 14 was excavated along River Vue Avenue was at the locations for the planned Lateral hookup for houses at numbers 49 and 50. In 2008, when Trench 1 was opened along this section of River Vue Avenue, multiple features were discovered (see Figure 6-1). The 2017 Trench 14 re-exposed what had been designated as Feature 5 (Figure 6-55) and was re-designated as Feature 3. The feature was re-exposed at 40 cmbs in the east half of the trench as a dark yellow brown, generally ovate anomaly with intermittent charcoal flecks. The feature fill and the surrounding B₁ soil matrix had intermixed pieces of quartz and argillite chipping debris. An argillite small stem point fragment was noted to the west of the feature, which extended into the east wall of the EU. The feature represents a lithic workshop that is recommended for preservation in place.

#### Webb Avenue

#### Feature 18 - Trench 4

Trench 4 was excavated at the planned Lateral hookup for the houses at 25 and 30 Webb Avenue. Machine-assisted soil removal took place systematically to 50 cmbs, where a slate gorget was exposed and surrounded by an amorphous feature with charcoal flecks, small fragments of fire-cracked rock, and calcined bone fragments (Figure 6-56) and designated as Feature 18.

The slate gorget was positioned in the approximate center of the feature (see Figure 6-56), which extended into the east wall of the trench. The gorget is broken, and retains half of a drill hole perforation (Figure 6-57). The 5-millimeter (mm) drilled hole has an "hourglass" profile showing one side was drilled and the artifact was turned over for drilling of the opposite side (see Figure 6-57). Polish was observed around the unbroken edges of the 49-mm-long gorget, which represented slightly less than half of the artifact before its breakage. At its widest point, it is 63 mm (at the break line) and it tapers to 35 mm at the intact terminal edge. At its thickest (medial) point it is 6 mm, tapering convexly to blade-like edges. Careful examination of the broken edge shows that the break across the middle of the artifact took place after the successful drilling of both sides, and the unbroken edges show use-wear polishing that shows that the artifact probably was finished and in use before breaking. Finding the gorget in direct association with calcined bone could be an indicator that the artifact was broken ("killed") intentionally for ceremonial purposes. Accordingly, Feature 18 in Trench 4 along Webb Avenue was covered with filter fabric and left in situ. Avoidance and preservation in place is recommended. Figure 6-58 (Back Pocket) shows the locations of archaeological testing and important cultural features within the Mill Cove Site noting the recommended areas for protection and preservation in place.

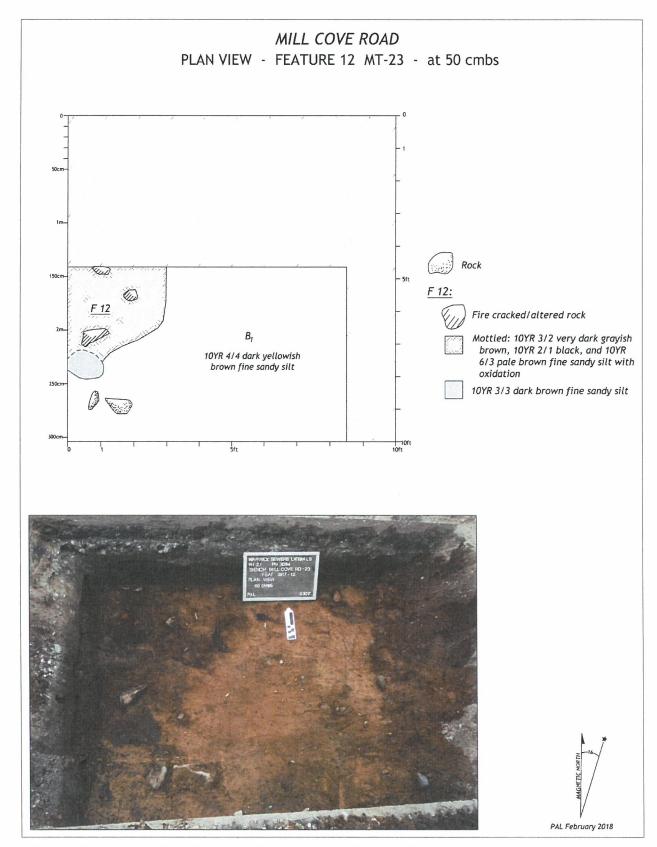


Figure 6-54. Feature 12 at 50 cmbs – Trench 23 on Mill Cove Road.

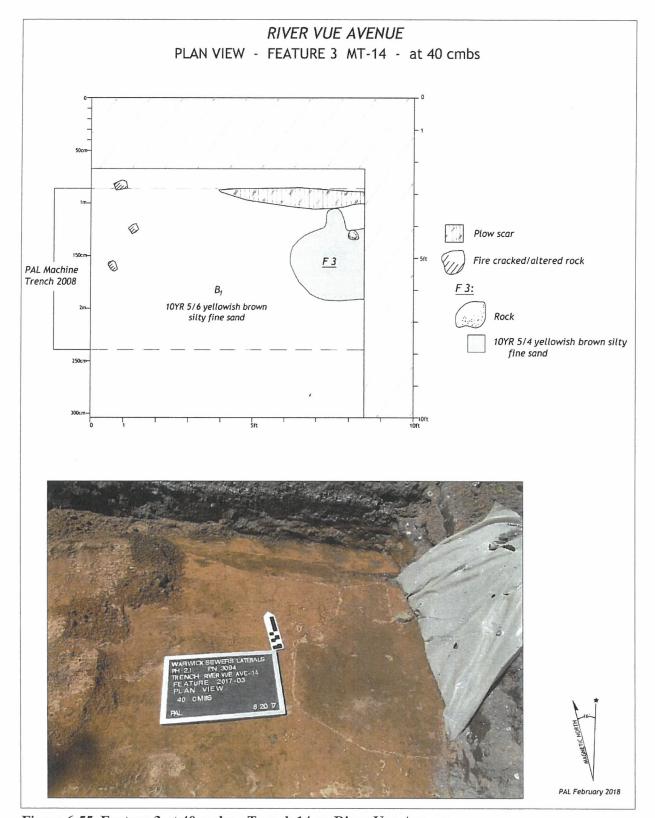


Figure 6-55. Feature 3 at 40 cmbs – Trench 14 on River Vue Avenue.

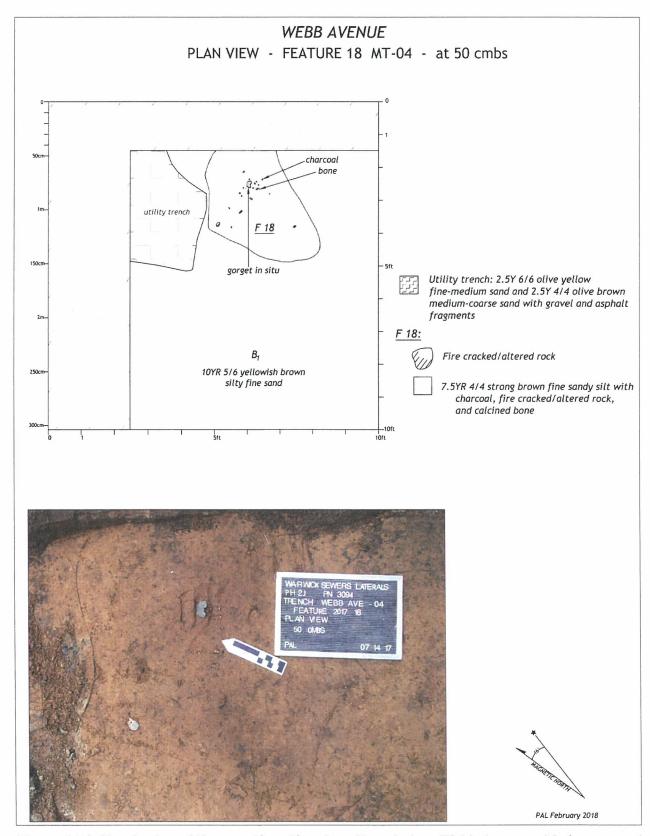


Figure 6-56. Sketch plan of Feature 18 at 50 cmbs – Trench 4 on Webb Avenue with fragment of slate gorget and associated calcined bone in situ.

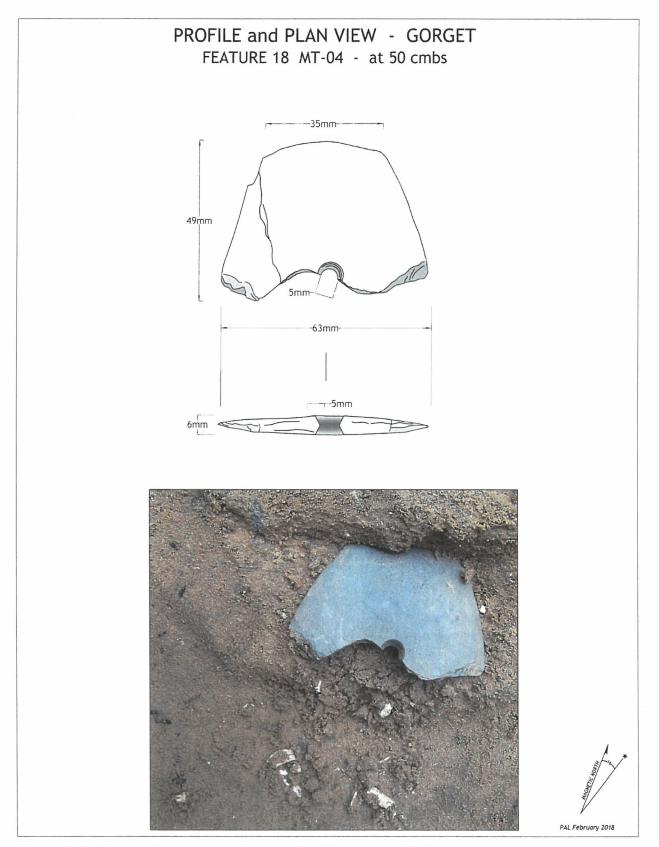


Figure 6-57. Sketch of slate gorget, Feature 18 – Trench 4 on Webb Avenue.

### **CHAPTER SEVEN**

# INTERPRETATIONS AND RECOMMENDATIONS

## Feature Characteristics, Contents, and Functions

Most of the archaeological features excavated and evaluated during the 2015 and 2017 investigations of the Bayside Sewer Project area were purposefully dug pits that extended from the ground surface to approximately 1–2 m into the subsoils. In the timespan of more than 300 years since the Native American occupation of the Mill Cove Site, the original surfaces across this landscape have been altered by a series of transformational processes (transforms). Original Native American ground surfaces were variably impacted, removed, or otherwise compromised by seventeenth—century English settlement, eighteenth—century plowing of farmland, the creation of nineteenth—century manicured estates, and eventually the twentieth-century building of more than 800 single-family homes and their supporting utilities and roadways,

The area's succession of landscape alterations has affected and even destroyed many Native American archaeological features and activity areas that existed there. However, the results of archaeological survey in 2007, 2008, 2015, and 2017 prove that remnants of large numbers of archaeological deposits and features have survived the transforms of developing suburbanization. The feature remnants across the Mill Cove Site contain important data in still-meaningful spatial contexts, despite the greatly altered character of the landscape. Supported by historical documentation, the archaeological record unambiguously points to the site as the location of the Narragansett Indian Shawomet Village, occupied from the Late Woodland to Contact and English Settlement periods that was abandoned in the chaos of war and is one of only two Native American villages archaeologically identified in southern New England. It was also one of the many birthplaces of what would become known as Manifest Destiny in the historical course of American cultural conflict and geopolitical expansion.

Sixteen features (approximately 48% of the 33 excavated along Tidewater Drive in 2015) extended to deeper than 40 cmbs, indicating they were purposefully dug. Several were deep enough depth to include a step in one wall to facilitate entry and exit during and/or following their creation. The first purpose of these features may have been storage; however, when archaeologically excavated, most had multiple fill lenses consistent with refuse disposal as their final function. Twenty-seven features (89%) contained multiple species of shellfish, indicating that the gathering, processing, consuming, and eventual discarding of intertidal and oceanic shellfish was a mainstay activity of the occupants of the Mill Cove Site.

Fishing and hunting/trapping of marine and terrestrial resources are reflected in the remains found within 21 (64%) of the 2015 features and included fish, reptile, bird, and medium-sized mammal bone, predominantly deer. Aboriginal ceramic fragments, reflecting processing, cooking, and possible storage were recovered from 14 features (42%).

While the manufacture and maintenance of stone tools took place across the Mill Cove Site, indicated by the presence of projectile points, point fragments, bifacially flaked tool fragments, and debitage in 27 (89%) of the features, the frequency and variety of lithics were generally low. Most were quartz, with very low frequencies of argillite, rhyolite, and chert that did not indicate lithic workshops, but rather later-stage maintenance debris and abandoned stone tools that were included with household refuse likely resulting from general cleaning of domestic spaces. The predominance of quartz reflects the sedentary nature of the

later Shawomet villagers and their familiarity with and reliance on locally obtained resources. The rich local ecosystem would have provided most of the needs of residing families, i.e., they would not have traveled far from the settlement and there is no evidence of extensive trade networking.

Two (6%) of the features found beneath Tidewater Drive during the 2015 study were formal human burials conforming to recognized Late Woodland Narragansett Indian ideology and related ceremonial traditions. On the basis of the orientation of the skull and position of a recognized third row phalangeal bone, Feature 23 is a flexed adult skeleton with the head to the southwest. Archaeological examination of the feature was limited to verification that it contained human remains. Excavation did not extend vertically below 10 cm from its beginning depth. Though shell fragments and a low density of argillite chipping debris were noted, no apparent grave goods or recognized offerings were observed during the excavation of the 10-cm soil level above the cranium or in the soils immediate next to it.

Feature 38 is similarly a tightly flexed or possibly bundled (indicated by a mandible resting on the distal femur) adult skeleton with the skull facing southwest and downward. The feature is oriented northwestsoutheast and the cranium is in the south-central portion of the grave. Bird wing bones and land turtle plastron bones were placed as grave goods upon or in immediate proximity to the head at the time of burial. Archaeological excavation did not continue past verification of the human remains and exposure of the immediate area surrounding the skull, so a complete interpretation of the extent and meaning of the Feature 38 grave offerings is not possible. However, there is sufficient information to speculate on the possibility that the bird bones may have been a wing fan and the plastron may have been part of a rattle.

Brief examination of the exposed teeth of the individuals in Features 23 and 38 indicated they were without visible caries and were partially worn, presumably as a result of a diet that included fine silty and/or sandy abrasives and/or use in working hides and basketry (see Hillson 1996). Both cranial sagittal and coronal sutures were clearly visible and fully closed but not fused, indicating the individuals had probably reached adulthood but did not live into what we would consider old age (see Key et al. 1994).

Features that were discovered during the 2017 machine-assisted excavations for the locations of the planned Lateral hookups were not excavated beyond the point of relative certainty that they were related to and resulted from Native American activities. Accordingly, feature function was not empirically determined, as the majority of their contents remain undisturbed in situ. However, features identified along Clara Avenue (Features 22, 23, 24, and 25), Lyndon Avenue (Features 34, 35, 36, 48, 51, 52, and 53), and Mill Cove Road (Feature 7) were similar enough in plan, size, and general character to burials and related ceremonial features verified in 2015 to classify them as ceremony-related. The discovery of a slate gorget fragment in association with calcined bone (Feature 18 on Webb Avenue) is also classified as ceremonial and is a possible cremation burial.

Ten (30%) of the features evaluated along Tidewater Drive in 2015 had remnant post molds next to or close to them. Similarly, during the 2017 study, individual posts molds were noted in association with features on Clara Avenue (Features 22 and 25), Longmeadow Avenue (Feature 37), and Lyndon Avenue (Features 34, 35, and 50). All these post molds were generally isolated or were so few that they apparently were not part of large constructed structures, such a dwellings or platforms. Instead, they likely indicate that a post or posts were erected adjacent to dug pits and/or activity areas that served to hang things on, suspend things from or, perhaps, used in pairs to hold a brace across. Such simple post-supported uses could have included markers, drying racks, and/or braces for protective lean-to coverings. Post molds in configurations suggesting constructed domestic structures were discovered in machine trenches in 2008 and are discussed below.

### Interpretations of Activities and Evidence for Village Occupation

Collectively, the results of the archaeological investigations within the Bayside Sewer Project area in 2007, 2008, 2015, and 2017 provide definitive evidence of activities and behaviors that resulted from long-term and semi-permanent to permanent habitation by multiple families of horticulturalists and hunter-gatherers during the Late Woodland to English Settlement periods (1000 B.P.–A.D. 1675).

Archaeological data collected from machine trenches in roadways sampled throughout the Project area confirm that the Mill Cove Site extends across the entirety of northern Warwick Neck north to south from Mill Cove to Arlington Avenue and east to west from the shore of Warwick Cove to and including Tidewater Drive. Native Americans occupied this landscape for multiple generations, and the remains of their secular and ideological activities have been found beneath the roadways that now form tangential transects across it. Informal communication with current residents include several anecdotal recollections of discoveries of artifacts and bones during construction and landscaping in the privately owned yards and lots that fill the spaces between archaeologically sampled roadways. The Mill Cove Site is a significant archaeological resource that includes the Pre-Contract and Contact Periods and the sixteenth-century Narragansett Indian Village of Shawomet.

Native American extended families formed a well-coordinated band level community in Shawomet Village. Their activities included building and occupying domestic structures (wigwams/wetus), hunting, fishing, and growing maize. They processed their foods, cooked meals, and cleaned their living spaces. They were making and using clay pots and manufacturing stone tools. They also took part in communal ceremonies and buried their dead.

Evidence of domestic structures across the Project area exists in partially patterned remnant post molds. Portions of structures were found in the 2008 Machine Trench 4 excavated along Mill Cove Road (see Figure 6-4). Probable structures are also reflected in lines of post molds in Machine Trench 7 on Whipple Avenue (see Figure 6-6) associated with an identified living surface, where multiple features indicated a mosaic of activity associated with dwelling places.

Evidence for intertidal and marine shellfish collecting and processing is ubiquitous in disposal pits quahog, soft shell clam, whelk, scallop, oyster, and mussel shell fragments were abundant. Saltwater and freshwater fishing and terrestrial hunting were in evidence in refuse lenses where bones and nut fragments were mixed with charcoal and burnt rocks. Maize kernels reflect horticultural practices (corn fields and/or gardens) nearby.

Features 23 and 38, identified during the 2015 investigations were both formal inhumations that required digging a grave, deliberately placing a body and, in the case of Feature 38, including grave offerings. These formal burials reflect ideological beliefs and ceremony conducted by the family and/or associated community members, possibly including a shaman or medicine person. The general orientation of Features 23 and 38 reflect the Narragansett Indian traditional belief that souls of the dead would travel southwest to the house of Kautantowwit (Williams 1936[1643]), also spelled Cautantowwit (Simmons 1970).

Human skeletal remains were also found in multiple locations other than Features 23 and 38, including in 2008 Machine Trench 5 along Lippitt Avenue and beneath Ocean Avenue in 2008 Machine Trench 3. On Ocean Avenue, a smear of highly fragmented calcined bone was identified immediately below the road surface and gravel bed. The bone fragments were chalky-white and spread horizontally for the extent of the machine trench floor. Close visual inspection of the calcined materials identified intermittently scattered human teeth among the remains and indicated that the feature resulted from the burning/cremation of bodies at or close to the original land surface. The Ocean Avenue deposits of calcined human bone relate temporally to the historically referenced events that took place at Shawomet Village in December 1675 and

July 1676 during King Philip's War (Fuller 1875; Strock 1851). However, the initial occupation of the Mill Cove Site and its development into the Shawomet Village spanned multiple generations before King Philip's War. The burial features beneath Tidewater Drive and Lippitt Avenue, and possibly the cremated bone and slate gorget beneath Webb Avenue, pre-date English settlement by hundreds of years.

### Project Area as an Archaeological and Anthropological Landscape

The expanding scale of regional archaeological research, findings in the field of historical geography, and incorporation of environmental and ecological perspective of anthropological theory have contributed to the development of the concept of historical landscapes (Darvell et al. 1993). This perspective was useful in recognizing that the Salt Pond Site (RI 110) in Narragansett represents a Native American village (Leveillee and Harrison 1996; Leveillee et al. 2006). Underlying the concept of historical landscapes is the recognition that remnants, or relics, of landscapes exist that contain multiple depositional events relating to particular cultures, and that the patterns of material culture within these landscapes reflect processes in operation during the times of their occupation. Within these landscapes, there exists sufficient archaeological evidence to allow the study of sociocultural patterning at a larger scale than is possible from single features or sites. Within such landscapes a sense of place was conceptualized in social, structural, functional, and cognitive terms by the communities that occupied them. The anthropological and archaeological elements of the landscape are articulated in a coherent way through one or more defining features or themes.

In the case of the Mill Cove Site, geographical and ecological features, as well as cultural, historical, and sociological themes are definable. Ecologically, northern Warwick Neck served as a reliable resource procurement location where freshwater, saltwater, intertidal, and terrestrial ecozones intersected and afforded a focal point for Native occupation of the landscape and enabled watercraft transportation in bay and coastal waters, travel routes to the interior mainland, and strategic visibility of most of the surrounding horizontal perimeter. The topographic variables and available resources were selection factors for the creators and occupants of the Mill Cove Site and later Shawomet Village.

Archaeological patterns reflecting semi-permanent or permanent village settlement and ideology exist within the Mill Cove Site and broaden our anthropological perspectives on Native American village life. Collectively, the data are unambiguous that multiple families occupied northern Warwick Neck and engaged in routine subsistence activities, including hunting, fishing, growing maize, constructing domestic dwellings, and maintaining their living spaces. These activities have left a tangible mosaic of archaeological deposits and remnant features across the landscape. The people of Shawomet Village also buried their dead there, likely in proximity to, but not within, their dwellings.

Temporal data indicate Native American occupation of the Mill Cove Site during the Late Woodland Period and extending until 1675, when the village was attacked and burned by Colonial forces during King Philip's War. The record of material culture and remnant features across the Bayside Sewer Project area constitutes a Native American historical, archaeological, and anthropological landscape that can provide additional information about the human ecology of Narragansett Bay before and during times of English contact, settlement, and expansion. Southern New England was a seventeenth-century geographical and historical nexus where distinctly different Old and New World cultures began relationships and dialogues that continue to the present. The Mill Cove Archaeological Site (the Narragansett Indian Shawomet Village) and the twenty-first century Bayside community are within that nexus.

Figure 7-1 illustrates what the Project area may have looked like in the Late Woodland Period and some of the activities reflected in the archaeological record.

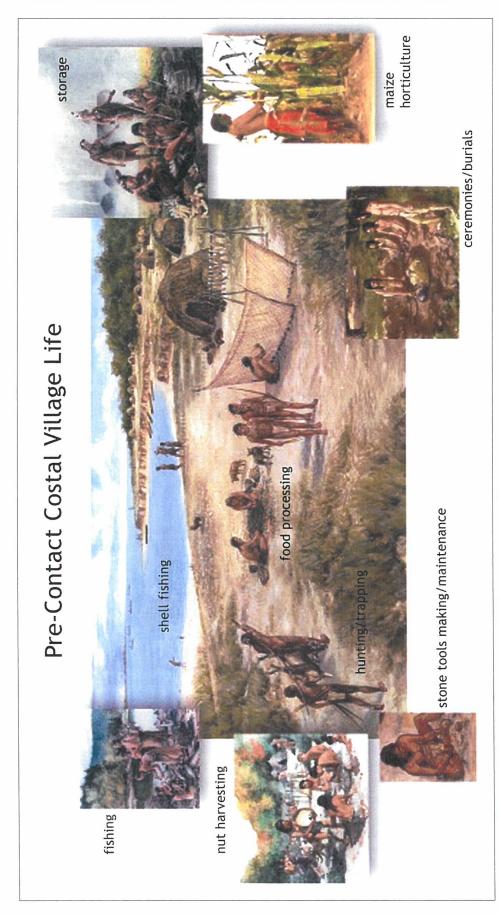


Figure 7-1. Illustration of activities at the pre-contact Mill Cove Site.

### **Expected Additional Data**

The combined 2007, 2008, 2015, and 2017 archaeological testing results show that the Mill Cove Site covers approximately 170 acres (see Figure 1-3). The 2015 machine trench excavated along Tidewater Drive exposed an area of 0.5 acre in a long and narrow continuous trench beneath the roadway from Mill Cove south to Arlington Avenue. Seventy-eight pre-contact Native American features were discovered within the Tidewater Drive machine trench. Extrapolating the density of features across the site results in approximately 150 features per acre, 4 of which could be expected to be burials. The implications for future discovery are an anticipated maximum of approximately 25,000 features, of which 650 could be burials. Historic development and construction has disturbed a significant percentage of the acreage, eliminating many features from consideration. Accordingly, if 50 to 70 percent of the features that once existed across the site have been destroyed by development, approximately 7,500 to 12,500 features could still be expected, 195 to 325 of which could be burials.

The Mill Cove Site is one of only two villages definitively verified archaeologically in the region, RI 110 in Narragansett is the other. With the exception of these two sites, our understanding of the cultural ecology of Native American village formation and life before, during, and after European settlement has depended on written historical accounts. The Mill Cove Site was clearly a Late Woodland and Contact Period Native American village, and the site's associated archaeological data provide new and important insights into the historical cultural ecology of Narragansett Bay before and at the time of European exploration and settlement. With temporal components dating, in part, to the King Philip's War era (1675–1676), this site may also contribute to conflict-related research from a unique perspective.

# REFERENCES CITED

Baron, Donna Keith, J. Edward Hood, and Holly V. Izard

1996 They Were Here All Along: The Native American Presence in Lower-Central New England in the Eighteenth and Nineteenth Centuries. The William and Mary Quarterly LIII(3):561-586.

Beers, D. G., and Company

1870 Atlas of the State of Rhode Island and Providence Plantations. D. G. Beers and Company, Philadelphia, PA.

Bendremer, Jeffrey C. M.

1993 Late Woodland Settlement and Subsistence in Eastern Connecticut. Unpublished Ph.D. dissertation, on file at the University of Connecticut, Storrs, CT.

Bendremer, Jeffrey C. M., and R. Dewar

1994 The Advent of Maize Horticulture in New England. In Corn and Culture in the Prehistoric New World, edited by Sissel Johannssen and Christine A. Hastorf, pp. 369-393. Westview Press, Boulder, CO.

Bernstein, David

1990 Prehistoric Seasonality Studies in Coastal Southern New England. American *Anthropologist* 92(1):96–115.

1992 Prehistoric Use of Plant Foods in the Narragansett Bay Region. Man in the Northeast 44:1-13.

1993 Prehistoric Subsistence on the Southern New England Coast: The Record from Narragansett Bay. Academic Press, Inc., Boston, MA.

Boothroyd, Jon C., and Janet Freedman

n.d. Interpretation of Core Samples from Providence Place, Providence, Rhode Island. Report on file at The Public Archaeology Laboratory, Inc., Pawtucket, RI.

Bradford, William

1981 [1647] Of Plymouth Plantation 1627–1647. Reprinted. Modern Library, New York, NY.

Bragdon, Kathleen J.

1996 Native Peoples of Southern New England, 1500-1650. University of Oklahoma Press, Norman, OK.

Braun, David P.

1974 Explanatory Models for the Evolution of Coastal Adaptation in Prehistoric Eastern New England. American Antiquity 39(4):582-596.

#### Brasser, T.J.

1978 Early Indian-European Contacts. In *Handbook of North American Indians: 78-88*. Smithsonian Institute. Washington, D.C.

#### Bunker, Victoria

Stratified Components of the Gulf of Maine Archaic Tradition at the Eddy Site, Amoskeag Falls. In *Early Holocene Occupation in Northern New England*, edited by Brian S. Robinson, James B. Peterson, and Ann K. Robinson, pp. 135–148. Occasional Publications in Maine Archaeology, No. 9, Maine Historic Preservation Commission, Augusta, ME.

### Chapin, Howard M.

Indian Graves. A survey of the Indian Graves that have been Discovered in Rhode Island. *Rhode Island Historical Society Collections.* Volume XX No.1.

1931 Sachems of the Narragansetts. Rhode Island Historical Society, Providence, RI.

#### Cherau, Suzanne Glover

Native Building Traditions in Southern New England: A Study of the Aquinnah Wampanoag Community, Martha's Vineyard. Paper presented at the 2001 Annual Meeting and Conference, Vernacular Architecture Forum, Mashantucket Pequot Museum and Research Center, Mashantucket, CT.

#### Cherau, Suzanne G., Ben Ford, and Matthew Kierstead

2003 Historic/Archaeological Mapping and Testing, Ely Mine Site, Vershire, Vermont. The Public Archaeology Laboratory, Inc. Report No. 1386. Prepared for the U.S. Army Corps of Engineers, New England District, Concord, MA.

### Cook, Lauren J.

1985 *The Rhode Island Burial Survey.* Office of Public Archaeology Center for Archaeological Studies Boston University, Boston, MA.

#### D'Amato, Donald A.

1991 Warwick's 350 - Year Heritage: A Pictorial History. The Donning Company, Virginia Beach, VA.

#### Darvill, Timothy, Christopher Gerrard, and Bill Startin

1993 Identifying and Protecting Historic Landscapes. *Antiquity* 67:563–574

# Dewar, Robert E., and Kevin A. McBride

Remnant Settlement Patterns. In *Space, Time and Archaeological Landscapes*, edited by Jacqueline Rossignol and LuAnn Wandsnider, pp. 227–255. Plenum Press, New York, NY.

#### Dincauze, Dena F.

1968 Cremation Cemeteries in Eastern Massachusetts. *Papers of the Peabody Museum of Archaeology and Ethnology* 59(1). Peabody Museum, Harvard University, Cambridge, MA.

- 1974 An Introduction to the Archaeology of the Greater Boston Area. Archaeology of Eastern North America 2(1):39-67.
- 1975 The Late Archaic Period in Southern New England. Arctic Anthropology 12(2):23-34.
- 1976 The Neville Site: 8,000 Years at Amoskeag, Manchester, New Hampshire. Peabody Museum Monographs 4. Harvard University, Cambridge, MA.
- 1993 Fluted Points in the Eastern Forrest. In From Kostenki to Clovis: Upper Paleolithic Paleo-Indian Adaptations. Chapter 20, edited by Olga Soffer and N. D. Praslov. Plenum Press, New York, NY.

### Dincauze, Dena F., and Mitchell T. Mulholland

1977 Early and Middle Archaic Site Distributions and Habitats in Southern New England. Annals of the New York Academy of Sciences 288:439-456.

### Doucette, Dianna, and John R. Cross

1997 Annasnappet Pond Archaeological District, North Carver Massachusetts: An Archaeological Data Recovery Program. The Public Archaeology Laboratory, Inc. Report No. 580. Submitted to the U. S. Department of Transportation, Federal Highway Administration and Massachusetts Highway Department, Boston, MA.

### Doughton, Thomas L.

- 1997 Unseen Neighbors: Native Americans of Central Massachusetts, A People Who Had "Vanished." In After King Philip's War: Presence and Persistence in Indian New England. England, edited by Colin G. Calloway, pp. 207–230. University Press of New England, Hanover, NH.
- 1999 "Like the Shadows in the Stream": Local Historians, The Discourse of Disappearance and Nipmuc Indians of Central Massachusetts. Document on file, The Public Archaeology Laboratory, Inc. (Abbreviated version presented at a meeting of the American Antiquarian Society, Worcester, MA, May 20, 1999.)

# Dragoo, Don W.

1976 Some Aspects of Eastern North American Prehistory: A Review 1975. American Antiquity 41:3-27.

### Dumont, John

1981 The PaleoIndian-Early Archaic Continuum: An Environmental Approach. Archaeology of Eastern North America. 9:18–37.

#### Everts and Richards

1895 Atlas of Providence County, Rhode Island. Everts and Richards Philadelphia, PA.

# Feder, Kenneth L.

1994 A Village of Outcasts: Historical Archaeology and Documentary Research at the Lighthouse Site. Mayfield Publishing Company, Mountain View, CA.

### Field, Edward.

1896 Revolutionary Defenses in Rhode Island. Preston and Rounds. Providence, RI.

### Figgins, Jesse D.

The Antiquity of Man in America. *Natural History* 27(3):229–239.

#### Filios, Elena L.

The End of the Beginning or the Beginning of the End: The Third Millennium in Southern New England. *Man in the Northeast* 38:79–93.

### Fitting, James E.

Regional Cultural Development, 300 B.C. to A.D. 1000. In *Northeast*, edited by Bruce G. Trigger, pp. 44–57. Handbook of North American Indians, Vol. 15, William C. Sturtevant, general editor, Smithsonian Institution, Washington, D.C.

### Flynn, Erin, Alan Leveillee, and Joseph Waller Jr.

A Study of Pre-contact Native American Archaeological Features Beneath Agricultural Fields: Site RI 1830 and the Expanding University of Rhode Island Kingston Campus. *Northeast Anthropology* No. 81-82:49–74.

### Fowler, William S.

- Twin Rivers: Four-Culture Sequence at a Rhode Island Site. *Bulletin of the Massachusetts Archaeological Society* 14:1–18.
- Sweet Meadow Brook, A Pottery Site in Rhode Island. *Bulletin of the Massachusetts Archaeological Society* 18:1–23.
- Locust Spring Site: Its Occupational Activities. Bulletin of the Massachusetts Archaeological Society 24(1):6–20.
- A Birdstone Recovery in Rhode Island. *Bulletin of the Massachusetts Archaeological Society* 26(3-4):39–43.
- Oaklawn Quarry: Stone Bowl and Pipe Making. *Bulletin of the Massachusetts Archaeological Society* 29(1):1–15.
- Stone Bowl Making at the Westfield Quarry. *Bulletin of the Massachusetts Archaeological Society* 30(1):6–16.
- 1968b Archaic Discoveries at Flat River. *Bulletin of the Massachusetts Archaeological Society* 29(2):17–36.

### Fuller, Oliver P.

1875 History of Warwick, Rhode Island. Angell, Burlingame & Company, Providence, RI.

### Funk, Robert E.

Early Man in the Northeast and the Late Glacial Environment. *Man in the Northeast* 4:7–39.

#### George, David, Brian Jones, and Ross Harper

1993 Archaeological Reconnaissance Survey of South Kingstown, Rhode Island. Report Prepared for the Town of South Kingstown, Public Archaeology Survey Team, Inc., Storrs, CT.

#### Gibson, Susan G. (editor)

1980

Burr's Hill: A Seventeenth Century Wampanoag Burial Ground in Warren, Rhode Island. Studies in Anthropology and Material Culture, Vol. 2. The Haffenreffer Museum of Anthropology, Brown University, Providence, RI.

#### Handsman, Russell G.

1995

A Homelands Model and Interior Sites: A Phase II Archaeological Study of Rhode Island Site 2050, Phenix Avenue, Cranston, Rhode Island. Research Report Number 1, The Program in Public Archaeology, University of Rhode Island. Report submitted to the Rhode Island Department of Transportation, Providence, RI.

#### Harrison, Burr, and Alan Leveillee

1995

Kent County 115 kV Electric Transmission Line Project, Phase II Archaeological Site Examination of the Maskerchugg Site, Warwick, Rhode Island. The Public Archaeology Laboratory, Inc. Report No. 618. Submitted to Narragansett Electric Company and Vanasse Hangen Brustlin Inc., Providence, RI.

#### Hasenstab, Robert

1991

Wetlands as a Critical Variable in Predictive Modelling of Prehistoric Site Locations: A Case Study from the Passaic Basin. Man in the Northeast 42:39-61.

#### Herbster, Holly, and Suzanne G. Cherau

2002

Archaeological Reconnaissance Survey, Town of Aquinnah, Martha's Vineyard Massachusetts. The Public Archaeology Laboratory, Inc. Report No. 1335. Submitted to the Massachusetts Historical Commission, Boston, MA, and Martha's Vineyard Commission, Martha's Vineyard, MA.

#### Herbster, Holly, and Deborah C. Cox

2002

Archaeological Reconnaissance Survey, Town of Dartmouth, Dartmouth, Massachusetts. The Public Archaeology Laboratory, Inc. Report No. 1328. Submitted to Dartmouth Historical Commission, Dartmouth, MA, and Massachusetts Historical Commission, Boston, MA.

### Herbster, Holly, and Kristen Heitert

2004

Archaeological Reconnaissance Survey, Town of Westport, Westport, Massachusetts. The Public Archaeology Laboratory, Inc. Report No. 1494. Submitted to Westport Historical Society, Westport, MA.

Hermes, O. D., L. P. Gromet, and D. P. Murray, N. A. Hamidzada, J. W. Skehan, and S. Mosher, S. 1994 Bedrock Geologic Map of Rhode Island. Rhode Island Map Series Map 1, Rhode Island Geological Survey, Office of Rhode Island State Geologist, Providence, RI.

#### Hillson, Simon

1996 Dental Anthropology. New York: Cambridge University Press.

### Holstein, Elizabeth, and John J. McNiff

1987

Phase I Archaeological Survey Seaview Country Club Development Warwick Neck Warwick, Rhode Island. The Public Archaeology Laboratory, Inc. Report No. 174. Submitted to Wheeler Caldwell Companies, Providence, RI.

### Johnson, Eric S.

1999

Community and Confederation: A Political Geography of Contact Period Southern New England, pp. 155-168. In The Archaeological Northeast, edited by Mary Ann Levine, Kenneth Sassaman, and Michael S. Nassaney, pp. 155-168. Bergin & Garvey, Westport, CT.

#### Juli, Harold D., and Kevin A. McBride

1984

The Early and Middle Woodland Periods of Connecticut Prehistory: Focus on the Lower Connecticut River Valley. Bulletin of the Archaeological Society of Connecticut 47:89– 98.

### Kerber, Jordan E.

1984

Prehistoric Human Occupation and Changing Environment of Potowomut Neck, Warwick, Rhode Island: An Interdisciplinary Approach. Unpublished Ph.D. dissertation, Department of Anthropology, Brown University, Providence, RI.

1994

Archaeological Investigations at the Lambert Farm Site, Warwick, Rhode Island: An Integrated Program of Research and Education by The Public Archaeology Laboratory, Inc. Report No. 248 Vol. 1. Submitted to The Rhode Island Historical Preservation Commission, Providence, RI.

1997

Lambert Farm-Public Archaeology and Canine Burials Along Narragansett Bay. Harcourt Brace College Publishers. New York

2006

Cross-Cultural Collaboration. University of Nebraska Press, Lincoln, NE.

#### Kerber, Jordan E., Alan D. Leveillee, and Ruth L. Greenspan –in text this way

1989

An Unusual Dog Burial Feature at the Lambert Farm Site, Warwick, Rhode Island: Preliminary Observations. Archaeology of Eastern North America 17:165–174.

#### Key, Catherine, Leslie Aiello, and Theya Molleson

1994

Cranial Suture Closure and Its Implications for Age Estimation. International Journal of Osteoarchaeology 4(3):193–207.

### King, Marsha

1988

Historic Site Location in Large Project Areas. Paper presented at the 28th Annual Meeting of the Northeastern Anthropological Association, Albany, NY.

