DESIGN SPECIFICATIONS
FOR CONSTRUCTION

Sea Street Pump Station—Force Main No.3
CWSRF #6722
Town of Nantucket, MA





ENVIRONMENTAL PARTNERS
— An Apex Company —

SEA STREET PUMP STATION FORCE MAIN NO.3
NANTUCKET, MASSACHUSETTS

TABLE OF CONTENTS

Section	Description	Page
DIVISION 0 – BIDDING AND CONTRACT REQUIREMENTS		
00010	Invitation for Bids	00010-1
00100	Instructions to Bidders	00100-1
00300	Bid Form	00300-1
00300B	Diesel Retrofit Program	00300B-1
00300C	SRF WMBE Provisions	00300C-1
00310	Bid Bond	00310-1
00430	Notice of Award	00430-1
00500	Form of Agreement	00500-1
00510	Certifications	00510-1
00600	Payment Bond	00600-1
00610	Performance Bond	00610-1
00650	Notice to Proceed	00650-1
00700	Standard General Conditions of the Construction Contract	00700-1
00800	Project Specific Requirements	00800-1
00820	Special Conditions - Federal and State Wage Rate Schedules	00820-1
00822	Special Conditions MGL - Excerpts	00822-1
00824	Special Conditions - DEP Policy Memoranda	00824-1
00825	Special Conditions - MA Suppl Equal Employment Opportunity, Non-Discrimination and Affirmative Action Program	00825-1
00826	Special Conditions - American Iron and Steel Provisions	00826-1
00945	Certificate of Substantial Completion	00945-1
00950	Certificate of Final Completion	00950-1
00955	Contractor Affidavit	00955-1
00960	Certificate of Final Release and Waiver of Liens	00960-1
DIVISION 1 - GENERAL REQUIREMENTS		
01010	Summary of Work	01010-1
01020	Allowances	01020-1
01024	Measurement and Payment	01024-1
01040	Project Coordination	01040-1
01046	Control of Work	01046-1
01050	Field Engineering	01050-1
01063	Miscellaneous Requirements	01063-1
01080	Abbreviations and Definitions	01080-1
01095	Reference Standards	01090-1
01110	Environmental Protection Measures	01110-1

SEA STREET PUMP STATION FORCE MAIN NO.3
NANTUCKET, MASSACHUSETTS

TABLE OF CONTENTS

Section	Description	Page
01170	Special Provisions	01170-1
01170A	Special Provisions – Price Adjustments	01170A-1
01200	Project Meetings	01200-1
01300	Submittals	01300-1
01311	Construction Progress Schedules	01311-1
01350	Health and Safety Plan	01350-1
01370	Schedule of Values	01370-1
01380	Construction Photographs	01380-1
01400	Quality Assurance	01400-1
01500	Temporary Facilities and Controls	01500-1
01610	Delivery, Storage and Handling	01610-1
01700	Contract Closeout	01700-1
01710	Cleaning Up	01710-1
01740	Warranties and Bonds	01740-1
01850	Traffic Management	01850-1
DIVISION 2 - SITE WORK		
02015	Geotechnical Instrumentation and Monitoring	02015-1
02020	Erosion and Sediment Control	02020-1
02050	Demolition, Modification, and Abandonment	02050-1
02060	Tree Protection	02060-1
02080	Soil and Waste Management	02080-1
02101	Site Investigation	02101-1
02140	Dewatering and Discharge	02140-1
02160	Temporary Excavation Support Systems	02160-1
02200	Earthwork	02200-1
02212	Rock Excavation	02212-1
02273	Geotextile Fabric	02273-1
02440	Sewer Cleaning and Inspection	02440-1
02538	Temporary By-Pass Sewage Pumping	02538-1
02570	Sewers, Manholes, and Appurtenances	02570-1
02576	Pavement Repair and Resurfacing	02576-1
02616	Ductile Iron Pipe and Fittings For Potable Water Systems	02616-1
02622	Polyvinyl Chloride (PVC) Pressure Pipe	02622-1
02630	Ductile Iron Pipe and Fittings For Sewer Force Main	02630-1
02640	Hydrants, Valves, and Appurtenances	02640-1
02700	Asbestos-Cement Pipe Removal and Disposal	02700-1
02721	Storm Drainage Systems	02721-1

SEA STREET PUMP STATION FORCE MAIN NO.3
NANTUCKET, MASSACHUSETTS

TABLE OF CONTENTS

Section	Description	Page
02725	Water Service Connections	02725-1
02736	Temporary Water Bypass	02736-1
02750	Abandonment of Existing Pipe	02750-1
02901	Miscellaneous Work and Cleanup	02901-1
02920	Topsoil	02920-1
02945	Turf	02945-1
DIVISION 3 - CONCRETE		
03300	Concrete	03300-1

SEA STREET PUMP STATION FORCE MAIN NO.3
NANTUCKET, MASSACHUSETTS

TABLE OF CONTENTS

Section **Description** **Page**

LIST OF APPENDICES

APPENDIX A
Geotechnical Memorandum

APPENDIX B
Preserving Historic Pavement on Nantucket

APPENDIX C
Asbestos Cement Forms and Regulations

DIVISION 0

BIDDING AND CONTRACT REQUIREMENTS

INDEX

Section	Title	Page
00010	Invitation for Bids	00010-1
00100	Instructions to Bidders	00100-1
00300	Bid Form	00300-1
00300B	Diesel Retrofit Program	00300B-1
00300C	SRF WMBE Provisions	00300C-1
00310	Bid Bond	00310-1
00430	Notice of Award	00430-1
00500	Form of Agreement	00500-1
00510	Certifications	00510-1
00600	Payment Bond	00600-1
00610	Performance Bond	00610-1
00650	Notice to Proceed	00650-1
00700	Standard General Conditions of the Construction Contract	00700-1
00800	Project Specific Requirements	00800-1
00820	Special Conditions - Federal and State Wage Rate Schedules	00820-1
00822	Special Conditions MGL - Excerpts	00822-1
00824	Special Conditions - DEP Policy Memoranda	00824-1
00825	Special Conditions - MA Suppl Equal Employment Opportunity, Non-Discrimination and Affirmative Action Program	00825-1
00826	Special Conditions - American Iron and Steel Provisions	00826-1
00945	Certificate of Substantial Completion	00945-1
00950	Certificate of Final Completion	00950-1
00955	Contractor Affidavit	00955-1
00960	Certificate of Final Release and Waiver of Liens	00960-1

SECTION 00010

INVITATION FOR BIDS

The Town of Nantucket, MA, hereinafter called the OWNER, invites Bidders to submit sealed Bids for the **Sea Street Pump Station – Force Main No.3**, which includes, but is not limited to the following Work; and all materials, equipment, services and construction inherent to this Work:

The Work under this Contract includes, but is not necessarily limited to furnishing all labor, services, equipment, materials, and devices required for the installation of a new 20-inch and 24-inch PVC sewer force main and associated manholes, valves, connections, and appurtenances; the removal and legal disposal of existing vitrified clay/asbestos cement gravity sewer mains, services, and manholes; installation of new PVC gravity sewer mains and associated manholes, service connections, and appurtenances; installation of temporary sewer bypass systems; removal and legal disposal of existing cast iron/ductile iron/asbestos cement water mains, services, and appurtenances; installation of new ductile iron water mains and associated service connections, hydrants, valves, and appurtenances; installation of temporary water bypass systems; removal and legal disposal of existing stormwater systems; installation of new stormwater systems including piping, manholes, and catch basins; installation of temporary dewatering systems; installation of erosion control measures; and temporary and permanent surface restoration (e.g. bituminous concrete/brick/cobblestone/Belgian Block pavers/granite sidewalks, aprons, ramps, and roadways) as specified in the Contract Documents.

All Bids for this project are subject to the applicable public bidding laws of Massachusetts including, but not limited to, Section 39M of Chapter 30 of the General Laws of the Commonwealth of Massachusetts as last revised.

The name and address and the Massachusetts Contractor's License Number of all Bidders must be plainly written on the outside of the envelope, and the envelope clearly marked:

SEA STREET PUMP STATION FORCE MAIN NO.3
SRF CONTRACT NO. 6722 - BID ENCLOSED

Sealed Bids will be received by the Town of Nantucket, Massachusetts at the Town of Nantucket, Procurement Office, Attn: Brian Turbitt, Director of Municipal Finance, 37 Washington Street, Nantucket, MA 02554, until **2:00 PM**, local prevailing time, on **Wednesday, October 6, 2021.** At 2:00 p.m., Bids will be brought to the Town Hall's First Floor Conference Room and will be publically read aloud. Bids received after the time of announced opening will not be accepted. Bidders shall be responsible to confirm the ability of overnight mailing or courier services to deliver to the Owner's offices. Every Bidder must submit the Bid Form and supplemental Bid Documents listed in Section 00100 Instruction to Bidders, Paragraph 9.3. Two copies of the bid are required.

Each Bid must be made on the blank forms provided in the bound copies of the CONTRACT DOCUMENTS and must be enclosed in a sealed envelope and addressed to Town of Nantucket, Procurement Office, 37 Washington Street, Nantucket, MA 02554, Attn: Brian Turbitt, Director of Municipal Finance

Estimated value of the Contract is approximately $24,000,000.