### Kintigh, Keith

1987

EVALSTP Subsurface Testing Evaluation: Perform a Monte Carlo Evaluation of a Subsurface Testing Program. Department of Anthropology, Arizona State University, Tempe, AZ.

1992

Tools for Quantitative Archaeology, Programs for Quantitative Analysis in Archaeology. Tempe, AZ.

### Kuehn, Steven R.

1998

New Evidence for Late PaleoIndian-Early Archaic Subsistence Behavior in the Western Great Lakes. American Antiquity 63(3):457–476.

#### Lavin, Lucianne

1988 Coastal Adaptation in Southern New England and Southern New York. Archaeology of Eastern North America 16:101-120.

# Leach, Douglas Edward

1958 Flintlock and Tomahawk: New England in King Philip's War. W.W. Norton, New York,

#### Leveillee, Alan

- 1993 Eastern Woodland Mortuary Practices as Reflected in Canine Burial Features at the Lambert Farm Site, Warwick, Rhode Island. Bulletin of the Massachusetts Archaeological Society. Volume 54(1):19–24.
- 1997 A History Written in Stone: Six Thousand Years of Native American Land Use in the Narragansett Bay Region; A Program of Supplemental Archaeological Data Recovery on Conanicut Island, The Joyner Site (RI 706). The Public Archaeology Laboratory, Inc. Report No. 412. Submitted to The Rhode Island Department of Transportation, Providence, RI.
- 1999a Some Thoughts on the Nature of Archaeological Sites, and the Trend Towards a Holistic Approach as we Enter a New Millennium. Bulletin of the Massachusetts Archaeological Society 60(2):55-56.
- 1999b Transitional Archaic Ideology as Reflected in Secondary Burials at the Millbury III Cremation Complex. Archaeology of Eastern North America 27:157–183.
- Discovery and Rediscovery of a Remnant 17th Century Narragansett Burial Ground in 2001 Warwick, Rhode Island. Bulletin of the Massachusetts Archaeological Society 62(2):46-
- 2002 Applied Archaeology Influencing Native Traditions: A Case From Rhode Island. Archaeology of Eastern North America 30:21–28.
- 2005 Evidence for Submerged Sites in Narragansett Bay: The Cedar Tree Beach Project. Massachusetts Archaeological Society Meetings, Middleborough, MA.
- 2008a Summary Report: Bayside 2 Sewer Segment, Warwick, Rhode Island. Machine-assisted Phase I archaeological Survey. The Public Archaeology Laboratory, Inc. Report No. 2214.01. Submitted to Gordon R. Archibald, Pawtucket, RI.
- 2008b Summary Report: Tidewater Drive, Warwick, Rhode Island. Machine-assisted Phase I(c) Archaeological Survey. The Public Archaeology Laboratory, Inc. Report No. 2214.09. Submitted to Gordon R. Archibald, Pawtucket, RI.
- Status Report: Warwick Sewers Bayside Segment, Warwick, Rhode Island. The Public 2009 Archaeology Laboratory, Inc. Report No. 2214. Submitted to Gordon R. Archibald, Pawtucket, RI.
- 2010 Archaeology in the Coastal Suburbs: The Cove Terrace Site Warwick, Rhode Island. Bulletin of the Massachusetts Archaeological Society 71(2):67–77.

- 2015 PaleoIndian and Early Archaic Peoples in the Formative Narragansett Bay Drainage. Institute of American Indian Studies Conference, Washington, CT.
- 2016 Archaeological Feature Identification and Evaluation, Tidewater Drive Warwick Sewer Bayside Segment, Warwick, Rhode Island. Public Archaeology Laboratory, Inc. Report No. 3094. Submitted to the Warwick Sewer Authority, Warwick, RI.

### Leveillee, Alan, and Burr Harrison

1996 An Archaeological Landscape in Narragansett, Rhode Island, Point Judith Upper Pond, RI 110. Bulletin of the Massachusetts Archaeological Society 57(2):58-63.

# Leveillee, Alan, and Reneé Van Couyghen

1990 The South Wind and Hoskins Park Sites: A Program of Archaeological Data Recovery in Rhode Island's Coastal Zone. 2 vols. The Public Archaeology Laboratory, Inc. Report No. 163-1. Submitted to Creative Housing Corporation, Inc. West Acton, MA.

### Leveillee, Alan, and Joseph Waller, Jr.

- 1999 Phase I(c) Archaeological Survey Confreda Fields Soccer Complex, Warwick, Rhode Island. The Public Archaeology Laboratory, Inc. Report No. 1063. Submitted to Warwick Planning Department, Warwick, RI.
- 2001 Phase I(c) Intensive Archaeological Survey, Omni Development Project Area, Warwick, Rhode Island. The Public Archaeology Laboratory, Inc. Report No. 1268. Submitted to Omni Development Corporation, Providence, RI.

### Leveillee, Alan, Joseph Waller, Jr., and Donna Ingham

Dispersed Villages in Late Woodland Period South-Coastal Rhode Island. Archaeology of 2006 Eastern North America. Volume 36:71–89.

Little, Barbara, Erika Martin Seibert, Jan Townsend, John H. Sprinkle Jr., and John Knoerl 2000 Guidelines for Evaluating and Registering Archeological Properties. National Register Bulletin No. 36. U.S. Department of the Interior, National Park Service, National Register, History and Education, Washington, D.C.

#### Lizee, Jonathan M.

1994 Prehistoric Ceramic Sequences and Patterning in Southern New England: The Windsor Tradition. Unpublished Ph.D. dissertation, University of Connecticut, Storrs, CT.

### Luedtke, Barbara E.

- 1987 The Pennsylvania Connection: Jasper in Massachusetts Archaeological Sites. Bulletin of the Massachusetts Archaeological Society 48(2):37–47.
- 1988 Where are the Late Woodland Villages in Eastern Massachusetts? Bulletin of the Massachusetts Archaeological Society 53:67-75.

#### Massachusetts Historical Commission (MHC)

- 1979 Public Planning and Environmental Review: Archaeology and Historic Preservation. Massachusetts Historical Commission, Boston, MA.
- 1982a Historic and Archaeological Resources of Southeast Massachusetts. Massachusetts Historical Commission, Massachusetts Historical Commission, Boston, MA.

- 1982b Historic and Archaeological Resources of the Boston Area: A Framework for Preservation Decisions. Massachusetts Historical Commission, Boston, MA.
- 1984 Historic and Archaeological Resources of the Connecticut Valley. Massachusetts Historical Commission, Boston, MA.

### Maymon, Jeffrey H., and Charles E. Bolian

1992 The Wadleigh Falls Site: An Early and Middle Archaic Period Site in Southeastern New Hampshire. In Early Holocene Occupation in Northern New England, edited by Brian S. Robinson, James B. Peterson, and Ann K. Robinson, pp. 117–134. Occasional Publications in Maine Archaeology, No. 9, Maine Historic Preservation Commission, Augusta, ME.

### McBride, Kevin A.

- 1984a Prehistory of the Lower Connecticut River Valley. Unpublished Ph.D. dissertation, Department of Anthropology, University of Connecticut, Storrs, CT.
- 1984b Middle and Late Archaic Periods in the Connecticut River Valley: A Re-Examination. Connecticut Archaeological Society Bulletin 47:55-71.

### McBride, Kevin A., and Robert E. Dewar

1987 Agriculture and Cultural Evolution: Causes and Effects in the Lower Connecticut River Valley. In Emergent Horticultural Economies of the Eastern Woodlands, edited by William F. Keegan, pp. 305-328. Center for Archaeological Investigations, Occasional Papers No. 7, Southern Illinois University, Carbondale, IL.

### McBride, Kevin A., and Mary G. Soulsby

1989 Prehistory of Eastern Connecticut Phase I, II and III Archaeological Surveys -Relocation of Route 6/I-84 Project. The Public Archaeology Survey Team, Inc. Report. Submitted to the Connecticut Department of Transportation, Wethersfield, CT.

### McGuire, Randall H., and Robert Paynter

1991 The Archaeology of Inequality. Basil Blackwell, Oxford, England.

#### McManamon, Francis P.

1990 A Regional Perspective on Assessing the Significance of Historic Period Sites. Historical Archaeology 24(2):14-22.

### Meltzer, David J., and Bruce D. Smith

PaleoIndian and Early Archaic Subsistence Strategies in Eastern North America. In 1986 Foraging, Collecting, and Harvesting: Archaic Period Subsistence and Settlement in the Eastern Woodlands, edited by Sarah W. Neusius, pp. 3-31. Center for Archaeological Investigations Occasional Papers No. 6, Southern Illinois University, Carbondale, IL.

# Morenon, E. Pierre

1984 Environmental Diversity of Salt Ponds and Prehistoric Adaptation: A Comparison of Trustom and Potter Ponds. Occasional Papers in Archaeology, No. 15, Public Archaeology Program, Department of Anthropology and Geography, Rhode Island College, Providence, RI.

1990 Results from a Phase I Archaeological Survey of Route 117, Warwick, Rhode Island. Occasional Papers in Archaeology 68(1), Public Archaeology Program, Rhode Island College, Providence, RI.

#### Mulholland, Mitchell T.

1984 Patterns of Change in Prehistoric Southern New England: A Regional Approach. Unpublished Ph.D. dissertation, Department of Anthropology, University of Massachusetts, Amherst, MA.

1988 Territoriality and Horticulture: A Perspective for Prehistoric Southern New England. In Holocene Human Ecology in Northeastern North America, edited by George P. Nicholas, pp. 137-164. Plenum Press, New York, NY.

### National Park Service (NPS)

1983 Secretary of the Interior's Standards and Guidelines for Archeology and Historic Preservation (48 FR 44716-44742). National Park Service, U.S. Department of the Interior, Washington, D.C.

2002 National Register Bulletin – How to Apply the National Register Criteria for Evaluation. U.S. Department of the Interior, National Park Service, Washington, D.C. Latest electronic version dated 2002: http://www.nps.gov/history/nr/publications/bulletins/nrb15/.

#### Nicholas, George P.

1987 Rethinking the Early Archaic. Archaeology of Eastern North America 15:99–124.

Places and Spaces: Changing Patterns in Wetland Use in Southern New England. Man in 1991 *the Northeast* 42:75–98.

### Ogden, J. Gordon

1977 The Late Quaternary Paleoenvironmental Record of the Northeastern North America. Annals of the New York Academy of Sciences 288:16-34.

#### Parker, Patricia, and Thomas F. King

1998 Guidelines for Evaluating and Documenting Traditional Cultural Properties. National Register Bulletin No. 38. U.S. Department of the Interior, National Park Service, National Register, History and Education, Washington, D.C.

#### Potter, Elisha R., Jr.

1835 The Early History of Narragansett. Collections of the Rhode Island Historical Society, III. Marshall, Brown and Company, Providence, RI.

### The Public Archaeology Laboratory, Inc.

1989 Archaeological Site Examination Weaver Cove Site (RI 1745), Portsmouth, Rhode Island. Manuscript on file The Public Archaeology Laboratory, Inc., Pawtucket, RI

2008 Summary Report: Machine-Assisted Phase I(c) Archaeological Survey. Warwick Sewers Longmeadow Segment, Warwick, Rhode Island. The Public Archaeology Laboratory, Inc. Report No. 2214.03. Submitted to Gordon R. Archibald, Pawtucket, RI.

### Rhode Island Historical Preservation Commission (RIHPC)

1981 Warwick, Rhode Island: Statewide Historical Preservation Report K-W-1. Rhode Island Historical Preservation Commission, Providence, RI.

1982 Standards for Archaeological Survey. Rhode Island Historical Preservation Commission, Providence, RI.

1986 *The Rhode Island Historical Preservation Plan.* Rhode Island Historical Preservation Commission, Providence, RI.

#### Rhode Island Historical Preservation & Heritage Commission (RIHPHC)

2015 Performance Standards and Guidelines for Archaeology in Rhode Islands. Rhode Island Historical Preservation & Heritage Commission, Providence, RI.

### Rhode Island Historical Society

1936 A Folsom Point Found in East Providence. *Rhode Island Historical Society Collections* 29(3):91.

#### Rider, Sidney B.

Retrospect from the Round Tower of the Pomham Club. Manuscript on file Narragansett Indian Tribal Historic Preservation Office- Library of Nancy Brown-Garcia.

The Lands of Rhode Island: As They Were Known To Caunounicus and Miantunnomu When Roger Williams Came in 1636. Published by the author. Providence, RI.

#### Ritchie, Duncan, Marsha K. King, and Martha Lance

Archaeological Survey of Westville Dam and Reservoir in Southbridge and Sturbridge, Massachusetts. The Public Archaeology Laboratory, Inc. Report No. 158-2. Submitted to IEP, Inc., Northborough, MA, and the U.S. Army Corps of Engineers, New England Division, Waltham, MA.

### Ritchie, William A.

1971a A Typology and Nomenclature for New York Projectile Points. Revised edition. New York State Museum and Science Service Bulletin 384, Albany, NY.

1971b The Archaic in New York. New York State Archaeological Association Bulletin 52:2–12.

1980 The Archaeology of New York State. Revised Edition. Harbor Hills Books, Harrison, NY.

### Robinson, Paul, Marc Kelley, and Patricia E. Rubertone

Preliminary Biocultural Interpretations from a Seventeenth-Century Narragansett Indian Cemetery in Rhode Island. In *Cultures in Contact: The European Impact on Native Cultural Institutions in Eastern North America, A.D. 1000–1800*, edited by William M. Fitzhugh, pp. 107–130. Smithsonian Institution, Washington, D.C.

### Rubertone, Patricia E.

Archaeology, Colonialism and Seventeenth-Century Native America: Towards an Alternative Interpretation. In *Conflict in the Archaeology of Living Traditions*, edited by Robert Layton, pp. 32–45. Unwin Hyman, Winchester, MA.

Grave Undertakings An Archaeology of Roger Williams and the Narragansett Indians. Smithsonian Institution Press, Washington, D.C.

# Salwen, Bert

1978 Indians of Southern New England and Long Island: Early Period. In *Northeast*, edited by Bruce G. Trigger, pp. 160–176. Handbook of North American Indians, Vol. 15, William C. Sturtevant, general editor, Smithsonian Institution, Washington, D.C.

Indians of Southern New England and Long Island. In *Connecticut Archaeology: Past, Present and Future*, edited by Robert E. Dewar, Kenneth L. Feder, and David A. Poirier, pp. 79–115. Occasional Papers in Anthropology, Department of Anthropology, University of Connecticut, Storrs, CT.

### Salwen, Bert, and Susan N. Mayer

1978 Indian Archaeology in Rhode Island. *Archaeology* 31:57–58.

# Schoonmaker, Peter K., and David R. Foster

Some Implications of Paleoecology for Contemporary Ecology. *The Botanical Review* 57(3): 205–243.

#### Scott, Elizabeth M.

1994 Those of Little Note: Gender, Race, and Class in Historical Archaeology. University of Arizona Press, Tucson, AZ.

### Simmons, William Scranton

1970 Cautantowwit's House: An Indian Burial Ground on the Island of Conanicut in Narragansett Bay. Brown University Press, Providence, RI.

### Simon, Brona G.

1991 Prehistoric Land Use and Changing Paleoecological Conditions at Titicut Swamp in Southeastern Massachusetts. *Man in the Northeast* 42:63–74.

#### Smith, Kevin P., Amy Smith, and Nina Hellebrekers

n.d. New Evidence for the Paleoindian Occupation of the Narragansett Basin, Rhode Island and Massachusetts, USA. Unpublished manuscript, Haffenreffer Museum, Brown University, Providence.

#### Snow, Dean

1980 The Archaeology of New England. Academic Press, New York, NY.

# Solecki, Ralph S.

Indian Forts of the Mid-17th Century in the Southern New England-New York Coastal Area. *Northeast Historical Archaeology* 21–22:64–78.

#### Spiess, Arthur, Deborah Wilson, and James Bradley

PaleoIndian Occupation in the New England-Maritimes Region: Beyond Cultural Ecology. *Archaeology of Eastern North America* 26:201–264.

### Stanford, Dennis, and Bruce Bradley

2012 Across the Atlantic Ice- The Origins of America's Clovis Culture. University of California Press. Berkley and Los Angeles, CA.

### Stevens, James

1831

A Topographical Map of Rhode Island and Providence Plantations. James Stevens, Newport, RI.

### Strock, Daniel

1851

Pictorial History of King Philip's War. Wentworth Publishing, Boston, MA.

### Taylor, Charlotte

1997

Subsistence and Settlement in the 17th Century Eastern Niantic Polity. Paper presented at the Conference on New England Archaeology. Sturbridge, MA.

#### Thorbahn, Peter F.

1982

The Prehistoric Settlement Systems of Southern New England: Final Report of The Interstate 495 Archaeological Data Recovery Program, Vol. I. Public Archaeology Laboratory, Department of Anthropology, Brown University, Providence, RI. Submitted to the Massachusetts Department of Public Works, Boston, MA.

### Thorbahn, Peter, and Deborah Cox

1988

The Effect of Estuary Formation on Prehistoric Settlement in Southern Rhode Island. In *Holocene Human Ecology in Northeastern North America*, edited by George .P. Nicholas, pp. 167–182. Plenum Press, New York, NY.

#### Thorbahn, Peter, F., Leonard Loparto, Deborah Cox, and Brona Simon

1980

Prehistoric Settlement Processes in Southern New England: A Unified Approach to Cultural Resource Management and Archaeological Research. Public Archaeology Laboratory, Department of Anthropology, Brown University, Providence, RI. Report on file, Massachusetts Historical Commission, Boston, MA.

#### Thorson, Robert M., and Kevin A. McBride

1988

The Bolton Spring Site, Connecticut: Early Holocene Human Occupation and Environmental Changes in Southern New England. *Geoarchaeology: An International Journal* 3(3):221–234.

#### Turnbaugh, William A.

1976 The St

The Survival of Native Craft in Colonial Rhode Island. *Man in the Northeast* 11:74–79.

1980

Early and Middle Archaic Elements in Southern Rhode Island. In *Early and Middle Archaic Cultures in the Northeast*, edited by David R. Starbuck and Charles F. Bolian, pp. 59–71. Occasional Publications in the Northeastern Anthropology No. 7. Department of Anthropology, Franklin Pierce College, Rindge, NH.

#### United States Department of Agriculture

1981

Soil Survey of Rhode Island. Soil Conservation Service. U.S. Government Printing Office, Washington, D.C.

#### Waddicor, Arthur

1969

Church Brook Rock Shelter No. 1. *Bulletin of the Massachusetts Archaeological Society* 30(1).

### Waddicor, Arthur, and Morris Mitchell

Furnace Hill Brook Site: A Salvage Dig. *Bulletin of the Massachusetts Archaeological Society* 30(2).

#### Waller, Joseph N.

Late Woodland Settlement and Subsistence in Southern New England Revisited: the Evidence from Coastal Rhode Island. *North American Archaeologist* 21(2):139–153.

### Waller, Joseph N., Patricia Fragola, and Alan Leveillee

1997 Phase I Archaeological Survey of Proposed Drainage Basins Associated with the Relocated Route 403 Project Area Phase II Site Examination Of the Fry Brook Site (RI 1248), North Kingstown, Rhode Island. The Public Archaeology Laboratory, Inc. Report No. 793. Submitted to Gordon R. Archibald, Inc., Pawtucket, RI.

### Waller, Joseph N., and Alan Leveillee

- Analyses of Cultural Material as an Element of Repatriation: The Maskerchugg Site Assemblage RI 2143 Warwick, Rhode Island. The Public Archaeology Laboratory, Inc. Report No. 706. Submitted to The Narragansett Electric Company, Providence, RI.
- Archaeological Investigations at site RI 2050 in Cranston, Rhode Island: A Native American Steatite Processing Site. *Bulletin of the Archaeological Society of Connecticut* 61:3–16.
- 1999 Site Verification, Evaluation, and Cultural Resource Management Within RI 196:
  Archaeology of the Ives Bluff Condominium Project, Warwick, Rhode Island. The Public Archaeology Laboratory Inc. Report No. 995. Submitted to Philip Ryan Homes.
  Providence, RI.
- 2002a Phase I(c) Archaeological Survey, Conimicut Sewer System Project Area (Contract 68-B), Warwick, Rhode Island. The Public Archaeology Laboratory, Inc. Report No. 1354. Submitted to Gordon R. Archibald, Inc., Pawtucket, RI.
- Archaic Period Land Use and Settlement in the Pawcatuck River Watershed of South-Central Rhode Island. *Northeast Anthropology* 63:71.
- 2002c Phase I Archaeological Survey of the 68B Warwick Sewer Segment, Warwick, Rhode Island. The Public Archaeology Laboratory, Inc. Report No. 1354. Submitted to the Warwick Sewer Authority. Warwick, RI.

### Williams, Roger

1936 [1643] A Key Into the Language of America. Reprinted in 1997. 5th edition, Rhode Island and Providence Plantations Tercentenary Committee, Inc., reprinted in 1997 by Applewood Books, Bedford, MA.

# APPENDIX A

# CATALOG OF CULTURAL MATERIALS

	*			

Appendix A. Catalog of Cultural Materials, Warwick Sewers Tidewater Drive, Phase III Data Recovery.

Provenience	Material	Object	Size	Attributes	Color(s)	Manufacture Date	Makers Mark	Count
Mill Cove Site								
Feature 08-N 1/2 0-10, Feature Fill	Charcoal	Charcoal		Complete				-
	Quartz	Chipping Debris Flake	1-3cm	Complete Cortex	White			-
Feature 08-N 1/2 10-20, Feature Fill	Charcoal	Charcoal		Complete				-
	Unid. Igneous	Fire-Cracked Rock		Complete	Tan			2
Feature 08-S 1/2 0-10, Feature Fill	Quartz	Unidentified	2.49x2.13x0.73	Mostly Complete	White			_
Feature 08-S 1/2 10-20, Feature Fill	Charcoal	Charcoal		Complete				_
Feature 09-E 1/2 0-20, Feature Fill	Quartz	Chipping Debris Flake	1-3cm	Complete Cortex	White			1
	Quartz	Chipping Debris Flake	1-3cm	Complete	White			4
Feature 09-W 1/2 10-20, Feature Fill	Charcoal	Charcoal		Complete				_
	Quartz	Chipping Debris Flake	1-3cm	Complete	White			1
	Quartz	Chipping Debris Flake	0-1cm	Complete	White			2
Feature 09-W 1/2 20-30, Feature Fill	Charcoal	Charcoal		Complete				_
	Quartz	Chipping Debris Shatter	1-3cm	Complete	White			-
	Quartz	Chipping Debris Flake	1-3cm	Complete	White			-
Feature 09-W 1/2 30-40, Feature Fill	Charcoal	Charcoal		Complete				1
Feature 13-E 1/2 0-10, Feature Fill	Bone	Mammal		Fragment				2
	Charcoal	Charcoal		Complete				1
	Charcoal	Charcoal		Complete				1
	Shell	Sample		Complete				-
	Shell	Sample		Complete				П

Appendix A. Catalog of Cultural Materials, Warwick Sewers Tidewater Drive, Phase III Data Recovery.

Provenience	Material	Object	Size At	Attributes	Color(s)	Manufacture Date	Makers Mark	Count
Mill Cove Site								
Feature 13-E 1/2 10-20, Feature Fill	Bone	Mammal		Fragment				34
	Calcined Bone	Unidentified		Fragment				∞
	Charcoal	Charcoal		Complete				1
	Granitic	Fire-Cracked Rock		Complete	Cream, Speckled, Tan			4
	Quartz	Biface	2.6x2.04x1.19	Fragment	White			1
	Quartz	Chipping Debris Flake	0-1cm	Complete	White			5
	Quartz	Chipping Debris Shatter	0-1cm	Complete	White			2
	Quartz	Chipping Debris Flake	1-3cm	Complete	White			10
	Quartz	Chipping Debris Flake	1-3cm	Complete Cortex	White			1
	Quartz	Chipping Debris Flake	3-5cm	Complete	White			1
	Quartzite	Unidentified		Complete	Gray, Tan			-
	Shell	Unidentified		Fragment				28
	Shell	Bivalve Scallop		Fragment				-
	Shell	Bivalve Quahog		Fragment				_
Feature 13-W 1/2 0-10, Feature Fill	Shell	Sample		Complete				-
Feature 13-W 1/2 0-20, Feature Fill	Bone	Mammal		Fragment				24
	Calcined Bone	Unidentified		Fragment				7
	Granitic	Fire-Cracked Rock		Complete	Cream, Speckled, Tan			3
	Quartz	Chipping Debris Flake	0-1cm	Complete	White			_
	Quartz	Chipping Debris Flake	1-3cm	Complete	White			2
	Quartz	Chipping Debris Flake	1-3cm	Complete	Clear, Gray			
	Shell	Bivalve		Fragment				1

Appendix A. Catalog of Cultural Materials, Warwick Sewers Tidewater Drive, Phase III Data Recovery.

Mull Cove Size         Small         Unidentified         Complete         Gray           Feature 17-E1 (2 0-10, Feature)         Shale         Charcoal         Charcoal         Charcoal         Complete         Gray           Feature 51 (1)         Charcoal         Charcoal         Charcoal         Charcoal         Charcoal         Charcoal         White           Feature 51 (1)         Shell         Small         Small         Charcoal         <	Provenience	Material	Object	Size	Attributes	Color(s)	Manufacture Date	Makers Mark	Count
shale         Unidentified         Complete           Shell         Sample         Complete           Charcoal         Chipping Debris Flake         1-3cm         Complete           Shell         Sample         Complete           Shell         Sample         Complete           Shell         Sample         Complete           Charcoal         Charcoal         Complete           Shell         Sample         Complete           Shell         Sample         Complete           Charcoal         Charcoal         Complete           Shell         Sample         Complete           Shell         Sample         Complete           Charcoal         Chipping Debris Flake         5-7cm         Complete           Quartz         Chipping Debris Flake         5-7cm         Complete           Aboriginal Vessels Sand Temper         Vessel         Body           Shell         Sample         Complete           Shell         Sample         Body	Mill Cove Site								
Shell         Sample         Complete           Charcoal         Charcoal         Charcoal           Shell         Sample         Complete           Shell         Sample         Complete           Shell         Sample         Complete           Charcoal         Charcoal         Complete           Shell         Sample         Complete           Charcoal         Charcoal         Complete           Charcoal         Sample         Complete           Charcoal         Sample         Complete           Shell         Sample         Complete           Charcoal         Brite-Cracked Rock         Complete           Quartz         Britace         Charcoal           Shell         Sample         S-7cm         Complete           Aboriginal Vessels Sand Temper         Chipping Debris Flake         I-3cm         Complete           Shell         Unidentified         I-3cm         Complete           Shell         Sample         Body           Aboriginal Vessels Sand Temper         Vessel         Body           Shell         Sample         Complete           Charcoal         Complete         Body	Feature 17-E 1/2 0-10, Feature Fill	Shale	Unidentified		Complete	Gray			-
charcoal         Charcoal         Complete           ure         Shell         Sample         Complete           shell         Sample         Complete           charcoal         Sample         Complete           charcoal         Charcoal         Complete           charcoal         Charcoal         Complete           charcoal         Charcoal         Complete           charcoal         Charcoal         Complete           duartz         Sample         Complete           duartz         Biface         1-3cm1 09x1 25x           duartz         Chipping Debris Flake         5-7cm         Complete           charciginal Vessels Sand Temper         Vessel         Complete         Body           charcoal         Charcoal         Complete         Body		Shell	Sample		Complete				1
ure         Shell         Complete         Complete           ure         Shell         Sample         Complete           Shell         Sample         Complete           Charcoal         Charcoal         Complete           Shell         Sample         Complete           Charcoal         Charcoal         Complete           Shell         Sample         Complete           Shell         Sample         Complete           Shell         Sample         S-7cm         Complete           Quartz         Chipping Debris Flake         S-7cm         Complete           Aboriginal Vessels Sand Temper         Vessel         L-3cm         Complete           Shell         Unidentified         Fragment         Body           Aboriginal Vessels Sand Temper         Vessel         Complete         Complete           Shell         Unidentified         Body         Scomplete           Shell         Charcoal         Complete         Complete           Charcoal         Charcoal         Complete         Complete	Feature 17-W 1/2 0-10, Feature Fill	Charcoal	Charcoal		Complete				-
shell         Sample         Complete           Shell         Sample         Complete           Shell         Sample         Complete           Charcoal         Charcoal         Complete           Shell         Sample         Complete           Charcoal         Charcoal         Complete           Shell         Sample         Complete           Instance         Charcoal         Complete           Shell         Sample         Instance           Instance         Sample         Somplete           Aboriginal Vessels Sand Temper         Chipping Debris Flake         Instance           Shell         Unidentified         Body           Aboriginal Vessels Sand Temper         Vessel         Body           Shell         Sample         Complete           Shell         Sample         Gomplete           Shell         Sample         Gomplete		Quartz	Chipping Debris Flake	1-3cm	Complete	White			1
with time of the polither of the polith		Shell	Sample		Complete				_
Shell         Sample         Complete           Charcoal         Charcoal         Complete           Shell         Charcoal         Complete           Charcoal         Charcoal         Complete           Grantic         Fire-Cracked Rock         Complete           Shell         Sample         Complete           Quartz         Briface         1-3cm1.09x1.25x         Tip           Quartz         Chipping Debris Flake         5-7cm         Complete           Quartz         Chipping Debris Flake         1-3cm1.09x1.25x         Tip           Quartz         Chipping Debris Flake         5-7cm         Complete           Quartz         Chipping Debris Flake         1-3cm         Complete           Shell         Unidentified         Fragment         Body           Shell         Sample         Complete           Charcoal         Charcoal         Complete	Feature 21-E 1/2 0-20, Feature Fill	Shell	Sample		Complete				-
Charcoal         Charcoal         Complete           Shell         Charcoal         Complete           Charcoal         Charcoal         Complete           Granitic         Fire-Cracked Rock         Complete           Shell         Sample         Complete           Quartz         Biface         1-3cm1.09x1.25x         Tip           Aboriginal Vessels Sand Temper         Vessel         S-7cm         Complete           Shell         Unidentified         Fragment         Body           Shell         Sample         Complete         Body           Shell         Charcoal         Complete         Complete		Shell	Sample		Complete				-
Shell         Sample         Complete           Charcoal         Charcoal         Complete           Granitic         Fire-Cracked Rock         Complete           Shell         Sample         Complete           Quartz         Biface         1-3cm1.09x1.25x         Tip           Hourizand Vessels Sand Temper         Vessel         S-7cm         Complete           Shell         Unidentified         1-3cm         Complete           Shell         Unidentified         Body           Shell         Vessel         Body           Shell         Sample         Complete           Charcoal         Charcoal         Complete	Feature 21-W 1/2 0-10, Feature Fill	Charcoal	Charcoal		Complete				1
Charcoal       Charcoal       Complete         Granitic       Fire-Cracked Rock       Complete         Shell       Sample       Complete         Quartz       Biface       1-3cm1.09x1.25x       Tip         Aboriginal Vessels Sand Temper       Vessel       S-7cm       Complete         Quartz       Chipping Debris Flake       1-3cm       Complete         Shell       Unidentified       Fragment         Aboriginal Vessels Sand Temper       Vessel       Body         Shell       Sample       Complete         Shell       Charcoal       Complete		Shell	Sample		Complete				-
Grantitic       Fire-Cracked Rock       Complete         Shell       Sample       1-3cm1.09x1.25x       Tip         Quartz       Chipping Debris Flake       5-7cm       Complete         Aboriginal Vessels Sand Temper       Vessel       Body         Shell       Unidentified       Fragment         Aboriginal Vessels Sand Temper       Vessel       Body         Shell       Sample       Complete         Charcoal       Charcoal       Complete	Feature 21-W 1/2 10-20, Feature Fill	Charcoal	Charcoal		Complete				-
Shell       Sample       Complete         Quartz       Chipping Debris Flake       1-3cm1.09x1.25x       Tip         Aboriginal Vessels Sand Temper       Vessel       S-7cm       Complete         Quartz       Chipping Debris Flake       1-3cm       Complete         Shell       Unidentified       Fragment         Aboriginal Vessels Sand Temper       Vessel       Body         Shell       Sample       Complete         Charcoal       Charcoal       Complete		Granitic	Fire-Cracked Rock		Complete	Cream, Speckled, Tan			7
Quartz       Chipping Debris Flake       1-3cml.09x1.25x       Tip         Aboriginal Vessels Sand Temper       Vessel       Complete         Quartz       Chipping Debris Flake       1-3cm       Complete         Shell       Unidentified       Fragment         Aboriginal Vessels Sand Temper       Vessel       Body         Shell       Sample       Complete         Charcoal       Charcoal       Complete		Shell	Sample		Complete				_
Aboriginal Vessels Sand Temper Vessel  Quartz Quartz Quartz Chipping Debris Flake Shell Aboriginal Vessels Sand Temper Shell Sample Shell Sample Charcoal Chipping Debris Flake I-3cm Body Body Complete	Feature 22 10-20, B1	Quartz	Biface	1-3cm1.09x1	.25x Tip	White			-
Aboriginal Vessels Sand TemperVesselBodyQuartzChipping Debris Flake1-3cmCompleteShellUnidentifiedFragmentAboriginal Vessels Sand TemperVesselBodyShellSampleCompleteCharcoalCharcoalComplete	Feature 22A 0-10, Disturbed Fill	Quartz	Chipping Debris Flake	5-7cm	Complete	White			-
QuartzChipping Debris Flake1-3cmCompleteShellUnidentifiedFragmentAboriginal Vessels Sand TemperVesselBodyShellSampleCompleteCharcoalCharcoalComplete	Feature 22A-N 1/2 0-10, Feature Fill	Aboriginal Vessels Sand Temper	Vessel		Body				7
Shell Unidentified Aboriginal Vessels Sand Temper Vessel Shell Sample Charcoal Charcoal		Quartz	Chipping Debris Flake	1-3cm	Complete	White			-
Aboriginal Vessels Sand Temper Vessel  Shell Sample  Charcoal Charcoal		Shell	Unidentified		Fragment				_
Shell Sample Charcoal Charcoal	Feature 22A-N 1/2 0-30, Feature Fill	Aboriginal Vessels Sand Temper	Vessel		Body				15
Charcoal		Shell	Sample		Complete				-
	Feature 22B/C-W 1/2 0-10, Feature Fill	Charcoal	Charcoal		Complete				-

Appendix A. Catalog of Cultural Materials, Warwick Sewers Tidewater Drive, Phase III Data Recovery.

Provenience	Material	Object	Size	Attributes	Color(s)	Manufacture Date	Makers Mark	Count
Mill Cove Site								
Feature 22B/C-W 1/2 0-10, Feature Fill	Quartz	Chipping Debris Flake	1-3cm	Complete	White			9
	Quartz	Chipping Debris Flake	1-3cm	Complete Cortex	White			1
	Quartz	Biface	4.55x2.25x0.86	Fragment	White			-
	Shale	Unidentified		Complete	Gray, White			-
	Shell	Sample		Complete				_
Feature 22B-E 1/2 0-40, Feature Fill	Aboriginal Vessels	Vessel		Body				, —
	Bone	Unidentified		Fragment Burned				4
	Bone	Fish		Fragment				_
	Bone	Unidentified		Fragment				7
	Charcoal	Charcoal		Complete				1
	Quartz	Chipping Debris Flake	1-3cm	Complete	White			2
	Quartz	Chipping Debris Flake	1-3cm	Complete Cortex	White			_
	Quartz	Chipping Debris Shatter	1-3cm	Complete	White			2
	Quartz	Chipping Debris Flake	0-1cm	Complete	White			_
	Shell	Unidentified		Fragment				1
	Shell	Sample		Complete				-
	Tooth	Unidentified		Fragment				-
	Tooth	Mammal		Mostly Complete				_
	Unid. Metamorphic	Manuport	13.32x3.68x2.22	2 Complete	Black, Lt Gray, Speckled			-
Feature 22B-W 1/2 0-10, Feature Fill	Aboriginal Vessels Sand Temper	Vessel		Body				7
	Bone	Unidentified		Fragment				4
	Charcoal	Charcoal		Complete				_
	Shale	Fossil		Fragment	Gray			1

Appendix A. Catalog of Cultural Materials, Warwick Sewers Tidewater Drive, Phase III Data Recovery.

Provenience	Material	Object	Size At	Attributes	Color(s)	Manufacture Date	Makers ( Mark	Count
Mill Cove Site								
Feature 22B-W 1/2 0-10, Feature Fill	Shell	Sample		Complete				
Feature 22B-W 1/2 10-20, Feature Fill	Bone	Fish		Fragment				3
	Shell	Sample		Complete				_
Feature 22B-W 1/2 20-30, B2	Quartz	Chipping Debris Flake	1-3cm	Complete	Clear, White			2
Feature 22B-W 1/2 20-30, Feature Fill	Aboriginal Vessels	Vessel		Body				_
	Charcoal	Charcoal		Complete				-
	Quartz	Chipping Debris Shatter	0-1cm	Complete	White			2
	Quartz	Chipping Debris Flake	1-3cm	Complete Cortex	White			1
	Shell	Sample		Complete				-
Feature 22C-W 1/2 10-20, Feature Fill	Shell	Sample		Complete				-
Feature 24A-W 1/2 0-10, Feature Fill	Shell	Sample		Complete				-
Feature 24B-E 1/2 0-10, Feature Fill	Bone	Mammal		Fragment				7
	Quartz	Unidentified	3.31x1.74x0.69	Complete	White			-
	Quartz	Chipping Debris Flake	1-3cm	Complete	White			-
	Shell	Sample		Complete				-
Feature 24B-W1/2 0-10, Feature Fill	Bone	Mammal		Fragment				91
	Quartz	Chipping Debris Flake	1-3cm	Complete	White			5
	Shell	Sample		Complete				1
Feature 24C 0-0, Feature Fill	Bone	Bird		Fragment				-
	Bone	Mammal		Fragment				~
Feature 24C-N 1/2 0-10, Feature Fill	Bone	Mammal		Fragment				5

Appendix A. Catalog of Cultural Materials, Warwick Sewers Tidewater Drive, Phase III Data Recovery.

Provenience	Material	Object	Size At	Attributes	Color(s)	Manufacture Date	Makers Count Mark	<b>±</b>
Mill Cove Site								I
Feature 24C-N 1/2 0-10, Feature Fill	Shell	Sample		Complete				1 -
Feature 25-W 1/2 0-10, Feature Fill	Granitic	Fire-Cracked Rock		Complete	Gray, Speckled			-
	Quartz	Core	5.93x5.75x4.53	Complete Cortex	White			_
	Rhyolite	Chipping Debris Flake	1-3cm	Complete	Gray, Speckled, Transluscent			-
	Shell	Sample		Complete				_
Feature 28-E 1/2 0-10, Feature Fill	Bone	Mammal		Fragment				_
	Chert	Biface	1.1x0.99x0.28	Tip	Gray			_
	Quartz	Chipping Debris Flake	1-3cm	Complete	White			9
	Quartz	Chipping Debris Shatter	3-5cm	Complete Cortex	White			_
	Quartz	Uniface	1.45x1.42x0.63	Mostly Complete	White			_
	Quartz	Chipping Debris Flake	0-1cm	Complete	White			_
	Quartz	Chipping Debris Flake	3-5cm	Complete	White			_
	Shell	Sample		Complete				_
	Tooth	Mammal		Fragment Burned				3
Feature 28-E 1/2 10-40, Feature Fill	Aboriginal Vessels	Vessel		Body				_
	Bone	Bird		Fragment				_
	Shell	Sample		Complete				_
Feature 28-W 1/2 0-10, Feature Fill	Shell	Sample		Complete				_
Feature 28-W 1/2 10-20, Feature Fill	Aboriginal Vessels Mineral Temper	Vessel		Body				
	Shell	Sample		Complete				_
Feature 28-W 1/2 20-30, Feature Fill	Aboriginal Vessels	Vessel		Body				2

Appendix A. Catalog of Cultural Materials, Warwick Sewers Tidewater Drive, Phase III Data Recovery.

Provenience	Material	Object	Size At	Attributes	Color(s)	Manufacture Date	Makers Mark	Count
Mill Cove Site								
Feature 28-W 1/2 20-30, Feature Fill	Bone	Unidentified		Fragment				-
	Bone	Fish		Fragment				7
	Charcoal	Charcoal		Complete				_
	Shell	Sample		Complete				_
Feature 28-W 1/2 30-40, Feature Fill	Quartz	Scraper Thumbnail Scraper	2.45x2.27x0.92	Complete Cortex	White			1
	Quartz	Chipping Debris Flake	1-3cm	Complete	White			2
Feature 29-E 1/2 0-10, Feature Fill	Aboriginal Vessels	Vessel		Body				7
	Charcoal	Charcoal		Complete				-
	Shale	Unidentified		Complete	Gray			_
	Shell	Sample		Complete				
Feature 31-E 1/2 0-10, Feature Fill	Aboriginal Vessels Grit Temper	Vessel		Body				6
	Aboriginal Vessels Shell Temper	Vessel		Body				Π
	Bone	Mammal		Fragment				4
	Charcoal	Charcoal		Complete				-
	Quartz	Chipping Debris Flake	1-3cm	Complete	White			2
	Quartz	Preform-Blank Projectile Point Blank/Preform	4.17x2.61x0.99	Complete	White			1
	Shell	Sample		Complete				1
Feature 31-E 1/2 0-40, Wall Clean-up	Bone	Mammal		Fragment				2
	Quartz	Chipping Debris Flake	1-3cm	Complete	White			3
	Shell	Sample		Complete				1
Feature 31-E 1/2 10-20, Feature Fill	Aboriginal Vessels Grit Temper	Vessel		Body				-
	Aboriginal Vessels Shell Temper	Vessel		Body				-

Appendix A. Catalog of Cultural Materials, Warwick Sewers Tidewater Drive, Phase III Data Recovery.

Provenience	Material	Object	Size	Attributes	Color(s)	Manufacture Date	Makers Mark	Count
Mill Cove Site								
Feature 31-E 1/2 10-20, Feature Fill	Bone	Mammal		Complete				2
	Charcoal	Charcoal		Complete				-
	Quartz	Chipping Debris Flake	1-3cm	Complete	White			_
	Shell	Sample		Complete				
Feature 31-E 1/2 20-30, Feature Fill	Charcoal	Charcoal		Complete				_
	Quartz	Chipping Debris Flake	1-3cm	Complete Cortex	White			_
	Shell	Sample		Complete				1
Feature 31-E 1/2 30-40, Feature Fill	Quartz	Chipping Debris Flake	1-3cm	Complete	White			2
	Shell	Sample		Complete				1
Feature 31-W 1/2 0-10, Feature Fill	Aboriginal Vessels Sand Temper	Vessel		Body				4
	Bone	Mammal		Fragment Burned				
	Charcoal	Charcoal		Complete				1
	Shell	Sample		Complete				_
	Unid. Metamorphic	Manuport	4.7x1.7x4	Complete	Banded, Black, Cream, Speckled			1
Feature 31-W 1/2 10-20, Feature Fill	Aboriginal Vessels Grit Temper	Vessel		Body				2
	Charcoal	Charcoal		Complete				-
	Quartz	Chipping Debris Flake	1-3cm	Complete	White			2
	Shell	Sample		Complete				_
Feature 31-W 1/2 20-30, Feature Fill	Charcoal	Charcoal		Complete				1
	Quartz	Chipping Debris Flake	1-3cm	Complete	White			1
Feature 32-E 1/2 0-10, Feature Fill	Aboriginal Vessels	Vessel		Body				1

Appendix A. Catalog of Cultural Materials, Warwick Sewers Tidewater Drive, Phase III Data Recovery.

Provenience	Material	Object	Size	Attributes	Color(s)	Manufacture Date	Makers Mark	Count
Mill Cove Site								
Feature 32-E 1/2 0-10, Feature Fill	Quartz	Chipping Debris Flake	1-3cm	Complete	Crystal			-
	Quartz	Chipping Debris Flake	1-3cm	Complete	White			2
	Shell	Sample		Complete				-
Feature 32-W 1/2 0-10, Feature Fill	Quartz	Chipping Debris Flake	1-3cm	Complete	White			2
	Shell	Sample		Complete				-
Feature 33-N 1/2 0-10, Feature Fill	Quartz	Chipping Debris Shatter	1-3cm	Complete	White			1
	Unid. Metamorphic	Unidentified		Fragment	Cream, Gray, Speckled			-
Feature 33-N 1/2 10-20, Feature Fill	Aboriginal Vessels Mineral Temper	Vessel Stamped		Body				2
	Charcoal	Charcoal		Complete				-
Feature 33-N 1/2 13-21, Feature Fill	Aboriginal Vessels	Vessel		Body				38
	Bone	Fish		Fragment				30
	Bone	Mammal		Fragment				20
	Charcoal	Charcoal		Complete				-
	Cumberlandite	Raw Material		Complete Cortex	Black, Speckled, White			-
	Quartz	Chipping Debris Flake	1-3cm	Complete	White			4
	Quartz	Biface	1.25x1.39x0.56	Tip	White			-
	Shell	Sample		Complete				-
Feature 33-N 1/2 20-30, Feature Fill	Quartz	Biface	3.17x2.21x1.1	Complete	White			1
Feature 33-N 1/2 20-40, Feature Fill	Aboriginal Vessels Grit Temper	Vessel		Body				_
	Quartz	Chipping Debris Flake	1-3cm	Complete Cortex	White			4
	Quartz	Chipping Debris Flake	1-3cm	Complete	White			-

Appendix A. Catalog of Cultural Materials, Warwick Sewers Tidewater Drive, Phase III Data Recovery.

Provenience	Material	Object	Size A	Attributes	Color(s)	Manufacture Date	Makers Mark	Count
Mill Cove Site								
Feature 33-N 1/2 20-40, Feature Fill	Quartz	Chipping Debris Flake	3-5cm	Complete Cortex	White			-
Feature 33-S 1/2 0-10, Feature Fill	Shell	Bivalve Quahog		Fragment				20
	Shell	Sample		Complete				-
Feature 33-S 1/2 10-20, Feature Fill	Aboriginal Vessels Grit Temper	Vessel		Body				10
	Bone	Unidentified		Fragment Burned				3
	Charcoal	Charcoal		Complete				-
	Quartz	Scraper	3.07x2.24x0.89	Mostly Complete	White			_
	Shell	Sample		Complete				1
Feature 33-S 1/2 20-30, Feature Fill	Charcoal	Charcoal		Complete				-
	Plant Part	Nutshell		Fragment Charred				3
Feature 34 10-20, Feature Fill	Quartz	Chipping Debris Flake	1-3cm	Complete	Crystal			1
Feature 34A 0-5, Feature Fill	Bone	Fish		Mostly Complete				3
	Bone	Unidentified		Fragment				7
	Quartz	Chipping Debris Flake	1-3cm	Complete	Red, White			_
	Quartz	Chipping Debris Flake	1-3cm	Complete	White			_
	Quartz	Chipping Debris Flake	1-3cm	Complete	White			3
	Shell	Sample		Complete				1
Feature 34A-E 1/2 10-15, Feature Fill	Quartz	Chipping Debris Flake	1-3cm	Complete	White			2
	Shell	Sample		Complete				1
	Tooth	Mammal		Mostly Complete				1
Feature 34A-E 1/2 5-10, Feature Fill	Aboriginal Vessels	Vessel		Body				П
	Charcoal	Charcoal		Complete				-

Appendix A. Catalog of Cultural Materials, Warwick Sewers Tidewater Drive, Phase III Data Recovery.

Provenience	Material	Object	Size At	Attributes	Color(s)	Manufacture Date	Makers Mark	Count
Mill Cove Site								
Feature 34A-E 1/2 5-10, Feature Fill	Shell	Sample		Complete				-
	Tooth	Mammal		Mostly Complete				7
Feature 34A-W 1/2 0-15, Feature Fill	Shell	Sample		Complete				-
Feature 34-N 1/2 0-10, Feature Fill	Bone	Fish		Mostly Complete				7
	Quartz	Chipping Debris Shatter	1-3cm	Complete	White			3
	Quartz	Chipping Debris Flake	1-3cm	Complete	White			2
	Quartz	Chipping Debris Shatter	1-3cm	Complete	White			_
	Quartz	Chipping Debris Flake	3-5cm	Complete	White			-
	Quartz	Chipping Debris Flake	1-3cm	Complete	White			2
	Quartz	Biface	4.54x2.42x1.72	Fragment	White			-
	Quartz	Biface	3.7x2.63x0.99	Complete	White			-
	Quartz	Chipping Debris Flake	1-3cm	Complete	White			20
	Shell	Sample		Complete				-
Feature 34-N 1/2 10-20, Feature Fill	Aboriginal Vessels Shell Temper	Vessel		Body				10
	Bone	Fish		Fragment				2
	Bone	Mammal		Fragment				9
	Charcoal	Charcoal		Complete				-
	Quartz	Chipping Debris Flake	0-1cm	Complete	White			2
	Quartz	Chipping Debris Flake	5-7cm	Complete	White			-
	Quartz	Chipping Debris Flake	1-3cm	Complete	White			-
	Quartz	Chipping Debris Flake	3-5cm	Complete Cortex	White			-
	Quartz	Chipping Debris Flake	3-5cm	Complete	White			1
	Quartz	Chipping Debris Shatter	3-5cm	Complete	White			-

Appendix A. Catalog of Cultural Materials, Warwick Sewers Tidewater Drive, Phase III Data Recovery.

Provenience	Material	Object	Size A	Attributes	Color(s)	Manufacture Date	Makers Mark	Count
Mill Cove Site								
Feature 34-N 1/2 10-20, Feature Fill	Quartz	Chipping Debris Shatter	1-3cm	Complete	White			
	Quartz	Biface	3.67x3.57x1.47	Fragment	White			_
	Quartz	Chipping Debris Flake	1-3cm	Complete	White			11
	Shell	Bivalve		Fragment				1
	Shell	Sample		Complete				-
Feature 34-N 1/2 20-30, Feature Fill	Aboriginal Vessels Shell Temper	Vessel		Body				-
	Bone	Mammal		Mostly Complete				4
	Charcoal	Charcoal		Complete				2
	Granitic	Fire-Cracked Rock		Complete	Gray, Speckled			-
	Quartz	Chipping Debris Flake	3-5cm	Complete	White			4
	Quartz	Chipping Debris Flake	0-1cm	Complete	White			-
	Quartz	Chipping Debris Flake	1-3cm	Complete	Red, White			2
	Quartz	Chipping Debris Shatter	1-3cm	Complete	White			3
	Quartz	Chipping Debris Flake	1-3cm	Complete	Crystal			2
	Quartz	Chipping Debris Flake	1-3cm	Complete	White			15
	Shell	Sample		Complete				1
Feature 34-N 1/2 30-40, Feature Fill	Bone	Mammal		Mostly Complete				2
	Bone	Unidentified		Fragment Burned				1
	Charcoal	Charcoal		Complete				2
	Quartz	Chipping Debris Flake	1-3cm	Complete	White			5
	Quartz	Chipping Debris Flake	1-3cm	Complete	Red, White			-
	Quartz	Biface	2.36x0.98x0.81	Base	White			1
	Quartz	Chipping Debris Flake	3-5cm	Complete	White			2
	Quartz	Chipping Debris Flake	1-3cm	Complete	Crystal			4

Appendix A. Catalog of Cultural Materials, Warwick Sewers Tidewater Drive, Phase III Data Recovery.

Provenience	Material	Object	Size	Attributes	Color(s)	Manufacture Date	Makers Mark	Count
Mill Cove Site								
Feature 34-N 1/2 30-40, Feature Fill	Shell	Sample		Complete				_
Feature 34-N 1/2 40-50, Feature Fill	Charcoal	Charcoal		Complete				1
	Quartz	Chipping Debris Flake	1-3cm	Complete	White			-
	Shell	Sample		Complete				_
Feature 34-S 1/2 0-10, Feature Fill	Aboriginal Vessels	Vessel		Body				2
	Bone	Mammal		Fragment				18
	Quartz	Chipping Debris Flake	1-3cm	Complete	White			4
	Quartz	Chipping Debris Shatter	5-7cm	Complete	White			_
	Quartz	Chipping Debris Flake	1-3cm	Complete Cortex	White			
	Quartz	Chipping Debris Shatter	1-3cm	Complete	White			1
	Quartz	Chipping Debris Flake	3-5cm	Complete	White			2
	Quartz	Chipping Debris Flake	1-3cm	Complete	White			10
	Quartz	Biface	4.43x3.31x1.79	Fragment	White			-
	Quartz	Chipping Debris Shatter	0-1cm	Complete	White			2
	Shell	Sample		Complete				-
	Shell	Sample		Complete				_
Feature 34-S 1/2 0-3, Feature Fill	Quartz	Chipping Debris Flake	0-1cm	Complete	White			_
	Quartz	Chipping Debris Flake	1-3cm	Complete	Red, White			1
	Shell	Sample		Complete				-
Feature 34-S 1/2 10-20, Feature Fill	Aboriginal Vessels Shell Temper	Vessel		Body				_
	Bone	Unidentified		Fragment				2
	Bone	Unidentified		Fragment				3
	Charcoal	Charcoal		Complete				-

Appendix A. Catalog of Cultural Materials, Warwick Sewers Tidewater Drive, Phase III Data Recovery.

Provenience	Material	Object	Size A	Attributes	Color(s)	Manufacture Date	Makers Mark	Count
Mill Cove Site								
Feature 34-S 1/2 10-20, Feature Fill	Quartz	Chipping Debris Shatter	3-5cm	Complete	White			
	Quartz	Chipping Debris Flake	3-5cm	Complete	White			9
	Quartz	Chipping Debris Flake	1-3cm	Complete	Crystal			П
	Quartz	Chipping Debris Shatter	1-3cm	Complete	White			1
	Shell	Sample		Complete				1
Feature 34-S 1/2 20-30, Feature Fill	Aboriginal Vessels Sand Temper	Vessel		Body				2
	Bone	Bird		Fragment				-
	Bone	Mammal		Fragment				1
	Bone	Unidentified		Fragment				∞
	Charcoal	Charcoal		Complete				-
	Quartz	Chipping Debris Flake	1-3cm	Complete	White			-
	Quartz	Chipping Debris Shatter	3-5cm	Complete	White			2
	Quartz	Chipping Debris Flake	1-3cm	Complete	White			7
	Quartz	Chipping Debris Shatter	1-3cm	Complete	Crystal			1
	Quartz	Core	4.55x3.94x2.47	Complete	White			-
	Shell	Gastropod Whelk		Fragment				-
	Shell	Bivalve		Fragment				39
	Shell	Sample		Complete				-
Feature 34-S 1/2 30-40, Feature Fill	Bone	Fish		Fragment				1
	Bone	Unidentified		Fragment Butchered				7
	Charcoal	Charcoal		Complete				_
	Charcoal	Charcoal		Complete				1
	Quartz	Chipping Debris Shatter	1-3cm	Complete	Clear			-

Appendix A. Catalog of Cultural Materials, Warwick Sewers Tidewater Drive, Phase III Data Recovery.

Provenience	Material	Object	Size	Attributes	Color(s)	Manufacture Date	Makers Mark	Count
Mill Cove Site								
Feature 34-S 1/2 30-40, Feature Fill	Quartz	Chipping Debris Flake	9-11cm	Complete	Rust, White			
	Quartz	Chipping Debris Flake	1-3cm	Complete	White			3
	Quartz	Chipping Debris Flake	3-5cm	Complete	White			3
	Quartz	Chipping Debris Flake	1-3cm	Complete	Rust, White			18
	Quartz	Chipping Debris Flake	1-3cm	Complete	Red, White			_
	Quartz	Chipping Debris Flake	0-1cm	Complete	Red, White			1
	Quartz	Chipping Debris Flake	0-1cm	Complete	White			1
	Quartz	Chipping Debris Flake	1-3cm	Complete	Crystal			9
	Shell	Sample		Complete				1
	Shell	Sample		Complete				1
	Unid. Metamorphic	Fire-Cracked Rock		Complete	Brown, Red			-
Feature 34-S 1/2 40-50, Feature Fill	Bone	Unidentified		Fragment				-
	Bone	Unidentified		Fragment Burned				_
	Charcoal	Charcoal		Complete				1
	Quartz	Chipping Debris Flake	1-3cm	Complete	White			11
	Quartz	Chipping Debris Flake	1-3cm	Complete	White			1
	Quartz	Chipping Debris Flake	3-5cm	Complete	White			2
	Rhyolite	Chipping Debris Flake	1-3cm	Complete	Gray, Green, Speckled			1
	Shell	Sample		Complete				-
	Shell	Sample		Complete				1
Feature 34-S 1/2 50-60, Feature Fill	Charcoal	Charcoal		Complete				1
	Quartz	Chipping Debris Flake	1-3cm	Complete	Red, White			1
	Quartzite	Chipping Debris Flake	1-3cm	Complete	Lt Gray, Transluscent			1

Appendix A. Catalog of Cultural Materials, Warwick Sewers Tidewater Drive, Phase III Data Recovery.

Provenience	Material	Object	Size	Attributes	Color(s).	Manufacture Date	Makers Mark	Count
Mill Cove Site								
Feature 34-S 1/2 50-60, Feature Fill	Shell	Sample		Complete	~~			_
Feature 36A-E 1/2 0-40, Feature Fill	Argillite	Chipping Debris Flake	1-3cm	Complete	Gray, Green			1
	Bone	Mammal		Fragment Butchered				-
	Bone	Mammal		Fragment				2
	Bone	Unidentified		Fragment				34
	Bone	Fish		Mostly Complete				-
	Charcoal	Charcoal		Complete				-
	Granitic	Fire-Cracked Rock		Complete	Cream, Gray, Spherulitic			-
	Quartz	Chipping Debris Flake	1-3cm	Complete	White			4
	Quartz	Chipping Debris Flake	3-5cm	Complete Cortex	White			-
	Quartz	Chipping Debris Flake	1-3cm	Complete	Red, White			-
	Quartz	Chipping Debris Flake	3-5cm	Complete	White			_
	Shell	Unidentified		Fragment				3
	Shell	Sample		Complete				_
	Tooth	Mammal Rodent		Mostly Complete				-
	Unid. Metamorphic	Fire-Cracked Rock		Complete	Gray			2
Feature 36A-W 1/2 30-40, Feature Fill	Charcoal	Charcoal		Complete				1
	Hornfels	Chipping Debris Flake	1-3cm	Complete	Gray, Rust, Tan			-
	Quartz	Chipping Debris Flake	1-3cm	Complete	White			5
	Quartz	Chipping Debris Flake	3-5cm	Complete	White			2
	Quartz	Chipping Debris Flake	0-1cm	Complete	White			2
	Shell	Sample		Complete				-

Appendix A. Catalog of Cultural Materials, Warwick Sewers Tidewater Drive, Phase III Data Recovery.

Provenience	Material	Object	Size	Attributes	Color(s)	Manufacture Date	Makers Mark	Count
Mill Cove Site								
Feature 36B-E 1/2 0-40, Feature Fill	Bone	Unidentified		Fragment				16
	Bone	Mammal		Fragment Butchered				1
	Charcoal	Charcoal		Complete				_
	Quartz	Chipping Debris Flake	1-3cm	Complete	White			-
	Quartz	Chipping Debris Flake	3-5cm	Complete	White			
	Shell	Sample		Complete				_
Feature 36B-W 1/2 30-40, Feature Fill	Aboriginal Vessels Mineral Temper	Vessel		Body				2
	Bone	Reptile Turtle		Fragment				2
	Bone	Unidentified		Fragment				8
	Bone	Fish		Fragment				6
	Bone	Mammal		Fragment				-
	Charcoal	Charcoal		Complete				-
	Quartz	Chipping Debris Flake	1-3cm	Complete Cortex	White			-
	Quartz	Chipping Debris Flake	1-3cm	Complete	White			5
	Quartz	Biface	2.12x2.26x0.64	Tip	Red, White			_
	Quartz	Chipping Debris Flake	3-5cm	Complete	White			_
	Shell	Bivalve Quahog		Mostly Complete Drilled				-
	Shell	Sample		Complete				_
	Tooth	Mammal		Fragment				9
Feature 36-W 1/2 0-10, B1	Aboriginal Vessels Grit Temper	Vessel		Body				-
	Quartzite	Chipping Debris Flake	1-3cm	Complete	Gray, Tan			-
Feature 36-W 1/2 0-10, Feature Fill	Aboriginal Vessels Grit Temper	Vessel		Body				2
	Bone	Unidentified		Fragment				-

Appendix A. Catalog of Cultural Materials, Warwick Sewers Tidewater Drive, Phase III Data Recovery.

Provenience	Material	Object	Size At	Attributes	Color(s)	Manufacture Date	Makers Mark	Count
Mill Cove Site								
Feature 36-W 1/2 0-10, Feature Fill	Bone	Bird		Fragment				-
	Bone	Unidentified		Fragment Burned				3
	Bone	Mammal		Fragment				23
	Bone	Unidentified	5.45x1.05x1.14	Fragment				2
	Charcoal	Charcoal		Complete				1
	Quartz	Chipping Debris Flake	1-3cm	Complete Cortex	White			1
	Quartz	Chipping Debris Flake	1-3cm	Complete	White			12
	Quartz	Chipping Debris Flake	3-5cm	Complete	White			4
	Shell	Sample		Complete				1
	Shell	Sample		Complete				-
	Unid. Metamorphic	Hammerstone	9.29x6.92x5.65	Complete	Gray, Speckled			_
Feature 36-W 1/2 10-20, Feature Fill	Aboriginal Vessels Shell Temper	Vessel		Body				2
	Bone	Fish		Fragment				_
	Bone	Reptile Turtle		Fragment				2
	Bone	Unidentified		Fragment				10
	Bone	Mammal		Fragment				2
	Charcoal	Charcoal		Complete				7
	Quartz	Chipping Debris Flake	0-1cm	Complete	White			_
	Quartz	Chipping Debris Flake	1-3cm	Complete	White			18
	Quartz	Chipping Debris Shatter	1-3cm	Complete	White			1
	Quartz	Chipping Debris Flake	1-3cm	Complete	Red, White			1
	Rhyolite	Projectile Point Levanna Projectile 2.07x2.39x0.5 Point	2.07x2.39x0.5	Complete	Dk Gray, Speckled			1
	Scale	Fish		Fragment				1
	Shell	Bivalve		Fragment				7

Appendix A. Catalog of Cultural Materials, Warwick Sewers Tidewater Drive, Phase III Data Recovery.

Provenience	Material	Object	Size	Attributes	Color(s)	Manufacture Date	Makers Mark	Count
Mill Cove Site								
Feature 36-W 1/2 10-20, Feature Fill	Shell	Bivalve		Fragment				3
	Shell	Sample		Complete				1
	Unidentified Organic	Unidentified		Fragment				1
Feature 36-W 1/2 20-30, Feature Fill	Argillite	Chipping Debris Flake	1-3cm	Complete	Gray, Green			-
	Bone	Unidentified		Fragment				3
	Bone	Mammal		Fragment				4
	Bone	Reptile Turtle		Fragment				2
	Charcoal	Charcoal		Complete				_
	Quartz	Chipping Debris Flake	1-3cm	Complete Cortex	White			-
	Quartz	Chipping Debris Flake	1-3cm	Complete	White			10
	Quartz	Chipping Debris Flake	3-5cm	Complete Cortex	White			-
	Shell	Sample		Complete				-
	Shell	Bivalve		Fragment				_
Feature 38-E 1/2 0-10, Feature Fill	Antler/Horn	Mammal		Fragment				-
	Bone	Unidentified		Fragment				3
	Bone	Unidentified		Fragment				3
	Bone	Bird		Fragment				-
	Bone	Reptile Turtle		Fragment Burned				-
	Bone	Reptile Turtle		Fragment				7
	Bone	Fish		Fragment				1
	Bone	Mammal		Fragment				-
	Bone	Mammal		Fragment				2
	Bone	Unidentified		Fragment Butchered				-

Appendix A. Catalog of Cultural Materials, Warwick Sewers Tidewater Drive, Phase III Data Recovery.

Provenience	Material	Object	Size	Attributes	Color(s)	Manufacture Date	Makers Mark	Count
Mill Cove Site								
Feature 38-E 1/2 0-10, Feature Fill	Bone	Bird		Fragment				
	Bone	Mammal		Fragment				4
	Charcoal	Charcoal		Complete				
	Charcoal	Charcoal		Complete				_
	Charcoal	Charcoal		Complete				1
	Quartz	Chipping Debris Flake	1-3cm	Complete	White			2
	Quartz	Chipping Debris Flake	0-1cm	Complete	White			_
	Quartz	Chipping Debris Flake	1-3cm	Complete	White			=
	Quartz	Chipping Debris Flake	1-3cm	Complete	White			4
	Quartz	Chipping Debris Flake	1-3cm	Complete	Red, White			_
	Quartz	Chipping Debris Flake	0-1cm	Complete	White			-
	Shell	Sample		Complete				1
	Shell	Sample		Complete				1
	Shell	Sample		Complete				1
	Shell	Sample		Complete				1
	Tooth	Mammal		Mostly Complete				1
Feature 39A-N 1/2 0-10, Feature Fill	Bone	Bird		Fragment				-
	Bone	Unidentified		Fragment				9
	Bone	Unidentified		Fragment				2
	Bone	Fish		Fragment				-
	Bone	Unidentified		Fragment Butchered				1
	Quartz	Chipping Debris Flake	1-3cm	Complete	White			4
	Quartz	Chipping Debris Shatter	1-3cm	Complete	White			
	Quartz	Chipping Debris Flake	1-3cm	Complete	Red, White			-

Appendix A. Catalog of Cultural Materials, Warwick Sewers Tidewater Drive, Phase III Data Recovery.

Provenience	Material	Object	Size	Attributes	Color(s)	Manufacture Date	Makers Mark	Count
Mill Cove Site								
Feature 39A-N 1/2 0-10, Feature Fill	Shell	Sample		Complete				
Feature 39A-N 1/2 10-20, Feature Fill	Charcoal	Charcoal		Complete				
	Quartz	Chipping Debris Flake	1-3cm	Complete	White			2
	Quartz	Chipping Debris Flake Bipolar Flake	5-7cm	Complete Cortex	White			1
	Shell	Sample		Complete				
Feature 39A-N 1/2 20-30, Feature Fill	Quartz	Chipping Debris Flake	1-3cm	Complete	White			_
	Shell	Sample		Complete				1
Feature 39A-N 1/2 30-40, Feature Fill	Bone	Mammal		Fragment				4
	Charcoal	Charcoal		Complete				1
	Quartz	Chipping Debris Shatter	1-3cm	Complete	White			1
	Quartz	Chipping Debris Flake	1-3cm	Complete	White			1
	Shell	Sample		Complete				-
Feature 39A-S 1/2 0-30, Feature Fill	Aboriginal Vessels Shell Temper	Vessel Cord Marked		Body				7
	Bone	Mammal		Fragment				9
	Bone	Bird		Fragment Butchered				1
	Bone	Unidentified		Fragment				3
	Quartz	Chipping Debris Flake	3-5cm	Complete	White			3
	Quartz	Chipping Debris Shatter	3-5cm	Complete	White			-
	Quartz	Chipping Debris Flake	1-3cm	Complete	Red, White			3
	Quartz	Chipping Debris Flake	1-3cm	Complete	White			∞
	Shell	Unidentified		Fragment				2
	Shell	Sample		Complete				1

Appendix A. Catalog of Cultural Materials, Warwick Sewers Tidewater Drive, Phase III Data Recovery.

Provenience	Material	Object	Size	Attributes	Color(s)	Manufacture Date	Makers Mark	Count
Mill Cove Site								
Feature 39A-S 1/2 0-30, Feature Fill	Tooth	Mammal Deer		Mostly Complete				_
Feature 39A-S 1/2 30-40, Feature Fill	Aboriginal Vessels Shell Temper	Vessel		Body				1
	Bone	Bird		Fragment				2
	Bone	Fish		Fragment				2
	Charcoal	Charcoal		Complete				1
	Quartz	Chipping Debris Shatter	1-3cm	Complete Cortex	Tan, White			-
	Quartz	Chipping Debris Flake	1-3cm	Complete	White			4
	Shell	Sample		Complete				-
	Shell	Sample		Complete				_
Feature 39B-N 1/2 0-10, Feature Fill	Bone	Unidentified		Fragment				1
	Shell	Sample		Complete				-
Feature 39B-N 1/2 0-3, Feature Fill	Bone	Unidentified		Fragment				_
	Shell	Sample		Complete				-
	Unid. Metamorphic	Abrader	6.9x3.63x3.49	Complete Cortex Utilized	Gray			1
Feature 39B-N 1/2 10-17, Feature Fill	Quartz	Chipping Debris Flake	0-1cm	Complete	White			1
	Shell	Sample		Complete				_
Feature 39B-N 1/2 10-20, Feature Fill	Aboriginal Vessels Sand Temper	Vessel		Body				22
	Bone	Mammal		Fragment				3
	Charcoal	Charcoal		Complete				-
	Quartz	Chipping Debris Flake	1-3cm	Complete	White			3
	Quartzite	Chipping Debris Flake	1-3cm	Complete	Gray, Tan			-
	Rhyolite	Chipping Debris Flake	1-3cm	Complete	Dk Gray, Speckled			1

Appendix A. Catalog of Cultural Materials, Warwick Sewers Tidewater Drive, Phase III Data Recovery.

Provenience	Material	Object	Size A	Attributes	Color(s)	Manufacture Date	Makers Mark	Count
Mill Cove Site								
Feature 39B-N 1/2 10-20, Feature Fill	Shell	Sample		Complete				-
Feature 39B-N 1/2 20-30, Feature Fill	Bone	Unidentified		Fragment				-
	Granitic	Hammerstone	9.29x6.75x5.49	Complete	Clear, Gray, Speckled			7
	Quartz	Chipping Debris Flake	1-3cm	Complete	White			-
	Shell	Sample		Complete				-
Feature 39B-N 1/2 30-40, Feature Fill	Charcoal	Charcoal		Complete				-
	Quartz	Chipping Debris Flake	1-3cm	Complete	White			-
	Shell	Sample		Complete				-
Feature 39B-S 1/2 0-17, Feature Fill	Charcoal	Charcoal		Complete				-
	Quartz	Chipping Debris Flake	0-1cm	Complete	White			1
	Quartz	Chipping Debris Flake	1-3cm	Complete	White			3
	Quartz	Chipping Debris Flake	1-3cm	Complete	Red, White			_
	Shell	Sample		Complete				П
Feature 39B-S 1/2 0-6, Feature Fill	Shell	Sample		Complete				-
Feature 39B-S 1/2 17-30, Feature Fill	Aboriginal Vessels	Vessel		Body				10
	Argillite	Chipping Debris Flake	3-5cm	Complete	Gray, Green			-
	Bone	Mammal		Fragment				7
	Bone	Unidentified		Fragment				9
	Bone	Mammal		Fragment				5
	Bone	Bird		Fragment				3
	Bone	Reptile Turtle		Fragment				2
	Bone	Fish		Fragment				_

Appendix A. Catalog of Cultural Materials, Warwick Sewers Tidewater Drive, Phase III Data Recovery.

Provenience	Material	Object	Size	Attributes	Color(s)	Manufacture Date	Makers Mark	Count
Mill Cove Site								
Feature 39B-S 1/2 17-30, Feature Fill	Bone	Fish		Fragment				4
	Charcoal	Charcoal		Complete				1
	Quartz	Chipping Debris Flake	1-3cm	Complete	White			1
	Quartz	Chipping Debris Flake	1-3cm	Complete	Red, White			1
	Quartz	Chipping Debris Flake	1-3cm	Complete	White			∞
	Quartz	Chipping Debris Flake	0-1cm	Complete	White			1
	Quartz	Chipping Debris Flake	3-5cm	Complete	White			1
	Rhyolite	Chipping Debris Flake	1-3cm	Complete	Dk Gray, Speckled			1
	Shell	Sample		Complete				П
	Tooth	Mammal		Fragment				
Feature 39B-S 1/2 30-40, Feature Fill	Argillite	Chipping Debris Flake	1-3cm	Complete	Banded, Gray, Green			1
	Bone	Unidentified		Fragment Burned				-
	Bone	Unidentified		Fragment				2
	Charcoal	Charcoal		Complete				1
	Shell	Sample		Complete				1
Feature 40-N 1/2 0-10, Feature Fill	Bone	Unidentified		Fragment				2
	Quartz	Chipping Debris Flake	1-3cm	Complete	White			1
	Quartz	Chipping Debris Shatter	3-5cm	Complete	White			
	Shell	Sample		Complete				
	Shell	Sample		Complete				1
Feature 40-N 1/2 10-20, Feature Fill	Bone	Unidentified		Fragment				1
	Shell	Sample		Complete				1
	Shell	Sample		Complete				_

Appendix A. Catalog of Cultural Materials, Warwick Sewers Tidewater Drive, Phase III Data Recovery.

Provenience	Material	Object	Size	Attributes	Color(s)	Manufacture Date	Makers Mark	Count
Mill Cove Site								
Feature 40-N 1/2 10-20, Feature Fill	Unid. Igneous	Manuport	8.03x7.95x3.89	Complete	Banded, Cream, Gray, Green			
	Unid. Igneous	Manuport	5.81x4.64x3.6	Complete	Green, Tan			_
Feature 40-N 1/2 20-30, Feature Fill	Granitic	Manuport	7.89x7.72x4.5	Complete	Cream, Speckled, Tan			-
	Quartz	Chipping Debris Flake	1-3cm	Complete	White			1
	Shell	Sample		Complete				_
	Shell	Sample		Complete				-
Feature 40-N 1/2 30-40, Feature Fill	Bone	Reptile Turtle		Fragment Butchered				1
	Charcoal	Charcoal		Complete				-
	Quartz	Uniface	4.88x2.52x1.42	Complete	Red, White			_
	Quartz	Chipping Debris Flake	1-3cm	Complete	White			4
	Quartz	Chipping Debris Flake	0-1cm	Complete	White			
	Shell	Sample		Complete				_
	Shell	Unidentified		Fragment				_
Feature 40-N 1/2 40-50, Feature Fill	Quartz	Chipping Debris Flake	1-3cm	Complete	White			4
	Shell	Sample		Complete				1
Feature 40-N 1/2 50-60, Feature Fill	Bone	Unidentified		Fragment				1
	Bone	Fish		Fragment				_
	Charcoal	Charcoal		Complete				
	Quartz	Chipping Debris Flake	1-3cm	Complete	White			_
	Shell	Sample		Complete				1
Feature 40-S 1/2 0-18, Feature Fill	Aboriginal Vessels Shell Temper	Vessel		Body				2
	Bone	Fish		Fragment				3

Appendix A. Catalog of Cultural Materials, Warwick Sewers Tidewater Drive, Phase III Data Recovery.

Provenience	Material	Object	Size	Attributes	Color(s)	Manufacture Date	Makers Mark	Count
Mill Cove Site								
Feature 40-S 1/2 0-18, Feature Fill	Bone	Mammal		Fragment				4
	Bone	Reptile Turtle		Fragment				-
	Bone	Unidentified		Mostly Complete				2
	Quartz	Projectile Point Levanna Projectile Point	3.1x0.9x3	Complete	White			1
	Quartz	Chipping Debris Flake	1-3cm	Complete	White			\$
	Quartz	Chipping Debris Shatter	3-5cm	Complete	White			_
	Rhyolite	Projectile Point Levanna Projectile Point	3.2x2.52x0.47	Mostly Complete	Gray			1
	Shell	Sample		Complete				-
	Tooth	Mammal Beaver		Fragment				_
Feature 40-S 1/2 0-20, Feature Fill	Charcoal	Charcoal		Complete				1
	Quartz	Chipping Debris Flake	1-3cm	Complete	Red, White			1
	Quartz	Chipping Debris Shatter	3-5cm	Complete	White			_
	Quartz	Uniface	2.73x22.6x0.86	Fragment	White			_
	Shell	Sample		Complete				_
	Shell	Bivalve Oyster		Mostly Complete Drilled				1
	Tooth	Mammal		Fragment				-
Feature 40-S 1/2 0-4, Feature Fill	Bone	Unidentified		Fragment				4
	Quartz	Chipping Debris Flake	1-3cm	Complete	Clear, White			2
	Shell	Sample		Complete				-
Feature 40-S 1/2 10-30, Feature Fill	Charcoal	Charcoal		Complete				1
	Graphite	Paintstone/Pigmentstone	6.25x4.13x2.05	Complete	Gray			-
	Shell	Sample		Complete				

Appendix A. Catalog of Cultural Materials, Warwick Sewers Tidewater Drive, Phase III Data Recovery.

Provenience	Material	Object	Size	Attributes	Color(s)	Manufacture Date	Makers Mark	Count
Mill Cove Site								
Feature 40-S 1/2 20-40, Feature Fill	Charcoal	Charcoal		Complete				-
	Quartz	Chipping Debris Flake	1-3cm	Complete	White			2
	Quartz	Chipping Debris Flake	1-3cm	Complete Cortex	Gray, White			1
	Shell	Sample		Complete				1
Feature 40-S 1/2 40-60, Feature Fill	Bone	Reptile Turtle		Fragment				1
	Bone	Unidentified		Fragment				-
	Bone	Mammal		Fragment				7
	Charcoal	Charcoal		Complete				-
	Quartz	Chipping Debris Flake	1-3cm	Complete	White			-
	Quartz	Chipping Debris Shatter	1-3cm	Complete	Clear, White			2
	Shell	Sample		Complete				П
Feature 41-N 1/2 10-20, Feature Fill	Aboriginal Vessels Shell Temper	Vessel Cord Marked		Fragment				1
	Bone	Mammal		Fragment				2
	Quartz	Chipping Debris Flake	1-3cm	Complete	Clear, White			2
	Shell	Sample		Complete				_
Feature 41-N 1/2 10-35, Mottled Feature Fill	Bone	Unidentified		Fragment				-
	Charcoal	Charcoal		Complete				1
	Quartz	Chipping Debris Flake	1-3cm	Fragment Cortex- Fracture Plane	Clear, Gray, White			-
	Shell	Sample		Complete				-
Feature 41-N 1/2 5-15, Feature Fill	Bone	Mammal		Fragment Burned				_
	Quartz	Chipping Debris Shatter	1-3cm	Complete Cortex	Tan, White			1
	Shell	Sample		Complete				_

Appendix A. Catalog of Cultural Materials, Warwick Sewers Tidewater Drive, Phase III Data Recovery.