A Pre-Bid conference will be held at the Surfside Wastewater Treatment Plant, 81 South Shore Road, Nantucket, MA on Tuesday, September 14, 2021 at 10:00 AM followed by a site walkthrough. In the event of inclement weather, the pre-bid meeting will be held on September 15, 2021. Potential bidders may submit questions pertaining to the Contract Documents in writing at the meeting. A site walk will be held following the Pre-Bid conference.

Completion time for the project will be calculated as calendar days from the date specified in the "Notice to Proceed" as follows:

1,035 calendar days for substantial completion.
1,095 calendar days for final completion.

Liquidated damages will be in the amounts shown below for each calendar day of delay beyond the dates established below:

Substantial completion (1,035 calendar days)	**$1,000** per day
Final completion (1,095 calendar days)	**$1,000** per day

Each Bid shall be accompanied by a Bid Security in the amount of 5% of the Bidder's maximum Bid Price. No Bid shall be considered or accepted unless at the time of its filing the same shall be accompanied by a deposit with of cash, or a cashier's check or a certified check drawn on a bank or trust company insured by the Federal Deposit Insurance Corporation made payable to Owner or a Bid Bond issued by a surety licensed to conduct business in the Commonwealth of Massachusetts, in an amount equal to not less than five percent (5%) of the Bidder's maximum Bid Price.

The successful Bidder must furnish 100% Performance and Payment Bonds, and will be required to execute the Contract Agreement within 5 days (excluding Saturday, Sunday and holidays) following notification of the acceptance of his/her Bid. If upon acceptance of his/her Bid, a Bidder fails to enter into a Contract with the Town of Nantucket within 10 days, the Bid Surety shall be forfeited to and become the property of the Town of Nantucket. No Bidder may withdraw his Bid within 60 days after the date of Bid opening.

This Project is to be funded in part with monies made available by the Clean Water State Revolving Fund (SRF) and the Massachusetts Clean Water Trust and compliance with the following is required: Environmental Protection Agency's (EPA) Diesel Retrofit Program; EPA/Massachusetts Department of Environmental Protection (MassDEP) Division of Municipal Services (DMS) Disadvantaged Business Enterprise Program; the American Iron and Steel requirements of P.L. 113-76 (the Consolidated Appropriations Act of 2014); and Federal Minimum Wage Rates as determined by the United States Department of Labor under the Davis-Bacon Act; and other MassDEP/DMS provisions and policies.

Disadvantaged Business Enterprise (DBE) goals are applicable to the total dollars paid to the construction contract. **The goals for this project are a minimum of 4.2 percent D/MBE participation and 4.5 percent D/WBE participation by certified DBEs. The two low bidders shall submit completed DBE forms (EEO-DEP-190, EEO-DEP-191 and the DBE Certification of United States Citizenship form) by the close of business on the third business day after bid opening.** Failure to comply with the requirements of this paragraph may be deemed to render a

proposal non-responsive. No waiver of any provision of this section will be granted unless approved by MassDEP.

Minimum Wage Rates as determined by the Commissioner of Department of Workforce Development under the provision of the Massachusetts General Laws, Chapter 149, Sections 26 to 27D, as amended, apply to this project. It is the responsibility of the contractor, before bid opening, to request if necessary, any additional information on Minimum Wage Rates for those trades people who may be employed for the proposed work under this contract. Federal Minimum Wage Rates as determined by the United States Department of Labor under the Davis-Bacon Act also apply to this Project.

The Owner reserves the right to reject any Proposal for failure to comply with all requirements of this Notice or of any of the Contract Documents. However, it may waive any minor defects or informalities at its discretion. The Owner further reserves the right to reject any and all Proposals or to Award the contract which in its judgment is in the best interest of the Owner.

Sets of Bidding Documents may be obtained on or after September 1, 2021 10:00 AM:

> **Electronically** at no cost by registering at http://www.nantucket-ma.gov
> On menu bar at top of page click on "Business" then click on "Procurement"

Complete sets of Bidding Documents shall be used to prepare Bids; neither the Owner nor the Engineer have any responsibility for misinterpretation or errors resulting from the use of incomplete sets of Contract Documents, including any Addenda, obtained from any other source or for modifications to the Contract Documents including electronic conversion.

Bidders must certify that they do not and will not maintain or provide for their employees any facilities that are segregated on a basis of race, color, creed or national origin, and so certify with the form included in the Proposal.

- END OF SECTION –

SECTION 00100

INSTRUCTIONS TO BIDDERS

1. DEFINED TERMS

1.1 Terms used in these Instructions to Bidders which are defined in the Standard General Conditions of the Construction Contract, EJCDC C-700 (2007 edition) shall have the meanings assigned to them in the General Conditions as modified, changed, added to or deleted by the Supplementary Conditions.

2. QUALIFICATIONS OF BIDDERS

To demonstrate his/her qualifications for the Project, each Bidder shall submit with his/her Bid satisfactory proof of his/her qualifications as set forth in the General Requirements and Contract Documents to perform in a satisfactory manner and within the time specified in the Bid, all of the work covered by the Contract Documents. Bidder shall submit, among other items, information and evidence with respect to the following:

2.1 That he has a well-trained and competent organization which has done work of similar character and value;

2.2 That he will have available to do the work at the proper time or times, adequate equipment and facilities listing such equipment and facilities in such detail that they can be quickly and accurately checked;

2.3 That he has ample repair parts and supplies to maintain all equipment and facilities properly and with minimum delay;

2.4 If the Bidder is a corporation, the names of all corporate officers and the name of the executive who will give his/her personal attention to the work;

2.5 Detailed financial information relating to the resources of the Bidder.

2.6 The Contractor shall perform work amounting to at least 50% of the Contract, using **his/her own personnel and equipment (owned or rented)**. No portion of the Contract shall be sublet, assigned, or otherwise disposed of without with the expressed written consent of the Owner. **If the Contractor fails to demonstrate to the Owner in its Bid submittal information that he has the ability to perform the specified percentage of the Work with his/her own personnel and equipment, his/her Bid may be considered non-responsive.** The Contractor shall submit with its Bid, data supporting its ability to comply with this requirement.

Forms for submitting data and information relating to the financial responsibility of the Bidder are included in the Contract Documents and Bidders are requested to use such forms for the purpose intended. All information will be kept strictly confidential and used in determining whether the Bidder is qualified to do work set forth in the Contract Documents.

3. EXAMINATION OF CONTRACT DOCUMENTS, RELATED DATA AND SITE

3.1 Before submitting his/her Bid, each Bidder must:

3.1.1 Examine the Contract Documents thoroughly and all other related data identified in the Contract Documents. Sets of Contract Documents may be examined and obtained as stated in the Invitation to Bid.

3.1.2 Visit the site and become familiar with and satisfy Bidder as to the general, local, and Site conditions that may affect cost, progress, and performance of the Work;

3.1.3 Familiarize himself/herself with federal, state, and local laws, ordinances, rules and regulations affecting performance of the Work;

3.1.4 Consider the information known to Bidder; information and observations obtained from visits to the Site; the Contract Documents; and the Site-related reports and drawings identified in the Contract Documents, with respect to the effect of such information, observations, and documents on (1) the cost, progress, and performance of the Work; (2) the means, methods, techniques, sequences, and procedures of construction to be employed by Bidder, including applying any specific means, methods, techniques, sequences, and procedures of construction expressly required by the Contract Documents; and (3) Bidder's safety precautions and programs;

3.1.5 Promptly give Engineer written notice of all conflicts, errors, ambiguities, or discrepancies that Bidder discovers in the Contract Documents and confirm that the written resolution thereof by Engineer is acceptable to Bidder;

3.1.6 Inspect the Site. The site shall be inspected only in the company of an authorized representative of the Owner with appointments made through: David Gray, Sewer Director, Town of Nantucket.

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

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

3.2 Reference is made to Section 00800 – Project Specific Requirements of the Specifications for the identification of those surveys and investigation reports of subsurface or latent physical conditions at, or in the vicinity of the site or otherwise

affecting performance of the work which have been relied upon by Engineer in preparing the Drawings and Specifications. Subsurface data are offered in good faith solely for the purpose of placing the Bidder in receipt of all information available to Owner and Engineer and in no event is to be considered part of the Contract Documents. Before submitting his/her Bid, each Bidder will, at his/her own expense, make such additional surveys and investigations as he may deem necessary to determine his/her Bid Price for performance of the work within the terms of the Contract Documents. Bidder shall be responsible for obtaining permission and necessary permits and insurance for access to the Site. Prior to the Bidder doing any additional subsurface investigations, he must obtain a permit from the Department of Public Works and shall furnish evidence of such documents to the Engineer prior to any activity in the street right-of-way. The Bidder shall be responsible for any damage (including damage to any underground utility) as a result of additional subsurface investigations. Bidder shall clean up and restore the Site to its former condition upon completion of any such explorations, investigations, tests, and studies. Bidder shall comply with all applicable Laws and Regulations relative to excavation and utility locates. Any Bidder desiring access to the site for the purpose of additional subsurface Investigations must advise the Owner through David Gray, Sewer Director Town of Nantucket for coordination of access.

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

3.4 Provisions concerning responsibilities for the adequacy of data furnished to prospective Bidders with respect to subsurface conditions, other physical conditions, and Underground Facilities, and possible changes in the Bidding Documents due to differing or unanticipated subsurface or physical conditions appear in Paragraphs 4.02, 4.03, and 4.04 of the Section 00700 - Standard General Conditions and Section 00800 - Project Specific Requirements. Provisions concerning responsibilities for the adequacy of data furnished to prospective Bidders with respect to a Hazardous Environmental Condition at the Site, if any, and possible changes in the Contract Documents due to any Hazardous Environmental Condition uncovered or revealed at the Site which was not shown or indicated in the Drawings or Specifications or identified in the Contract Documents to be within the scope of the Work, appear in Paragraph 4.06 of the General Conditions and Section 00800 - Project Specific Requirements.

3.5 The submission of a Bid will constitute an incontrovertible representation by Bidder that Bidder has complied with every requirement of this Article 3, that without exception the Bid is premised upon performing and furnishing the Work required by the Contract Documents and applying any specific means, methods, techniques, sequences, and procedures of construction that may be shown or indicated or expressly required by the Contract Documents, that Bidder has given Engineer written notice of all conflicts, errors, ambiguities, and discrepancies that Bidder has discovered in the Contract Documents and the written resolutions thereof by

Engineer are acceptable to Bidder, and that the Contract Documents are generally sufficient to indicate and convey understanding of all terms and conditions for performing and furnishing the Work.

4. INTERPRETATIONS AND ADDENDA

4.1 All questions about the meaning or intent of the Contract Documents shall be submitted in writing or via email to:

Environmental Partners Group, Inc.
1900 Crown Colony Drive, Suite 402, Quincy, MA 02169
Attn: Ziad F. Kary, P.E.
Phone: 617-657-0283
(email: zfk@envpartners.com).

Replies will be issued by Addenda, mailed or delivered to all parties recorded by the Engineer as having received the bidding documents. Questions received less than five (5) days prior to the date for opening of Bids will not be answered. Only questions answered by formal written Addenda will be binding. Oral and other interpretations or clarifications will be without legal effect.

4.2 Addenda, when issued, will be on file at the offices of the Owner and Engineer at least forty-eight (48) hours before Bids are opened. **It shall be the Bidder's responsibility to make inquiry as to the Addenda issued. It is each Bidder's responsibility to check the Town website for Addenda during the Bidding period and obtain and Acknowledge addenda issued.** All such Addenda shall become part of the Contract Documents and all Bidders shall be bound by such Addenda, whether or not received by the Bidders.

4.3 Bidder is responsible for any interpretation or conclusion Bidder draws from any "technical data" or any other data, interpretations, opinions, or information contained in such reports or shown or indicated in such documents.

5. BID SECURITY

5.1 Each Bid must be accompanied by a Bid security which shall not be less than five (5%) percent of the Bidder's maximum Bid Price. The required security must be in the form of cash, a certified or bank cashier's check on some bank or trust company insured by the Federal Deposit Insurance Corporation made payable to Owner, or a Bid Bond issued by a surety licensed to conduct business in the Commonwealth of Massachusetts where the Project is located. The Bid security of the successful Bidder will be retained until he has executed the AGREEMENT and furnished the required Contract security, whereupon it will be returned; if he fails to execute and deliver the AGREEMENT and furnish the required Contract security within five (5) working days of the Notice to Award, Owner may annul the Notice of Award and the Bid security of the Bidder will be forfeited. The Bid security of all but the three (3) lowest Bidders will be returned within five (5) working days of the Bid opening.

6. CONTRACT TIME AND LIQUIDATED DAMAGES

6.1 The number of days (Contract time) within which the Work is to be substantially completed and ready for final payment is set forth in the Agreement. The Contractor shall commence work on the date specified in the Notice to Proceed, and he shall complete the work within the stipulated Contract time.

6.2 Provisions for liquidated damages, are set forth in the Agreement.

7. SUBCONTRACTORS

7.1 Disadvantaged Business Enterprise (DBE) – Disadvantaged Business Enterprise (DBE) goals are applicable to the total dollars paid to the construction contract. The goals for this project are a minimum of **4.2** percent D/MBE participation and **4.5** percent D/WBE participation by certified DBEs. The two low bidders shall submit completed DBE forms (EEO-DEP-190, EEO-DEP-191 and the DBE Certification of United States Citizenship form) by the close of business on the third business day after bid opening. Failure to comply with the requirements of this paragraph may be deemed to render a proposal non-responsive. No waiver of any provision of this section will be granted unless approved by the Department of Environmental Protection (MassDEP).

7.2 The apparent low Bidder and any other Bidder so requested shall within thirty (30) days after the Bid opening submit to the Owner an experience statement with pertinent information as to similar projects and other evidence of qualifications for each identified Subcontractor, person or organization who will furnish labor or materials including the names of equipment manufacturers. If Owner or Engineer after due investigation has reasonable objection to any proposed Subcontractor, other person or organization, he may before giving the Notice of Award request the apparent low Bidder to submit an acceptable substitute without an increase in his/her Bid Price. Any Subcontractor, other person or organization so listed and to whom the Owner or Engineer does not make written objection prior to the giving of the Notice of Award will be deemed acceptable to the Owner and Engineer. This does not remove responsibilities for said Subcontractor, supplier, etc., to comply with the Contract Specifications.

7.3 Contractor shall not be required to employ any Subcontractor, other person or organization against whom he has reasonable objection.

8. PREPARATION OF BID

8.1 The Bid Form and other required Supplemental Documentation are included in the Contract Documents.

8.2 Bids shall be submitted on the Bid Form furnished with the Contract Documents.

8.3 All blank spaces for Bid prices in the Bid Form shall be properly completed in ink in both words and numerals. In case of conflict between the Price in words and its

equivalent shown in numerals, the words will take precedence. BIDS SHALL NOT BE CONDITIONAL, LIMITED OR RESTRICTED IN ANY WAY.

8.4 Bids by corporations must be executed in the corporate name by the President or Vice-President (or other corporate officer accompanied by evidence of authority to sign) and the corporate seal shall be affixed and attested by the secretary or an assistant secretary. The corporate address and state of incorporation shall be shown below the signature.

8.5 Bids by partnership must be executed in the partnership name and signed by a partner, his/her title must appear under his/her signature and the official address of the partnership must be shown below the signature. The Owner reserves the right to request submission of partnership documents to determine the authority of the partner to execute the instrument.

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

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

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

8.9 All names must be printed in ink below the signature.

8.10 Bid shall contain an acknowledgement of receipt of all Addenda (the numbers of which shall be filled in on the Bid Form).

8.11 Enter Contractor's license number where called for on the Bid Form.

9. SUBMISSION OF BIDS

9.1 Bids shall be submitted at the time and place indicated in the Invitation for Bids and shall be included in an opaque sealed envelope, **marked with the Project title: "SEA STREET PUMP STATION FORCE MAIN NO.3, SRF NO. 6722 – BID ENCLOSED" in the lower left hand corner. The name and address and the Massachusetts Contractor's License Number of all Bidders must be plainly written on the outside of the envelope and accompanied by the Bid security and other required supplemental Bid documents listed below under paragraph 9.3.** No Bid will be considered unless filed on or before the time and at the place designated in the Invitation for Bids. Bids received after the time set for their receipt will be returned unopened.

9.2 Bids sent by mail should be registered mail. Bids sent by mail, courier or other delivery system shall be addressed to the Owner at the address listed below. The sealed Bid, marked as indicated above, should be enclosed in an additional sealed envelope similarly marked and addressed to:

Town of Nantucket
Procurement Office
37 Washington Street
Nantucket, MA 02554

Attn: Brian Turbitt, Director of Municipal Finance

Bids sent by mail, courier or other delivery system and arriving after the time for opening of Bids shall not be considered as valid Bids. In such instances, the Bidder shall have no claim against the Owner. Bidders are responsible to confirm the eligibility of overnight mailing or courier services to deliver to the Owner's offices.

9.3 THE FOLLOWING FORMS AND DOCUMENTATION SHALL BE COMPLETELY FILLED OUT AND SUBMITTED WITH THE BIDS:

BID SUBMITTAL CHECKLIST (Two copies of the Bid are required to be completed and submitted. One copy shall be an original signed hard copy of the documents listed below):

1) Bid Form (Section 00300)
2) Bid Bond – Penal Sum Form (Section 00310)
   OR other Required Bid Security
3) CERTIFICATIONS Required by Law For Public Construction Contracts (Section 00510)
4) Diesel Retrofit Intent to Comply

Failure of Bidder to submit all of the above forms with the Bid shall be just cause for rejection of the Bid by the Owner.

9.4 Pursuant to M.G.L.c.62C, s49A, each Bidder shall certify under the penalties of perjury that Bidder has filed all state tax returns and paid all State Taxes required under law.

10. MODIFICATION AND WITHDRAWAL OF BID

10.1 Written or telegraphic modifications of Bid may be accepted if received in accordance with the requirements for the submission of Bid as provided in Article 9 above. Bidders are cautioned that if in the opinion of the Owner or the Engineer such modifications are not explicit, or are in any sense subject to misinterpretation, then the Bid so amended or modified will be subject to rejection.