Provenience	Material	Object	Size	Attributes	Color(s)	Manufacture Date	Makers Mark	Count
Mill Cove Site								
Feature 41-S 1/2 0-10, B1	Quartz	Chipping Debris Flake	1-3cm	Complete	Clear, White			-
	Shell	Sample		Complete				
Feature 41-S 1/2 0-10, Feature Fill	Bone	Reptile		Fragment				_
	Bone	Fish		Fragment				2
	Bone	Unidentified		Fragment				1
	Charcoal	Charcoal		Complete				_
	Quartz	Chipping Debris Flake	1-3cm	Complete	Crystal, White			4
	Shell	Sample		Complete				_
	Shell	Sample		Complete				_
Feature 41-S 1/2 10-20, B1	Quartz	Chipping Debris Flake	1-3cm	Complete	Lt Gray, White			1
Feature 41-S 1/2 10-20, Feature Fill	Bone	Fish		Fragment				-
	Bone	Reptile		Fragment				1
	Bone	Unidentified		Fragment				_
	Charcoal	Charcoal		Complete				-
	Quartz	Chipping Debris Flake	1-3cm	Complete	Clear, White			5
	Quartz	Chipping Debris Flake	1-3cm	Complete	Crystal			_
	Quartz	Chipping Debris Shatter	1-3cm	Complete	Clear, Lt Gray, White			1
	Quartz	Biface	2.5x2.4x0.7	Complete Cortex- Fracture Plane	Clear, White			_
	Quartz	Chipping Debris Flake	0-1cm	Complete	White			1
	Shell	Sample		Complete				1
	Shell	Sample		Complete				-
Feature 41-S 1/2 20-35, Mottled Feature Fill	Shell	Sample		Complete				-

Appendix A. Catalog of Cultural Materials, Warwick Sewers Tidewater Drive, Phase III Data Recovery.

Provenience	Material	Object	Size	Attributes	Color(s)	Manufacture Date	Makers Mark	Count
Mill Cove Site								
Feature 42A-E 1/2 0-40, Wall Clean-up	Bone	Mammal		Fragment				2
	Charcoal	Charcoal		Complete				-
	Quartz	Projectile Point Untyped	2.3x2.1x0.6	Tip	Clear, Gray, White			-
	Quartz	Chipping Debris Flake	1-3cm	Complete	Clear, Tan, White			5
	Quartz	Chipping Debris Shatter	1-3cm	Complete	Clear, White			2
	Shell	Sample		Complete				П
Feature 42A-E 1/2 0-55, Feature Fill	Aboriginal Vessels Sand Temper	Vessel Smooth		Body				
	Bone	Mammal		Fragment				16
	Bone	Unidentified		Fragment				2
	Bone	Unidentified		Fragment				11
	Bone	Unidentified		Fragment				6
	Charcoal	Charcoal		Complete				1
	Granitic	Fire-Cracked Rock		Complete	Lt Gray, Red			1
	Quartz	Chipping Debris Flake	3-5cm	Complete	White			_
	Quartz	Chipping Debris Flake	3-5cm	Complete Cortex- Fracture Plane	Gray, Rust, White			2
	Quartz	Chipping Debris Flake	3-5cm	Complete Cortex- Cobble	Lt Gray, White			П
	Quartz	Chipping Debris Shatter	1-3cm	Complete Cortex- Fracture Plane	Gray, Rust, White			9
	Quartz	Chipping Debris Flake	1-3cm	Complete Cortex- Fracture Plane	Clear, Rust, White			6
	Quartz	Chipping Debris Shatter	1-3cm	Complete Cortex- Cobble	Lt Gray, White			2
	Quartz	Chipping Debris Shatter	1-3cm	Complete	Clear, Gray, White			18
	Quartz	Chipping Debris Flake	1-3cm	Complete	Clear, Lt Gray, White			38

Appendix A. Catalog of Cultural Materials, Warwick Sewers Tidewater Drive, Phase III Data Recovery.

Provenience	Material	Object	Size	Attributes	Color(s)	Manufacture Date	Makers Mark	Count
Mill Cove Site								
Feature 42A-E 1/2 0-55, Feature Fill	Quartz	Chipping Debris Flake	0-1cm	Complete	Clear, White			
	Quartz	Chipping Debris Shatter	0-1cm	Complete	Lt Gray, White			1
	Shell	Sample		Complete				1
	Shell	Sample		Complete				
	Tooth	Mammal Deer		Fragment				_
	Unid. Metamorphic	Hammerstone	8.1x5.2x3.2	Complete	Gray			-
Feature 42A-W 1/2 0-10, Feature Fill	Quartz	Chipping Debris Flake	1-3cm	Complete	White			4
	Shell	Sample		Complete				-
Feature 42A-W 1/2 10-20, Feature Fill	Aboriginal Vessels Shell Temper	Vessel Smooth		Body				_
	Charcoal	Charcoal		Complete				1
	Quartz	Chipping Debris Shatter	0-1cm	Complete	Clear, White			2
	Quartz	Chipping Debris Flake	1-3cm	Complete	Clear, Gray, White			3
	Shell	Sample		Complete				-
Feature 42A-W 1/2 20-30, Feature Fill	Bone	Mammal		Fragment Burned				-
	Bone	Mammal		Fragment				7
	Quartz	Chipping Debris Flake	1-3cm	Complete	Clear, White			-
	Shell	Sample		Complete				
Feature 42A-W 1/2 30-40, Feature Fill	Bone	Unidentified		Fragment				-
	Charcoal	Charcoal		Complete				1
	Plant Part	Nutshell		Fragment Charred				5
	Quartz	Chipping Debris Flake	0-1cm	Complete	Clear, White			_
	Shell	Sample		Complete				_

Appendix A. Catalog of Cultural Materials, Warwick Sewers Tidewater Drive, Phase III Data Recovery.

Provenience	Material	Object	Size	Attributes	Color(s)	Manufacture Date	Makers Mark	Count
Mill Cove Site								
Feature 42A-W 1/2 40-50, Feature Fill	Bone	Mammal		Fragment Burned				-
	Charcoal	Charcoal		Complete				_
	Quartz	Chipping Debris Flake	1-3cm	Fragment	Clear, White			2
	Quartz	Chipping Debris Flake	1-3cm	Complete Cortex- Fracture Plane	Clear, Rust, White			П
	Shell	Sample		Complete				1
Feature 42A-W 1/2 50-60, Feature Fill	Quartz	Chipping Debris Flake	l-3cm	Complete	Clear, Lt Gray, White			1
	Shell	Sample		Complete				_
Feature 42B-E 1/2 0-10, Feature Fill	Quartz	Chipping Debris Flake	1-3cm	Complete Cortex- Fracture Plane	Tan, White			_
	Shell	Sample		Complete				1
Feature 42B-E 1/2 10-35, Feature Fill	Quartz	Chipping Debris Flake	1-3cm	Complete	White			-
	Shell	Sample		Complete				-
Feature 42B-E 1/2 35-45, Feature Fill	Charcoal	Charcoal		Complete				-
	Quartz	Chipping Debris Shatter	1-3cm	Complete	Tan, White			-
Feature 42B-W 1/2 0-10, Feature Fill	Shell	Sample		Complete				-
Feature 42B-W 1/2 10-20, Feature Fill	Shell	Sample		Complete				-
Feature 42B-W 1/2 20-30, Feature Fill	Shell	Sample		Complete				-
Feature 42B-W 1/2 40-50, Feature Fill	Aboriginal Vessels Leached Out	Vessel Scallop Shell Stamped		Rim/Body				20
	Basalt	Chipping Debris Shatter	1-3cm	Complete	Black, Rust			П
	Quartz	Chipping Debris Flake	0-1cm	Complete	White			_
	Shell	Sample		Complete				-

Appendix A. Catalog of Cultural Materials, Warwick Sewers Tidewater Drive, Phase III Data Recovery.

Provenience	Material	Object	Size	Attributes	Color(s)	Manufacture Date	Makers Mark	Count
Mill Cove Site								
Feature 42B-W 1/2 40-50, Feature Fill	Soil	Sample Unfloated Sample		Complete				
Feature 45-N 1/2 0-16, Feature Fill	Bone	Mammal		Fragment				4
	Bone	Fish		Fragment				
	Charcoal	Charcoal		Complete				1
	Plant Part	Nutshell		Fragment Charred				3
	Quartz	Biface	5.4x3.3x1.6	Complete Cortex- Fracture Plane	Gray, Rust, White			-
	Quartz	Chipping Debris Flake	0-1cm	Complete	Clear, Lt Gray, White			П
	Quartz	Chipping Debris Flake	1-3cm	Complete Cortex- Fracture Plane	Clear, Tan, White			2
	Quartz	Chipping Debris Flake	1-3cm	Complete	Clear, White			4
	Quartz	Chipping Debris Shatter	1-3cm	Complete	White			П
	Shell	Sample		Complete				_
Feature 45-N 1/2 16-30, Feature Fill	Aboriginal Vessels Grit Temper	Vessel Smooth		Body				1
	Bone	Reptile		Fragment				_
	Charcoal	Charcoal		Complete				_
	Plant Part	Nutshell		Fragment Charred				∞
	Quartz	Chipping Debris Flake	0-1cm	Complete	White			_
	Quartz	Chipping Debris Flake	1-3cm	Complete	Clear, Lt Gray, White			9
	Quartz	Chipping Debris Flake	1-3cm	Complete Cortex- Fracture Plane	Clear, Rust, White			3
	Quartz	Chipping Debris Shatter	7-9cm	Complete Cortex- Cobble	Rust, White			-
	Quartz	Chipping Debris Shatter	1-3cm	Complete	Gray, White			9
	Quartz	Chipping Debris Shatter	0-1cm	Complete	White			

Appendix A. Catalog of Cultural Materials, Warwick Sewers Tidewater Drive, Phase III Data Recovery.

Provenience	Material	Object	Size	Attributes	Color(s)	Manufacture Date	Makers Mark	Count
Mill Cove Site								
Feature 45-N 1/2 16-30, Feature Fill	Shell	Sample		Complete				-
	Textile	Unidentified		Fragment Charred				-
Feature 45-N 1/2 30-50, Feature Fill	Bone	Mammal		Fragment				-
	Bone	Unidentified		Fragment				5
	Bone	Awl	6.4x0.9x0.5	Complete				2
	Charcoal	Charcoal		Complete				1
	Plant Part	Nutshell		Fragment Charred				6
	Quartz	Chipping Debris Shatter	1-3cm	Complete	Clear, Lt Gray, White			3
	Quartz	Chipping Debris Shatter	3-5cm	Complete Cortex- Fracture Plane	Clear, Lt Gray, Rust			-
	Quartz	Chipping Debris Flake	1-3cm	Complete	Crystal, Lt Gray, White			8
	Quartz	Chipping Debris Shatter	0-1cm	Complete	White			П
	Quartz	Biface	4.2x3x1.2	Mostly Complete Cortex	Clear, White			-
	Quartz	Chipping Debris Shatter	0-1cm	Complete	Rose, White			-
	Quartzite	Chipping Debris Flake	1-3cm	Complete	Gray, Lt Gray			П
	Shell	Sample		Complete				1
Feature 45-N 1/2 50-65, Feature Fill	Aboriginal Vessels Indeterminate Temper	Vessel		Body				-
	Bone	Unidentified		Fragment				3
	Charcoal	Charcoal		Complete				-
	Plant Part	Nutshell		Fragment Charred				5
	Quartz	Chipping Debris Flake	1-3cm	Complete	Clear, Lt Gray, White			10
	Quartz	Chipping Debris Shatter	1-3cm	Complete	Clear, White			4

Appendix A. Catalog of Cultural Materials, Warwick Sewers Tidewater Drive, Phase III Data Recovery.

Provenience	Material	Object	Size	Attributes	Color(s)	Manufacture Date	Makers Mark	Count
Mill Cove Site								
Feature 45-N 1/2 50-65, Feature Fill	Quartz	Chipping Debris Flake	1-3cm	Complete Cortex- Fracture Plane	Rust, White			7
	Quartz	Chipping Debris Flake	3-5cm	Complete	White			-
	Quartz	Chipping Debris Flake	0-1cm	Complete	Clear, White			1
	Shell	Sample		Complete				1
Feature 45-S 1/2 0-10, Feature Fill	Aboriginal Vessels Grit Temper	Vessel Smooth		Body				-
	Aboriginal Vessels Mica Temper	Vessel		Body				1
	Bone	Mammal		Fragment				9
	Charcoal	Charcoal		Complete				1
	Charcoal	Charcoal		Complete				-
	Quartz	Chipping Debris Shatter	1-3cm	Complete	Clear, Lt Gray, White			_
	Quartz	Chipping Debris Shatter	3-5cm	Complete	White			1
	Quartz	Chipping Debris Flake	3-5cm	Complete	Tan, White			-
	Quartz	Chipping Debris Shatter	1-3cm	Complete	Gray, White			1
	Quartz	Chipping Debris Flake	1-3cm	Complete Cortex- Fracture Plane	Clear, Gray, Rust, White			4
	Quartz	Chipping Debris Flake	1-3cm	Complete	Clear, Lt Gray, White			9
	Shell	Sample		Complete				1
	Shell	Sample		Complete				-
Feature 45-S 1/2 10-20, Feature Fill	Aboriginal Vessels Leached Out	Vessel		Body				7
	Charcoal	Charcoal		Complete				1
	Charcoal	Charcoal		Complete				_
	Quartz	Chipping Debris Flake	1-3cm	Complete Cortex- Fracture Plane	Tan, White			-
	Quartz	Chipping Debris Shatter	1-3cm	Complete	Red, White			2

Appendix A. Catalog of Cultural Materials, Warwick Sewers Tidewater Drive, Phase III Data Recovery.

Provenience	Material	Object	Size	Attributes	Color(s)	Manufacture Date	Makers Mark	Count
Mill Cove Site								
Feature 45-S 1/2 10-20, Feature Fill	Quartz	Chipping Debris Flake	1-3cm	Complete	Clear, White			3
	Quartz	Chipping Debris Flake	0-1cm	Complete	Clear, Lt Gray, White			7
	Quartz	Chipping Debris Shatter	1-3cm	Complete	Clear, Lt Gray, White			3
	Quartz	Chipping Debris Flake	1-3cm	Complete	Clear, White			2
	Quartz	Chipping Debris Shatter	1-3cm	Complete Cortex- Fracture Plane	Rust, White			7
	Shell	Sample		Complete				1-
	Shell	Sample		Complete				-
Feature 45-S 1/2 20-30, Feature Fill	Bone	Unidentified		Fragment				2
	Bone	Mammal Deer		Fragment				2
	Quartz	Chipping Debris Flake	1-3cm	Complete	Clear, White			3
	Quartz	Chipping Debris Flake	1-3cm	Complete	Clear, White			7
	Quartz	Chipping Debris Shatter	1-3cm	Complete	Clear, White			-
	Quartz	Chipping Debris Flake	0-1cm	Complete Cortex- Fracture Plane	Rose, White			1
	Quartz	Chipping Debris Flake	1-3cm	Complete Cortex- Fracture Plane	Gray, Tan, White			2
	Shell	Sample		Complete				-
	Shell	Bivalve Soft Shell Clam		Fragment				-
	Shell	Sample		Complete				-
	Shell	Sample		Complete				-
	Soil	Sample Unfloated Sample		Complete				_
Feature 45-S 1/2 30-40, Feature Fill	Aboriginal Vessels Leached Out	Vessel		Body				2
	Aboriginal Vessels Quartz Temper	Vessel Cord Marked		Body				П

Appendix A. Catalog of Cultural Materials, Warwick Sewers Tidewater Drive, Phase III Data Recovery.

Provenience	Material	Object	Size	Attributes	Color(s)	Manufacture Date	Makers Mark	Count
Mill Cove Site								
Feature 45-S 1/2 30-40, Feature Fill	Aboriginal Vessels Quartz Temper	Vessel		Body				
	Bone	Mammal		Fragment				2
	Bone	Unidentified		Fragment				6
	Bone	Unidentified		Fragment Burned				2
	Bone	Unidentified		Fragment				20
	Charcoal	Charcoal		Complete				-
	Plant Part	Nutshell		Fragment Charred				1
	Quartz	Chipping Debris Shatter	0-1cm	Complete	Clear, White			1
	Quartz	Chipping Debris Shatter	1-3cm	Complete	Clear, White			1
	Quartz	Chipping Debris Flake	3-5cm	Complete Cortex- Fracture Plane	Orange, White			-
	Quartz	Chipping Debris Shatter	1-3cm	Complete Cortex- Fracture Plane	Rust, White			2
	Quartz	Chipping Debris Flake	1-3cm	Complete	Clear, White			3
	Quartz	Fire-Cracked Rock		Fragment	Rose, Tan, White			1
	Quartz	Chipping Debris Flake	1-3cm	Complete	Clear, Lt Gray, White			7
	Shell	Sample		Complete				1
	Shell	Sample		Complete				1
Feature 45-S 1/2 40-50, Feature Fill	Bone	Unidentified		Fragment				1
	Bone	Mammal		Fragment				9
	Calcined Bone	Unidentified		Fragment				8
	Charcoal	Charcoal		Complete				
	Plant Part	Nutshell		Fragment				100
	Quartz	Chipping Debris Flake	1-3cm	Complete	Clear, White			3
	Quartz	Chipping Debris Shatter	1-3cm	Complete	White			_

Appendix A. Catalog of Cultural Materials, Warwick Sewers Tidewater Drive, Phase III Data Recovery.

Provenience	Material	Object	Size	Attributes	Color(s)	Manufacture Date	Makers Mark	Count
Mill Cove Site								
Feature 45-S 1/2 40-50, Feature Fill	Quartz	Chipping Debris Flake	1-3cm	Complete Cortex- Fracture Plane	Clear, Gray, Orange, White			2
	Quartz	Projectile Point Untyped	3.1x1.8x0.7	Base	White			_
	Quartz	Chipping Debris Shatter	1-3cm	Complete	Lt Gray, White			2
	Quartz	Projectile Point Untyped	2.4x2.9x0.7	Base	White			
	Shell	Sample		Complete				
Feature 45-S 1/2 50-54, Feature Fill	Shell	Sample		Complete				-
Feature 45-S 1/2 50-60, Feature Fill	Charcoal	Charcoal		Complete				-
	Quartz	Chipping Debris Flake	1-3cm	Complete	Clear, White			2
	Quartz	Chipping Debris Flake	0-1cm	Complete	Clear, White			-
	Quartz	Chipping Debris Shatter	1-3cm	Complete Cortex- Fracture Plane	Clear, Rust, White			-
	Quartz	Chipping Debris Flake	1-3cm	Complete Cortex- Fracture Plane	Orange, White			-
	Shell	Sample		Complete				-
Feature 45-S 1/2 60-70, Feature Fill	Charcoal	Charcoal		Complete				_
	Quartz	Chipping Debris Flake	1-3cm	Complete	Clear, Gray, White			3
Feature 50-N 1/2 0-10, Feature Fill	Charcoal	Charcoal		Complete				-
	Quartz	Chipping Debris Flake	1-3cm	Complete	Clear, Lt Gray, White			7
	Shell	Sample		Complete				_
Feature 50-S 1/2 0-10, Feature Fill	Bone	Unidentified		Fragment				_
	Quartz	Chipping Debris Flake	1-3cm	Complete	Clear, Lt Gray, White			4
	Quartz	Chipping Debris Flake	1-3cm	Complete Cortex- Fracture Plane	Clear, Rust, White			-

Appendix A. Catalog of Cultural Materials, Warwick Sewers Tidewater Drive, Phase III Data Recovery.

Provenience	Material	Object	Size	Attributes	Color(s)	Manufacture Date	Makers Mark	Count
Mill Cove Site								
Feature 50-S 1/2 0-10, Feature Fill	Quartz	Chipping Debris Flake	0-1cm	Complete	Clear, White			-
	Quartz	Chipping Debris Flake	3-5cm	Complete Cortex- Fracture Plane	Clear, Rust, White			-
	Quartz	Chipping Debris Shatter	1-3cm	Complete	Lt Gray, White			3
	Shell	Sample		Complete				_
Feature 50-S 1/2 10-20, Feature Fill	Shell	Sample		Complete				1
Feature 53-E 1/2 0-35, Feature Fill	Quartz	Chipping Debris Shatter	1-3cm	Complete	Tan, White			7
	Quartz	Chipping Debris Shatter	0-1cm	Complete	Clear, Lt Gray, White			2
	Quartz	Chipping Debris Flake	1-3cm	Complete	Clear, White			3
	Shell	Sample		Complete				-
Feature 53-W 1/2 0-10, Feature Fill	Quartz	Chipping Debris Flake	0-1cm	Complete	Clear, White			1
	Shell	Sample		Complete				_
Feature 53-W 1/2 10-20, Feature Fill	Bone	Unidentified		Fragment				10
	Charcoal	Charcoal		Complete				-
	Quartz	Chipping Debris Flake	1-3cm	Complete	Clear, White			_
	Quartz	Chipping Debris Flake	0-1cm	Complete	Clear, Lt Gray, White			1
	Shell	Sample		Complete				-
Feature 53-W 1/2 20-30, Feature Fill	Shell	Sample		Complete				1
Feature 54-W 1/2 0-10, Feature Fill	Charcoal	Charcoal		Complete				1
	Granitic	Fire-Cracked Rock		Complete	Gray, Red, Tan			-
	Quartz	Chipping Debris Shatter	1-3cm	Complete Cortex- Fracture Plane	White			1

Appendix A. Catalog of Cultural Materials, Warwick Sewers Tidewater Drive, Phase III Data Recovery.

Provenience	Material	Object	Size	Attributes	Color(s)	Manufacture Date	Makers Mark	Count
Mill Cove Site								
Feature 60-E 1/2 0-10, Feature Fill	Aboriginal Vessels Leached Out	Vessel Cord Marked		Body				-
	Charcoal	Charcoal		Complete				-
Feature 60-W 1/2 0-7, Feature Fill	Shell	Sample		Complete				-
Feature 61-E 1/2 0-10, Feature Fill	Calcined Bone	Mammal		Fragment				_
Feature 61-W 1/2 0-10, Feature Fill	Quartz	Projectile Point Untyped	3.3x2.5x0.9	Mostly Complete	Clear, Gray, White			_
	Quartz	Chipping Debris Flake	0-1cm	Complete	Clear, White			2
	Quartz	Chipping Debris Shatter	0-1cm	Complete	Lt Gray, White			1
	Quartz	Chipping Debris Shatter	1-3cm	Complete	White			1
Feature 63A-E 1/2 10-20, Feature Fill	Charcoal	Charcoal		Complete				1
	Shell	Sample		Complete				-
Feature 63B-E 1/2 10-20, Feature Fill	Bone	Unidentified		Fragment				3
	Charcoal	Charcoal		Complete				-
	Shell	Bivalve Hard Clam		Fragment				1
Feature 63-E 1/2 0-10, Feature Fill	Calcined Bone	Unidentified		Fragment				12
	Quartz	Chipping Debris Flake	1-3cm	Complete	Clear, White			1
	Quartz	Chipping Debris Shatter	3-5cm	Complete Cortex	Clear, Gray, White			-
	Shell	Sample		Complete				1
Feature 63-E 1/2 20-30, Feature Fill	Charcoal	Charcoal		Complete				-
	Plant Part	Nutshell		Fragment Charred				-
	Plant Part	Seed Maize		Complete Carved				-
	Shell	Sample		Complete				-

Appendix A. Catalog of Cultural Materials, Warwick Sewers Tidewater Drive, Phase III Data Recovery.

Provenience	Material	Object	Size	Attributes	Color(s)	Manufacture Date	Makers Mark	Count
Mill Cove Site								
Feature 63-E 1/2 30-40, Feature Fill	Charcoal	Charcoal		Complete				
	Shell	Sample		Complete				-
Feature 63-W 1/2 0-20, Feature Fill	Bone	Bird		Fragment				-
	Bone	Unidentified		Fragment				1
	Charcoal	Charcoal		Complete				5
	Plant Part	Seed Maize		Complete				-
	Plant Part	Nutshell		Fragment Charred				9
	Shell	Unidentified		Fragment				1
	Shell	Sample		Complete				1
	Shell	Sample		Complete				1
Feature 63-W 1/2 20-50, Feature Fill	Charcoal	Charcoal		Complete				_
	Plant Part	Nutshell		Fragment Charred				2
	Plant Part	Seed Maize		Complete Charred				1
	Quartz	Projectile Point Untyped	2.5x2.5x0.8	Mostly Complete	White			1
	Shell	Sample		Complete				_
Feature 70-S 1/2 0-10, Feature Fill	Charcoal	Charcoal		Complete				2
	Granitic	Hammerstone	9.2x8.1x4	Fragment	Brown, Gray			1
Feature 81-N 1/2 20-30, Feature Fill	Charcoal	Charcoal		Complete				_
	Shell	Unidentified		Fragment				-
Feature 81-S 1/2 0-10, Feature Fill	Charcoal	Charcoal		Complete	•			_
	Shell	Bivalve Oyster		Fragment				6
Feature 81-S 1/2 10-20, Feature Fill	Charcoal	Charcoal		Complete				_

Appendix A. Catalog of Cultural Materials, Warwick Sewers Tidewater Drive, Phase III Data Recovery.

Provenience	Material	Object	Size	Attributes	Color(s)	Manufacture Date	Makers Mark	Count
Mill Cove Site								
Feature 81-S 1/2 10-20, Feature Fill	Plant Part	Unidentified		Complete Charred				
Feature 81-S 1/2 20-30, Feature Fill	Aboriginal Vessels Leached Out	Vessel Smooth		Body				2
	Charcoal	Charcoal		Complete				-
	Plant Part	Nutshell		Fragment Charred				5
	Quartz	Projectile Point Untyped	1.7x1.1x0.5	Tip	White			-
Feature 81-S 1/2 30-40, Feature Fill	Charcoal	Charcoal		Complete				_
MT-04 30-40, Apz	Chert	Chipping Debris Flake	1-3cm	Complete	Dk Gray			-
	Felsite Hingham Felsite	Chipping Debris Flake	1-3cm	Complete	Red, Speckled, White			1
	Quartz	Chipping Debris Shatter	3-5cm	Complete Cortex- Fracture Plane	Brown, Rust, White			3
	Quartz	Chipping Debris Flake	1-3cm	Complete Cortex- Fracture Plane	Clear, Rust, White			2
	Quartz	Chipping Debris Shatter	0-1cm	Complete Cortex- Fracture Plane	Gray, White			
	Quartz	Chipping Debris Flake	0-1cm	Complete	Clear, Lt Gray, White			2
	Quartz	Chipping Debris Flake	1-3cm	Complete	Clear, Lt Gray, White			\$
	Quartz	Chipping Debris Shatter	1-3cm	Complete	Clear, Lt Gray, White			9
	Quartz	Chipping Debris Shatter	5-7cm	Complete	White			-
	Quartz	Chipping Debris Shatter	5-7cm	Complete Cortex- Fracture Plane	Tan, White			1
	Quartz	Chipping Debris Flake	5-7cm	Complete Cortex- Cobble	Clear, Tan, White			-
	Quartz	Chipping Debris Shatter	0-1cm	Complete	Clear, Lt Gray, White			5

Appendix A. Catalog of Cultural Materials, Warwick Sewers Tidewater Drive, Phase III Data Recovery.

Provenience	Material	Object	Size	Attributes	Color(s)	Manufacture Date	Makers Mark	Count
Mill Cove Site								
MT-04 30-40, Apz	Quartz	Chipping Debris Flake	3-5cm	Complete Cortex- Fracture Plane	Clear, Gray, White			-
	Rhyolite	Chipping Debris Flake	5-7cm	Complete	Lt Gray, Lt Green, Rust			1
	Shale	Abrader	9.6x5.4x3	Complete	Gray			-
MT-04 40-50, Apz	Copper	Tube		Fragment				1
MT-09 35-35, Feature Fill 20	Argillite	Chipping Debris Flake	3-5cm	Complete	Gray, Green			1
MT-10 0-0, Back dirt	Ball Clay	Smoking Pipe		Stem 8/64				1
MT-10 30-40, Feature Fill 31	Quartz	Projectile Point Levanna Projectile 1.9x3.1x0.6 Point	1.9x3.1x0.6	Midsection/Base	White			1
	Quartz	Chipping Debris Flake	1-3cm	Complete Cortex- Cobble	Clear, Gray, White			1
MT-10 40-40, Apz	Quartz	Chipping Debris Shatter	3-5cm	Complete	Clear, White			
MT-11 30-40, Feature Fill 34	Quartz	Projectile Point Untyped	1.7x2.9x0.6	Base	Clear, Lt Gray, White			1
MT-11 30-40, Feature Fill 39	Quartz	Projectile Point Levanna Projectile Point	3.7x1.7x0.5	Mostly Complete	Clear, Lt Gray, White			-
MT-12 60-60, Feature Fill 43	Quartz	Biface	5.1x3.7x1.5	Complete Cortex	White			1
MT-12 60-60, Feature Fill 44	Aboriginal Vessels Leached Out	Vessel		Body				4
MT-14 20-40, Apz	Ironstone	Holloware		Handle Embossed/Molded		1840 Present		2
	Ironstone	Ceramic Sherd		Body		1840 Present		3
	Porcelaneous Hand Painted	Bottle/Jar Bottle Closure		Mostly Complete	Red	1880s 1920s		3
	Quartz	Biface	1.9x1.1x0.5	Fragment	Clear, White			-
	Quartz	Chipping Debris Flake	1-3cm	Complete	Clear, White			1
	Quartz	Chipping Debris Flake	3-5cm	Complete Cortex	Clear, Gray, White			1
	Quartz	Chipping Debris Flake	1-3cm	Complete Cortex- Fracture Plane	Clear, Gray, White			-
	Unid. Coarse Earthenware Lead Glaze	Holloware		Body	Brown, White	1900 Present		-

Appendix A. Catalog of Cultural Materials, Warwick Sewers Tidewater Drive, Phase III Data Recovery.

Provenience	Material	Object	Size	Attributes	Color(s)	Manufacture Date	Makers Mark	Count
Mill Cove Site								
MT-14 20-40, Apz	Whiteware	Flatware		Base		1820 Present		2
MT-17 0-0, Back dirt/Apz	Unid. Metamorphic	Unidentified	10.5x4.7x2.8	Complete	Gray, Rust			1
MT-18 0-0, Back dirt/Apz	Glass	Bottle/Jar Wine Bottle		Base	Dk Green			-
MT-20_Lateral 38 30-40, Apz/Feature Fill	Quartz	Projectile Point Levanna Projectile 2.9x2.7x0.9 Point	2.9x2.7x0.9	Mostly Complete	Clear, White			-
MT-22 70-80, Living Surface	Calcined Bone	Unidentified		Fragment				2
	Mica Schist	Fire-Cracked Rock		Fragment	Gray, Rust			_
	Quartz	Chipping Debris Shatter	3-5cm	Complete Cortex- Fracture Plane	Lt Gray, Rust, White			2
	Quartz	Chipping Debris Flake	1-3cm	Complete	Clear, Lt Gray, White			\$
	Quartz	Chipping Debris Shatter	1-3cm	Complete Cortex- Fracture Plane	Gray, Rust, White			3
	Quartz	Chipping Debris Flake	1-3cm	Complete Cortex- Fracture Plane	Clear, Gray, Rust			S
	Quartzite	Chipping Debris Shatter	3-5cm	Complete Cortex- Cobble	Dk Gray			1
	Rhyolite	Chipping Debris Flake	1-3cm	Complete	Dark, Maroon			2
	Rhyolite	Chipping Debris Shatter	7-9cm	Complete	Dark, Maroon			-
MT-23 50-60, Apz	Cryptocrystalline	Chipping Debris Flake	7-9cm	Complete Cortex	Brown, Speckled, Tan			1
MT-26 0-0, Back dirt	Copper Alloy	Miscellaneous Personal		Fragment Embossed/Molded				1
MT-29 30-40, Feature Fill 72	Coal Ash	Coal Ash		Complete				2
	Ferrous	Nail Wire Nail		Mostly Complete		1890 Present		4
	Ferrous	Nail Unidentified Nail		Fragment				4
	Ferrous	Strap		Fragment				-
	Glass	Curved Glass		Fragment	Colorless			2
	Glass	Flat Glass Window Glass		Fragment	Aqua Tint			3

Appendix A. Catalog of Cultural Materials, Warwick Sewers Tidewater Drive, Phase III Data Recovery.

Provenience	Material	Object	Size	Attributes	Color(s)	Manufacture Date	Makers ( Mark	Count
Mill Cove Site								
MT-29 30-40, Feature Fill 72	Hard Paste Porcelain Decal, Overglaze	Holloware		Body	Polychrome	1890 Present		7
	Machine Made Glass	Bottle/Jar Bottle		Lip/Neck Continuous Thread	Colorless	1920s Present		7
	Machine Made Glass	Bottle/Jar Medicine Bottle		Base/Body Embossed	Cobalt	1910s Present	>	4
	Machine Made Glass	Bottle/Jar Medicine Bottle		Complete Bead Embossed	Colorless	1910s mid-20th c	>	-
	White Metal	Miscellaneous Personal		Complete				3
MT-30 30-40, Apz/Fill	Ferrous	Spike Railroad Spike		Complete				-
MT-36_Lateral 72 30-70, Fill	American Stoneware Albany Slip/Salt Glaze	Bottle/Jar Jar		Lid	Brown, Dark, Tan	1805 1920		-
	Hard Paste Porcelain Transfer Print, Overglaze	Holloware		Body	Brown	1900 Present		_
	Hard Paste Porcelain Transfer Print, Underglaze	Holloware		Rim/Body	Gold, Green	1900 Present		3
	Ironstone	Flatware Platter		Rim/Base		1840 Present		-
	Machine Made Glass	Bottle/Jar Household Bottle		Complete Continuous Thread Parison Mold	Brown, Dark	1920s Present	>	-
	Machine Made Glass	Bottle/Jar Soda/Water Bottle		Complete Crown Embossed Cup Base Mold	Colorless	1892 1910s	>	_
	Porcelaneous	Flatware Platter		Rim/Base		1900 Present		-
	Redware	Flower Pot		Rim		1900 Present		-
	Whiteware	Holloware Bowl		Base/Body		1820 Present		2
	Whiteware	Holloware		Body		1820 Present		5
	Whiteware Decal	Flatware		Rim Embossed/Molded	Polychrome	1890 Present		-
	Whiteware Transfer Print	Flatware		Base	Cobalt	1820 Present		3
	Whiteware Transfer Print, Overglaze	Flatware Dish		Lid	Black, Gold	1900 Present		8

Appendix A. Catalog of Cultural Materials, Warwick Sewers Tidewater Drive, Phase III Data Recovery.

Provenience	Material	Object	Size A	Attributes	Color(s)	Manufacture Date	Makers Mark	Count
Mill Cove Site								
MT-37_Lateral 73 50-90, Fill	Ironstone Transfer Print	Holloware		Body	Cobalt	1850 Present		2
	Whiteware	Ceramic Sherd		Rim		1820 Present		_
	Whiteware	Flatware		Base	Green	1820 Present	>	1
	Yellowware Annular	Holloware Bowl		Rim	White	1830 1940		-
Near Feature 41-E 1/2 0-10, Feature Fill	Bone	Unidentified		Fragment				-
	Quartz	Chipping Debris Shatter	1-3cm	Complete	White			-
	Quartz	Chipping Debris Flake	1-3cm	Complete	Clear, Lt Gray, White			4
	Quartz	Chipping Debris Flake	1-3cm	Complete	Clear, Lt Gray, Red			_
	Shell	Sample		Complete				1
Near Feature 41-E 1/2 10-20, Feature Fill	Bone	Unidentified		Fragment				_
	Quartz	Chipping Debris Shatter	1-3cm	Complete	Clear, Lt Gray, White			-
	Quartz	Chipping Debris Flake	3-5cm	Complete Cortex- Fracture Plane	Rust, White			-
	Shell	Sample		Complete				-
Near Feature 41-E 1/2 30-40, Feature Fill	Quartz	Chipping Debris Flake	1-3cm	Complete	Clear, White			-
	Shell	Sample		Complete				1
	Unid. Metamorphic	Manuport	5.3x4.5x2.3	Complete	Gray, Rust			1
Near Feature 41-W 1/2 0-0, Surface	Cumberlandite	Manuport	15.4x5.4x12.5	Complete	Black, Gray			1
Near Feature 41-W 1/2 0-40, Feature Fill	Bone	Unidentified		Fragment				3
	Bone	Reptile Turtle		Fragment				-
	Quartz	Utilized Flake	2.5x2.1x0.6	Complete Cortex- Fracture Plane	Clear, Rust, White			-

Appendix A. Catalog of Cultural Materials, Warwick Sewers Tidewater Drive, Phase III Data Recovery.

Makers Count

Color(s)

Attributes

Size

Object

Material

Provenience	Material	Object	Size	Attributes	Color(s)	Manufacture Date	Makers Count Mark	Count
Mill Cove Site								
Near Feature 41-W 1/2 0-40, Quartz Feature Fill	Quartz	Chipping Debris Flake	1-3cm	Complete Cortex- Fracture Plane	Clear, Rust, White			_
	Quartz	Chipping Debris Flake	Ì-3cm	Complete	Clear, Gray, White			-
	Quartz	Chipping Debris Shatter	1-3cm	Complete	Gray, White			1
	Shell	Sample		Complete				1
West of Feature 24 0-10, B1	Bone	Mammal		Fragment				3

2459

Total:

## APPENDIX B

## RADIO CARBON DATING



Consistent Accuracy . . . Delivered On-time

Beta Analytic Inc. 4985 SW 74 Court Mianti, Florida 33155 USA Tel: 305 667 5167 Fax: 305 663 0964 Beta@radiocarbon.com www.radiocarbon.com Darden Hood President

Ronald Hatfield Christopher Patrick Deputy Directors

January 18, 2016

Ms. Heather Olson Public Archaeology Laboratory, Incorporated 26 Main Street Pawtucket, RI 02860 USA

RE: Radiocarbon Dating Results For Samples 3094-01, 3094-02, 3094-03, 3094-04, 3094-05, 3094-06

Dear Ms. Olson:

Enclosed are the radiocarbon dating results for six samples recently sent to us. As usual, the method of analysis is listed on the report with the results and calibration data is provided where applicable. The Conventional Radiocarbon Ages have all been corrected for total fractionation effects and where applicable, calibration was performed using 2013 calibration databases (cited on the graph pages).

The web directory containing the table of results and PDF download also contains pictures, a cvs spreadsheet download option and a quality assurance report containing expected vs. measured values for 3-5 working standards analyzed simultaneously with your samples.

Reported results are accredited to ISO/IEC 17025:2005 Testing Accreditation PJLA #59423 standards and all chemistry was performed here in our laboratory and counted in our own accelerators here. Since Beta is not a teaching laboratory, only graduates trained to strict protocols of the ISO/IEC 17025:2005 Testing Accreditation PJLA #59423 program participated in the analyses.

As always Conventional Radiocarbon Ages and sigmas are rounded to the nearest 10 years per the conventions of the 1977 International Radiocarbon Conference. When counting statistics produce sigmas lower than +/- 30 years, a conservative +/- 30 BP is cited for the result. The reported d13C values were measured separately in an IRMS (isotope ratio mass spectrometer). They are NOT the AMS d13C which would include fractionation effects from natural, chemistry and AMS induced sources.

Our invoice has been sent separately. Thank you for your prior efforts in arranging payment. As always, if you have any questions or would like to discuss the results, don't hesitate to contact me.

)

Digital signature on file



4985 S.W. 74 COURT MIAMI, FLORIDA, USA 33155 PH: 305-667-5167 FAX:305-663-0964 beta@radiocarbon.com

## REPORT OF RADIOCARBON DATING ANALYSES

Ms. Heather Olson

Report Date: 1/18/2016

Public Archaeology Laboratory, Incorporated

Material Received: 1/8/2016

Sample Data	Measured Radiocarbon Age	d13C	Conventional Radiocarbon Age(*)
E-Muse control is a control of control of the activation of the desired from the rest of the control of the con		and the second section of the supplemental second second second second section in the second section is a first end of the second secon	ного да преставувания принципальный два от воздать по на преставувает принципального в сег у так и по до тиче
Beta - 428346	860 +/- 30 BP	-26.3 o/oo	840 +/- 30 BP
SAMPLE: 3094-01			
ANALYSIS: AMS-Standard deli	The second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second secon		
2 SIGMA CALIBRATION:	: (charred material): acid/alkali/acid Cal AD 1155 to 1260 (Cal BP 795 to 690)		
2 SIGNIA CALIBICATION .	Cai AD 1133 to 1200 (Cai Di 733 to 030)		_
D	070 + / 20 DD	260 -1	040 I / 20 DD
Beta - 428347 SAMPLE: 3094-02	870 +/- 30 BP	-26.8 o/oo	840 +/- 30 BP
ANALYSIS: AMS-Standard deli	verv		
	: (charred material): acid/alkali/acid		
2 SIGMA CALIBRATION :	Cal AD 1155 to 1260 (Cal BP 795 to 690)		
			-
Beta - 428348	670 +/- 30 BP	-27.5 0/00	630 +/- 30 BP
SAMPLE: 3094-03			
ANALYSIS: AMS-Standard deli			
2 SIGMA CALIBRATION:	: (charred material): acid/alkali/acid Cal AD 1285 to 1400 (Cal BP 665 to 550)		
2 SIGMA CALIBRATION .	Cal AD 1283 to 1400 (Cal Br 003 to 330)		_
		~	0.40 + 4.00 PP
Beta - 428349	340 +/- 30 BP	-24.9 o/oo	340 +/- 30 BP
SAMPLE: 3094-04 ANALYSIS: AMS-Standard deli	in or a		
	: (charred material): acid/alkali/acid		
2 SIGMA CALIBRATION :	Cal AD 1455 to 1645 (Cal BP 495 to 305)		
	,		

Dates are reported as RCYBP (radiocarbon years before present, "present" = AD 1950). By international convention, the modern reference standard was 95% the 14C activity of the National Institute of Standards and Technology (NIST) Oxalic Acid (SRM 4990C) and calculated using the Libby 14C half-life (5568 years). Quoted errors represent 1 relative standard deviation statistics (68% probability) counting errors based on the combined measurements of the sample, background, and modern reference standards. Measured 13C/12C ratios (delta 13C) were calculated relative to the PDB-1 standard.

The Conventional Radiocarbon Age represents the Measured Radiocarbon Age corrected for isotopic fractionation, calculated using the delta 13C. On rare occasion where the Conventional Radiocarbon Age was calculated using an assumed delta 13C, the ratio and the Conventional Radiocarbon Age will be followed by "*". The Conventional Radiocarbon Age is not calendar calibrated. When available, the Calendar Calibrated result is calculated from the Conventional Radiocarbon Age and is listed as the "Two Sigma Calibrated Result" for each sample.



4985 S.W. 74 COURT MIAMI, FLORIDA, USA 33155 PH: 305-667-5167 FAX:305-663-0964 beta@radiocarbon.com

## REPORT OF RADIOCARBON DATING ANALYSES

Ms. Heather Olson

2 SIGMA CALIBRATION :

Report Date: 1/18/2016

Sample Data	Measured Radiocarbon Age	d13C	Conventional Radiocarbon Age(*)
Beta - 428350 SAMPLE : 3094-05	860 +/- 30 BP	-25.7 o/oo	850 +/- 30 BP
ANALYSIS: AMS-Standard delive MATERIAL/PRETREATMENT: 2 SIGMA CALIBRATION:			
Beta - 428351 SAMPLE: 3094-06 ANALYSIS: AMS-Standard delive	30 +/- 30 BP	-8.5 o/oo	300 +/- 30 BP

Cal AD 1490 to 1655 (Cal BP 460 to 295)

Dates are reported as RCYBP (radiocarbon years before present, "present" = AD 1950). By international convention, the modern reference standard was 95% the 14C activity of the National Institute of Standards and Technology (NIST) Oxalic Acid (SRM 4990C) and calculated using the Libby 14C half-life (5568 years). Quoted error represent 1 relative standard deviation statistics (68% probability) counting errors based on the combined measurements of the sample, background, and modern reference standards. Measured 13C/12C ratios (delta 13C) were calculated relative to the PDB-1 standard.

MATERIAL/PRETREATMENT: (charred material): acid/alkali/acid

The Conventional Radiocarbon Age represents the Measured Radiocarbon Age corrected for isotopic fractionation, calculated using the delta 13C. On rare occasion where the Conventional Radiocarbon Age was calculated using an assumed delta 13C, the ratio and the Conventional Radiocarbon Age will be followed by "*". The Conventional Radiocarbon Age is not calendar calibrated. When available, the Calendar Calibrated result is calculated from the Conventional Radiocarbon Age and is listed as the "Two Sigma Calibrated Result" for each sample.

(Variables: C13/C12 = -26.3 o/oo : lab. mult = 1)

Laboratory number

Beta-428346: 3094-01

Conventional radiocarbon age

840 ± 30 BP

Calibrated Result (95% Probability)

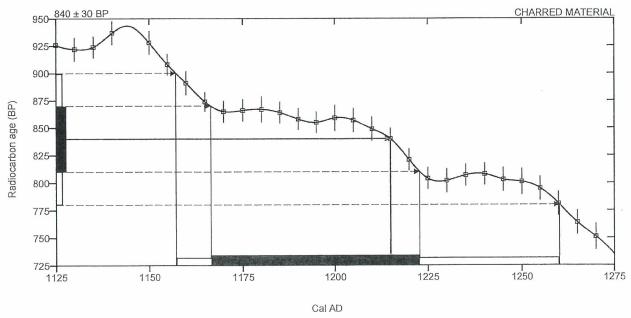
Cal AD 1155 to 1260 (Cal BP 795 to 690)

Intercept of radiocarbon age with calibration curve

Cal AD 1215 (Cal BP 735)

Calibrated Result (68% Probability)

Cal AD 1165 to 1225 (Cal BP 785 to 725)



#### Database used

INTCAL13

#### References

Mathematics used for calibration scenario

A Simplified Approach to Calibrating C14 Dates, Talma, A. S., Vogel, J. C., 1993, Radiocarbon 35(2):317-322

References to INTCAL13 database

(Variables: C13/C12 = -26.8 o/oo : lab. mult = 1)

Laboratory number

Beta-428347: 3094-02

Conventional radiocarbon age

840 ± 30 BP

Calibrated Result (95% Probability)

Cal AD 1155 to 1260 (Cal BP 795 to 690)

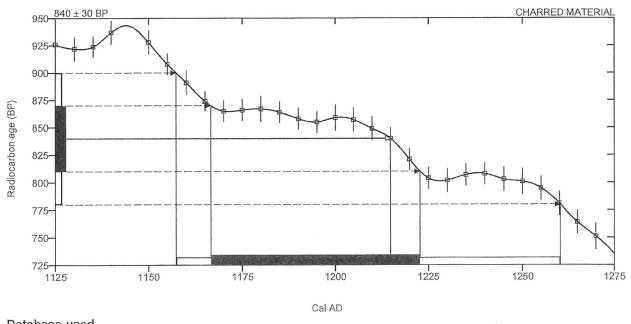
Intercept of radiocarbon age with calibration

curve

Cal AD 1215 (Cal BP 735)

Calibrated Result (68% Probability)

Cal AD 1165 to 1225 (Cal BP 785 to 725)



## Database used INTCAL13

#### References

Mathematics used for calibration scenario

A Simplified Approach to Calibrating C14 Dates, Talma, A. S., Vogel, J. C., 1993, Radiocarbon 35(2):317-322

References to INTCAL13 database

(Variables: C13/C12 = -27.5 o/oo : lab. mult = 1)

Laboratory number

Beta-428348: 3094-03

Conventional radiocarbon age

630 ± 30 BP

Calibrated Result (95% Probability)

Cal AD 1285 to 1400 (Cal BP 665 to 550)

Intercept of radiocarbon age with calibration

curve

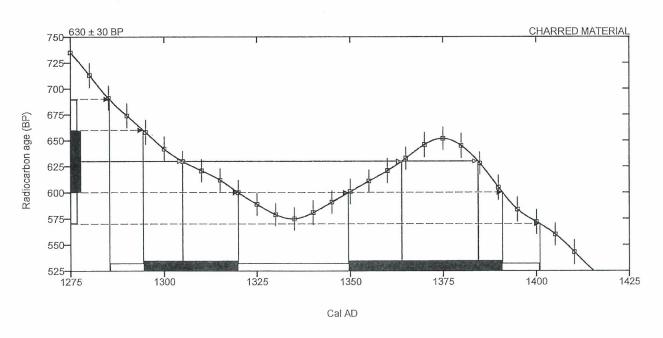
Cal AD 1305 (Cal BP 645)

Cal AD 1365 (Cal BP 585)

Cal AD 1385 (Cal BP 565)

Calibrated Result (68% Probability)

Cal AD 1295 to 1320 (Cal BP 655 to 630) Cal AD 1350 to 1390 (Cal BP 600 to 560)



## Database used

#### References

Mathematics used for calibration scenario

A Simplified Approach to Calibrating C14 Dates, Talma, A. S., Vogel, J. C., 1993, Radiocarbon 35(2):317-322

References to INTCAL13 database

(Variables: C13/C12 = -24.9 o/oo : lab. mult = 1)

Laboratory number

Beta-428349: 3094-04

Conventional radiocarbon age

340 ± 30 BP

Calibrated Result (95% Probability)

Cal AD 1455 to 1645 (Cal BP 495 to 305)

Intercept of radiocarbon age with calibration

curve

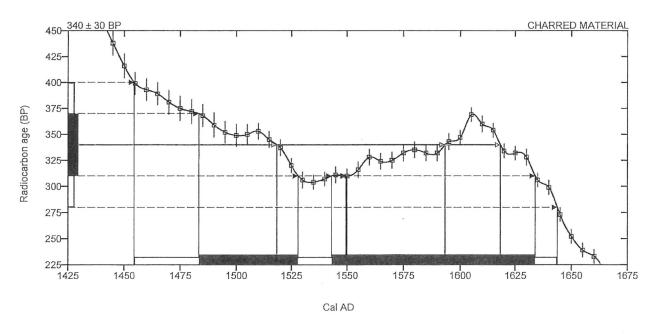
Cal AD 1520 (Cal BP 430)

Cal AD 1595 (Cal BP 355)

Cal AD 1620 (Cal BP 330)

Calibrated Result (68% Probability)

Cal AD 1485 to 1530 (Cal BP 465 to 420) Cal AD 1545 to 1635 (Cal BP 405 to 315)



## Database used

#### References

Mathematics used for calibration scenario

A Simplified Approach to Calibrating C14 Dates, Talma, A. S., Vogel, J. C., 1993, Radiocarbon 35(2):317-322

References to INTCAL13 database

(Variables: C13/C12 = -25.7 o/oo: lab. mult = 1)

Laboratory number

Beta-428350: 3094-05

Conventional radiocarbon age

850 ± 30 BP

Calibrated Result (95% Probability)

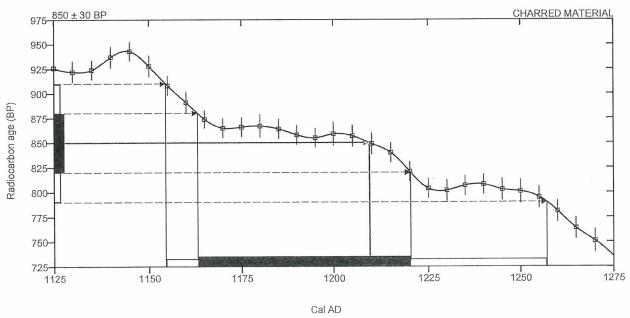
Cal AD 1155 to 1255 (Cal BP 795 to 695)

Intercept of radiocarbon age with calibration curve

Cal AD 1210 (Cal BP 740)

Calibrated Result (68% Probability)

Cal AD 1165 to 1220 (Cal BP 785 to 730)



## Database used

#### References

Mathematics used for calibration scenario

A Simplified Approach to Calibrating C14 Dates, Talma, A. S., Vogel, J. C., 1993, Radiocarbon 35(2):317-322

References to INTCAL13 database

(Variables: C13/C12 = -8.5 o/oo : lab. mult = 1)

Laboratory number

Beta-428351: 3094-06

Conventional radiocarbon age

300 ± 30 BP

Calibrated Result (95% Probability)

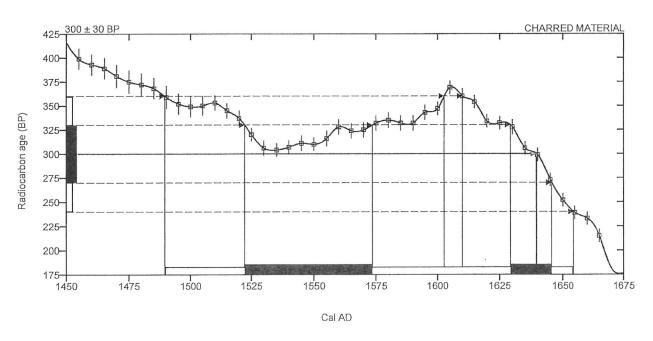
Cal AD 1490 to 1655 (Cal BP 460 to 295)

Intercept of radiocarbon age with calibration curve

Cal AD 1640 (Cal BP 310)

Calibrated Result (68% Probability)

Cal AD 1520 to 1575 (Cal BP 430 to 375) Cal AD 1630 to 1645 (Cal BP 320 to 305)



## Database used

#### References

Mathematics used for calibration scenario

A Simplified Approach to Calibrating C14 Dates, Talma, A. S., Vogel, J. C., 1993, Radiocarbon 35(2):317-322

References to INTCAL13 database

## APPENDIX C PROJECT CORRESPONDENCE



# WARWICK SEWER AUTHORITY 125 ARTHUR W. DEVINE BLVD. WARWICK, RHODE ISLAND 02886

TEL 401-739-4949

November 25, 2008

Lois K. Adams, Chief Grants, Tribal & Municipal Assistance Branch Office of Ecosystems Protection U.S. Environmental Protection Agency, Region I 1 Congress Street, Suite 1100 (CSP) Boston, MA 02114-2023

Dear Ms. Adams:

I would like to thank you again for organizing that meeting on September 12th between the Environmental Protection Agency (EPA), the Narragansett Indian Tribal Historical Preservation Officers (NITHPO), and the Warwick Sewer Authority (WSA). I am writing as a follow up to that meeting as we have not heard from you since then. I am curious to know if you have made any progress in your discussions with the NITHPO regarding WSA's archaeological findings in the Bayside sewer project area.

As you know, WSA would like to keep moving forward in its design of the Bayside sewer projects. We are continuing, with due diligence, to determine the extent of archaeological "features" in these project areas but we cannot proceed with final design or possibly redesigning of these projects in light of the archaeological issues unless the consultation process with the Narragansett Indians moves ahead.

WSA would like to assist EPA in any way possible with the consultation process for the Bayside sewer projects. We have provided your office with relevant archaeological studies and report. WSA has also provided the Narragansett Indian tribe with all archaeological reports and findings. WSA believes we have made reasonable opportunities available to the NITHPO to comment on our proposed sewer project, however, we have yet to receive any formal comments, advice, or concerns about the project's possible effects on Narragansett Indian history, artifacts, and/or ancestral burials. I am curious to know whether you have made any progress in your discussions with representatives from the Narragansett Indian tribe regarding an agreement to move forward with the consultation process.

For your information, WSA was approached by a neighborhood association with questions about the status of the Bayside sewer projects. There is a lot of interest from residents because there is a real need for sewers in this area of the City. Although we do

not really have a lot of answers for these residents at this point, we have scheduled a meeting for December 2nd at 7:00 PM at WSA to discuss the Bayside sewer projects. Public input from this meeting may be valuable to you and your staff as you negotiate the consultation process with the Narragansett Indians and I welcome you to attend.

We remain hopeful that EPA can get and keep the National Historic Preservation Act, Section 106 consultation process moving with the Narragansett Indian tribe so that design work can continue on the Bayside sewer projects. Please let me know what WSA can do to assist you with the consultation process.

Sincerely,

Executive Director

ce: WSA Board of Directors

John Brown, Narragansett Indian Tribal Historic Preservation Officer
Doug Harris, Narragansett Indian Deputy Tribal Historic Preservation Officer

Alan Leveillee, Public Archaeology Laboratories

Todd Ravanelle, Gordon R. Archibald, Inc.

James E. Feeney, III, Construction Program Manager

Anthony Simeone, Rhode Island Clean Water Finance Agency



## UNITED STATES ENVIRONMENTAL PROTECTION AGENCY REGION I

## 5 POST OFFICE SQUARE, SUITE 100 BOSTON, MASSACHUSETTS 02109-3912

16 May 2012

Mr. Rick Greenwood, Deputy Director Rhode Island Historical Preservation & Heritage Commission Old State House 150 Benefit Street Providence, RI 02903

Dear Mr. Greenwood:

EPA New England has been coordinating closely with the City of Warwick and the Narragansett Indian Tribe as well as the Rhode Island Historical Preservation & Heritage Commission in the planning and design of the proposed Bayside-Mill Cove sewer project over the past number of years.

As your office is aware, the funding for the construction of the Warwick Sewers project will likely include federal monies. Accordingly, the undertakings are subject to Section 106 of the National Historic Preservation Act of 1966 (NHPA), as amended, and subject to review by the State Historic Preservation Officer (SHPO). The firm of Gordon R. Archibald, Inc, (GRA) contracted with Public Archaeological Laboratory (PAL) to conduct a cultural resource management survey to consider potential historic properties within the undertaking's Area of Potential Effect (APE). This study was completed in 2009.

Based upon the findings of the archaeological study, as summarized in the attached report, EPA New England recommends that this Bayside-Mill Cove site be considered eligible for the National Historical Registry. This recommendation is based upon evidence that the site is representative of a property that is significant in the history of the Nation, the State of Rhode Island, and the Narragansett Indian Tribe. As evidenced in the attached report, the property is significant because the site has the potential to provide new information about the Nation's past. The archaeological findings completed thus far include discovery of a myriad of features and artifacts that provide perspective on aspects of the lives of the Narragansett Indian Tribe's ancestors. Additional proposed archaeological investigations will further reveal the significance and need for protecting this culturally and historically sensitive site.

EPA New England hereby respectfully submits this letter of request for a determination of eligibility of the Bayside-Mill Cove site for the National Historical Registry, supported by the attached survey report that includes the site description and map of the project. Please contact the EPA New England Indian Program Manager, CAPT Michael A. Stover, PE, at (617) 918-1123 if you have any questions, and I look forward to your response to this recommendation for eligibility.

Sincerely,

Lois K. Adams

Chief

Grants, Tribal, Community and Municipal Assistance Branch

cc: Charlotte Taylor, Senior Archaeologist, RIHPC

attachment: Technical Proposal, Warwick Sewer - Bayside - Mill Cove Site, Tidewater Drive

## STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS RHODE ISLAND HISTORICAL PRESERVATION AND HERITAGE COMMISSION

Application for permission to conduct archaeological field investigations (pursuant to the Antiquities Act of Rhode Island, G.L. 42-45 and the R.I. Procedures for Registration and Protection of Historic Properties)

1. Applicant's name and address	
<ul><li>A. Principal Investigator(s):</li><li>B. Field Supervisor(s):</li></ul>	Alan Leveillee, RPA Kirk VanDyke
2. Previous experience (attach vita):	On File
3. Beginning date of project:	July 15, 2015
4. Duration of project:	6 months
5. Location of project:	Please See Attached
<ul><li>6. Ownership:</li><li>7. Scope of project (refer to applicable scope in</li></ul>	Beneath and along municipal roadway- Warwick, RI Survey Standards): Phase I Machine-Assisted Feature Identification
8. Research design (present research problems, tested with data, discuss how data will be mani	formulate hypotheses, discuss how hypotheses will be pulated and hypotheses evaluated).
Attach extra sheets:	Please See Attached
9. Attach budget:	Please See Attached
	The Public Archaeology Laboratory, Inc. 26 Main Street Pawtucket, Rhode Island 02860 Estimated No. of Artifact Boxes: 5.
11. Projected completion of final report and date RIHP&HC:	when a draft review copy will be submitted to

A.

B.

Draft:

Final:

December 2015

January 2016

RIHP&HC, Permit Application Page - 2 -

I, Alan Leveillee, (archaeologist) certify that the information contained in this application is correct, and that I will comply with applicable federal and state legislation, regulations and standards, and any special conditions appended to this application. I understand that any change to the specifications of this permit, the research design, or project scope of work, without the approval of the RIHP&HC, may result in the revocation of this permit and the cessation of archaeological investigations. I also understand that should I fail to satisfy the conditions of this permit (items 7,8,9,10,11) the RIHP&HC may decide not to issue me, or my employer, permits for future projects until the deficiencies under this permit are resolved.

I. Janine Burke, (landowner or project proponent,) agree to comply with applicable federal and state legislation and special conditions attached to this permit. I also agree to maintain adequate security at the project area, and, if determined necessary by the RIHP&HC, will take steps, as required by the RIHP&HC, to prevent trespessers or other unauthorized individuals from causing harm to the archaeological site or sites under investigation.

Permit Effective Date  Sendleron  Approved By Rhode Island Historical Preservation and Heritage Commission	Applicant(s)  Applicant(s)  Mires Durle  Property Owner or Project Proponent
Reviewed By: Charles Tung	, RIHP&HC Staff Archaeologist
See below for any attached Special Conditions that ma	y apply to this permit:
1.) Native American Special Condition Yes_	No
2.) Other Special Conditions Yes _	No
The RIHP&HC reserves the right to amend the terms an information received in the course of the project.	nd conditions of this permit based on new
	Form Revised 1000s

RIHPHC Archaeological Permit: 15-12 Effective date: 06/19/15 - 06/30/16 Project: Tidewater Drive, Warwick

## Special Conditions

The following tribe has stated an interest in this project and in accordance with the RIHPHC's Survey Standards the following items apply:

- 1. The RIHPHC will send a copy of this permitting correspondence to the Narragansett Tribe.
- The project archaeologist shall seek the input of the above-referenced tribe in carrying out the
  work. The RIHPHC encourages archaeologists and the tribe to maintain cooperative and
  collegial relationships and to share information about work in progress.
- The project archaeologist shall inform the tribe when fieldwork will begin.
- The project archaeologist shall send copies of the draft and final report or management memo to the tribe.
- The RIHPHC will notify the tribe when the archaeological report or management memo is accepted and what further work (if any) the RIHPHC has required.



June 16, 2015

Charlotte Taylor Senior Archaeologist Rhode Island Historical Preservation and Heritage Commission 150 Benefit Street Providence, Rhode Island 02903

Re: Warwick Sewers- Tidewater Drive Machine-assisted Phase I Archaeological Feature Identification PAL #3094

Dear Ms. Taylor:

Enclosed please find a scope of work and a RIHPHC permit application for PAL to conduct machine-assisted Phase I Archaeological Feature Identification along Tidewater Drive in Warwick, Rhode Island. The investigation is a planning element of proposed new sewer construction in the Warwick Neck section of the city. Previous archaeological survey in this area resulted in the discovery of the Mill Cove Site, a significant Native American cultural resource dating to the pre-contact, contact, and early English settlement periods. We anticipate the fieldwork to begin in July or August, 2015 and continue through the early autumn.

If you have any questions or require additional information please don't hesitate to contact Deborah C. Cox, President or at your convenience.

Regards,

Alan Leveillee, RPA Senior Archaeologist

Enclosure



November 10, 2015

Charlotte Taylor Senior Archaeologist Rhode Island Historical Preservation and Heritage Commission 150 Benefit Street Providence, Rhode Island 02903

Re: Warwick Sewers-Tidewater Drive

Machine-assisted Phase I Archaeological Feature Identification

PAL #3094

Dear Ms. Taylor:

Enclosed please find a scope of work for PAL to conduct archaeological feature excavation and analyses of 28 features along Tidewater Drive in Warwick, Rhode Island. We request an amendment to existing RIHPHC Permit # 12012 issued by you on June 19, 2015. We would like to schedule the work to begin the week of November 16, 2015.

If you have any questions or require additional information please don't hesitate to contact Deborah C. Cox, President or me at your convenience.

Regards,

Alan Leveillee, RPA Senior Archaeologist

Enclosure

# STATE OF THE AMO

## STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS

#### HISTORICAL PRESERVATION & HERITAGE COMMISSION

Old State House • 150 Benefit Street • Providence, R.I. 02903-1209

TEL (401) 222-2678

FAX (401) 222-2968

TTY / Relay 711

Website www.preservation.ri.gov

16 November, 2015

Alan Leveillee PAL, Inc 26 Main Street Pawtucket, RI 02860

Re:

Warwick Sewers-Tidewater Drive

Phase I Archaeological Feature Identification

Top of

Dear Mr. Leveillee,

The Rhode Island Historical Preservation and Heritage Commission has reviewed the scope of work for the investigation of selected features beneath Tidewater Drive. The original permit (#15-12) issued to you for the machine investigation of Tidewater Drive covers the investigation of features, and is valid till the end of June, 2016. We therefore have no objection to PAL starting work on this phase of the project.

These comments are provided in accordance with Section 106 of the National Historic Preservation Act. If you have any questions, please contact Charlotte Taylor, Senior Archaeologist at this office.

Very truly yours,

Edward F. Sanderson

**Executive Director** 

State Historic Preservation Officer

Cc: John Brown, NTHPO

151116.03



## UNITED STATES ENVIRONMENTAL PROTECTION AGENCY REGION I

#### 5 POST OFFICE SQUARE, SUITE 100 BOSTON, MASSACHUSETTS 02109-3912

February 4, 2016

Mr. Rick Greenwood
Deputy Director
Rhode Island Historical Preservation & Heritage Commission
Old State House
150 Benefit Street
Providence, RI 02903

RE: Notification of Potential Adverse Effect - Mill Cove/Bayside Sewer Project, Warwick, RI

#### Dear Mr. Greenwood:

EPA has been coordinating closely with the City of Warwick and the Narragansett Indian Tribe as well as the Rhode Island Historical Preservation & Heritage Commission (RIHPHC) in the planning and design of the proposed Mill Cove/Bayside sewer project over the past number of years. Funding for the construction of this project will include EPA State Revolving Fund (SRF) financial assistance. As a result, the project is a federal "undertaking" as defined in the Advisory Council of Historic Preservation (ACHP) regulations at 36 CFR 800.16(y).

As a result and in accordance with section 106 of the National Historic Preservation Act, to assess the effects of this undertaking on historic properties, Public Archaeological Laboratory (PAL) conducted a cultural resource management survey. This survey identified potential historic properties within the project's Area of Potential Effect (APE). Based upon the findings of the initial 2009 archaeological study, in 2012, EPA recommended that the Mill Cove/Bayside sewer project APE be considered eligible for listing on the National Register of Historic Places. In April 2012, the RIHPHC concurred with this recommendation.

From November through December 2015, PAL conducted an archaeological investigation of a proposed sewer alignment along Tidewater Drive. The investigation revealed numerous tribal historic properties, including two human burials, as indicated in the attached slides from PAL. While this archaeological investigation was conducted to determine whether the proposed sewer project along Tidewater Drive could be constructed to avoid adverse effects on historic properties, it has now become evident, due to the density of features discovered in the relatively small area of exploration, that the construction of this project has the potential to adversely affect historic properties not yet encountered, even if technologies such as directional drilling are employed to minimize the risk of disturbance.

In accordance with 36 CFR 800.4(d)(2), EPA has determined that this federal undertaking has the potential to effect historic properties. EPA invites the RIHPHC and other consulting parties to share their views on the effects, and commits to the assessment of adverse effects, if any, in accordance with 36 CFR 800.5.

As the responsible Federal agency and in accordance with 36 CFR 800.6, EPA is committed to the continuation of consultation with the Narragansett Indian Tribe, RIHPHC, and the City of Warwick. In addition, opportunities for public involvement will be provided to determine appropriate construction methods and technologies to avoid, minimize, or mitigate adverse effects on historic properties to the maximum extent possible. EPA will work with the Town of Warwick, the Narragansett Indian Tribe and the RIHPHC to reach agreement on measures to avoid, reduce or mitigate adverse effects for the project area through the execution of a Memorandum of Agreement. In addition, EPA will notify the ACHP of this finding, and will invite the Council to participate in the consultation process and execution of an MOA.

Please contact the EPA Region 1 Indian Program Manager, CAPT Michael A. Stover, PE, at (617) 918-1123 if you have any questions. I look forward to your working with you to assess and resolve the adverse effects, if any, that could result from this project.

Sincerely,

Ken Moraff

Director, Office of Ecosystem Protection

cc:

Charlotte Taylor, RIHPHC

Tim Ives, RIHPC

Janine Burke, Warwick Sewer Authority John Brown, Narragansett Indian Tribe

Attachment: email transmission from Alan Leveillee, PAL, to Michael Stover, EPA

## NITHPO

## Narragansett Indian Tribal Historic Preservation Office

4425 A South County Trail Charlestown, RI 02813



March 31, 2016

On February 22, 2016, a meeting was held at the Narragansett Indian Tribe Longhouse regarding the Mill Cove sewer project in Warwick, Rhode Island. At this meeting, John Brown, Tribal Historic Preservation Officer, committed to having his office review and comment on a draft Memorandum of Agreement for the project. John Brown also relayed the Tribe's preference that the two human burials are to be preserved in place on Tidewater Drive, and recommended that while process of developing the Memorandum of Agreement continues, a letter of intent be signed by all parties to move forward with the project.

This letter hereby establishes the intent of the signatories to work collaboratively together with the understanding that:

- (1) The parties acknowledge the importance of consultation with the Narragansett Indian Tribe in accordance with all applicable federal and state laws;
- (2) The parties understand that preservation in place is the preferred alternative by the Tribe in the event of discovery of human remains of tribal origin, in the case of the recent and future discoveries;
- (3) The parties understand that the project design will include directional drilling as the means for installing the facilities to the extent possible, and that avoidance of tribal cultural areas is the preferred alternative by drilling and installing sewer facilities at a depth below the likelihood of presence of tribal cultural properties;
- (4) To minimize the risk of disturbing tribal burial related cultural properties resources, the project in its entirety will pre-designed with proposed locations and boundaries of excavation areas (sewer manholes, jack and bore pits, service connections) followed by archaeological investigations accompanied by tribal cultural monitoring in each of these areas;
- (5) If tribal burial related cultural properties resources or features are discovered during the investigations, investigation at that location will halt, the locations will be altered repositioned until suitable alternative locations are found;
- (6) If no alternative solutions are found, then impact mitigation through tribal consultation will be pursued.

This letter of Intent is hereby seened	
10 A 20 A 20 A 20 A 20 A 20 A 20 A 20 A	(Narragansett Indian Tribal Mistoric Preservation Office)
	(Warwick Sewer Authority)
Michael Stover	(Environmental Protection Agency)
MANUFACTURE CONTROL OF THE PARTY OF THE PART	(RIHPHC)

.

•



May 31, 2016

John Brown III Narragansett Indian Tribal Historic Preservation Officer Narragansett Indian Longhouse 4375 South County Trail Charlestown, Rhode Island 02813

Re: Warwick Sewers Bayside Cultural Resource Services PAL #3094

Dear Mr. Brown:

Enclosed please find a copy of the PAL technical report entitled *Archaeological Feature Identification and Evaluation Tidewater Drive Warwick Sewer Bayside Segment, Warwick, Rhode Island* for your review and consideration. We appreciate the significant contributions that you and your tribal colleagues have made to the consultation process and in your efforts to identify and evaluate features within the Mill Cove Site.

If you have any questions or require additional information, please don't hesitate to contact Deborah C. Cox, President, or me at your convenience.

Respectfully,

Alan Leveillee, RPA Senior Archaeologist

Enclosure

cc: Michael Stover, EPA (w/o encl.)
Dr. Timothy Ives, RIHPHC (w/o encl.)
Janine Burke-Wells, WSA (w/o encl.)
Todd Ravenelle, GRA (w/o encl.)



May 2, 2017

Charlotte Taylor Senior Archaeologist Rhode Island Historical Preservation and Heritage Commission 150 Benefit Street Providence, Rhode Island 02903

Re: Warwick Sewers- Tidewater Drive Machine-assisted Archaeological Feature Identification- Lateral Sewer System PAL #3094

Dear Ms. Taylor:

Enclosed please find a scope of work and Permit Application for PAL to conduct machine-assisted archaeological investigations in the Bayside Section of Warwick Neck, in Warwick, Rhode Island. Related archaeology work was conducted under RIHPHC Permit #15-12, issued by your office on June 9, 2015. The results, interpretations, and recommendations of the study conducted under Permit #15-12 were submitted to your office on May 31, 2016.

We request an RIHPHC Archaeological Permit for PAL to conduct Machine-assisted Archaeological Feature Identification study as a planning element for the design and construction of the Bayside Lateral Sewer System. We would like to schedule the work to begin on June 1, 2017.

If you have any questions or require additional information please don't hesitate to contact Deborah C. Cox, President or me at your convenience.

Regards,

Alan Leveillee, RPA

Senior Archaeologist

Enclosure

## STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS RHODE ISLAND HISTORICAL PRESERVATION AND HERITAGE COMMISSION

Application for permission to conduct archaeological field investigations (pursuant to the Antiquities Act of Rhode Island, G.L. 42-45 and the R.I. Procedures for Registration and Protection of Historic Properties)

1. Applicant's name and address	
<ul><li>A. Principal Investigator(s):</li><li>B. Field Supervisor(s):</li></ul>	Alan Leveillee, RPA Kirk VanDyke
2. Previous experience (attach vita):	On File
3. Beginning date of project:	June 1, 2017
4. Duration of project:	June- November, 2017
5. Location of project:	Bayside Sewer Segment, Warwick Neck, RI
6. Ownership:	City Streets- Warwick Sewer Authority Easements
7. Scope of project (refer to applicable scope	e in Survey Standards): Machine-Assisted Feature Identification
8. Research design (present research problem tested with data, discuss how data will be ma	ns, formulate hypotheses, discuss how hypotheses will be inipulated and hypotheses evaluated).
Attach extra sheets:	Please See Attached
9. Attach budget:	Please See Attached
10. Specify repository:	The Public Archaeology Laboratory, Inc. 26 Main Street Pawtucket, Rhode Island 02860 Estimated No. of Artifact Boxes:2.
11 70 1 1 1 1 1 0 0 1 1 1 1 1	

11. Projected completion of final report and date when a draft review copy will be submitted to RIHP&HC:

A. Draft: December 2017

B. Final: February 2018

#### RIHP&HC, Permit Application Page - 2 -

I, <u>Alan Leveillee, RPA</u>, (archaeologist) certify that the information contained in this application is correct, and that I will comply with applicable federal and state legislation, regulations and standards, and any special conditions appended to this application. I understand that any change to the specifications of this permit, the research design, or project scope of work, without the approval of the RIHP&HC, may result in the revocation of this permit and the cessation of archaeological investigations. I also understand that should I fail to satisfy the conditions of this permit (items 7,8,9,10,11) the RIHP&HC may decide not to issue me, or my employer, permits for future projects until the deficiencies under this permit are resolved.

I, <u>Janine Burke-Wells</u>, ( **project proponent**,) agree to comply with applicable federal and state legislation and special conditions attached to this permit. I also agree to maintain adequate security at the project area, and, if determined necessary by the RIHP&HC, will take steps, as required by the RIHP&HC, to prevent trespassers or other unauthorized individuals from causing harm to the archaeological site or sites under investigation.

×17-11 5/11/17-12/	31/17	Dan Carl IPA
Permit Effective Date		Applicant(s)
May 1 Triedy		Jan John Wells
Approved By Rhode Island Historical Preservation and Heritage Commission	(	Property Owner or Project Proponent
Reviewed By: Chura &		, RIHP&HC Staff Archaeologist
See below for any attached Special Conditions that may apply to this permit:		
1.) Native American Special Condition	Yes	No
2.) Other Special Conditions	Yes	No

The RIHP&HC reserves the right to amend the terms and conditions of this permit based on new information received in the course of the project.

Form Revised 10/98



May 23, 2017

John Brown III Narragansett Indian Tribal Historic Preservation Officer Narragansett Indian Tribal Historic Preservation Office 4425A South County Trail Charlestown, Rhode Island 02813

Attn: Nancy Brown-Garcia

Max Garcia

Re: Warwick Sewers Bayside

Lateral Sewers

Cultural Resource Services Fieldwork Commencement

PAL #3094

Dear Mr. Brown:

PAL is scheduling the commencement of machine-assisted archaeological investigations of planned Lateral Sewer construction areas beneath existing roadways within the Mill Cove Site in Warwick, Rhode Island.

In 2015 and 2016, Tribal Monitors were instrumental in working with the Environmental Protection Agency (EPA) and the Warwick Sewer Authority (WSA) to find, evaluate, and protect cultural resources in the planning stages of this important project. PAL appreciates the active participation of your office in our earlier investigations and we invite you and your representatives to rejoin us in the field as the project proceeds. We will begin work in Warwick Neck on Monday June 5, 2017 and continue through November 17, 2017. I will telephone Nancy Brown-Garcia to coordinate the starting time and location.

If you have any questions or require additional information, please don't hesitate to contact Deborah C. Cox, President, or me at your convenience.