10.2 Any Bidder upon his/her properly notarized written request will be given permission to withdraw his/her Bid prior to the time scheduled for the opening of Bids. At the time of opening of the Bids, when such Bid is included, it will be returned to the Bidder unread. Negligence on the part of the Bidder in preparing his/her Bid confers no right for the withdrawal of the Bid after it has been opened.

11. OPENING OF BIDS

11.1 Bids will be received and Bids publicly opened and read at the time and place indicated in the Invitation for Bids.

12. BIDS TO REMAIN OPEN

The time period for holding Bids, where Federal approval is not required is 30 days, Saturdays, Sundays and legal holidays excluded, after the opening of bids and where Federal approval is required, the time period for holding bids is 30 days, Saturdays, Sundays and holidays excluded after Federal approval.

Owner may, in his/her sole discretion, release any Bid and return the Bid security prior to that date.

13. AWARD OF CONTRACT

13.1 Owner reserves the right to reject any and all Bids and waive any and all informalities, and the right to disregard all nonconforming or conditional Bids or counter Proposals.

13.2 In evaluating Bids, Owner shall consider the qualifications of the Bidders, whether or not the Bids comply with the prescribed requirements, and alternates and installed prices as requested in the Proposal forms. He may consider the qualifications and experience of Subcontractors and other persons and organizations (including those who are to furnish the principal items of material or equipment) proposed for those portions of the work as to which the identity of Subcontractors and other persons and organizations must be submitted, as required by Article 7. He may conduct such investigations as he deems necessary to establish the responsibility, qualifications and financial ability of the Bidders, proposed Subcontractors and other persons and organizations to do the work in accordance with the Contract Documents to Owner's satisfaction within the prescribed time. Owner reserves the right to reject the Bid of any Bidder who does not pass any such evaluation to Owner's satisfaction.

13.3 If a Contract is to be awarded, it will be awarded to the lowest responsible Bidder whose evaluation by Owner indicates to the Owner that the Award will be in the best interest of the Project.

13.4 The Owner will give the apparent successful Bidder a Notice of Award within thirty (30) days after the day of the Bid opening. The successful Bidder shall execute and return to the Engineer the Contract within five (5) working days of the date of Notice of Award of Contract.

13.5 In addition, the successful Bidder, within the period stipulated in Paragraph 13.4, shall procure, execute and deliver to the Owner and maintain, at his/her own cost and expense, 100% Performance and Payment bonds.

13.6 Failure or refusal of the Bidder whose Bid Proposal is accepted to execute the Contract as hereinbefore provided shall constitute a breach by such Bidder of the Contract created by the acceptance of the Bid Proposal, and in such event, the Owner at his/her option, may determine that such Bidder has abandoned the Contract. Thereupon such Bidder's Bid Proposal and the acceptance thereof shall be null and void. It is understood by the Bidder, in the event of the annulment of the Award, that the amount of the cash, certified check, or Bid Bond, submitted with the Bid Proposal shall be forfeited to the use of the Owner, not as a penalty, but as liquidated damages.

14. PRE-BID CONFERENCE

14.1 Pre-Bid Conference

A Pre-Bid Conference will be held at the time, date and location as indicated in the Invitation to Bid to discuss the Project. Representatives of the Owner and Engineer will be available to answer pertinent questions. Bidders are encouraged to attend and participate in the conference.

14.2 Addenda will be issued to all prospective Bidders of record considered necessary in response to questions arising at the conference by posting on the Owner's website only. Oral statements may not be relied upon and will not be binding or legally effective. It is each Bidder's responsibility to check the Owner's website for Addenda per Paragraph 4.2.

15. APPLICABLE LAWS AND REGULATION

15.1 Applicable provisions of Massachusetts General Laws and Regulations and/or the United States Code and Code of Federal Regulations govern this Contract and any provision in violation of the foregoing shall be deemed null, void and of no effect. Where conflict between Code of Federal Regulations and State Laws and Regulations exist, the more stringent requirement shall apply.

15.2 Contractors, Subcontractors or suppliers that appear on the Excluded Parties List System at www.epls.gov are not eligible for award of any contracts funded by the Massachusetts State Revolving Fund.

16. MINIMUM WAGE RATES

16.1 Minimum Wage Rates as determined by the Commissioner of Department of Workforce Development under the provision of the Massachusetts General Laws, Chapter 149, Sections 26 to 27D, as amended, apply to this project. It is the responsibility of the contractor, before bid opening, to request if necessary, any additional information on Minimum Wage Rates for those trades people who may be employed for the proposed work under this contract. Federal Minimum Wage Rates as determined by the United States Department of Labor under the Davis-

Bacon Act also apply to this project. Required contract language for projects in the 2016 Intended Use Plan is included in Section 00820 of these Specifications.

17. CONTRACTOR WORK AND SERVICES

17.1 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. Provisions concerning Contractor's general warranty, guarantees and correction period are set forth in Articles 6.19, 13.06, 13.07 and 14.03 of the Section 00700 - General Conditions and Section 00800 - Project Specific Requirements.

17.2 If at any time within the said period of guarantee any part of the Work requires repairing, correction or replacement, the Owner may notify the contractor in writing to make the required repairs, correction or replacements. If the Contractor neglects to commence making such repairs, corrections or replacements to the satisfaction of the Owner within seven (7) days from the date of receipt of such notice, or having commenced fails to prosecute such Work with diligence, the Owner may employ other persons to make said repairs, correction or replacements, and charge the costs, including compensation for additional professional services, to the Contractor.

18. SAFETY AND HEALTH REGULATIONS

18.1 This project is subject to the Safety and Health Regulations of the U.S. Department of Labor set forth in Title 29 CFR, Part 1926 and to all subsequent amendments, and to the Massachusetts Department of Labor and Industries, Division of Industrial Safety 'Rules and Regulations for the Prevention of Accidents in Construction Operations' (Chapter 454 CMR 10.00 et seq.). Contractors shall be familiar with the requirements of these regulations.

19. EQUIPMENT MANUFACTURER EXPERIENCE

19.1 Whenever it is written that an equipment manufacturer must have a specified period of experience with his/her product, equipment which does not meet the specified experience period can be considered if the equipment supplier or manufacturer is willing to provide an "Efficiency Guarantee Bond" or cash deposit for the duration of the specified time period which will guarantee replacement of that equipment in the event of failure.

20. MASSACHUSETTS DIESEL RETROFIT PROGRAM (MDRP)

20.1 This project is subject to the requirements of the Department of Environmental Protection's Diesel Retrofit Program. Bidders must submit a signed and dated Statement of Intent to Comply form as part of their bid proposal documents.

21. AMERICAN IRON AND STEEL

21.1 This project is subject to the American Iron and Steel requirements of P.L. 113-76, the Consolidated Appropriations Act of 2014.

- END OF SECTION -

SUBMIT THIS FORM WITH BID

SECTION 00300

BID FORM

To the Awarding Authority:

A. The Undersigned proposes to furnish all labor and materials required for Sea Street Pump Station Force Main No.3, MA DEP Project CWSRF 6722 in Nantucket, Massachusetts, in accordance with the accompanying plans and specifications prepared by Environmental Partners Group, Inc. for the Total Contract Price specified below, subject to additions and deductions according to the terms of the Contract Documents.

Basis of Award: The Contract Award shall be made to the lowest eligible and responsible bidder, offering the lowest price for the **Total Base Price (total of Items 1 through 31, inclusive) plus *Item 32A. Bid Alternate No.1 - Liberty Street Drainage Improvements, Item 32B. Bid Alternate No.2 – Downtown Sidewalk and Crosswalk Improvements, Item 32C. Bid Alternate No.3 – Atlantic Avenue Drainage Improvements, Item 32D. Bid Alternate No.4 – Silver Street Parking Lot Rehabilitation, and Item 32E. Bid Alternate No. 5 – Winter Street Cobblestone Restoration.***

Each alternate contained in the Bid Form is listed in a numerical sequence in order of priority. The Owner shall consider the alternates in numerical sequence, such that no single alternate shall be considered unless every alternate preceding it on the list has been added to or subtracted from the base bid price. The alternate bids may become part of the Contract at the sole discretion of the Owner.

If no alternates are included in the Contract, the Contract Award shall be made to the lowest eligible and responsible bidder, offering the lowest price for the **Total Base Price (total of Items 1 through 31, inclusive).**

If *Alternate No. 1* is included in the Contract, the Contract Award shall be made to the lowest eligible and responsible bidder, offering the lowest price for the **Total Base Price (total of Items 1 through 31, inclusive) plus the price of Item 32A. Bid Alternate No. 1 – Liberty Street Drainage Improvements**.