Respectfully,

Alan Leveillee, RPA Senior Archaeologist

cc: Michael Stover, EPA

Dr. Timothy Ives, RIHPHC Janine Burke-Wells, WSA Todd Ravenelle, GRA



April 13, 2018

John Brown III Narragansett Indian Tribal Historic Preservation Officer Narragansett Indian Longhouse 4375 South County Trail Charlestown, Rhode Island 02813

Re: Warwick Sewers Bayside Cultural Resource Services PAL #3094

Dear Mr. Brown:

Enclosed please find a copy of the PAL technical report entitled *Bayside Sewer Project Archaeology*, *Discovery*, *Evaluation*, *and Planning for the Shawomet Native American Village-Mill Cove Site*, *Warwick*, *Rhode Island* for your review and consideration. We appreciate the significant contributions that you and your tribal colleagues made to the consultation process and in your efforts to identify and evaluate features within the Mill Cove Site.

If you have any questions or require additional information, please don't hesitate to contact Deborah Cox, President, or me at your convenience.

Respectfully,

Alan Leveillee, RPA Senior Archaeologist

Enclosure

cc: Michael Stover, EPA (w/encl.)
Dr. Timothy Ives, RIHPHC (w/encl.)
Janine Burke-Wells, WSA (w/encl.)
Todd Ravenelle, GRA (w/encl.)

# APPENDIX D

# UNANTICIPATED DISCOVERIES PLAN

# UNANTICIPATED DISCOVERIES PLAN

# PROCEDURES GUIDING THE DISCOVERY OF UNANTICIPATED HISTORIC PROPERTIES AND HUMAN REMAINS: POST-REVIEW DISCOVERIES

# **Bayside Community Sewer Project**

Warwick, Rhode Island

Prepared for:

# WARWICK SEWER AUTHORITY

Prepared by

The Public Archaeology Laboratory, Inc. 26 Main Street Pawtucket, Rhode Island 02860



November 2018

INTRODUCTION	3
STANDARDS/GUIDELINES AND LAWS/REGULATIONS FOR UNANTICIPATED HISTORIC PROPERTIES AND HUMAN	
Remains	3
Rhode Island	3
CONSULTING PARTIES AND INDIAN TRIBES	3
UNANTICIPATED DISCOVERY OF ARCHAEOLOGICAL MATERIALS	4
Cultural Resources Training	4
Notification Procedures	4
UNANTICIPATED DISCOVERY OF HUMAN REMAINS	6
Provisions for Site Security	7
Public Outreach	8
CONTACTS	0

#### INTRODUCTION

The procedures guiding the unanticipated discovery of historic properties and human remains detailed herein ("Procedures") were developed on behalf of the Warwick Sewer Authority (WSA) in consultation with the State Historic Preservation Office (SHPO) at the Rhode Island Historical Preservation & Heritage Commission (RIHPHC), the United States Environmental Protection Agency (EPA), and the Narragansett Indian Tribal Historic Preservation Officer (NITHPO). These Procedures detail the approach that WSA will use during construction activities within the Bayside Community Sewer Project (Project) area of potential effect (APE)¹.

The purpose of the archaeological investigations during the planning of the municipal sewerage project (Project) was to determine the presence or absence of historic properties within the project area. These archaeological investigations were conducted in accordance with Section 106 of the National Historic Preservation Act of 1966 (54 U.S.C. 306108), as amended and it's implementing regulations (36 CFR 800), specifically, those procedures regarding "post-review discoveries" as outlined in 36 CFR 800.13.

# Standards/Guidelines and Laws/Regulations for Unanticipated Historic Properties and Human Remains

#### Federal

- Section 106 of the National Historic Preservation Act of 1966, as amended (54 U.S.C. 306108);
- Secretary of the Interior's Standards and Guidelines for Archeology and Historic Preservation (48 CFR 44716), (1983);
- Advisory Council on Historic Preservation (ACHP): *Policy Statement Regarding Treatment of Burial Sites, Human Remains, and Funerary Objects* (2007); and

### Rhode Island

- Rhode Island SHPO: Performance Standards and Guidelines for Archaeological Projects (Standards for Archaeological Survey) (2015);
- Rhode Island SHPO: Rules and Regulations Pertaining to Registration and Protection of Historic Cemeteries (2012);
- Rhode Island General Laws, Title 23, Chapter 18, Section 11(2)(c) (Rhode Island Cemeteries Act);

### Consulting Parties and Indian Tribes

As part of the Bayside Community Sewer Project, WSA and the U.S. Environmental Protection Agency (EPA) initiated contact with the Rhode Island SHPO, and the Narragansett Indian Tribe, represented by the Narragansett Indian Tribal Historic Preservation Officer (NITHPO) and his

¹ In these Procedures, when the term "WSA" is used, it may also refer to WSA acting through its contractors or consultants.

designated representatives. All contact information for the SHPO, consulting parties, and the NITHPO is included at the end of this document.

# Unanticipated Discovery of Archaeological Materials

# Cultural Resources Training

The identification of archaeological resources requires basic training in order to recognize potential sites. WSA requires that its employees and contractors have an understanding of the nature of cultural resources. As a result, all WSA inspectors and construction contractor personnel will be given training in cultural resource site recognition. These Procedures will be included in construction contractor documents.

The purpose of this training will be to review WSA's commitments regarding cultural resources compliance and to provide an overview of the general cultural history of the project site, in order that construction personnel are aware of the kinds of archaeological resources that may be encountered in the field. In addition, the training program will emphasize the exact procedures to be followed, regarding actions to be taken and notification required in the event of an archaeological resource discovery, including human remains, during construction.

The training will ensure that WSA personnel and construction contractors understand the extent of the archaeological survey program for the Bayside Community Sewer Project and are fully aware of the distinction between sites that have been located and "cleared" under the cultural resource program (i.e., determined to be non-significant or sites that have already undergone data recovery); areas to be avoided; and new discoveries during the construction process.

### Notification Procedures

WSA recognizes that it is possible that previously unknown cultural resource sites could be discovered during project construction, particularly during excavation activities. WSA recognizes the requirement for compliance with federal and state regulations and guidelines regarding the treatment of human remains, if any are discovered. The following details the protocols that will be followed in the event that new cultural resource sites or human remains are discovered during the construction process.

This protocol will be followed in the event of an unanticipated discovery of archaeological materials:

- The WSA Contractor will immediately notify the WSA Executive Director of an unanticipated discovery.
- The Executive Director will direct a *Stop Work* order to the Contractor's Site Foreman to flag or fence off the archaeological discovery location and direct the Contractor to take measures to ensure site security. Any discovery made on a weekend or overnight hours will be protected until all appropriate parties are notified of the discovery. The Contractor will not restart work in the area of the find until the Executive Director has granted clearance.

- The Contractor will indicate the location and date of the discovery on project plans and notify the PAL Archaeologist, will undertake a site visit or otherwise coordinate an on-site archaeological consultation.
- The Archaeologist will assess of the find to determine if it is a potentially significant archaeological site.
- If the find is determined by the Archaeologist to not be a potentially significant archaeological site, the WSA Executive Director will notify the Contractor's Work Foreman to resume work.
- If the Archaeologist determines the find is a potentially significant archaeological site, WSA Executive Director will immediately notify EPA, the SHPO and the THPO of the find. Notifications will be made by WSA within 4 hours.
- WSA will direct the Archaeologist to assess of the find's significance and potential
  project effects. The Archaeologist will dispatch an archaeological team to the site to
  determine the nature and extent of the archaeological resources. WSA and the
  Archaeologist will ensure that the team has full access to the site area and complete this
  investigation in the most expeditious manner possible.
- The Archaeologist will notify WSA and EPA of the team's findings and recommendations, whether the find is assessed not to be significant and request approval for construction to proceed, or describe a proposed scope of work for evaluating the significance of the find and evaluating project effects.
- The Archaeologist will convey this information to the SHPO, NITHPO, and relevant consulting parties.
- If the resource is determined to be a significant archaeological resource and is threatened by project construction, the Archaeologist, at the direction of WSA and in consultation with the EPA, SHPO, NITHPO, and relevant consulting parties, will develop a site mitigation plan.
- At the direction of the WSA, the EPA, and the SHPO, the Archaeologist will implement the archaeological mitigation plan.
- A meeting or site visit may be held with EPA, WSA, SHPO, NITHPO, Archaeologist, and other appropriate parties once the field mitigation has been completed to review the work accomplished.
- Duration of any work stoppage will be contingent upon the significance of the identified archaeological resource(s) and consultation among EPA, WSA, the SHPO, NITHPO and the Archaeologist, and other appropriate parties to determine the appropriate measures to avoid, minimize, or mitigate any adverse effects to the site.

# Unanticipated Discovery of Human Remains

WSA and its contractors will treat any human remains encountered during the Bayside Community Sewer Project in a manner guided by the policy statement adopted by the ACHP: see *Policy Statement Regarding Treatment of Burial Sites, Human Remains, and Funerary Objects*, (Advisory Council February 23, 2007) ("ACHP Policy Statement"), and by the relevant state laws and guidelines. The ACHP policy statement recommends that, when burial sites, human remains, or funerary objects will be or are likely to be encountered in the course of Section 106 review, the following principles should be adhered to:

- **Principle 1:** Participants in the Section 106 process should treat all burial sites, human remains, and funerary objects with dignity and respect.
- **Principle 2:** Only through consultation, which is the early and meaningful exchange of information, can a federal agency make an informed and defensible decision about the treatment of burial sites, human remains, and funerary objects.
- **Principle 3:** Native Americans are descendants of original occupants of this country. Accordingly, in making decisions, federal agencies should be informed by and utilize the special expertise of Indian tribes and Native Hawaiian organizations in the documentation and treatment of their ancestors.
- **Principle 4:** Burial sites, human remains, and funerary objects should not be knowingly disturbed unless absolutely necessary, and only after the federal agency has consulted and fully considered avoidance of impact and whether it is feasible to preserve them in place.
- **Principle 5:** When human remains or funerary objects must be relocated, they should be removed carefully, respectfully, and in a manner developed in consultation.
- **Principle 6:** The federal agency is ultimately responsible for making decisions regarding avoidance of impact to or treatment of burial sites, human remains, and funerary objects. In reaching its decisions, the federal agency must comply with applicable federal, tribal, state, or local laws.
- **Principle 7:** Through consultation, federal agencies should develop and implement plans for the treatment of burial sites, human remains, and funerary objects that may be encountered.
- **Principle 8:** In cases where the disposition of human remains and funerary objects is not legally prescribed, federal agencies should proceed following a hierarchy that begins with the rights of lineal descendants, and if none, then the descendant community, which may include Indian tribes and Native Hawaiian organizations.

This protocol is specifically designed for circumstances where human remains are encountered during the construction of the Bayside Community Sewer Project.

• The Contractor will immediately notify the WSA Executive Director of an unanticipated discovery.

- The WSA Executive Director will direct a *Stop Work* order to the Contractor's Site Foreman to flag or fence off the archaeological discovery location and direct the Contractor to take measures to ensure site security. Any discovery made on a weekend or overnight hours will be protected until all appropriate parties are notified of the discovery. The Contractor will not restart work in the area of the find until the Executive Director has granted clearance.
- The WSA Executive Director will indicate the location and date of the discovery on the project plans and notify WSA and EPA.
- At all times human remains will be treated with dignity and respect. Human remains and/or associated artifacts will be left in place and not disturbed. No skeletal remains or materials associated with the remains will be collected or removed until appropriate consultation has taken place and a plan of action has been developed.
- WSA will immediately notify EPA, NITHPO, and SHPO of the find, as well as the Archaeologist, the local police, and the Rhode Island State Medical Examiner's Office.
- WSA will provide an opportunity for local law enforcement and, if necessary, a representative of the chief Medical Examiner's Office, to visit and inspect the site to determine whether the site constitutes a crime scene.
- If it is declared a criminal matter, the Archaeologist will have no further involvement and the decision to declare it a *Cleared Site* for construction will be made by the appropriate legal authorities.
- If the find is determined not to be a criminal matter, WSA will comprehensively evaluate the potential to avoid and/or minimize the Project's effects on the human remains.
  - o If human remains are determined to be Native American, the remains will be left in place and protected from further disturbance until a site-specific work plan for their avoidance or removal can be generated. According to the ACHP Policy Statement, "removal of human remains or funerary objects should occur only when other alternatives have been considered and rejected." The Archaeologist will contact the SHPO and NITHPO to develop a plan of action that is consistent with the Native American Graves Protection and Repatriation Act (NAGPRA) guidance, NAGPRA guidance, the ACHP Policy Statement, and applicable Rhode Island laws.
  - o If human remains are determined to be non-Native American, the remains will be left in place and protected from further disturbance until a site-specific work plan for their avoidance or removal can be generated. Avoidance is the preferred choice of the SHPO. Consultation with the SHPO and other appropriate parties will be required to determine a plan of action.

## **Provisions for Site Security**

Provisions must be made to secure any area containing, or suspected of containing, human remains. If field assessment of human remains or related excavations cannot be completed before

the end of a work day, WSA will provide a security guard to provide constant monitoring of the burial location to prevent unauthorized entry during off-work hours.

If relocation is necessary, temporary work shelters will be erected over individual (or small groups of) graves while they are in the process of being excavated and their remains removed. The shelters will permit adequate interior work space, but will prevent any outside persons from viewing the remains or the relocation process. The shelters will also permit the relocation team to work in most if not all weather conditions.

# Public Outreach

Due to the sensitive nature of the potential remains, WSA will assume all responsibility and authority for making public notifications of the work being conducted. The archaeologist will be to provide to WSA, information on the progress of the investigation for the purposes of public notification and/or attend press conferences or field meetings for that purpose. All public outreach conducted as part of the relocation project will be performed at the request and direction of WSA.

## **CONTACTS**

# Federal Agency

EPA - New England Region 1 5 Post Office Square, Suite 100 Mail Code OEP06-3

Contact: Michael Stover, PE Indian Program Manager Tel: (617) 918-1123

Email: stover.michael@EPA.gov

## Medical Examiner

Rhode Island Office of the Chief Medical Examiner 48 Orms Street Providence, Rhode Island 02904 Contact: Alexander Chirkov, MD Tel: (401) 222-5500

#### State Police

Appropriate State Police Barracks

Contact: Tel: 911

# State Historic Preservation Office

Rhode Island Historical Preservation & Heritage Commission Old State House 150 Benefit Street Providence, Rhode Island 02903

Contact: Timothy Ives,

Principal Archaeologist Tel: (401) 222-4139

Email: timothy.ives@preservation.ri.gov

## **Tribal Contacts**

Narragansett Indian Tribe Narragansett Indian Longhouse 4425D South County Trail Charlestown, Rhode Island 02813

Contact: John Brown, III,

Tribal Historic Preservation Officer

Tel: (401) 539-1190

Email: jb@nithpo.com Nancy Garcia Brown

Deputy Tribal Historic Preservation Officer

Tel: (401) 952-7225

Email: imbabywoman@yahoo.com

# Project Engineer

Gordon R. Archibald, Inc.

200 Main Street

Pawtucket, Rhode Island 02860

Contact: Todd Ravenelle

Senior Vice President Tel: (401) 728-1533

Email: travenelle@graengs.com

# City

Warwick Sewer Authority

125 Arthur W. Devine Blvd., Suite B

Warwick, Rhode Island 02886

Contact: Janine Burke-Wells

Executive Director Tel: (401) 468-4700

Email: Janine.Burke-Wells@warwickri.com

# Archaeologist

The Public Archaeology Laboratory, Inc.

26 Main Street

Pawtucket, Rhode Island 02860

Contact: Deborah C. Cox

President

Tel: (401) 288-6301 Email: <u>dcox@palinc.com</u>

Joseph Waller

Senior Archaeologist Tel: (401) 288-6311

Email: jwaller@palinc.com





# Soil Erosion and Sediment Control Plan For:

# BAYSIDE SEWER SYSTEM PRESSURE SEWERS CONTRACT NO. 86B

Warwick, Rhode Island

Assessor's Plats 335, 355, 356 and 380

	Warwick Sewer Authority
Owner:	Janine Burke-Wells, Executive Director 125 Arthur W. Devine Boulevard Warwick, RI 02886 (401) 468-4710
	Company Name
	Name
Operator:	Address
TO BE DETERMINED UPON CONTRACT AWARD	City, State, Zip Code
CONTROL AWARD	Telephone Number
	Email Address
Estimated Project Dates:	Start Date: 2019 (TBD)
	Completion Date: 2021 (TBD)
	Gordon R. Archibald, Inc.
	Todd A. Ravenelle, P.E., Senior Vice President
SESC Plan Prepared By:	200 Main Street Pawtucket, RI 02860 (401) 726-4084 travenelle@graengs.com Rhode Island P.E. No. 5928
SESC Plan Preparation Date:	January 31, 2019
SESC Plan Revision Date:	

Revision Date: 1/20/2017

**OPERATOR CERTIFICATION** 

Upon contract award, the OPERATOR must sign this certification statement before

construction may begin.

I certify under penalty of law that this document and all attachments were prepared under the direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that it is the responsibility of the owner/operator to implement and amend the Soil Erosion and Sediment Control Plan as appropriate in accordance with the requirements of the RIPDES Construction General

Operator Signature:

Permit.

Date

Contractor Representative: Name

Contractor Title: Title

Contractor Company Name: Company Name (if applicable)

Address: Mailing Address

Phone Number: Phone Number

Email Address: Email

# **TABLE OF CONTENTS**

OPERA	ATOR CERTIFICATION	İ
TABLE	OF CONTENTS	ii
	DUCTION	
	ONAL RESOURCES	
SECTIO	ON 1: SITE DESCRIPTION	1
1.1	Project/Site Information	
1.3	Natural Heritage Area Information	2
1.4	Historic Preservation/Cultural Resources	2
SECTIO	ON 2: EROSION, RUNOFF, AND SEDIMENT CONTROL	3
2.1	Avoid and Protect Sensitive Areas and Natural Features	3
2.2	Minimize Area of Disturbance	
2.3	Minimize the Disturbance of Steep Slopes	7
2.4	Preserve Topsoil	
2.5	Stabilize Soils	
2.6	Protect Storm Drain Outlets	g
2.7	Establish Temporary Controls for the Protection of Post-Construction	
	Stormwater Treatment Practices	
2.8	Divert or Manage Run-on from Up-gradient Areas	10
2.9	Retain Sediment Onsite through Structural and Non-Structural Practices	
2.10	Properly Design Constructed Stormwater Conveyance Channels	
2.11	Erosion, Runoff, and Sediment Control Measure List	
SECTIO	ON 3: CONSTRUCTION ACTIVITY POLLUTION PREVENTION	
3.1	Existing Data of Known Discharges from Site	
3.2	Prohibited Discharges	
3.3	Proper Waste Disposal	
3.4	Spill Prevention and Control	
3.5	Control of Allowable Non-Stormwater Discharges	
3.6	Control Dewatering Practices	
3.7	Establish Proper Building Material Staging Areas	
3.8	Minimize Dust	
3.9	Designate Washout Areas	
3.10	Establish Proper Equipment/Vehicle Fueling and Maintenance Practices	
3.11	Chemical Treatment for Erosion and Sediment Control	
	Construction Activity Pollution Prevention Control Measure List	29
	ON 4: CONTROL MEASURE INSTALLATION, INSPECTION, and	
	ENANCE	
4.1	Installation	
4.2	Monitoring Weather Conditions	
4.3	Inspections	
4.4	Maintenance	
4.5	Corrective Actions	
CECTIC	ON 5. AMENIOMENTS	23

SECTION 6: RECORDKEEPING	34
SECTION 7: PARTY CERTIFICATIONS	35
LIST OF ATTACHMENTS	36

This Table of Contents is structured to be automatically populated by Microsoft Word. Upon final completion of this template, "right-click" anywhere in the Table of Contents, select "Update Field", and then "Update entire table". Page numbers will automatically be synced with the changed document.

# INTRODUCTION

The purpose of erosion, runoff, and sedimentation control measures is to prevent pollutants from leaving the construction site and entering waterways or environmentally sensitive areas during and after construction. This SESC Plan has been prepared prior to the initiation of construction activities to address anticipated worksite conditions. The control measures depicted on the site plan and described in this narrative should be considered the minimum measures required to control erosion, sedimentation, and stormwater runoff at the site. Since construction is a dynamic process with changing site conditions, it is the operator's responsibility to manage the site during each construction phase so as to prevent pollutants from leaving the site. This may require the operator to revise and amend the SESC Plan during construction to address varying site and/or weather conditions, such as by adding or realigning erosion or sediment controls to ensure the SESC Plan remains compliant with the RIPDES Construction General Permit. Records of these changes must be added to the amendment log attached to the SESC Plan, and to the site plans as "red-lined" drawings. Please Note: Even if practices are correctly installed on a site according to the approved plan, the site is only in compliance when erosion, runoff, and sedimentation are effectively controlled throughout the entire site.

It is the responsibility of the site owner and the site operator to maintain the SESC Plan at the site, including all attachments, amendments and inspection records, and to make all records available for inspection by RIDEM during and after construction. (RIPDES CGP - Part III.G)

The site owner, the site operator, and the designated site inspector are required to review the SESC Plan and sign the Party Certification pages (Section 8). The primary contractor (if different) and all subcontractors (if applicable) involved in earthwork or exterior construction activities are also required to review the SESC Plan and sign the certification pages before construction begins.

Any questions regarding the SESC Plan, control measures, inspection requirements, or any other facet of this document may be addressed to the RIDEM Office of Water Resources, at 401-222-4700 or via email: water@dem.ri.gov.

# SOIL EROSION AND SEDIMENT CONTROL PLAN GUIDENCE

# **SECTION 1: SITE DESCRIPTION**

#### 1.1 Project/Site Information

Project/Site Name:

BAYSIDE SEWER SYSTEM PRESSURE SEWERS - CONTRACT NO. 86B

City of Warwick, Rhode Island

The Warwick Sewer Authority (WSA) is advancing construction of the Bayside Sewer System project, which will involve construction of a new low-pressure sanitary sewer collection system, and trunk line in the Bayside neighborhood along Warwick Neck in the City of Warwick, Rhode Island. As depicted on the Site Plans, sewers will be installed through combination of conventional opencut methods and trenchless technologies (e.g., directional drilling), the latter employed to avoid potential impacts in areas of high archaeological sensitivity. Upon completion of the project approximately 800 homes will have sewer service available, allowing for the phase out of individual sewage disposal systems in this densely developed area along the Providence River/Narragansett Bay coastline.

Project Street/Location:

- The Bayside sewershed spans a residential neighborhood along Warwick Neck that accessed by the main collector roads of Tidewater Drive, Harborview Driver, and Palmer Avenue. The sewershed is bound to the north by the Mill Creek and to the east by the coastal waters of Narragansett Bay.
- See Attachment A of this SESC Plan for a General Location Map.

Provide construction site estimates of the total area of the site and the total area of the site that is expected to undergo soil disturbance.

The following are estimates of the construction site area:

• Total Project Area 350 acres

(City rights-of-way)

Total Project Area to be Disturbed
 3 acres

The nature of the sewer construction (excavation for installation of structures, trenchless technologies, etc.) combined with the need to maintain local traffic is such that no more 5,000 square feet (0.1 acre) of roadway pavements will be open at any given time during construction. In accordance with local ordinance, all excavations will be paved within 3 days of the work.

☐ Yes ☐ No The Limits of Disturbance have been marked in the field

# 1.3 Natural Heritage Area Information

#### RIPDES CGP - Part III.H

Each project authorized under the RIPDES Construction General Permit must determine if the site is within or directly discharges to a Natural Heritage Area (NHA). DEM Natural Heritage Areas include known occurrences of state and federal rare, threatened and endangered species. Review RIDEM NHA maps to determine if there are natural heritage areas on or near the construction site that may be impacted during construction. For more information you may contact the RIDEM Rhode Island Natural Heritage Program mailto:plan@dem.ri.gov

Are there any Natural Heritage Areas being disturbed by the construction activity or will discharges be directed to the Natural Heritage Area as a result of the construction activity?

☐ Yes ☐ No

If yes, describe or refer to documentation which determines the likelihood of an impact on this area and the steps that will be taken to address any impacts.

N/A

## 1.4 Historic Preservation/Cultural Resources

The National Historic Preservation Act, and any state, local, and tribal historic preservation laws apply to construction activities. As with endangered species, some permits may specifically require you to assess the potential impact of your stormwater discharges on historic properties. However, whether or not this is stated as a condition for permit coverage, the National Historic Preservation Act and any applicable state or tribal laws apply to you. Contact the Rhode Island Historic Preservation Officer (<a href="http://www.preservation.ri.gov/">http://www.preservation.ri.gov/</a>) or your Tribal Historic Preservation Officer (<a href="http://grants.cr.nps.gov/THPO_Review/index.cfm">http://grants.cr.nps.gov/THPO_Review/index.cfm</a>) for more information.

Are there any historic properties, historic cemeteries or cultural resources on or near the construction site?

Yes	☐ No
Z 1 00	

Describe how this determination was made and summarize state or tribal review comments:

 A Phase 1 Archaeological Assessment of the project area was completed in 2008-2015 by Public Archaeological Laboratory, Inc. and revealed unanticipated discoveries of high historical/cultural sensitivity.

If yes, describe or refer to documentation which determines the likelihood of an impact on this historic property, historic cemetery or cultural resource and the steps taken to address that impact including any conditions or mitigation measures that were approved by other parties.

 The project design has been developed through extensive coordination with consulting parties to avoid potential impacts to archaeological resources. Refer to the Specification Section 01800 – Archaeological Perversions for more information about historical property impact and mitigations.

# SECTION 2: EROSION, RUNOFF, AND SEDIMENT CONTROL

RIPDES Construction General Permit - Part III.J.1 - Erosion, Runoff, and Sediment Controls

The purpose of <u>erosion controls</u> is to prevent sediment from being detached and moved by wind or the action of raindrop, sheet, rill, gully, and channel erosion. Properly installed and maintained erosion controls are the primary defense against sediment pollution.

<u>Runoff controls</u> are used to slow the velocity of concentrated water flows. By intercepting and diverting stormwater runoff to a stabilized outlet or treatment practice or by converting concentrated flows to sheet flow erosion and sedimentation are reduced.

<u>Sediment controls</u> are the last line of defense against moving sediment. The purpose is to prevent sediment from leaving the construction site and entering environmentally sensitive areas.

This section describes the set of control measures that will be installed before and during the construction project to avoid, mitigate, and reduce impacts associated with construction activity. Specific control measures and their applicability are contained in <u>Section Four: Erosion Control Measures</u>, <u>Section Five: Runoff Control Measures</u>, and <u>Section Six: Sediment Control Measures</u> of the *RI SESC Handbook*. The *RI SESC Handbook* can be found at the following address:

http://www.dem.ri.gov/soilerosion2014final.pdf

# 2.1 Avoid and Protect Sensitive Areas and Natural Features

Per RI Stormwater Design and Installation Standards Manual 3.3.7.1:

Areas of existing and remaining vegetation and areas that are to be protected as identified in the Section 1.6 of the SESC Plan must be clearly identified on the SESC Site Plans for each Phase of Construction. Prior to any land disturbance activities commencing on the site, the Contractor shall physically mark limits of disturbance (LOD) on the site and any areas to be protected within the site, so that workers can clearly identify the areas to be protected.

Constraints are identified to ensure a comprehensive understanding of the project and surrounding areas. The first goal in the low impact development (LID) site planning and design process is to avoid disturbance of natural features. This includes identification and preservation of natural areas that can be used in the protection of water resources. It is important to understand that minimizing the hydrologic alteration of a site is just as important as stormwater treatment for resource protection. Therefore, describe all site features and sensitive resources that exist at the site such as, view barriers, steep slopes (>15%) that if disturbed will require additional erosion controls, areas with the potential to receive run-on from off-site areas, wetlands, surface waters, and their riparian buffers, specimen trees, natural vegetation, forest areas, stream crossings, historic properties, historic cemeteries or cultural resources that are to be preserved. **This** 

includes those site features that should be avoided within the designated limits of disturbance. These areas are often identified on a constraints map or in a separate constraints report. For additional discussion on this topic refer to Appendix F. <u>Site Constraint Map</u> of the RI SESC Handbook.

Describe and illustrate on SESC Site Plans Sensitive Areas and Natural Features and how each will be protected during construction activity. Examples of areas to be protected include vegetated buffers, forests, stands of trees on the perimeter and within the site, large diameter trees, areas designated for infiltration (QPAs), bioretention, rain gardens, and OWTS leach fields. Protection for stands of trees and individual trees to be preserved must be specified and such protection must comply with the RI SESC Handbook and extend to the drip line.

Describe and illustrate on SESC Site Plans based on Constraints Map, the areas that will be disturbed with each phase of construction and the control measures (signs, fences, etc.) that will be used to protect those areas that should not be disturbed. This includes marking for limits of disturbance at the perimeter and areas within the limits of disturbance. Acceptable measures include but are not limited to construction fencing (plastic mesh, snow fence, chain link fence etc.) appropriate for the site, boundary markers using construction tape, flagged stakes, etc. for low density use, sediment barriers such as silt fence, compost socks with flagging where also required for sediment control, and signage. The narrative portion of the plan and SESC Site Plans must highlight measures to prevent soil compaction in areas designated as Qualified Pervious Areas (QPAs) and infiltration practices to protect infiltration capacity.

Feature Requiring Protection	Construction Phase #	Method of Protection	Sheet #
Wetlands & Water Body – Old Mill Creek & Apponaug Cove	Trenchless	Staking of LOD, perimeter compost filter sock	10 – Height Ave and Friendship Ave
Wetlands & Water Body – Apponaug Cove &Tributary	Trenchless	Staking of LOD, perimeter compost filter sock	11 – River Vue Ave Tidewater Drive to Posner Ave Posner Ave
Water Body - Apponaug Cove Tributary & Narragansett Bay	Trenchless	Staking of LOD, perimeter compost filter sock	12 – River Vue Avenue Posner Ave to end
Wetlands – Old Mill Creek	Trenchless	Staking of LOD, perimeter compost filter sock	14 – Mill Cove Road Tidewater Drive to West End Mayor Lane
Water Body – Apponaug Cove Tributary	Trenchless	Staking of LOD, perimeter compost filter sock	15 – Mill Cove Road Tidewater Drive to Wentworth Avenue
Water Body – Narragansett Bay	Trenchless	Staking of LOD, perimeter compost filter sock	16 – Mill Cove Road Wentworth Avenue to end Bolster Street
Water Body – Apponaug Cove Tributary & Narragansett Bay	Trenchless	Staking of LOD, perimeter compost filter sock	17 – Lippitt Avenue
Water Body – Apponaug Tributary	Trenchless	Staking of LOD, perimeter compost filter sock	18 – Whipple Avenue Tidewater Drive to Wentworth Avenue
Water Body – Apponaug Tributary	Trenchless	Staking of LOD, perimeter compost filter sock	19 – Cady Avenue Tidewater Drive to Wentworth Avenue
Water Body – Narragansett Bay	Trenchless	Staking of LOD, perimeter compost filter sock	20 – Cady Avenue & Whipple Avenue

			Tidewater Drive to Wentworth Avenue
Wetlands – Old Mill Creek	Open Cut	Staking of LOD, perimeter compost filter sock	22 – Beatrice Terrace & Beatrice Avenue Tidewater Drive to end of cul-de-sac
Wetlands – Old Mill Creek	Open Cut	Staking of LOD, perimeter compost filter sock	23 – Clara Avenue
Water Body – Narragansett Bay	Trenchless	Staking of LOD, perimeter compost filter sock	25 – Lyndon Avenue and Avon Avenue
Water Body – Narragansett Bay	Trenchless	Staking of LOD, perimeter compost filter sock	27 – Pender Avenue
Water body – Narragansett Bay	Trenchless	Staking of LOD, perimeter compost filter sock	28 – Van Zandt Avenue Curry Place Van Zandt Avenue to Pender Avenue
Water body – Narragansett Bay	Trenchless	Staking of LOD, perimeter compost filter sock	30 – Longmeadow Avenue Curry Place to end Shore Avenue
Water Body – Narragansett Bay	Trenchless	Staking of LOD, perimeter compost filter sock	32 – Riverside Avenue Ocean Avenue to end Ocean Avenue Longmeadow Avenue to Riverside Avenue
Water Body – Narragansett Bay	Trenchless	Staking of LOD, perimeter compost filter sock	34 – Park Avenue
Water Body – Narragansett Bay	Trenchless	Staking of LOD, perimeter compost filter sock	35 – Samuel Gorton Avenue
Water Body – Narragansett Bay	Open Cut	Staking of LOD, perimeter compost filter sock	36 – Arlington Avenue Tidewater Drive to end Ocean Avenue Arlington Avenue to Samuel Gorton Ave
Water Body – Narragansett Bay	Open Cut	Staking of LOD, perimeter compost filter sock	37 – Grove Avenue
Wetland	Open Cut	Staking of LOD, perimeter compost filter sock	39 – Lighthouse Lane Bourne Street
Water Body – Narragansett Bay	Open Cut	Staking of LOD, perimeter compost filter sock	44 – Alden Avenue Pyle Avenue to Mayflower Avenue Mayflower Avenue
Water Body – Narragansett Bay	Open Cut	Staking of LOD, perimeter compost filter sock	54 – Burnett Road
Wetland	Open Cut	Staking of LOD, perimeter compost filter sock	55 – Boylston Street Channing Street

Wetland	Open Cut	Staking of LOD, perimeter compost filter sock	56 – Medford Street Melrose Avenue

	1
2.2	Minimize Area of Disturbance
Per RI Stormv	vater Design and Installation Standards Manual 3.3.7.2:
Will >5 acres b	pe disturbed in order to complete this project?
Yes	No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No     No
If yes, phasing	g must be utilized at this site.
Will <5 acres b	be disturbed or will disturbance activities be completed within a six (6) month window?
⊠ Yes	□ No
	g is not required as long as all other performance criteria will be met and phasing is not protect sensitive or highly vulnerable areas.
Sec. 56-16. "O the Contractor and closing th shall subject t requirement to	arwick Ordinance Amendment No. 0-3.0.1 dated February 24, 2003, of Section I, Chapter 56, On all construction projects which require excavation in the roadway of any street in the City, performing the work shall apply pavement to the roadway within three (3) days of backfilling the excavated portion of the roadway. Failure to apply pavement within the three-day period the Contractor to a penalty of \$500.00 per day for each day of the violation. Relief from the papply paving may be granted by the Director of Public Works and the Warwick Sewer weather conditions of other circumstances, which, in his or her discretion, would warrant the panted."
Based on the	answers to the above questions will phasing be required for this project?
☐ Yes	⊠ No
If yes, and pha	asing is required, describe phasing plan as prompted below.
If No, provide	substantive reasons why this was determined to be infeasible.
Phasing is not any given time	required for this project due to the scope of the project and the amount of disturbed area at
PHASING PLA	AN
	se of the construction project, provide site estimates of the total area of the project phase, and of the project phase that is expected to undergo soil disturbance.
The following	are estimates of each phase of the construction project:
(Copy and pas	ste this section for projects with multiple phases)
Phase No. or	Identifier
Total Area of I	
Area to be Dis	turbed acres

### Description of Construction Sequencing for Phase

Proper sequencing of construction activities is essential to maximize the effectiveness of erosion, runoff, and sediment control measures. Construction sequencing of construction activities for each phase must address the following elements:

- 1. Installation of control measures identifying limits of disturbance and areas internal to the site that require protection before start of land disturbance.
- 2. Installation of all erosion, runoff, and sediment controls and temporary pollution prevention measures that are required to be in place and functional <u>before</u> any earthwork begins. This shall be done in accordance with the RI SESC Handbook and/or the RI Department of Transportation Standard Specifications for Road and Bridge Construction (as amended). Upon acceptable completion of site preparation and installation of erosion, runoff, and sediment controls and temporary pollution prevention measures, site construction activities may commence.
- 3. The phasing plan shall address the use of phasing to manage and limit increases in runoff rates and volumes during construction. Designated phases and timing of construction should also address the impacts to important or sensitive habitats.
- 4. Upon commencement of site construction activities, the operator shall initiate appropriate stabilization practices on all disturbed areas as soon as possible, but not more than fourteen (14) days after the construction activity in that area has temporarily or permanently ceased. Such temporary or permanent soil stabilization measures must be installed prior to initiating land disturbance in subsequent phases.
- 5. Routine inspection and maintenance and/or modification of erosion, runoff, and sediment controls and temporary pollution prevention measures <u>while</u> earthwork is ongoing is required.
- 6. Final site stabilization of any disturbed areas <u>after</u> earthwork has been completed and removal of temporary erosion, runoff, and sediment controls and temporary pollution prevention measures.
- 7. Activation of post-construction stormwater treatment conveyances and practices.

Include narrative discussion of the construction sequence for this phase here.

### 2.3 Minimize the Disturbance of Steep Slopes

Per RI Stormwater Design and Installation Standards Manual 3.3.7.3:

Are steep slope	es (>15%) present within the proposed project area?
Yes	⊠ No
If yes, steep slo	pes must be identified on SESC Site Plans.

If yes, also list the specific control measures that will be used to control surface runoff and reduce erosion potential on steep slopes during construction including references to SESC Site Plans where the locations of such control measures are shown. Examples include limiting the number of steep slopes that are disturbed at one time, implementing land grading techniques such as reverse slope benches, diversions, stair steps, and terraced landforms, installation of retaining walls for stabilization of challenging slopes, prevention of soil movement, and slope protection, applying materials for temporary and permanent protection of slopes to prevent erosion such as stone aggregates, rip-rap, erosion control blankets, appropriate spacing of sediment barriers as a function of barrier size, slope, and slope length, geotextile, cellular confinement systems, mattresses (gabions and others), and articulating blocks.

There are no steep slopes within the project limits of disturbance.

# 2.4 Preserve Topsoil

Per RI Stormwater Design and Installation Standards Manual 3.3.7.4:

Site owners and operators must preserve existing topsoil on the construction site to the maximum extent feasible and as necessary to support healthy vegetation, promote soil stabilization, and increase stormwater infiltration rates in the post-construction phase of the project.

Will existing topsoil be preserved at the site?

1 1/		NI.
Yes	$\square$	INO

If Yes, describe how topsoil will be preserved at the site by describing the techniques that will be implemented to achieve appropriate depths of topsoil (4 inch minimum) and identify the locations where topsoil will be restored on SESC Site Plans.

N/A

If No, provide substantive reasons why this was determined to be infeasible.

The nature and scope of the project is such that virtually all surface disturbance will be contained within existing paved roadways. Consequently, no material quantities of topsoil will be disturbed or require preservation. Any incidental disturbances to lawns and grassed areas in the execution of the work will be restored through the placement of loam and seed.

Soil compaction must be minimized by maintaining limits of disturbance throughout construction. In instances where site soils are compacted the site owner and operator must restore infiltration capacity of the compacted soils by tilling or scarifying compacted soils and amending soils as necessary to ensure a minimum depth of topsoil is available in these areas. In areas where infiltrating stormwater treatment practices are located compacted soils must be amended such that they will comply the design infiltration rates.

Identify the methods that will be used to restore and amend topsoil at the site. Include references to plan notes and SESC Site Plan sheet numbers where this information is made available for the site operator.