If *Alternate Nos. 1 and 2* are included in the Contract, the Contract Award shall be made to the lowest eligible and responsible bidder, offering the lowest price for the **Total Base Price (total of Items 1 through 31, inclusive) plus the price of Item 32A. Bid Alternate No. 1 – Liberty Street Drainage Improvements; and the price of Item 32B. Bid Alternate No.2 – Downtown Sidewalk and Crosswalk Improvements.**

If *Alternate Nos. 1, 2 and 3* are included in the Contract, the Contract Award shall be made to the lowest eligible and responsible bidder, offering the lowest price for the **Total Base Price (total of Items 1 through 31, inclusive) plus the price of Item 32A. Bid Alternate No. 1 – Liberty Street Drainage Improvements; the price of Item 32B. Bid Alternate No.2 – Downtown Sidewalk and Crosswalk Improvements; and the price of Item 32C. Bid Alternate No.3 – Atlantic Avenue Drainage Improvements.**

If *Alternate Nos. 1, 2, 3, and 4* are included in the Contract, the Contract Award shall be made to the lowest eligible and responsible bidder, offering the lowest price for the **Total Base Price (total of Items 1 through 31, inclusive) plus the price of Item 32A. Bid Alternate No. 1 – Liberty Street Drainage Improvements; the price of Item 32B. Bid Alternate No.2 – Downtown Sidewalk and Crosswalk Improvements; the price of Item 32C. Bid Alternate No.3 – Atlantic Avenue Drainage Improvements; and the price of Item 32D. Bid Alternate No.4 – Silver Street Parking Lot Rehabilitation.**

If *Alternate Nos. 1, 2, 3, 4, and 5* are included in the Contract, the Contract Award shall be made to the lowest eligible and responsible bidder, offering the lowest price for the **Total Base Price (total of Items 1 through 31, inclusive) plus the price of Item 32A. Bid Alternate No. 1 – Liberty Street Drainage Improvements; the price of Item 32B. Bid Alternate No.2 – Downtown Sidewalk and Crosswalk Improvements; the price of Item 32C. Bid Alternate No.3 – Atlantic Avenue Drainage Improvements; the price of Item 32D. Bid Alternate No.4 – Silver Street Parking Lot Rehabilitation; and the price of Item 32E. Bid Alternate No.5 – Winter Street Cobblestone Restoration.**

B. This bid includes addenda numbered_____

TOTAL BID

PART 1: BASE BID

The work of the Bidder, being all work covered by Items 1 through 31, inclusive.

Item No.	Item Description and Unit Price in Words	Units	Estimated Quantity	Unit Price (In Figures)	Extended Amount (In Figures)
1	Mobilization and Demobilization (No more than 5% of Base Bid) _____ Dollars and Cents	Lump Sum	1		
2a	Preconstruction Video and Photographs _____ Dollars and Cents	Lump Sum	1		
2b	Monthly Construction Progress Photographs _____ Dollars and Cents	Lump Sum	1		
3a	Furnish and Install 24" SDR18 C900 PVC Pipe and Fittings via Open Cut _____ Dollars and Cents	Linear Foot	7,980		
3b	Furnish and Install 20" SDR18 C900 PVC Pipe and Fittings via Open Cut _____ Dollars and Cents	Linear Foot	9,650		
3c	Furnish and Install 24" Protecto 401 Epoxy Lined DI Pipe and Fittings via Open Cut _____ Dollars and Cents	Linear Foot	340		
3d	Furnish and Install 20" Protecto 401 Epoxy Lined DI Pipe and Fittings via Open Cut _____ Dollars and Cents	Linear Foot	170		

Item No.	Item Description and Unit Price in Words	Units	Estimated Quantity	Unit Price (In Figures)	Extended Amount (In Figures)
3e	Furnish and Install 16" Protecto 401 Epoxy Lined DI Pipe and Fittings via Open Cut _____ Dollars and Cents	Linear Foot	20		
3f	Furnish and Install 8" Protecto 401 Epoxy Lined DI Pipe and Fittings via Open Cut _____ Dollars and Cents	Linear Foot	45		
4a	Furnish and Install 24" Sewer Force Main Plug Valves _____ Dollars and Cents	Each	6		
4b	Furnish and Install 20" Sewer Force Main Plug Valves _____ Dollars and Cents	Each	10		
4c	Furnish and Install 16" Sewer Force Main Plug Valves _____ Dollars and Cents	Each	1		
4d	Furnish and Install 8" Sewer Force Main Plug Valves _____ Dollars and Cents	Each	2		
4e	Furnish and Install 8" Sewer Force Main Check Valves and Structures _____ Dollars and Cents	Each	1		
5a	Furnish and Install 8' Diameter Intermediate Access Point Manholes and Associated Fittings _____ Dollars and Cents	Each	7		

Item No.	Item Description and Unit Price in Words	Units	Estimated Quantity	Unit Price (In Figures)	Extended Amount (In Figures)
5b	Furnish and Install 5' x 8' Intermediate Access Point Manholes and Associated Fittings _____ Dollars and Cents	Each	3		
6a	Furnish and Install 8' Diameter Air Release/Vacuum Relief Manholes and Associated Fittings _____ Dollars and Cents	Each	2		
6b	Furnish and Install 5' x 8' Air Release/Vacuum Relief Manholes and Associated Fittings _____ Dollars and Cents	Each	3		
7a	Furnish and Install 8' Diameter Blow-off/Clean Out Manholes and Associated Fittings _____ Dollars and Cents	Each	1		
7b	Furnish and Install 6' x 8' Blow-off/Clean Out Manholes and Associated Fittings _____ Dollars and Cents	Each	3		
8a	Furnish and Install 12” DI Water Main _____ Dollars and Cents	Linear Foot	60		
8b	Furnish and Install 8” DI Water Main _____ Dollars and Cents	Linear Foot	2,140		
8c	Furnish and Install 6” DI Water Main _____ Dollars and Cents	Linear Foot	3,220		
9a	Furnish and Install 12” Gate Valves and Boxes _____ Dollars and Cents	Each	3		

Item No.	Item Description and Unit Price in Words	Units	Estimated Quantity	Unit Price (In Figures)	Extended Amount (In Figures)
9b	Furnish and Install 8” Gate Valves and Boxes _____ Dollars and Cents	Each	10		
9c	Furnish and Install 6” Gate Valves and Boxes _____ Dollars and Cents	Each	27		
9d	Furnish and Install 4” Gate Valves and Boxes _____ Dollars and Cents	Each	3		
9e	Furnish and Install Additional Gate Valves and Boxes _____ Dollars and Cents	Each	3		
10a	Furnish and Install Hydrant Assemblies _____ Dollars and Cents	Each	10		
10b	Furnish and Install Additional Hydrant Assemblies _____ Dollars and Cents	Each	3		
11	Furnish and Install Water Service Taps and Curb Boxes _____ Dollars and Cents	Each	122		
12	Furnish and Install Polyethylene Water Services _____ Dollars and Cents	Linear Foot	1,830		
13a	Furnish and Install 4” Temporary Bypass Piping and Appurtenances _____ Dollars and Cents	Linear Foot	4,505		

Item No.	Item Description and Unit Price in Words	Units	Estimated Quantity	Unit Price (In Figures)	Extended Amount (In Figures)
13b	Furnish and Install 2” Temporary Bypass Piping and Appurtenances _____ Dollars and Cents	Linear Foot	1,060		
14	Furnish and Install Additional Water Main Fittings _____ Dollars and Cents	Pounds	1,500		
15a	Furnish and Install 12” SDR 35 PVC Gravity Sewer Pipe _____ Dollars and Cents	Linear Foot	1,340		
15b	Furnish and Install 10” SDR 35 PVC Gravity Sewer Pipe _____ Dollars and Cents	Linear Foot	315		
15c	Furnish and Install 8” SDR 35 PVC Gravity Sewer Pipe _____ Dollars and Cents	Linear Foot	2,775		
15d	Furnish and Install 12” C909 PVC Gravity Sewer Pipe _____ Dollars and Cents	Linear Foot	75		
15e	Furnish and Install 8” C909 PVC Gravity Sewer Pipe _____ Dollars and Cents	Linear Foot	250		
16	Furnish and Install 6” PVC Gravity Sewer Service and Cleanout _____ Dollars and Cents	Each	143		
17a	Furnish and Install 4’ Diameter Gravity Sewer Manhole _____ Dollars and Cents	Each	37		

Item No.	Item Description and Unit Price in Words	Units	Estimated Quantity	Unit Price (In Figures)	Extended Amount (In Figures)
17b	Furnish and Install 5' Diameter Gravity Sewer Manhole _____ Dollars and Cents	Each	2		
17c	Furnish and Install Gravity Sewer Manhole Frame and Cover _____ Dollars and Cents	Each	39		
18a	Furnish and Install 18" DI Drain Pipe _____ Dollars and Cents	Linear Foot	10		
18b	Furnish and Install 15" DI Drain Pipe _____ Dollars and Cents	Linear Foot	35		
18c	Furnish and Install 12" DI Drain Pipe _____ Dollars and Cents	Linear Foot	265		
18d	Furnish and Install 8" DI Drain Pipe _____ Dollars and Cents	Linear Foot	135		
19a	Remove and Replace Catch Basin _____ Dollars and Cents	Each	2		
19b	Remove and Replace Leaching Catch Basin _____ Dollars and Cents	Each	5		
19c	Remove and Replace Drain Manhole _____ Dollars and Cents	Each	3		
19d	Remove and Replace Gutter Inlet _____ Dollars and Cents	Each	7		

Item No.	Item Description and Unit Price in Words	Units	Estimated Quantity	Unit Price (In Figures)	Extended Amount (In Figures)
20	Installation of Concrete Cradles Over Force Main Pipe for Catch Basins and Drain Manholes _____ Dollars and Cents	Each	1		
21a	AC Pipe Removal and Disposal _____ Dollars and Cents	Linear Foot	700		
21b	Management and Disposal of Crushed AC Pipe and AC Impacted Soils _____ Dollars and Cents	Cubic Yard	350		
21c	Removal and Disposal of Unforeseen Asbestos _____ Dollars and Cents	Allowance	1	$250,000.00	$250,000.00
21d	Removal and Disposal of Other Hazardous Materials _____ Dollars and Cents	Allowance	1	$100,000.00	$100,000.00
21e	Soil Management Plans _____ Dollars and Cents	Lump Sum	1		
22a	Exploratory Excavation _____ Dollars and Cents	Cubic Yard	1,200		
22b	Rock Excavation _____ Dollars and Cents	Cubic Yard	250		
23a	3” Temporary Trench Pavement _____ Dollars and Cents	Square Yard	18,500		
23b	Full-Width Full-Depth Reclamation and Pavement _____ Dollars and Cents	Square Yard	12,900		

Item No.	Item Description and Unit Price in Words	Units	Estimated Quantity	Unit Price (In Figures)	Extended Amount (In Figures)
23c	12” Processed Gravel Subbase _____ Dollars and Cents	Square Yard	9,150		
23d	7” Permanent Trench Pavement _____ Dollars and Cents	Square Yard	9,150		
23e	2” Mill and Overlay _____ Dollars and Cents	Square Yard	12,700		
23f	4” Permanent Bike Path Construction _____ Dollars and Cents	Square Yard	2,150		
24a	Install New Brick Sidewalk _____ Dollars and Cents	Square Yard	620		
24b	Remove and Reset Brick Sidewalk _____ Dollars and Cents	Square Yard	1,500		
24c	Furnish and Install Brick Wheelchair Ramps _____ Dollars and Cents	Square Yard	150		
24d	Remove and Replace Bituminous Concrete Sidewalk _____ Dollars and Cents	Square Yard	150		
24e	Remove and Reset Granite Curb _____ Dollars and Cents	Linear Foot	4,900		
24f	Install New Granite Curb _____ Dollars and Cents	Linear Foot	650		

Item No.	Item Description and Unit Price in Words	Units	Estimated Quantity	Unit Price (In Figures)	Extended Amount (In Figures)
24g	Install Bituminous Concrete Cape Cod Berm _____ Dollars and Cents	Linear Foot	180		
24h	Restoration of Growth _____ Dollars and Cents	Square Yard	1,850		
24i	Furnish and Install Cobblestone/Belgian Block Road _____ Dollars and Cents	Square Yard	150		
24j	Remove, Stockpile, and Deliver Existing Cobblestones to the DPW (From Winter Street and Pine Street) _____ Dollars and Cents	Square Yard	4,200		
24k	Remove, Stockpile, and Deliver Additional Existing Cobblestones to the DPW _____ Dollars and Cents	Square Yard	1,000		
24l	Furnish and Install New Cobblestone/Belgian Block _____ Dollars and Cents	Square Yard	45		
24m	Driveway Apron Restoration _____ Dollars and Cents	Square Yard	100		
24n	Remove and Reset Existing Fence _____ Dollars and Cents	Linear Foot	350		
25	Remove and Dispose of Existing Fire Protection Cistern _____ Dollars and Cents	Lump Sum	1		

Item No.	Item Description and Unit Price in Words	Units	Estimated Quantity	Unit Price (In Figures)	Extended Amount (In Figures)
26	Traffic Management _____ Dollars and Cents	Lump Sum	1		
27	Utility Support and Coordination _____ Dollars and Cents	Allowance	1	$100,000.00	$100,000.00
28a	12” Diameter Filter Sock _____ Dollars and Cents	Linear Foot	550		
28b	Silt Sacks _____ Dollars and Cents	Each	100		
29	Dewatering and Discharge _____ Dollars and Cents	Lump Sum	1		
30	Geotechnical Instrumentation and Monitoring _____ Dollars and Cents	Lump Sum	1		
31	Miscellaneous Work and Cleanup _____ Dollars and Cents	Lump Sum	1		

TOTAL FOR BASE BID

Total Amount of Base Bid (Items 1 through 31, inclusive).

$ _____
(Amount in figures)

_____
(Amount in words)

PART 2: BID ALTERNATES

Bid Alternates as Follows:

Item No.	Item Description and Unit Price in Words	Units	Estimated Quantity	Unit Price (In Figures)	Extended Amount (In Figures)
32a	Bid Alternate No.1 Liberty Street Drainage Improvements _____ Dollars and Cents	Lump Sum	1		
32b	Bid Alternate No.2 Downtown Sidewalk and Crosswalk Improvements _____ Dollars and Cents	Lump Sum	1		
32c	Bid Alternate No.3 Atlantic Avenue Drainage Improvements _____ Dollars and Cents	Lump Sum	1		
32d	Bid Alternate No.4 Silver Street Parking Lot Rehabilitation _____ Dollars and Cents	Lump Sum	1		
32e	Bid Alternate No.5 Winter Street Cobblestone Restoration _____ Dollars and Cents	Lump Sum	1		

TOTAL FOR BASE BID PLUS BID ALTERNATE NO.1

Total Base Price (total of Items 1 through 31, inclusive) plus the price of Item 32A. Bid Alternate No. 1 – Liberty Street Drainage Improvements.

$ _____

(Amount in figures)

_____

(Amount in words)

TOTAL FOR BASE BID PLUS BID ALTERNATE NO.1 AND NO.2

Total Base Price (total of Items 1 through 31, inclusive) plus the price of Item 32A. Bid Alternate No. 1 – Liberty Street Drainage Improvements; and the price of Item 32B. Bid Alternate No.2 – Downtown Sidewalk and Crosswalk Improvements.

$ _____

(Amount in figures)

_____

(Amount in words)

TOTAL FOR BASE BID PLUS BID ALTERNATES NO.1, NO.2, AND NO.3

Total Base Price (total of Items 1 through 31, inclusive) plus the price of Item 32A. Bid Alternate No. 1 – Liberty Street Drainage Improvements; the price of Item 32B. Bid Alternate No.2 – Downtown Sidewalk and Crosswalk Improvements; and the price of Item 32C. Bid Alternate No.3 – Atlantic Avenue Drainage Improvements.

$ _____

(Amount in figures)

_____

(Amount in words)

TOTAL FOR BASE BID PLUS BID ALTERNATES NO.1, NO.2, NO.3. AND NO.4

Total Base Price (total of Items 1 through 31, inclusive) plus the price of Item 32A. Bid Alternate No. 1 – Liberty Street Drainage Improvements; the price of Item 32B. Bid Alternate No.2 – Downtown Sidewalk and Crosswalk Improvements; the price of Item 32C. Bid Alternate No.3 – Atlantic Avenue Drainage Improvements; and the price of Item 32D. Bid Alternate No.4 – Silver Street Parking Lot Rehabilitation.

$ _____

(Amount in figures)

_____

(Amount in words)

TOTAL FOR BASE BID PLUS BID ALTERNATES NO.1, NO.2, NO.3. NO.4, AND NO.5

Total Base Price (total of Items 1 through 31, inclusive) plus the price of Item 32A. Bid Alternate No. 1 – Liberty Street Drainage Improvements; the price of Item 32B. Bid Alternate No.2 – Downtown Sidewalk and Crosswalk Improvements.; the price of Item 32C. Bid Alternate No.3 – Atlantic Avenue Drainage Improvements; the price of Item 32D. Bid Alternate No.4 – Silver Street Parking Lot Rehabilitation; and the price of Item 32E. Bid Alternate No.5 – Winter Street Cobblestone Restoration.

$ _____

(Amount in figures)

_____

(Amount in words)

C. The undersigned agrees that, if he is selected as the contractor, he will within five days, Saturdays, Sundays and legal holidays excluded, after presentation thereof by the awarding authority, execute a contract in accordance with the terms of this bid and furnish a performance bond and also a labor and materials or payment bond, each of a surety company qualified to do business under the laws of the commonwealth and satisfactory to the awarding authority and each in the sum of the contract price, the premiums for which are to be paid by the contractor and are included in the contract price; provided, however, that if there is more than 1 surety company, the surety companies shall be jointly and severally liable.

The undersigned hereby certifies that he is able to furnish labor that can work in harmony with all other elements of labor employed or to be employed on the work; that all employees to be employed at the worksite will have successfully completed a course in construction safety and health approved by the United States Occupational Safety and Health Administration that is at least 10 hours in duration at the time the employee begins work and who shall furnish documentation of successful completion of said course with the first certified payroll report for each employee; and that he will comply fully with all laws and regulations applicable to awards made subject to section 44A.

The undersigned further certifies under the penalties of perjury that this bid is in all respects bona fide, fair and made without collusion or fraud with any other person. As used in this subsection the word "person" shall mean any natural person, joint venture, partnership, corporation or other business or legal entity. The undersigned further certifies under penalty of perjury that the said undersigned is not presently debarred from doing public construction work in the commonwealth under the provisions of section twenty-nine F of chapter twenty-nine, or any other applicable debarment provisions of any other chapter of the General Laws or any rule or regulation promulgated thereunder and is not presently debarred, suspended, proposed for debarment, declared, ineligible, or voluntarily excluded from covered transactions by any Federal department or agency.