N/A

#### 2.5 Stabilize Soils

## Per RI Stormwater Design and Installation Standards Manual 3.3.7.5:

Upon completion and acceptance of site preparation and initial installation of erosion, runoff, and sediment controls and temporary pollution prevention measures, the operator shall initiate appropriate temporary or permanent stabilization practices during all phases of construction on all disturbed areas as soon as possible, but not more than fourteen (14) days after the construction activity in that area has temporarily or permanently ceased.

Any disturbed areas that will not have active construction activity occurring within 14 days must be stabilized using the control measures depicted in the SESC Site Plans, in accordance with the *RI SESC Handbook*, and per manufacturer product specifications.

Only areas that can be reasonably expected to have active construction work being performed within 14 days of disturbance will be cleared/grubbed at any one time. It is NOT acceptable to clear and grub the entire construction site if portions will not be active within the 14-day time frame. Proper phasing of clearing and grubbing activities shall include temporary stabilization techniques for areas cleared and grubbed that will not be active within the 14-day time frame.

All disturbed soils exposed prior to October 15 of any calendar year shall be seeded by that date if vegetative measures are the intended soil stabilization method. Any such areas that do not have adequate vegetative stabilization, as determined by the site operator or designated inspector, by November 15, must be stabilized through the use of non-vegetative erosion control measures. If work continues within any of these areas during the period from October 15 through April 15, care must be taken to ensure that only the area required for that day's work is exposed, and all erodible soil must be restabilized within 5 working days. In limited circumstances, stabilization may not be required if the intended function of a specific area of the site necessitates that it remain disturbed (i.e. construction of a motocross track).

Describe controls (i.e., temporary seeding with native vegetation, hydroseeding, mulching, application of rolled erosion control products, etc.) including design specifications and details that will be implemented to stabilize exposed soils where construction activities have temporarily or permanently ceased.

## Temporary Vegetative Control Measures

Temporary vegetative controls are not applicable given the location and nature of the work. Earth
disturbance will be limited to only to the roadway areas for sewer installation by open cut and
trenchless technologies (i.e., drill pits).

# **Temporary Non-Vegetative Control Measures**

• There are no areas of steep slopes on the project that would require more intensive measures.

## Permanent Vegetative Control Measures

No permanent vegetative control measures are applicable for this type of work.

### Permanent Non-Vegetative Control Measures

No permanent non-vegetative control measures are applicable for this type of work.

## 2.6 Protect Storm Drain Outlets

#### Per RI Stormwater Design and Installation Standards Manual 3.3.7.7:

Temporary or permanent outlet protection must be used to prevent scour and erosion at discharge points through the protection of the soil surface, reduction in discharge velocities, and through the promotion of infiltration. Outlets often have high velocity, high volume flows, and require strong materials that will withstand the forces of stormwater. Storm drain outlet control measures also offer a last line of protection against sediment entering environmentally sensitive areas.

All stormwater outlets that may discharge sediment-laden stormwater flow from the construction site must be protected using the control practices depicted on the approved plan set and in accordance with the *RI SESC Handbook*.

Describe controls, including design specifications and details, which will be implemented to protect outlets discharging stormwater from the project.

, ,	or permanent point source discharges be generated at the site as the result of construction os or basins, diversions, and conveyance channels?
⊠ Yes	□ No

If Yes, describe the method(s) of outlet protection specified for each instance where a point source discharge will be generated. In addition, specifically reference SESC Site Plan Sheet Numbers which identify where the outlets will be constructed at the site and the corresponding control measures that will be utilized for their protection including any associated specifications required for their installation and maintenance.

As depicted on the Erosion and Sediment Controls detail sheet of the Site Plans, sump pumps that are used to dewater the open excavation are to discharge directly to a compost filter sock silt trap for stilling and diffuse release. All downgradient storm drain inlets will be further provided with inlet protection devices (catch basin filter bag inserts, compost filter sock).

If No, discuss rationale for not including these elements in the SESC Plan.

N/A

# 2.7 Establish Temporary Controls for the Protection of Post-Construction Stormwater Treatment Practices

Per RI Stormwater Design and Installation Standards Manual 3.3.7.8:

Temporary measures shall be installed to protect permanent or long-term stormwater control and treatment measures as they are installed and throughout the construction phase of the project so that they will function properly when they are brought online.

Examples of temporary control measures that can be used to protect permanent stormwater control measures include: establishing temporary sediment barriers around infiltrating practices, ensuring proper material staging areas and equipment routing (i.e. do not allow construction equipment to compact areas where infiltrating practices will be installed), and by conducting final cleaning of structural long term practices after construction is completed.

List and describe all post-construction stormwater treatment practices that will be installed during the construction process. Next, outline how these measures will be protected during the construction phase of the project to ensure that they will function appropriately once they are brought online.

Will long-term stormwater treatment practices be installed at the site	?

☐ Yes ⊠ No

If Yes, describe the specific long-term stormwater treatment practices that will require protection from sedimentation and compaction. In addition, specifically reference SESC Site Plan Sheet Numbers which identify the location of these practices and the corresponding control measures that will be utilized for their protection including any associated specifications required for their installation and maintenance.

N/A

If No, discuss rationale for not including these elements in the SESC Plan.

There are no long-term stormwater treatment practices that apply to this type of work on this project.

#### 2.8 Divert or Manage Run-on from Up-gradient Areas

Per RI Stormwater Design and Installation Standards Manual 3.3.7.10:

Is stormwater from off-site areas anticipated to flow onto the project area or onto areas where soils will be disturbed?

Г	Yes	$\square$	No
	1165		INO

If Yes, describe the specific runoff control measures (i.e., check dams, water bars, diversions, perimeter dikes, lined waterways, vegetated waterways, temporary line channels, sediment barriers, pipe slope drains, etc.) that will be utilized at the site including references to the SESC Site Plan Sheet Numbers, design specifications and details. See the RI SESC Handbook, Section Five: Runoff Control Measures for additional guidance.

Pre-Construction and Construction sub-watershed maps are included for each phase in this SESC Plan submittal.

Structural control measures will be used to limit stormwater flow from coming onto the project area, and to divert and slow on-site stormwater flow that is expected to impact exposed soils for the purpose of minimizing erosion, runoff, and the discharge of pollutants from the site.

Control measures shall be installed as depicted on the approved plan set and in accordance with the RI SESC Handbook or the RI Department of Transportation Standard Specifications for Road and Bridge Construction. Run-on and Run-off Management								
On-site or Control measure Identified on Sheet # Sheet # Sheet #								
Insert Text	Insert Text	Insert Text		Insert Text				
<b>Insert Text</b>	<b>Insert Text</b>	Insert Text		Insert Text				
<b>Insert Text</b>	<b>Insert Text</b>	Insert Text		Insert Text				

If No, discuss rationale for not including these elements in the SESC Plan.

There are no areas up-gradient of the project limits (streets along which utility trenching will occur) from which any material amount of run-on will occur. What little run-on may occur from adjacent driveways and lawns will continue along existing drainage patterns, and all receiving storm drain inlets will be provided with appropriate inlet protection devices.

## 2.9 Retain Sediment Onsite through Structural and Non-Structural Practices

Per RI Stormwater Design and Installation Standards Manual 3.3.7.12:

Once the erosion control measures and the run-on diversions are identified and located on the plans, the next step to site planning is sediment control and sediment management. Sediment barriers, inlet protection, construction entrances, stockpile containment, temporary sediment traps, and temporary sediment basins must be integrated into the SESC Plan if applicable. Refer to the RI SESC Handbook Section Six: Sediment Control Measures for additional guidance.

Per RI Stormwater Design and Installation Standards Manual 3.3.7.9:

**SEDIMENT BARRIERS** must be installed along the perimeter areas of the site that will receive stormwater from disturbed areas. This also may include the use of sediment barriers along the contour of disturbed slopes to maintain sheet flow and minimize rill and gully erosion during construction. Installation and maintenance of sediment barriers must be completed in accordance with the maintenance requirements specified by the product manufacturer or the *RI SESC Handbook*.

Will sediment barriers be utilized at the toe of slopes and other downgradient areas subject to stormwater impacts and erosion during construction?
⊠ Yes □ No
If Yes, Describe the rationale for selecting control measures to serve as sediment barriers at the toe of slopes and other down gradient areas subject to stormwater impacts during construction. Describe the specific sediment barriers that will be used at the site in the table provided.
If No, discuss rationale for not including these elements in the SESC Plan.
Rhode Island Department of Transportation (RIDOT) standard compost filter sock will be employed as linear sediment barriers at the locations shown on the Site Plans. A 8-inch standard compost filter sock was selected as the appropriate device given its proven effectiveness, diameter appropriate to the limited lengths of slope on the project, and availability to contractors.
Describe rationale for whether or sediment barriers are required at regular intervals along slopes in order to minimize the creation of concentrated flow paths (i.e. rilling, gully erosion) and to encourage sheet flow. Keep in mind that sediment barriers can be placed at the toe, top, face, and at grade breaks of exposed and erodible slopes to shorten slope length and spread runoff as sheet flow. The description of the selected control measures must focus on sediment barrier spacing as a function of slope length and steepness. Refer to the RI SESC Handbook, Section Six: Sediment Control Measure, Straw Wattles, Compost Tubes, and Fiber Rolls Control Measure for additional information on acceptable spacing distances.
Will sediment barriers be utilized along the contour of slopes to maintain sheet flow and minimize rill and gully erosion during construction?
☐ Yes
If Yes, list the specific sediment barriers that will be used at the site in the table provided. Describe the rationale for the locations and spacing frequency selected by the designer based on slope length and steepness. For additional guidance refer to the RI SESC Handbook or sediment barrier manufacturer's

specifications.

SEDIMENT BARRIERS							
Construction Phase #	Sediment Barrier Type	Sediment Barrier is Labeled on Sheet #	Detail is on Sheet #				
Project	Project RIDOT-standard compost filter sock – 8" dia		Erosion & Sediment Controls Details - 2				
Insert Text	Insert Text	Insert Text	Insert Text				
Insert Text	Insert Text	Insert Text	Insert Text				
Insert Text	Insert Text	Insert Text	Insert Text				

If No, discuss rationale for not including these elements in the SESC Plan.

There are no lengthy or steep slopes on the project that are potentially susceptible to rill and gully erosion.

Per RI Stormwater Design and Installation Standards Manual 3.3.7.6:

**INLET PROTECTION** will be utilized to prevent soil and debris from entering storm drain inlets. These measures are usually temporary and are implemented before a site is disturbed. ALL stormwater inlets &/or catch basins that are operational during construction and have the potential to receive sediment-laden stormwater flow from the construction site must be protected using control measures outlined in the *RI SESC Handbook*.

For more information on inlet protection refer to the RI SESC Handbook, Inlet Protection control measure.

### **Maintenance**

The operator must clean, or remove and replace the inlet protection measures as sediment accumulates, the filter becomes clogged, and/or as performance is compromised. Accumulated sediment adjacent to the inlet protection measures should be removed by the end of the same work day in which it is found or by the end of the following work day if removal by the same work day is not feasible.

Describe controls, including design specifications and details, which will be implemented to protect all inlets receiving stormwater from the project during the entire duration of the project. For more information on inlet protection refer to the RI SESC Handbook Inlet Protection control measure.

Do inlets exist adjacent to or within the project area that require temporary protection?					
⊠ Yes	□ No				

If Yes, describe the method(s) of inlet protection, including maintenance requirements and complete the table provided.

The following lists the proposed storm drain inlet types selected from Section Six of the *RI SESC Handbook*. Each row is unique for each phase and inlet protection type.

INLET PROTECTION						
Construction Phase #	Inlet Protection Type	Inlet Protection is labeled on Sheet #	Detail(s) is/are on Sheet #			
Project Catch basin protection (filter bag insert) with compost filter sock shoulder/curb inlet protection where required		Sewer Plans & Profile sheets	Erosion & Sediment Controls Details - 2			
Insert Text	Insert Text	Insert Text	Insert Text			
Insert Text	Insert Text	Insert Text	Insert Text			

If No, discuss rationale for not including these elements in the SESC Plan.

N/A

**CONSTRUCTION ENTRANCES** will be used in conjunction with the stabilization of construction roads to reduce the amount of sediment tracking off the project. This project has avoided placing construction entrances on poorly drained soils where possible. Where poorly drained soils could not be eliminated, the detail includes subsurface drainage.

Any construction site access point must employ the control measures on the approved SESC site plans and in accordance with the *RI SESC Handbook*. Construction entrances shall be used in conjunction with the stabilization of construction roads to reduce the amount of mud picked up by construction vehicles. All construction access roads shall be constructed prior to any roadway accepting construction traffic.

The site owner and operator must:

- 1. Restrict vehicle use to properly designated exit points.
- 2. Use properly designed and constructed construction entrances at all points that exit onto paved roads so that sediment removal occurs prior to vehicle exit.
- 3. When and where necessary, use additional controls to remove sediment from vehicle tires prior to exit (i.e. wheel washing racks, rumble strips, and rattle plates).
- 4. Where sediment has been tracked out from the construction site onto the surface of off-site streets, other paved areas, and sidewalks, the deposited sediment must be removed by the end of the same work day in which the track out occurs. Track-out must be removed by sweeping, shoveling, or vacuuming these surfaces, or by using other similarly effective means of sediment removal.

Will	construction	entrances	he	utilized	at t	the	proposed	construction	site?
v v 111	COLISTIACTION	CHILIANICOS	$\sim$	utilizea	aı	เมเบ	DIODOSCU	COLISTIACTION	i Silo i

☐ Yes ☐ No

If Yes, indicate location(s) of vehicle entrance(s) and exit(s), and stabilization practices used to prevent sediment from being tracked off-site in the table provided. See also RI SESC Handbook, Section Six, Construction Entrances Measure.

CONSTRUCTION ENTRANCE						
Construction Phase #	Soil Type at the Entrance	Entrance is located on Sheet #	Detail is on Sheet #			
Insert Text	Insert Text	Insert Text	Insert Text			
Insert Text	Insert Text	Insert Text	Insert Text			
Insert Text	Insert Text	Insert Text	Insert Text			
Insert Text	Insert Text	Insert Text	Insert Text			

### If No, discuss rationale.

Construction entrances cannot be implemented for trenching / sewer installation operations due to the project location within paved local roads.

**STOCKPILE CONTAINMENT** will be used onsite to minimize or eliminate the discharge of soil, topsoil, base material or rubble, from entering drainage systems or surface waters. All stockpiles must be located within the limit of disturbance, protected from run-on with the use of temporary sediment barriers and provided with cover or stabilization to avoid contact with precipitation and wind where and when practical.

Stock pile management consists of procedures and practices designed to minimize or eliminate the discharge of stockpiled material (soil, topsoil, base material, rubble) from entering drainage systems or surface waters.

For any stockpiles or land clearing debris composed, in whole or in part, of sediment or soil, you must comply with the following requirements:

- 1. Locate piles within the designated limits of disturbance.
- 2. Protect from contact with stormwater (including run-on) using a temporary perimeter sediment barrier.
- 3. Where practicable, provide cover or appropriate temporary vegetative or structural stabilization to avoid direct contact with precipitation or to minimize sediment discharge.

- 4. <u>NEVER</u> hose down or sweep soil or sediment accumulated on pavement or other impervious surfaces into any stormwater conveyance, storm drain inlet, or surface water.
- 5. To the maximum extent practicable, contain and securely protect from wind.

Describe materials expected to be stockpiled or stored on-site and procedures for storage of materials to minimize exposure of the materials to stormwater and to eliminate the discharge of stockpiled material from entering drainage systems and surface waters. Refer to the RI SESC Handbook, Stockpile and Staging Area Management Control Measure for additional guidance. Complete the table provided.

STOCKPILE CONTAINMENT							
Construction Phase #	Run-on measures necessary? (yes/no)	Stabilization or Cover Type	Stockpile Containment Measure	Sheet #			
Project	No	Temporary seeding, tarp or other measures as applicable to contain dust and sediment	RIDOT- standard compost filter sock – 8" dia	Erosion & Sediment Controls Details - 2			
Insert Text	Insert Text	Insert Text	Insert Text	Insert Text			
Insert Text	Insert Text	Insert Text	Insert Text	Insert Text			
Insert Text	Insert Text	Insert Text	Insert Text	Insert Text			

The installation of sewer facilities will require the temporary stockpiling of materials excavated (e.g., pavements and common borrow) along with smaller quantities of sand and store aggregates required for construction. All stockpiles will be sited on paved surfaces to the immediate vicinity of the active trenching operation and be contained by a perimeter of RIDOT-standard compost filter sock (CFS).

### **CONSTRUCTED SEDIMENT STRUCTURES**

If each common drainage location receives water from an area with less than one (1) acre disturbed at a time, this section can be deleted and no sediment traps or basins are required. However, it is important to remember that there is still a requirement to retain sediment on-site. Therefore, if it is in the best professional judgment of the designer, that there is a condition or circumstance which may require structural controls (per Section 3.3.7.13 of the RI Stormwater Design and Installation Standards Manual), this section can be used.

**TEMPORARY SEDIMENT TRAPS** will be utilized onsite. There will be no disturbed drainage areas greater than one acre that will be exposed for longer than six months. Design and sizing calculations in accordance with the *RI SESC Handbook*, Section Six are found in __Insert Text___ of this SESC Plan. A summary of the calculations are provided below:

For Disturbed Areas 1 to 5 Acres – Those areas with a common drainage location that serves an area between one (1) and five (5) acres disturbed at one time, a temporary sediment trap must be provided where attainable and where the sediment trap is only intended to be used for a period of six (6) months or less. For longer term projects with a common drainage location that serves between one (1) and five (5) acres disturbed at one time, a temporary sediment basin must be provided where attainable. Temporary sediment trapping practices must be designed in accordance with the RI SESC Handbook and must be sized to have a total storage volume capable of storing one (1) inch of runoff from the contributing area or one hundred and thirty four (134) cubic yards per acre of drainage area. A minimum of fifty percent (50%)

of the total volume shall be storage below the outlet (wet storage). See RISDISM 3.3.7.12 for requirements and RI SESC Handbook, Section Six: Temporary Sediment Traps Measure for design details.

Are temporary sediment traps required at the site?					
☐ Yes	⊠ No				

If Yes, complete the table provided. If an area greater than one acre will be exposed for longer than 6 months and a sediment trap is proposed, explain why the sediment basin was not attainable.

SEDIMENT TRAPS							
Construction Phase # Exposed Area Trap # Sheet # Detail (acres)							
Insert Text	Insert Text	Insert Text	Insert Text	Insert Text			
Insert Text	Insert Text	Insert Text	Insert Text	Insert Text			
Insert Text	Insert Text	Insert Text	Insert Text	Insert Text			
Insert Text	Insert Text	Insert Text	Insert Text	Insert Text			

Trap #	Wet Storage Volume (cu.ft)	Dry Storage Volume (cu.ft.)	Cleanout Depth (ft)	Provide Reference to Location of Supporting Design and Sizing Calculations
Insert Text	Insert Text	Insert Text	Insert Text	Insert Text
Insert Text	Insert Text	<b>Insert Text</b>	Insert Text	Insert Text
<b>Insert Text</b>	<b>Insert Text</b>	<b>Insert Text</b>	Insert Text	Insert Text
<b>Insert Text</b>	Insert Text	<b>Insert Text</b>	Insert Text	Insert Text

All traps will be functional and installed prior to disturbance in the contributing drainage area. Access for sediment removal is provided on the plans with cleanout depth requirements. The removed sediment will be utilized onsite or disposed of properly off-site.

If No, discuss rationale.

Temporary sediment traps are not required given the nature and areas of disturbance associated with sewer installation.

**TEMPORARY SEDIMENT BASIN(S)** will be utilized onsite. Every effort must be made to prevent erosion and control it near the source.

If the following criterion does not apply to your proposed construction project, then this section may be eliminated from the plan.

For Disturbed Areas of 1 to 5 Acres – Those areas with a common drainage location that serves an area between one (1) and five (5) acres disturbed at one time for longer than six (6) months.

For Disturbed Areas > 5 Acres — Those areas with a common drainage location that serves an area with greater than five (5) acres disturbed at one time, a temporary (or permanent) sediment basin must be provided where attainable until final stabilization of the site is complete. Temporary sediment basins must be designed in accordance with the RI SESC Handbook. The volume of wet storage shall be at least twice the sediment storage volume and shall have a minimum depth of two (2) feet. Sediment storage volume must accommodate a minimum of one year of predicted sediment load as calculated using the sediment volume formula in the RI SESC Handbook. In addition to sediment storage volume and wet storage volume, the sediment basin shall provide adequate residence storage volume to provide a minimum 10 hours

residence time for a ten (10) -year frequency, twenty four (24) hour duration, Type III distribution storm. To the maximum extent practicable, outlet structures must be utilized that withdraw water from the surface of temporary sedimentation basins for the purpose of minimizing the discharge of pollutants. Exceptions may include periods of extended cold weather, where alternative outlets are required during frozen periods. If such a device is infeasible for portions of or the entire construction period justification must be made in the SESC Plan. Describe the reasons sediment basins are required for this project. They may include physical conditions, land ownership, construction operations etc. For design details see RI SESC Handbook Section Six: Temporary Sediment Basins Measure.

Are temporary sediment basins required at the site?				
☐ Yes	No			
If No, discuss rationale.				

The limited amount of disturbance (exposed soils) at any given time during construction (see Section 1.1 of this SESC Plan) do not warrant the implementation of temporary sediment basins.

# If Yes, complete the table provided.

There will be disturbed areas greater than 5 acres and/or disturbed areas greater than one acre but exposed for longer than six months. The basins have been located to intercept runoff only from disturbed areas and minimize interference with other construction activities and construction of utilities. They have been located outside of any natural buffers. The dam height is less than six feet and holds less than fifteen (15) acre-ft.

Modeling, Design and Sizing calculations in accordance with the *RI SESC Handbook*, Section Six are found in __Insert Text___ of this SESC Plan. The designs were also prepared to satisfy Section 3.3.7.13 of the Stormwater Manual and will control Temporary Increases in Stormwater Velocity, Volume, and Peak Flows. A summary of the assumptions and calculations are provided below:

TEMPORARY SEDIMENT BASINS					
Construction Phase #	Exposed Area (acres)	Basin #	Sheet #	Detail found on Sheet#	
Insert Text	Insert Text	Insert Text	Insert Text	Insert Text	
Insert Text	Insert Text	Insert Text	Insert Text	Insert Text	
Insert Text	Insert Text	Insert Text	Insert Text	Insert Text	
Insert Text	Insert Text	Insert Text	Insert Text	Insert Text	

Provide the following tables for each temporary sediment basin. Each basin shall be designed to contain sediment and runoff from the 10-year Type III distribution storm.

SEDIMENT BASIN #1 Pre-Development					
Pre- Construction Cover Type	Contributing Area (acres)	Soil Type	Curve Number	Tc (minutes)	10- Year Type III (cfs, at time t, acre feet)
<b>Insert Text</b>	Insert Text	Insert Text	Insert Text	Insert Text	Insert Text
Insert Text	Insert Text	Insert Text	Insert Text	Insert Text	Insert Text
Insert Text	Insert Text	Insert Text	Insert Text	Insert Text	Insert Text
Total Pre-Construction Volume (cuft): Insert Text					
During Construction					

Construction Cover Type	Contributing Area	Erosion Rates	Curve Number	Tc (minutes)	10-Year Type III (cfs, at time t, acre feet)	
Insert Text	Insert Text	Insert Text	Insert Text	Insert Text	Insert Text	
<b>Insert Text</b>	<b>Insert Text</b>	<b>Insert Text</b>	<b>Insert Text</b>	<b>Insert Text</b>	Insert Text	
<b>Insert Text</b>	<b>Insert Text</b>	<b>Insert Text</b>	<b>Insert Text</b>	<b>Insert Text</b>	Insert Text	
Total Runoff Volume During Construction (cuft): Ins				<b>Insert Text</b>		
	Basin #1					
Pre- Construction Peak Discharge (cfs)	Wet Storage Volume (cuft)	Sediment Storage Volume (cuft)	Residence Storage Volume (cuft)	Outlet Max Discharge Rate (cfs)	Emergency Spillway Discharge Capacity (cfs)	
Insert Text	Insert Text	Insert Text	Insert Text	Insert Text	Insert Text	

Discuss if baffles will be required in order to create effective flow length. The details should contain sediment storage markers.

Describe the surface outlets. Identify whether or not these devices will be infeasible to use during periods of extended cold weather. If periods of extended cold weather are anticipated to be an issue, provide the operator with instructions for discharging from the basin using an alternate method during this period of time. In addition, instruct the operator to document the justification for not using a surface outlet device during frozen periods in the inspection reports associated with these instances.

All sediment basins will be functional and installed prior to disturbance in the contributing drainage area. Access for sediment removal is provided on the plans with cleanout depth specifications. The removed sediment will be utilized onsite or properly disposed of off-site.

## 2.10 Properly Design Constructed Stormwater Conveyance Channels

Conveyances are required to be designed for inlets to temporary sediment basins. The construction site planner must use best professional judgment to determine if additional conveyance design is required for run-on control or in any other location where velocity control is required.

Are temporary stormwater conveyance practices required in order to properly manage runoff within the proposed construction project?

☐ Yes ⊠ No

If Yes, describe the specific control measures that will be used at the site. Provide or attach design calculations associated with each proposed conveyance measure, demonstrating that each one is designed and sized to handle the peak flow from a 10-year, 24-hour, Type III design storm. Note where within the site plans each specified conveyance is depicted, including specifications and construction details.

### N/A

The conveyance will be maintained as depicted on SESC Site Plans and in accordance with the *RI SESC Handbook* and if applicable.

If No, discuss rationale for not including conveyance measures in the SESC Plan.

The nature of the sanitary sewer infrastructure project is such that all pre-project drainage patterns will be maintained. No modifications to existing closed drainage systems are proposed, however, minor relocations/replacements may be required to accommodate sewer installations. Any damaged or deficient drainage structures/piping will be replaced as directed by the Owner.

## 2.11 Erosion, Runoff, and Sediment Control Measure List

Complete the following table for each Phase of construction where Erosion, Runoff, and Sediment Control Measures are located. This table is to be used as part of the SESC Plan Inspection Report – please fill out accordingly.

It is expected that this table and corresponding Inspection Reports will be amended as needed throughout the construction project as control measures are added or modified.

Project					
Location/Station	Control Measure Description/Reference	Maintenance Requirement			
Project-wide, including material stockpiles	Perimeter Barriers – Compost Filter Socks (CFS)  RIDOT Standard Specifications Sections 206, 212  RI Soil Erosion and Sediment Control Handbook	Inspection should be made after each storm event and repair or replacement should be made promptly as needed.  Section 212 – Cleanout of accumulated sediment behind the barrier is necessary if ½ of the original height of CFS becomes filled in with sediment.			
Project-wide, including material stockpiles	Calcium Chloride for Dust Control  RIDOT Standard Specifications  RI Soil Erosion and Sediment Control Handbook	To be applied as need / as directed when weather conditions dictate (e.g., high wind, low moisture conditions)			
Adjacent Roads	Public roads adjacent to a construction site shall be clean at the end of each day	Contractor to conduct street sweeping if construction site sediment is visible			
Project-wide	Pick up of construction trash and debris	All loose trash and debris must be disposed of properly at the end of each working day			
Project-wide Spill prevention / spill containment measures		Ensure that all equipment maintenance and other activities with the potential for release of prohibited discharges are conducted in designated staging/storage areas.  Maintain spill kits and adequate quantities of materials (e.g. absorbents) at readily accessible locations.			

Insert a new table for each additional construction phase.

# SECTION 3: CONSTRUCTION ACTIVITY POLLUTION PREVENTION

Per RI Stormwater Design and Installation Standards Manual 3.3.7.14:

The purpose of construction activity pollution prevention is to prevent day to day construction activities from causing pollution.

This section describes the key pollution prevention measures that must be implemented to avoid and reduce the discharge of pollutants in stormwater. Example control measures include the proper management of waste, material handling and storage, and equipment/vehicle fueling/washing/maintenance operations.

Where applicable, include RI SESC Handbook or the RI Department of Transportation Standard Specifications for Road and Bridge Construction (as amended) specifications.

### 3.1 Existing Data of Known Discharges from Site

Per RIPDES Construction General Permit - Part III.I:

List and provide existing data (if available) on the quality of any known discharges from the site. Examples include discharges from existing stormwater collection systems, discharges from industrial areas of the site, etc.

Are there known discharges from the project area?  ☑ Yes □ No
Describe how this determination was made:
<ul> <li>Closed drainage systems along local streets within the project area discharge to wetlands or Narragansett Bay.</li> </ul>
If yes, list discharges and locations:
<ul> <li>Outfall locations include a wetland that stretches north of Mill Cove Road down to north of Cady Avenue. All other outfall locations head towards Narragansett Bay.</li> </ul>
Is there existing data on the quality of the known discharges?
☐ Yes
If yes, provide data:
• N/A

# 3.2 Prohibited Discharges

Per RI SESC Handbook - Part D

The following discharges are prohibited at the construction site:

 Contaminated groundwater, unless specifically authorized by the DEM. These types of discharges may only be authorized under a separate DEM RIPDES permit.

- Wastewater from washout of concrete, unless the discharge is contained and managed by appropriate control measures.
- Wastewater from washout and cleanout of stucco, paint, form release oils, curing compounds, and other construction materials.
- Fuels, oils, or other pollutants used in vehicle and equipment operation and maintenance. Proper storage and spill prevention practices must be utilized at all construction sites.
- Soaps or solvents used in vehicle and equipment washing.
- Toxic or hazardous substances from a spill or other release.

All types of waste generated at the site shall be disposed of in a manner consistent with State Law and/or regulations.

Will any of the above listed prohibited discharges be generated at the site?	
☐ Yes         No	
If Yes, provide a list of those that will be generated at the site and provide a discussion of how they will managed, including references to the specific SESC Site Plans where such control measures are specific	
N/A	
If No, discuss rationale.	
The contractor will not be permitted to discharge prohibited substances (including all those listed above) use soaps or solvents for vehicle washing at the site.	or
3.3 Proper Waste Disposal	
Per RI SESC Handbook – Part D	
Building materials and other construction site wastes must be properly managed and disposed of ir manner consistent with State Law and/or regulations.	ı a
<ul> <li>A waste collection area shall be designated on the site that does not receive a substan amount of runoff from upland areas and does not drain directly to a waterbody or storm dra</li> </ul>	
All waste containers shall be covered to avoid contact with wind and precipitation.	
Waste collection shall be scheduled frequently enough to prevent containers from overfilling	Э.
<ul> <li>All construction site wastes shall be collected, removed, and disposed of in accordance wastes applicable regulatory requirements and only at authorized disposal sites.</li> </ul>	/ith
<ul> <li>Equipment and containers shall be checked for leaks, corrosion, support or foundation failured or other signs of deterioration. Those that are found to be defective shall be immediate repaired or replaced.</li> </ul>	
Is waste disposal a significant element of the proposed project?	
☐ Yes	

If Yes, identify potential building materials and other construction wastes and document how these wastes will be properly managed and disposed of at the construction site (i.e., trash disposal, sanitary wastes, recycling, and proper material handling). Include references to the specific SESC Site Plans where such control measures are specified.

N/A

If No. discuss rationale.

By its nature, construction the new sewer facilities will not generate significant quantities of waste materials requiring conventional (e.g. landfill) disposal. With the exception of bituminous pavements, all suitable material excavated for the installation of sewers will be used in backfilling.

## 3.4 Spill Prevention and Control

#### Per RI SESC Handbook - Part D

All chemicals and/or hazardous waste material must be stored properly and legally in covered areas, with containment systems constructed in or around the storage areas. Areas must be designated for materials delivery and storage. All areas where potential spills can occur and their accompanying drainage points must be described. The owner and operator must establish spill prevention and control measures to reduce the chance of spills, stop the source of spills, contain and clean-up spills, and dispose of materials contaminated by spills. The operator must establish and make highly visible location(s) for the storage of spill prevention and control equipment and provide training for personnel responsible for spill prevention and control on the construction site.

Are spill prevention and control measures required for this particular project?

☐ Yes	$\boxtimes$	No
-------	-------------	----

If Yes, describe all areas where potential spills can occur, and their accompanying drainage points, and describe the spill prevention and control plan to reduce the chance of spills, stop the source of spills, contain and clean up spills, dispose of materials contaminated by spills, and train personnel responsible for spill prevention and control. Provide the method of establishing and making highly visible the location(s) for the storage of spill prevention equipment. Refer to the RI SESC Handbook, Spill Prevention and Control Plan for guidance.

- Given the nature of the work, the potential for spills arising from construction operations is negligible and generally limited to equipment fuels/oils. The contractor shall be responsible for providing spill kits, including absorbents, physical barriers, etc. to prevent contaminants from being mobilized.
- On-site construction vehicles shall be inspected for oil and fuel leaks daily and provided regular
  preventive maintenance. Any discharge petroleum product shall be cleaned immediately. No
  petroleum products shall be discharged to any drainage practices. Logs should be also
  provided for this activity.

If No. discuss rationale.

By its nature, construction of the project does not require the use of chemicals and will not generate hazardous waste materials of any significant quantity to constitute a spill risk. The contractor shall be responsible for providing spill prevention/control measures for potential releases arising from construction equipment use as described above.

## 3.5 Control of Allowable Non-Stormwater Discharges

Per RIPDES Construction General Permit – Part III.J.2.e:

Discharges not comprised of stormwater are allowed under the RIPDES Construction General Permit but are limited to the following: discharges which result from the washdown of vehicles where no detergents are used; external building wash-down where no detergents are used; the use of water to control dust; firefighting activities; fire hydrant flushing; natural springs; uncontaminated groundwater; lawn watering; potable water sources including waterline flushing; irrigation drainage; pavement wash waters where spills or leaks of toxic or hazardous materials have not occurred (unless all spilled materials have been removed) and where detergents are not used; and foundation or footing drains where flows are not contaminated with process materials such as solvents, or contaminated by contact with soils where spills or leaks of toxic or hazardous materials has occurred. If any of these discharges may reasonably be expected to be present and to be mixed with stormwater discharges, they must be specifically listed here.

and to be mixed with stermwater discharges, they must be specifically listed me	<i>510.</i>
Are there allowable non-Stormwater discharges present on or near the project	area?
☐ Yes	
If yes, list the sources of allowable non-Stormwater discharge(s) associated will each of the allowable non-stormwater discharge(s) identified, describe the conbe implemented at those locations to minimize pollutant contamination of these them from temporary discharges of stormwater during construction.	trols and measures that wi
List of allowable non-stormwater discharge(s) and the associated control meas	sure(s):
N/A	
If any existing or proposed discharges consist of <u>contaminated</u> groundwate <u>authorized</u> under the RIPDES Construction General Permit. These disclese separately by seeking coverage to treat and discharge under a separate RIPDE the RIPDES Remediation General Permit. Contact the RIDEM Office of Permitting Program at 401-222-4700 for application requirements and addition	harges must be permitted ES individual permit or unde Water Resources RIPDES
Are there any known or proposed contaminated discharges, including anticipate operations, planned on or near the project area?	ed contaminated dewatering
☐ Yes	
If yes, list the discharge types and the RIPDES individual permit number(s General Permit Authorization number(s) associated with these discharges.	s) or RIPDES Remediation
<ul> <li>Discharge Type and RIPDES Individual Permit number: N/A</li> </ul>	
Discharge Type and RIPDES Remediation General Permit Authorization	on number: N/A

### 3.6 Control Dewatering Practices

#### Per RI SESC Handbook - Part D

Site owners and operators are prohibited from discharging groundwater or accumulated stormwater that is removed from excavations, trenches, foundations, vaults, or other similar points of accumulation, unless such waters are first effectively managed by appropriate control measures.

Examples of appropriate control measures include, but are not limited to, temporary sediment basins or sediment traps, sediment socks, dewatering tanks and bags, or filtration systems (e.g. bag or sand filters) that are designed to remove sediment. Uncontaminated, non-turbid dewatering water can be discharged without being routed to a control.

At a minimum the following discharge requirements must be met for dewatering activities:

- 1. Do not discharge visible floating solids or foam.
- 2. To the extent feasible, utilize vegetated, upland areas of the site to infiltrate dewatering water before discharge. In no case will surface waters be considered part of the treatment area.
- 3. At all points where dewatering water is discharged, utilize velocity dissipation devices.
- 4. With filter backwash water, either haul it away for disposal or return it to the beginning of the treatment process.
- 5. Replace and clean the filter media used in dewatering devices when the pressure differential equals or exceeds the manufacturer's specifications.
- 6. Dewatering practices must involve the implementation of appropriate control measures as applicable (i.e. containment areas for dewatering earth materials, portable sediment tanks and bags, pumping settling basins, and pump intake protection.)

Is it at all likely that the site operator will need to implement construction dewatering in order to complete the proposed project?

	⊠ Yes	3		] No						
If Yes,	describe a	II areas	where	construction	dewatering	may b	be required	d and the	proposed	control
measu	res that will	be used	to treat	and manage	dewatering	fluids i	ncluding al	l proposed	d discharge	points.
<b>Propos</b>	sed control r	neasure	s must (	comply with t	he RI SESC	Handl	book. Inclui	de referer	nces to all r	elevant

• Given the project's location along the Narragansett Bay coastline, it is anticipated that dewatering will be required for sewer installation at certain lower-lying locations along project roadways. Sump pump discharge will be directed to compost filter sock silt traps (see details on Site Plans) for stilling and diffuse release of water to the storm drainage system, and the contractor is required to adhere to all applicable Contract provisions pertaining to excavation and dewatering.

If No, discuss rationale.

SESC Site Plans.

N/A

## 3.7 Establish Proper Building Material Staging Areas

#### Per RI SESC Handbook - Part D

All construction materials that have the potential to contaminate stormwater must be stored properly and legally in covered areas, with containment systems constructed in or around the storage areas. Areas must be designated for materials delivery and storage. Designated areas shall be approved by the site owner/engineer. Minimization of exposure is not required in cases where the exposure to precipitation and to stormwater will not result in the discharge of pollutants, or where exposure of a specific material or product poses little risk of stormwater contamination (such as final products and materials intended for outdoor use).

Describe construction materials expected to be stored on-site and procedures for storage of materials to minimize exposure of the materials to stormwater. Include references to all relevant SESC Site Plans.

Construction materials that are expected to be temporarily stored on site consist of limited quantities of aggregates (sand, stone) to be used as bedding or backfill in the installation of facilities. Hot mix asphalt used for patching and overlay will be delivered to the site at the time of paving operations, and no quantities of asphaltic materials will be stored on the site. Construction equipment and maintenance materials will be stored in a designated area. A watertight shipping container shall be used to store hand tools, small parts and other construction equipment. Storage areas will be inspected weekly and after storm events.

#### 3.8 Minimize Dust

#### Per RI SESC Handbook - Part D

Dust control procedures and practices shall be used to suppress dust on a construction site during the construction process, as applicable. Precipitation, temperature, humidity, wind velocity and direction will determine amount and frequency of applications. However, the best method of controlling dust is to prevent dust production. This can best be accomplished by limiting the amount of bare soil exposed at one time. Dust Control measures outlined in the *RI SESC Handbook* shall be followed. Other dust control methods include watering, chemical application, surface roughening, wind barriers, walls, and covers.