This Bid is submitted by the Undersigned:

A Corporation:

Corporation Name:

_____

State of Incorporation:

_____

Type:

_____
(*General Business, Professional, Service, other*)

By:

_____Date:_____
(*Signature – attach evidence of authority to sign*)

Name (*typed or printed*):

_____

Title:

_____

(CORPORATE SEAL)
Attest:

_____Date:_____
(*Signature of Corporate Secretary*)

Business Address:

_____

_____

Phone & Facsimile Nos:

_____

Email Address:

_____

Date of qualification to do business as out-of-state corporation:

_____

A Limited Liability Company (LLC):

LLC Name:

_____

State in which Organized:

_____

By:

_____Date:_____

(*Signature – attach evidence of authority to sign*)

Name (*typed or printed*):

_____

Title:

_____

(CORPORATE SEAL)

Attest:

_____Date:_____

(*Signature of Corporate Secretary*)

Business Address:

_____

_____

Phone & Facsimile Nos:

_____

Email Address:

_____

Date of qualification to do business as out-of-state corporation:

_____

A Partnership:

Partnership Name:

_____(SEAL)

By:

_____Date:_____

(*Signature – attach evidence of authority to sign*)

Name (*typed or printed*):

_____

Title:

_____

Business Address:

_____

_____

Phone & Facsimile Nos:

_____

Email Address:

_____

A Joint Venture:

First Joint Venturer Name:

_____

By:

_____Date:_____

(*Signature – attach evidence of authority to sign*)

Name (*typed or printed*):

_____

Title: _____

Business Address:

_____

_____

Phone & Facsimile Nos:

_____

Email Address:

_____

Second Joint Venturer Name:

_____

By:

_____Date:_____

(*Signature – attach evidence of authority to sign*)

Name (*typed or printed*):

_____

Title:

_____

Business Address:

_____

_____

Phone & Facsimile Nos:

_____

Email Address:

_____

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

SUBMITTED ON:
State License No. (if applicable)
EIN/FEIN:

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

The contractor must provide both a Performance Bond and a Payment Bond each in the amount of 100% of the total contract price.

Completion time for the project will be calculated as calendar days from the date specified in the "Notice to Proceed" as follows:

1,035 calendar days for substantial completion.
1,095 calendar days for final completion.

Liquidated damages will be in the amounts shown below for each calendar day of delay beyond the dates established below:

Substantial completion (1,035 calendar days)	**$1,000** per day
Final completion (1,095 calendar days)	**$1,000** per day

The time period for holding bids, where Federal approval is not required is 30 days, Saturdays, Sundays and legal holidays excluded, after the opening of bids and where Federal approval is required, the time period for holding bids is 30 days, Saturdays, Sundays and holidays excluded after Federal approval.

The undersigned hereby certifies that he/she will comply fully with all laws and regulations applicable to awards made subject to ML Ch. 30, Section 39M. The bidding and award of the contract will be in full compliance with Section 39M inclusive of Chapter 30 of the General Laws of the Commonwealth of Massachusetts as last revised.

Pursuant to M.G.L.c.62C, s49A I certify under the penalties of perjury that I, to my best knowledge and belief, have filed all state tax returns and paid all State Taxes required under law.

The undersigned bidder hereby certifies he/she will comply with the specific affirmative action steps contained in the EEO/AA provisions of this Contract, including compliance with the Disadvantaged Business Enterprise provisions as required under these contract provisions. The contractor receiving the award of the contract shall incorporate the EEO/AA provisions of this contract into all subcontracts and purchase orders so that such provisions will be binding upon each subcontractor or vendor.

The undersigned further certifies under penalty of perjury that the said undersigned is not presently debarred from doing public construction work in the Commonwealth under the provisions of Section Twenty-Nine F of Chapter Twenty-Nine, or any other applicable debarment provisions of any other Chapter of the General Laws or any rule or regulation promulgated thereunder; and is not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from covered transactions by any Federal department or agency.

Bidders must fully comply with Subpart C of 2 CFR Part 180 and 2 CFR Part 1532, entitled responsibilities of Participants Regarding transactions (Doing Business with Other Persons). Contractors, subcontractors, or suppliers that appear on the Excluded Parties List System at www.usgovxml.com/dataservice.aspx?ds=EPLS are not eligible for award of any contracts funded by the Massachusetts State Revolving Fund.

The Contractor agrees that it will fully comply with Subpart C of 2 CFR Part 180 and 2 CFR Part1532, entitled Responsibilities of Participants Regarding Transactions (Doing Business with Other Persons). The Contractor shall not award any subcontracts or purchase any materials from suppliers that appear on the Excluded Parties List System. The Contractor shall include this requirement in each subcontract and require it to be included in all subcontracts regardless of tier. The Contractor shall maintain reasonable records to demonstrate compliance with these requirements.

Section 00300B

Appendix B - Diesel Retrofit Program

The Department of Environmental Protection ("DEP") has developed the Diesel Retrofit Program in response to increasing public health concerns with the emissions from diesel engines and vehicles.

Diesel Construction Equipment Standard

All diesel powered non-road construction equipment and vehicles greater than 50 brake horsepower which will be used in the performance of the work under the Contract (hereinafter "Diesel Construction Equipment") must have the following pollution control device installed unless exempt as provided below:

1. Emission control technology verified by U.S. Environmental Protection Agency ("EPA") or the California Air Resources Board ("CARB") for use with non-road engines;
2. Emission control technology verified by EPA or CARB for use with on-road engines provided that such equipment is operated with diesel fuel that has no more than 15 parts per million sulfur content (i.e. Ultra Low Sulfur Diesel fuel); or
3. Emission control technology certified by the manufacturer that such technology meets or exceeds the emission reductions provided by on-road or off-road emission control technology verified by EPA or CARB, i.e. that a Diesel Oxidation Catalyst is achieving the following minimum emission reductions: particulate matter 20%; carbon monoxide 40%; volatile organic compounds 50%; or a Diesel Particulate Filter is achieving a minimum of 85% emission reductions for particulate matter.

Emission control devices, such as oxidation catalysts or particulate filters, shall be installed on the exhaust system side of the Diesel Construction Equipment. The Contractor shall be responsible to insure that the emissions control technology is operated, maintained, and serviced as recommended by the manufacturer.

For the latest up-to-date list of EPA verified-technologies, see:
http://www.epa.gov/otaq/retrofit/retroverifiedlist.htm
For the latest up-to-date list of CARB verified technologies, see:
http://www.arb.ca.gov/diesel/verdev/verifiedtechnologies/vt.htm

Exemptions

The following Diesel Construction Equipment shall be exempt from the standard above. The Contractor shall include such Diesel Construction Equipment in the required recordkeeping:

1. Diesel Construction Equipment not owned by the Contractor and used in the performance of the work under this Contract for 30 calendar days (cumulative days but not necessarily consecutive) or less;
2. Unless otherwise exempt, additional Diesel Construction Equipment originally not anticipated to be used under the Contract or used as permanent replacement after the work under the Contract has commenced, for 15 calendars days from the date such Diesel Construction Equipment is brought on site; DEP-DMS-P&S -19

3. Diesel Construction Equipment with an engine that meets the EPA particulate matter (PM) Tier emission standards in effect at the start of the Contract for non-road diesel engines for the applicable engine power group (e.g., as of January 1, 2009, a piece of Diesel Construction Equipment with a Tier 3 engine is exempt from meeting the standard until the piece of Diesel Construction Equipment is available with a Tier 4 engine) provided that if such emissions standards are superseded during the Contract then such Diesel Construction Equipment must be retrofitted in accordance with the standards above prior to the end of the Contract;
4. A large crane (e.g. a sky crane or link belt crane which is responsible for critical lift operations) if such device would adversely affect the operation of the crane provided the Contractor submits to the municipality's project engineer written technical justification documenting the adverse impact on operation; and
5. Diesel Construction Equipment that the project engineer has determined is necessary to control a compelling emergency including but not limited to, the need for rescue vehicles or other equipment to prevent harm to human beings or additional equipment required to address a catastrophic emergency such as structure collapse or imminent collapse. After the compelling emergency is controlled, such non-compliant equipment must be removed from the Contract site and may not be used in further performance of the work under this Contract. Meeting Contract deadlines is not a compelling emergency.

Contractor Certification

Each bidder shall submit as part of its bid, the Statement of Intent to Comply. Within 10 days of being notified that it has been awarded a contract, the bidder and each of its Contractors and Subcontractors shall submit a Diesel Retrofit Program Contractor Certification. Each such Certification shall contain the following information for each piece of Diesel Construction Equipment:

1. Contractor or Subcontractor name;
2. Equipment type, make, model;
3. Vehicle Identification Number or VIN;
4. Engine model and year of manufacture;
5. Engine HP rating;
6. Emission Control Device (ECD) type (Diesel Oxidation Catalyst or Diesel Particulate Filter);
7. ECD make, model, and manufacturer;
8. ECD EPA or CARB Verification Number or manufacturer's certification that the DOC or DPF meets or exceeds emission reductions provided by similar emission control technology verified by EPA or CARB;
9. ECD installation date;
10. Type of fuel to be used; and
11. Whether the equipment is owned or rented.