Describe dust control practices that will be used to suppress dust and limit its generation (i.e. applying water, limiting the amount of bare soil exposed at one time etc.).

The contractor will be required to provide and utilize calcium chloride for dust control in accordance with the *Rhode Island Soil Erosion and Sediment Control Handbook* (as amended).

## 3.9 Designate Washout Areas

#### Per RI SESC Handbook - Part D

At no time shall any material (concrete, paint, chemicals) be washed into storm drains, open ditches, streets, streams, wetlands, or any environmentally sensitive area. The site operator must ensure that construction waste is properly disposed of, to avoid exposure to precipitation, at the end of each working day.

Will washout areas be required for the proposed project?

☐ Yes	No

If Yes, describe location(s) and control measures that will be used to minimize the discharge of pollutants from equipment and vehicle washing, wheel wash water, washout areas for concrete mixers, paint, stucco, etc. The recommended location(s) of washout areas should be identified, or at a minimum the locations where these washout areas should not be sited should be called out.

N/A

### If No, discuss rationale.

No concrete, asphalt, or other materials shall be discharged on site. If concrete trucks are to discharge surplus concrete or drum wash water on site, the contractor must provide a plan to the engineer for approval, indicating the location of the wash-out area, method of containment and disposal. This plan shall be incorporated into the SESC Plan as a modification. No release to nearby surface waters will be permitted.

# 3.10 Establish Proper Equipment/Vehicle Fueling and Maintenance Practices

#### Per RI SESC Handbook - Part D

Vehicle fueling shall not take place within regulated wetlands or buffer zone areas, or within 50-feet of the storm drain system. Designated areas shall be depicted on the SESC Site Plans, or shall be approved by the site owner.

Vehicle maintenance and washing shall occur off-site, or in designated areas depicted on the SESC Site Plans or approved of by the site owner. Maintenance or washing areas shall not be within regulated wetlands or buffer zone areas, or within 50-feet of the storm drain system. Maintenance areas shall be clearly designated, and barriers shall be used around the perimeter of the maintenance area to prevent stormwater contamination.

Construction vehicles shall be inspected frequently for leaks. Repairs shall take place immediately. Disposal of all used oil, antifreeze, solvents and other automotive-related chemicals shall be according to applicable regulations; at no time shall any material be washed down the storm drain or in to any environmentally sensitive area.

Describe equipment/vehicle fueling and maintenance practices that will be implemented to prevent pollutants from mixing with stormwater (e.g., secondary containment, drip pans, spill kits, etc.) Provide recommended location(s) of fueling/maintenance areas, or, at minimum, locations where fueling/maintenance should be avoided.

Several types of vehicles and equipment will be used on-site throughout the project, including, excavators, paving equipment, rollers, trucks, and backhoes. All major equipment/vehicle maintenance shall be performed off-site. When vehicle fueling must occur on-site, the fueling activity shall occur in designated equipment storage areas. Only minor equipment maintenance shall occur on-site. Spill kits, including absorbents and other cleanup materials will be provided by the contractor and kept at the combined equipment and materials storage area. Drip pans will be placed under all equipment receiving maintenance and vehicles and equipment parked overnight.

#### 3.11 Chemical Treatment for Erosion and Sediment Control

### Per RI SESC Handbook - Appendix J

Chemical stabilizers, polymers, and flocculants are readily available on the market and can be easily applied to construction sites for the purposes of enhancing the control of erosion, runoff, and sedimentation. The following guidelines should be adhered to for construction sites that plan to use treatment chemicals as part of their overall erosion, runoff, and sedimentation control strategy.

The U.S. Environmental Protection Agency has conducted research into the relative toxicity of chemicals commonly used for the treatment of construction stormwater discharges. The research conducted by the EPA focused on different formulations of chitosan, a cationic compound, and both cationic and anionic

polyacrylamide (PAM). In summary, the studies found significant toxicity resulting from the use of chitosan and cationic PAM in laboratory conditions, and significantly less toxicity associated with using anionic PAM. EPA's research has led to the conclusion that the use of treatment chemicals for erosion, runoff, and sedimentation control requires proper operator training and appropriate usage to avoid risk to aquatic species. In the case of cationic treatment chemicals additional safeguards may be necessary.

### **Application/Installation Minimum Requirements**

If a site operator plans to use polymers, flocculants, or other treatment chemicals during construction the SESC plan must address the following:

- 1. Treatment chemicals shall not be applied directly to or within 100 feet of any surface water body, wetland, or storm drain inlet.
- Use conventional erosion, runoff, and sedimentation controls prior to and after the application of treatment chemicals. Use conventional erosion, runoff, and sedimentation controls prior to chemical addition to ensure effective treatment. Chemicals may only be applied where treated stormwater is directed to a sediment control (e.g. temporary sediment basin, temporary sediment trap or sediment barrier) prior to discharge.
- 3. <u>Sites shall be stabilized as soon as possible using conventional measures to minimize the need to use chemical treatment.</u>
- 4. <u>Select appropriate treatment chemicals.</u> Chemicals must be selected that are appropriately suited to the types of soils likely to be exposed during construction and to the expected turbidity, pH, and flow rate of stormwater flowing into the chemical treatment system or treatment area. **Soil testing is essential.** Using the wrong form of chemical treatment will result in some form of performance failure and unnecessary environmental risk.
- 5. Minimize discharge risk from stored chemicals. Store all treatment chemicals in leak-proof containers that are kept under storm-resistant cover and surrounded by secondary containment structures (e.g., spill berms, decks, spill containment pallets), or provide equivalent measures, designed and maintained to minimize the potential discharge of treatment chemicals in stormwater or by any other means (e.g., storing chemicals in covered areas or having a spill kit available on site).
- 6. <u>Use chemicals in accordance with good engineering practices and specifications of the chemical provider/supplier.</u> You must also use treatment chemicals and chemical treatment systems in accordance with good engineering practices, and with dosing specifications and sediment removal design specifications provided by the supplier of the applicable chemicals, or document specific departures from these practices or specifications and how they reflect good engineering practice.

Will chemical stabilized construction project?	7 1 2	or other treatment chemicals be utilized on the proposed
☐ Yes	⊠ No	
	• • • • • • • • • • • • • • • • • • • •	ion Plan and describe how the owner or SESC Plan nated operator prior to the application of such treatment

Treatment Chemical Application Plan Required Elements

Insert information listed below:

- 1. List Manufacturer's name and product name for each treatment chemical proposed for use at the site.
- 2. Attach a copy of applicable Material Safety Data Sheets (MSDSs) or Safety Data Sheets (SDS) for each proposed treatment chemical.
- 3. Provide the results of third party toxicity testing of the materials proposed for use at the site.
- 4. Provide a certification from the site owner and operator that all proposed treatment chemicals are the same as those used in the toxicity tests and will not be altered in any way.
- 5. Provide an explanation as to why conventional erosion, runoff, and sediment control measures, alone or in combination, will not be sufficient to prevent turbidity impacts and sedimentation in downstream receptors.
- 6. Provide a plan prepared in consultation with the chemical treatment manufacturer(s) or authorized manufacturer's representative which includes the following:
  - a. Identification of the areas of the site where treatment chemicals will be applied and the name, location, and distance to all downstream receptors that have the potential to be impacted from the discharges from the treatment areas.
  - b. List the expected start and end dates or specific phases of the project during which each treatment chemical will be applied.
  - c. Provide test results for representative soils from the site, and any recommendations from the manufacturer based on the soil tests, indicating the type of treatment chemical and the recommended application rate.
  - d. List the frequency, method, and rates of application which are designed to ensure that treatment chemical concentrations will not exceed 50% of the IC25 or NOEC toxicity values, whichever is less, for each treatment chemical proposed.
  - e. Provide the frequency of inspection and maintenance of the treatment chemical application system.
  - f. List the method proposed for the collection, removal, and disposal or stabilization of settled particles to prevent re-suspension.
  - g. Describe the training that will be provided to all persons who will handle and use treatment chemicals at the construction site. Training must include appropriate, product-specific training and proper dosing requirements for each product.

## Treatment Chemical SESC Plan Weekly Inspection Report Documentation Requirements

- Document the type and quantity of treatment chemicals applied.
- List the date, duration of discharge, and estimated discharge rate.
- Provide an estimate of the volume of water treated.
- 4. Provide an estimate of the concentration of treatment chemicals in the discharge, with supporting calculations.

# 3.12 Construction Activity Pollution Prevention Control Measure List

Complete the following table for each Phase of construction where Pollution Prevention Control Measures will be implemented. This table is to be used as part of the SESC Plan Inspection Report – please fill out accordingly.

It is expected that this table will be amended as needed throughout the construction project.

Project						
Location/Station	Control Measure Description/Reference	Maintenance Requirement				
Adjacent Roads	Public roads adjacent to a construction site shall be clean at the end of each day	Contractor to conduct street sweeping if construction site sediment is visible				
Project-wide	Pick up of construction trash and debris	All loose trash and debris must be disposed of properly at the end of each working day				
Project-wide	Spill prevention / spill containment measures	Ensure that all equipment maintenance and other activities with the potential for release of prohibited discharges are conducted in designated staging/storage areas.  Maintain spill kits and adequate quantities of materials (e.g. absorbents) at readily accessible locations.				
CFS locations as indicated on Site Plans and as Material Stockpile Perimeter Barriers	RIDOT Standard Specifications Sections 206, 212 RI Soil Erosion and Sediment Control Handbook	Inspection should be made after each storm event and repair or replacement should be made promptly as needed.  Cleanout of accumulated sediment behind the barrier is necessary if ½ of the original height of CFS becomes filled in with sediment.				

Insert a new table for each additional construction phase.

# SECTION 4: CONTROL MEASURE INSTALLATION, INSPECTION, and MAINTENANCE

#### 4.1 Installation

#### Per RI SESC Handbook - Part D:

Complete the installation of temporary erosion, runoff, sediment, and pollution prevention control measures by the time each phase of earth-disturbance has begun. All stormwater control measures must be installed in accordance with good judgment, including applicable design and manufacturer specifications. Installation techniques and maintenance requirements may be found in manufacturer specifications and/or the *RI SESC Handbook*.

Include references to SESC Site Plans where installation requirements are located.

Control measures shall be installed in accordance with the Contract Plans and Specifications, RIDOT Standard Specifications where applicable, the *Rhode Island Soil Erosion and Sediment Control Handbook*, and manufacturer's recommendations – see Site Plans and notes thereon.

# 4.2 Monitoring Weather Conditions

### Per RI SESC Handbook - Part D:

<u>Anticipating Weather Events</u> - Care will be taken to the best of the operator's ability to avoid disturbing large areas prior to anticipated precipitation events. Weather forecasts must be routinely checked, and in the case of an expected precipitation event of over 0.25-inches over a 24-hour period, it is highly recommended that all control measures should be evaluated and maintained as necessary, prior to the weather event. In the case of an extreme weather forecast (greater than one-inch of rain over a 24-hour period), additional erosion/sediment controls may need to be installed.

<u>Storm Event Monitoring For Inspections</u> - At a minimum, storm events must be monitored and tracked in order to determine when post-storm event inspections must be conducted. Inspections must be conducted and documented at least once every seven (7) calendar days and within twenty-four (24) hours after any storm event, which generates at least 0.25 inches of rainfall per twenty-four (24) hour period and/or after a significant amount of runoff or snowmelt.

In order for an operator to successfully satisfy this requirement list the weather gauge station that will be utilized to monitor weather conditions on the construction site. See <a href="www.wunderground.com">www.wunderground.com</a> or <a href="www.wunderground.com">www.wunderground.com</a> or <a href="www.wunderground.com">www.wunderground.com</a> or <a href="www.wunderground.com">www.wunderground.com</a> or <a href="www.wunderground.com">www.wunderground.com</a> or <a href="www.wunderground.com">www.wunderground.com</a> or <a href="www.wunderground.com">www.wunderground.com</a> or <a href="www.wunderground.com">www.wunderground.com</a> or <a href="www.wunderground.com">www.wunderground.com</a> or <a href="www.wunderground.com">www.wunderground.com</a> or <a href="www.wunderground.com">www.wunderground.com</a> or <a href="www.wunderground.com">www.wunderground.com</a> or <a href="www.wunderground.com">www.wunderground.com</a> or <a href="www.wunderground.com">www.wunderground.com</a> or <a href="www.wunderground.com">www.wunderground.com</a> or <a href="www.wunderground.com">www.wunderground.com</a> or <a href="www.wunderground.com">www.wunderground.com</a> or <a href="www.wunderground.com">www.wunderground.com</a> or <a href="www.wunderground.com">www.wunderground.com</a> or <a href="www.wunderground.com">www.wunderground.com</a> or <a href="www.wunderground.com">www.wunderground.com</a> or <a href="www.wunderground.com">www.wunderground.com</a> or <a href="www.wunderground.com">www.wunderground.com</a> or <a href="www.wunderground.com">www.wunderground.com</a> or <a href="www.wunderground.com">www.wunderground.com</a> or <a href="www.wunderground.com">www.wunderground.com</a> or <a href="www.wunderground.com">www.wunderground.com</a> or <a href="www.wunderground.com">www.wunderground.com</a> or <a href="www.wunderground.com">www.wunderground.com</a> or <a href="www.wunderground.com">www.wunderground.com</a> or <a href="www.wunderground.com">www.wunderground.com</a> or <a href="www.wunderground.com">www.wun

The weather gauge station and website that will be utilized to monitor weather conditions on the construction site is as follows:

KPVD / PROVIDENCE (T.F. Green Memorial State Airport, Warwick, Rhode Island)

# 4.3 Inspections

#### Per RI SESC Handbook - Part D:

<u>Minimum Frequency</u> - Each of the following areas must be inspected by or under the supervision of the owner and operator at least once every seven (7) calendar days and within twenty-four (24) hours after any storm event, which generates at least 0.25 inches of rainfall per twenty-four (24) hour period and/or after a significant amount of runoff or snowmelt:

- All areas that have been cleared, graded, or excavated and where permanent stabilization has not been achieved:
- b. All stormwater erosion, runoff, and sediment control measures (including pollution prevention control measures) installed at the site;
- c. Construction material, unstabilized soil stockpiles, waste, borrow, or equipment storage, and maintenance areas that are covered by this permit and are exposed to precipitation;
- d. All areas where stormwater typically flows within the site, including temporary drainage ways designed to divert, convey, and/or treat stormwater;
- e. All points of discharge from the site;
- f. All locations where temporary soil stabilization measures have been implemented;
- g. All locations where vehicles enter or exit the site.

<u>Reductions in Inspection Frequency</u> - If earth disturbing activities are suspended due to frozen conditions, inspections may be reduced to a frequency of once per month. The owner and operator must document the beginning and ending dates of these periods in an inspection report.

<u>Qualified Personnel</u> – The site owner and operator are responsible for designating personnel to conduct inspections and for ensuring that the personnel who are responsible for conducting the inspections are "qualified" to do so. A "qualified person" is a person knowledgeable in the principles and practices of erosion, runoff, sediment, and pollution prevention controls, who possesses the skills to assess conditions at the construction site that could impact stormwater quality, and the skills to assess the effectiveness of any stormwater controls selected and installed to meet the requirements of the permit.

<u>Recordkeeping Requirements</u> - All records of inspections, including records of maintenance and corrective actions must be maintained with the SESC Plan. Inspection records must include the date and time of the inspection, and the inspector's name, signature, and contact information.

## General Notes

- A separate inspection report will be prepared for each inspection.
- The Inspection Reference Number shall be combination of the а RIPDES Construction General Permit No consecutively numbered inspections. Inspection reference number for the 4th inspection of a project would be: RIR10####-4
- Each report will be signed and dated by the Inspector and must be kept onsite.
- Each report will be signed and dated by the Site Operator.
- The corrective action log contained in each inspection report must be completed, signed, and dated by the site operator once all necessary repairs have been completed.
- It is the responsibility of the site operator to maintain a copy of the SESC Plan, copies of <u>all</u> completed inspection reports, and amendments as part of the SESC Plan documentation <u>at the</u> site during construction.

Failure to make and provide documentation of inspections and corrective actions under this part constitutes a violation of your permit and enforcement actions under 46-12 of R.I. General Laws may result.

#### 4.4 Maintenance

#### Per RI SESC Handbook - Part D:

Maintenance procedures for erosion and sedimentation controls and stormwater management structures/facilities are described on the SESC Site Plans and in the RI SESC Handbook.

Site owners and operators must ensure that all erosion, runoff, sediment, and pollution prevention controls remain in effective operating condition and are protected from activities that would reduce their effectiveness. Erosion, runoff, sedimentation, and pollution prevention control measures must be maintained throughout the course of the project.

Note: It is recommended that the site operator designates a full-time, on-site contact person responsible for working with the site owner to resolve SESC Plan-related issues.

#### 4.5 Corrective Actions

#### Per RI SESC Handbook - Part D:

If, in the opinion of the designated site inspector, corrective action is required, the inspector shall note it on the inspection report and shall inform the site operator that corrective action is necessary. The site operator must make all necessary repairs whenever maintenance of any of the control measures instituted at the site is required.

In accordance with the *RI SESC Handbook*, the site operator shall initiate work to fix the problem immediately after its discovery, and complete such work by the close of the next work day, if the problem does not require significant repair or replacement, or if the problem can be corrected through routine maintenance.

When installation of a new control or a significant repair is needed, site owners and operators must ensure that the new or modified control measure is installed and made operational by no later than seven (7) calendar days from the time of discovery where feasible. If it is infeasible to complete the installation or repair within seven (7) calendar days, the reasons why it is infeasible must be documented in the SESC Plan along with the schedule for installing the control measures and making it operational as soon as practicable after the 7-day timeframe. Such documentation of these maintenance procedures and timeframes should be described in the inspection report in which the issue was first documented. If these actions result in changes to any of the control measures outlined in the SESC Plan, site owners and operators must also modify the SESC Plan accordingly within seven (7) calendar days of completing this work.

# **SECTION 5: AMENDMENTS**

#### Per RIPDES Construction General Permit - Part III.F:

This SESC Plan is intended to be a working document. It is expected that amendments will be required throughout the active construction phase of the project. Even if practices are installed on a site according to the approved plan, the site is only in compliance when erosion, runoff, and sedimentation are effectively controlled throughout the entire site for the entire duration of the project.

The SESC Plan shall be amended within seven (7) days whenever there is a change in design, construction, operation, maintenance or other procedure which has a significant effect on the potential for the discharge of pollutants, or if the SESC Plan proves to be ineffective in achieving its objectives (i.e. the selected control measures are not effective in controlling erosion or sedimentation).

In addition, the SESC Plan shall be amended to identify any new operator that will implement a component of the SESC Plan.

All revisions must be recorded in the Record of Amendments Log Sheet, which is contained in Attachment G of this SESC Plan, and dated red-lined drawings and/or a detailed written description must be appended to the SESC Plan. Inspection Forms must be revised to reflect all amendments. Update the Revision Date and the Version # in the footer of the Report to reflect amendments made.

All SESC Plan Amendments, except minor non-technical revisions, must be approved by the site owner and operator. Any amendments to control measures that involve the practice of engineering must be reviewed, signed, and stamped by a Professional Engineer registered in the State of RI.

The amended SESC plan must be kept on file <u>at the site</u> while construction is ongoing and any modifications must be documented.

Attach a copy of the Amendment Log.

Reference RI Model SESC Plan ATTACHMENT G

# **SECTION 6: RECORDKEEPING**

RIPDES Construction General Permit - Parts III.D, III.G, III.J.3.b.iii, & V.O

It is the site owner and site operator's responsibility to have the following documents available at the construction site and immediately available for RIDEM review upon request:

- A copy of the fully signed and dated SESC Plan, which includes:
  - A copy of the General Location Map INCLUDED AS ATTACHMENT A
  - A copy of all SESC Site Plans INCLUDED AS ATTACHMENT B

Refer to the Site Plans included in the Contract Bid Package; upon Contract Award Plans shall be bound with SESC Plan to be maintained by the contractor

- A copy of the RIPDES Construction General Permit (To save paper and file space, do not include in DEM/CRMC submittal, for operator copy only) INCLUDED AS ATTACHMENT C
- A copy of any regulatory permits (RIDEM Freshwater Wetlands Permit, CRMC Assent, RIDEM Water Quality Certification, RIDEM Groundwater Discharge Permit, RIDEM RIPDES Construction General Permit authorization letter, etc.)
   INCLUDED AS ATTACHMENT D

### CRMC Assent to be inserted upon receipt

- The signed and certified NOI form or permit application form (if required as part of the application, see RIPDES Construction General Permit for applicability)
   INCLUDED AS ATTACHMENT E
- Completed Inspection Reports w/Completed Corrective Action Logs INCLUDED AS ATTACHMENT F
- SESC Plan Amendment Log INCLUDED AS ATTACHMENT G

# **SECTION 7: PARTY CERTIFICATIONS**

RIPDES Construction General Permit - Part V.G

All parties working at the project site are required to comply with the Soil Erosion and Sediment Control Plan (SESC Plan including SESC Site Plans) for any work that is performed on-site. The site owner, site operator, contractors and sub-contractors are encouraged to advise all employees working on this project of the requirements of the SESC Plan. A copy of the SESC Plan is available for your review at the following location: Insert Onsite Location Here, or may be obtained by contacting the site owner or site operator.

The site owner and site operator and each subcontractor engaged in activities at the construction site that could impact stormwater must be identified and sign the following certification statement.

I acknowledge that I have read and understand the terms and conditions of the Soil Erosion and Sediment Control (SESC) Plan for the above designated project and agree to follow the control measures described in the SESC Plan and SESC Site Plans.

Site Owner:  Warwick Sewer Authority  Janine Burke-Wells, Executive Director  125 Arthur W. Devine Boulevard		
Warwick, RI 02886	signature/date	
(401) 468-4710		
Site Operator:		
Insert Company or Organization Name		
Insert Name & Title		
Insert Address		
Insert City, State, Zip Code	signature/date	
Insert Telephone Number, Insert Fax/Email		
Designated Site Inspector:		
Insert Company or Organization Name		
Insert Name & Title		
Insert Address		
Insert City, State, Zip Code	signature/date	
Insert Telephone Number, Insert Fax/Email		
SubContractor SESC Plan Contact:		
Insert Company or Organization Name		
Insert Name & Title		
Insert Address		
Insert City, State, Zip Code	signature/date	
Insert Telephone Number, Insert Fax/Email		
Insert more contact/signature lines as necessary		

# LIST OF ATTACHMENTS

* See Section 6 of SESC Plan *

**Attachment A - General Location Map** 

Attachment B - SESC Site Plans

Attachment C - Copy of RIPDES Construction General Permit and Authorization to Discharge (To save paper and file space, do not include in DEM/CRMC submittal, for operator copy only)

**Attachment D - Copy of Other Regulatory Permits** 

Attachment E - Copy of RIPDES NOI (if required as part of application, see RIPDES Construction General Permit for applicability)

Attachment F - Inspection Reports w/ Corrective Action Log

**Attachment G - SESC Plan Amendment Log** 



# **General Location Map**

Sources: RIGIS, USGS National Map • Approximate Scale: 1" = 2,000'

# SESC Plan Inspection Report Instructions

For all projects subject to the requirements of the *RI Stormwater Design and Installation Standards Manual* or the *RIPDES Construction General Permit* the site owner and operator are required to develop and comply with a site specific Soil Erosion and Sediment Control Plan (SESC Plan) in order to remain in compliance with applicable regulations.

This inspection report template has been provided by RIDEM for use by the site operator and designated inspector to document the adequacy and condition of erosion, runoff, sediment, and pollution prevention control measures specified for use on the construction site. It should be customized for your specific site conditions and consistent with the SESC Plan developed for your site.

# Using the Inspection Report

This inspection report is designed to be customized according to the control measures and conditions at the site. On a copy of the applicable SESC Site Plans, number or label all stormwater control measures and areas of the site that will be inspected. Include all control measures (temporary traps, basins, inlet protection measures, etc.) and areas that will be inspected. Also, identify all point source discharges/outfalls, and the priority natural resource areas (i.e. streams, wetlands, mature trees, etc). List each control measure or area to be inspected separately in the site-specific control measure section of the inspection report.

Complete any items that will remain constant, such as the project information and control measure locations and descriptions. Then, print out multiple copies of this customized inspection report to use during the inspections.

When conducting the inspection, walk the site by following the SESC Site Plans and numbered control measure locations for inspection. Also note whether the overall site issues have been addressed. Customize this list according to the conditions at the site.

# Minimum Monitoring and Reporting Requirements

Your site must be inspected by or under the supervision of the owner and operator at least once every seven (7) calendar days and within twenty-four (24) hours after any storm event which generates at least 0.25 inches of rainfall per twenty-four (24) hour period and/or after a significant amount of runoff. Read Section 4.2 of your SESC Plan for more information regarding the importance of monitoring weather conditions.

## General Notes

A separate inspection report will be prepared for each inspection.

- The <u>Inspection Reference Number</u> shall be a combination of the RIPDES Permit Authorization Number - <u>consecutively numbered inspections</u>. For example: Inspection reference number for the 4th inspection of a project would be: RIR101000-4
- <u>Each report will be signed and dated by the inspector</u> and forwarded to the site operator within 24 hours of the inspection.
- Each report will be signed and dated by the site operator upon his/her receipt and after completion of all required corrective actions.
- It is the responsibility of the site operator to maintain a copy of the SESC Plan, copies of <u>all</u> completed inspection reports, and amendments as part of the SESC Plan documentation at the site during construction.

# **Corrective Actions**

If the SESC Plan Inspection determines that corrective actions are necessary to install or repair control measures, the resultant actions taken must be documented by the site operator. The actions must be recorded in the Corrective Action Log attached to each SESC Plan inspection form. If the site operator disagrees with the corrective action recommendations, it must be documented, with justifiable reasons, in the Corrective Action Log, as well. Required timeframes for corrective actions are established by regulation and are discussed in Section 4.5 of your SESC Plan.

#### **Amendments**

All SESC Plan Amendments, except minor non-technical revisions, must be approved by the site owner and site operator. The revision must be recorded in the Record of Amendments Log Sheet within the SESC Plan, and dated red-line drawings and/or a detailed written description of the revision must be appended to the SESC Plan. Inspection forms must be revised to reflect all amendments. Update the *Revision Date* and the *Version #* in the footer of the report to reflect amendments made.

The SESC Plan shall be amended whenever there is a change in design, construction, operation, maintenance or other procedure, which has a significant effect on the potential for the discharge of pollutants, or if the SESC Plan proves to be ineffective in achieving its objectives.

***Remember that the regulations are performance-oriented.

Even if all control measures are installed on a site according to the SESC Plan, the site is only in compliance when erosion, runoff, sedimentation, and pollution are effectively controlled. ***

# **SESC Plan Inspection Report**

		Project Informat	on .				
Name							
Location							
DEM Permit No.							
Site Owner	Name	Phone		Email			
Site Operator	Name	Phone		Email			
	-	Inspection Informa	ation				
Inspector Name	Name	Phone		Email			
Inspection Date		Start/End	Time				
Inspection Type ☐ Weekly ☐ F	Pre-storm event 🔲 Du	ring storm event	☐ Post-storm event	☐ Other			
		Weather Information					
Last Rain Event							
Date:	Duration (hrs):	Approxi	mate Rainfall (in):				
Rain Gauge Location	& Source:						
Weather at time of this	s inspection:						
Check statement that	applies then sign and d	ate below:					
	Inspector, certify that tenance and corrective a			by regulation and I have			
☐ I, as the designated Inspector, certify that this site has been inspected as required by regulation and I have made the determination that the site requires corrective actions. The required corrective actions are noted within this inspection report.							
Inspector:		Signature		Date			
The Site Operator acknowledges by his/her signature, the receipt of this SESC Plan inspection report and its findings. He/she acknowledges that all recommended corrective actions must be completed and documentation of all such corrective actions must be made in this inspection report per applicable regulations.							
Operator: Print Name		Signature	por applicable le	Date			

SESC Plan Inspection Report

# **Site-specific Control Measures**

Number the structural and non-structural stormwater control measures identified in the SESC Plan and on the SESC Site Plans and list them below (add as necessary). Bring a copy of this inspection form and any applicable SESC Site Plans with you during your inspections. This list will assist you to inspect all control measures at your site.

FILL THIS TABLE USING THE SESC PLAN TABLES 2.11 & 3.12.

TILL		THE SESC PLAN TABLES 2.1			A	O
	Location/Station	Control Measure Description	Installe Operat Proper	ing ly?	Assoc. Photo/ Figure #	Corrective Action Needed (Yes or No; if 'Yes', please detail action required)
1	Example 1: Eastern Parcel – Slope No. 4 Adjacent to I-95. Straw Wattles	Straw Wattle. Section Six, Sediment Control Measures, Straw Wattles, Compost Tubes and Fiber Rolls - RI SESC Handbook.	□Yes			
2	Example 2: Western Parcel – Green Street Construction Entrance	Stone Stabilized Pad. Section Six: Sediment Control Measures – Construction Entrances –RI SESC Handbook.	□Yes			
3	Example 3:  Hospital Main Footings – Excavation Area – SESC Site Plan Sheet No. 3.	Pump Intake Protection Using Stone Filled Sump with Standpipe. Section Six: Sediment Control Measures, Pump Intake Protection, RI SESC Handbook.	□Yes	□No		
4	Example 4:  Bridge Abutment Construction Southbound Bridge Abutment, Bridge No. 244 – SESC Site Plan Sheet No. 18.	Prefabricated Concrete Washout Container with Ramp. Used to contain concrete washout during concrete pouring operations. Section Three: Pollution Prevention and Good Housekeeping, Concrete Washouts, RI SESC Handbook.	□Yes	□No		
5	INSERT TEXT	INSERT TEXT	□Yes	□No		
6	Attention Operator:	You must modify this inspection form as the project progresses, control measure locations change, and amendments to the SESC Plan are instituted in the field.	□Yes			
7			□Yes	□No		
8			□Yes	□No		
	i	i	1			1

SESC P	lan Inspe	ection	Report
--------	-----------	--------	--------

	Location/Station	Control Measure Description	Installed & Operating Properly?	Assoc. Photo/ Figure #	Corrective Action Needed (Yes or No; if 'Yes', please detail action required)
9			□Yes □No		
10			□Yes □No		
11			□Yes □No		
12			□Yes □No		
13			□Yes □No		
14			□Yes □No		
15			□Yes □No		
16			□Yes □No		
17			□Yes □No		
18			□Yes □No		
19			□Yes □No		
20			□Yes □No		
21			□Yes □No		
22			□Yes □No		
23			□Yes □No		
24			□Yes □No		

SESC Plan Inspection Report

	Location/Station	Control Measure Description	Installed & Operating Properly?	Assoc. Photo/ Figure #	Corrective Action Needed (Yes or No; if 'Yes', please detail action required)
25			□Yes □No		
26			□Yes □No		
27			□Yes □No		
28			□Yes □No		
29			□Yes □No		
30			□Yes □No		

(add more as necessary)

# **General Site Issues**

Below are some general site issues that should be assessed during inspections. Please **customize** this list as needed for conditions at the site.

	Compliance Question			Assoc. Photo/ Figure #	Corrective Action Needed (If 'Yes', please detail action required and include location/station)
1	Have all control measures been installed as specified in the RISESC Handbook and prior to any earth disturbing activities?	□Yes □ □ N/A			
2	Are appropriate limits of disturbance (LOD) established?	□Yes □ □ N/A	⊒No		
3	Are controls that limit runoff from exposed soils by diverting, retaining, or detaining flows (such as check dams, sediment basins, etc.) in place?	□Yes □ □ N/A			
4	Are all temporary conveyance practices installed correctly and functioning as designed?	□Yes □ □ N/A	⊒No		
5	Has maintenance been performed as required to ensure continued proper function of all temporary conveyances practices?	□Yes □ □ N/A	⊒No		
6	Were all exposed soils seeded by October 15 th ?	□Yes □ □ N/A	⊒No		
7	Have soils been stabilized where earth disturbance activities have permanently or temporarily ceased on any portion of the site and will not resume for more than 14 days?	□Yes □ □ N/A	⊒No		
8	In instances where adequate vegetative stabilization was not established by November 15 th , have non-vegetative erosion control measures must be employed?	□Yes □ □ N/A	□No		
9	If work is to continue from October 15 th through April 15 th , are steps taken to ensure that only the day's work area will be exposed and all erodible soil is stabilized within 5 working days?	□Yes □ □ N/A	⊒No		
10	Have inlet protection measures (such as fabric drop inlet protection, curb drop inlet protection, etc.) been properly installed?	□Yes □ □ N/A	⊒No		
11	Has the operator cleaned and maintained inlet protection measures when needed?	□Yes □ N/A	⊒No		
12	Has the operator removed accumulated sediment adjacent to inlet protection measures within 24 hours of detection?	□Yes □ □ N/A	□No		

SESC Plan Inspection Report

	Compliance Question		Assoc. Photo/ Figure #	Corrective Action Needed (If 'Yes', please detail action required and include location/station)
13	Has the operator properly installed outlet protection (such as riprap, turf mats, etc.) at all temporary and permanent discharge points?	□Yes □No □ N/A		
14	Are all outlet protection measures functioning properly in order to reduce discharge velocity, promote infiltration, and eliminate scour?	□Yes □No □ N/A		
15	Have all discharge points been inspected to ensure the prevention of scouring and channel erosion?	□Yes □No □ N/A		
16	Have sediment controls been installed along perimeter areas that will receive stormwater from earth disturbing activities?	□Yes □No □ N/A		
17	Is the operator maintaining sediment controls in accordance with the requirements in the <i>RI SESC Handbook?</i>	□Yes □No □ N/A		
18	Have temporary sediment barriers been installed around permanent infiltration areas (such as bioretention areas, infiltration basins, etc.)?	□Yes □No □ N/A		
19	Have staging areas and equipment routing been implemented to avoid compaction where permanent infiltration areas will be located?	□Yes □No □ N/A		
20	Are surface outlet structures (such as skimmers, siphons, etc.) installed for each temporary sediment basin? [Exception: frozen conditions]	□Yes □No □ N/A		
21	Have all temporary sediment basins or traps been inspected and maintained as required to ensure proper function?	□Yes □No □ N/A		
22	Does the project include the use of polymers, flocculants, or other chemicals to control erosion, sedimentation, or runoff from the site?	□Yes □No □ N/A		
23	Are all chemicals being managed in accordance with Appendix J of the <i>RISESC Handbook</i> and current best management practices?	□Yes □No □ N/A		
24	Has the site operator taken steps to <b>prohibit</b> the following pollutant discharges on the site?			
а	Contaminated groundwater.	□Yes □No □ N/A		

SESC Plan Inspection Report

	Compliance Question			Assoc. Photo/ Figure #	Corrective Action Needed (If 'Yes', please detail action required and include location/station)
b	Wastewater from washout of concrete; unless properly contained, managed, and disposed of.	□Yes □ N/A	□No		
С	Wastewater from washout and cleanout of stucco, paint, form release oils, curing compounds, and other construction products.	□Yes □ N/A	□No		
d	Fuels, oils, or other pollutants used in vehicle and equipment operation and maintenance.	□Yes □ N/A	□No		
Ф	Soaps or solvents used in vehicle and equipment washing.	□Yes □ N/A	□No		
f	Toxic or hazardous substances from a spill or other release.	□Yes □ N/A	□No		
25	Is the operator using properly constructed entrances/exits to the site so sediment removal occurs prior to vehicles exiting?	□Yes □ N/A	□No		
26	If needed, are additional controls (such as rumble strips, rattle plates, etc.) in place to remove sediment from tires prior to exiting?	□Yes □ N/A	□No		
27	Is sediment track-out being removed by the end of the same workday in which it occurs (via sweeping, shoveling, or vacuuming)?	□Yes □ N/A	□No		
28	Are all wastes generated at the site being managed and properly disposed of by the end of each workday?	□Yes □ N/A	□No		
29	Are all chemicals and hazardous waste materials stored properly in covered areas and surrounded by containment control systems?	□Yes □ N/A	□No		
30	Has the operator established highly visible locations for the storage of spill prevention and control equipment on the construction site?	□Yes □ N/A	□No		
31	Are allowable non-stormwater discharges being managed properly with adequate controls?	□Yes □ N/A	□No		
32	Is the site operator properly managing groundwater or stormwater that is removed from excavations, trenches, or similar points of accumulation?	□Yes □ N/A			
33	Are proper procedures and controls in place for the storage of materials that may discharge pollutants if	□Yes □ N/A	□No		

SESC Plan Inspection Report

Compliance Question		Assoc. Photo/ Figure #	Corrective Action Needed (If 'Yes', please detail action required and include location/station)
exposed to stormwater?			
Are stockpiles located within the limits of disturbance?	□Yes □No □ N/A		
Are stockpiles being protected from contact with stormwater using a temporary sediment barrier?	□Yes □No □ N/A		
Where needed, has cover or appropriate temporary vegetative or structural stabilization been utilized for stockpiles?	□Yes □No □ N/A		
Is the operator effectively managing the generation of dust through the use of water, chemicals, or minimization of exposed soil?	□Yes □No □ N/A		
Are designated washout areas (such as wheel washing stations, washout for concrete, paint, stucco, etc.) clearly marked on the site?	□Yes □No □ N/A		
Are vehicle fueling and maintenance areas properly located to prevent pollutants from impacting stormwater and sensitive receptors?	□Yes □No □ N/A		
(Other)			

(add more as necessary)

PROJECT:	INSPECTION DATE:
General Field Comments:	
SESC Plan Inspection Report	Page of

## **Photos:**

(Associated photos – each photo should be dated and have a unique identification # and written description indicating where it is located within the project area. If a close up photo is required, it should be preceded with a photo including both the detail area and some type of visible fixed reference point. Photos should be annotated with Station numbers and other identifying information where needed.)

Photo #:	Station:
(insert Photo here)	Description:
(110011111010)	2000.19.10.11
Photo #:	Station:
(insert Photo here)	Description:
Photo #:	Station:
(insert Photo here)	Description:
(55.1.1166611616)	
	To: ::
Photo #:	Station:
(insert Photo here)	Description:
Photo #:	Station:
(insert Photo here)	Description:
	2000.19.10.11
Disate #	Chatian
Photo #:	Station:
(insert Photo here)	Description:

SESC Plan Inspection Report

(add more as necessary)

# **Corrective Action Log**

# TO BE FILLED OUT BY SITE OPERATOR

Describe repair, replacement, and maintenance of control measures, actions taken, date completed, and note the person that completed the work

trat	Location/Station	Corrective Action	Date Completed	Person Responsible
Оре	erator Signature:		Date:	

SESC Plan Inspection Report

# **Amendment Log**

# TO BE FILLED OUT BY SITE OPERATOR

Describe amendment(s) to be made to the SESC Plan, the date, and the person/title making the amendment. ALL amendments must be approved by the Site Owner.

#	Date	Description of Amendment	Amended by: Person/Title	Site Owner Must Initial
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				

Add more lines/pages as necessary