Recordkeeping

Each Contractor and Subcontractor shall maintain detailed records of all Diesel Construction Equipment used under the Contract, including the dates and duration times the Diesel Construction Equipment is DEP-DMS-P&S -20

used at the Contract site. Records shall be available for inspection by DEP. Each Contractor and Subcontractor shall notify DEP within 48 hours of any new Diesel Construction Equipment brought onto the Contract site.

For Diesel Construction Equipment that has an emissions control device with a manufacturer's certification, the Contractor shall maintain records of all supporting emissions test data and test procedures. If upon review the emissions reductions are not supported by the test data and test procedures, then the emissions control device may need to be replaced with a compliant retrofit device.

Project Regulatory Agreement

The following language shall be included section 4 (Covenants of the Borrower) of the municipality's Project Regulatory Agreement if it receives funds from the State Revolving Fund:

> The Borrower shall require each Contractor and Subcontractor to submit the Diesel Retrofit Program Contractor Certification to DEP and the Borrower prior to commencing work on the Project. The Borrower shall not allow any Contractor or Subcontractor to commence work at the Project site prior to submitting such Certification.

STATEMENT OF INTENT TO COMPLY

This form must be signed and submitted by the bidder as part of the bid.

Local Governmental Unit _____ **SRF Project No.** _____

Contract No. _____ **Contact Title** _____

Bidder _____

The undersigned, on behalf of the above-named Bidder, agrees that, if awarded the Contract:

1. **the Bidder shall comply with the Department of Environmental Protection's ("DEP") Diesel Retrofit Program by ensuring that all diesel powered non-road construction equipment and vehicles greater than 50 brake horsepower which will be used in the performance of the work under the Contract are equipped or retrofitted with a pollution control device in accordance with the Diesel Retrofit Program Standard;**

2. **the Bidder shall require all Subcontractors to comply with DEP's Diesel Retrofit Program by ensuring all diesel powered non-road construction equipment and vehicles greater than 50 brake horsepower which will be used in the performance of the work under the Contract are equipped or retrofitted with a pollution control device in accordance with the Diesel Retrofit Program Standard; and**

3. **The Bidder shall submit and shall require each Subcontractor to submit a Diesel Retrofit Program Contractor Certification (form attached) with a Diesel Retrofit List to DEP (NAME and ADDRESS) and the Bidder within 10 days of the bidder being notified that it has been awarded the Contract. The Bidder shall require each Subcontractor to update such Certification and List within 2 days of using additional Diesel Construction Equipment on the project under the Contract.**

_____

(Signature of Bidder's Authorized Representative) **(Date)**

DIESEL RETROFIT PROGRAM CONTRACTOR CERTIFICATION

Each Contractor and its Subcontractor(s) must sign and submit this form to John Felix, 6th Floor, MassDEP, One Winter Street, Boston, MA 02108 and the Municipality within 10 days after the Contractor is notified that it is awarded the Contract.

Local Governmental Unit _____ **SRF Project No.** _____

Contract No. _____ **Contact Title** _____

Contractor _____

I, _____, an authorized signatory for _____, whose principal place of business is at _____ do hereby certify that any and all diesel powered non-road construction equipment and vehicles greater than 50 brake horsepower which will be used in the performance of the work under the Contract (hereinafter "Diesel Construction Equipment") have pollution control devices, such as oxidation catalysts or particulate filters, installed on the exhaust system side of the diesel combustion engine equipment in accordance with the Diesel Retrofit Program Standard.

I am submitting on behalf of _____ a list of all said Diesel Construction Equipment, labeled "Diesel Retrofit List," that will be used in connection with this Contract by _____. I hereby certify that the information on the attached Diesel Retrofit List is correct and accurate as of the date of signature. The List includes the following information for each piece of Diesel Construction Equipment:

1. Equipment type, make, model;
2. Vehicle Identification Number or VIN;
3. Engine model and year of manufacture;
4. Engine HP rating;
5. Emission Control Device ("ECD") type (Diesel Oxidation Catalyst or Diesel Particulate Filter);
6. ECD make, model, and manufacturer;
7. ECD EPA or CARB Verification Number or manufacturer's certification that the DOC or DPF meets or exceeds emission reductions provided by similar emission control technology verified by EPA or CARB;
8. ECD installation date;
9. Type of fuel to be used; and
10. Whether the equipment is owned or rented.

DIESEL RETROFIT PROGRAM CONTRACTOR CERTIFICATION

_____shall notify DEP within 48 hours of any new Diesel Construction Equipment brought onto the Contract site. _____shall maintain detailed records of all Diesel Construction Equipment used at the Contract site, including the dates and duration times the Diesel Construction Equipment is used at the Contract site. _____ shall make such records available for inspection by DEP. _____shall ensure that the emissions control technology for each piece of Diesel Construction Equipment is operated, maintained, and serviced as recommended by the manufacturer. _____ shall retrofit prior to the end of the Contract any Diesel Construction Equipment no longer exempt from meeting the Diesel Construction Equipment Standard under exemption 3 (because it had an engine that met the EPA particulate matter (PM) Tier emission standards currently in effect at the start of the Contract for non-road diesel engines for the applicable engine power group and such emissions standards were superseded during the Contract).

I acknowledge that this certificate is being furnished as a requirement under this Contract and is subject to applicable State and federal laws, both criminal and civil. Signed under pains and penalty of perjury on this date _____.

Signature_____

Name: _____

Title: _____

Appendix – C

Special Provisions for Disadvantaged Business Enterprises

APPENDIX C
CONSTRUCTION BID SPECIFICATIONS
SPECIAL PROVISIONS FOR DISADVANTAGED BUSINESS ENTERPRISES
MASSACHUSETTS DEPARTMENT OF ENVIRONMENTAL PROTECTION
DIVISION OF MUNICIPAL SERVICES

DISADVANTAGED BUSINESS ENTERPRISE PROGRAM BACKGROUND

In May 2008 a United States Environmental Protection Agency (EPA) rule became effective that changed the Minority Business Enterprise (MBE) and Women Business Enterprise (WBE) Program to a Disadvantaged Business Enterprise (DBE) Program.

For firms to qualify under the old MBE/WBE program they needed to be socially disadvantaged and had to be certified by the Supplier Diversity Office (SDO). Under the new DBE rule, the firms must be both **socially** and **economically** disadvantaged, **citizens of the United States**, and certified as a DBE. Women and certain minorities are presumed to be socially disadvantaged. The economic disadvantage is measured by the owner's initial and continuing personal net worth of less than $1,320,000.

Because the Clean Water Act requires the use of MBEs and WBEs, these firms will still be utilized in the State Revolving Fund (SRF) Loan Program, but they must also be certified as DBEs.

SDO will continue to be the certifying agency for the SRF program. SDO certifies firms under the federal Department of Transportation program, which is acceptable for use in the SRF program. An additional form has been added to the DBE package to verify that DBEs are owned or controlled by United States citizens.

BID SPECIFICATIONS

I. In this contract, the percentage of business activity to be performed by disadvantaged business enterprise(s) (DBE) shall not be less than the following percentages of the total contract price or the percentage submitted by the contractor in the Schedule of Participation, whichever is greater:

Disadvantaged MBE (D/MBE) 4.2% Disadvantaged WBE (D/WBE) 4.5%

II. DEFINITIONS

For the purpose of these provisions, the following terms are defined as follows:

A. Awarding Authority – Entity that awards a prime contract under a State Revolving Fund loan.

B. Bidder - Any individual, partnership, joint venture, corporation, or firm submitting a price, directly or through an authorized representative, for the purpose of performing construction or construction related activities under a Contract.

C. Certified DBE – A DBE certified by the United States Small Business Administration, under its 8(a) Business Development Program (13 CFR part 124, subpart A) or its Small Disadvantaged Business Program (13 CFR part 124, subpart B); The United States Department of Transportation (DOT), under its regulations for Participation by DBSs in DOT programs (49 CFR parts 23 and 26); or SDO in accordance with 40 CFR part 33; provided that the certification meets the U.S. citizenship requirement under 40 CFR §33.202 or §33.203.

D. Compliance Unit - A subdivision of MassDEP's Affirmative Action Office designated to ensure compliance under these provisions.

E. Contractor - Any business that contracts or subcontracts for construction, demolition, renovation, survey, or maintenance work in the various classifications customarily used in work and that is acting in this capacity under the subject contract.

F. Construction Related Services - Those services performed at the work site ancillary to, and/or in support of, the construction work, such as hauling, trucking, equipment operation, surveying or other technical services, etc. For the purposes hereof, supply and delivery of materials (e.g. pre-cast concrete elements) to the site by a supplier who has manufactured those goods, or substantially altered them before re-sales shall be considered as "construction related services

G. Construction Work - The activities at the work site, or labor and use of materials in the performance of constructing, reconstructing, erecting, demolishing, altering, installing, disassembling, excavating, etc, all or part of the work required by the Contract Documents.

H. Disadvantaged Business Enterprise (DBE) - An entity owned or controlled by a socially and economically disadvantaged individual as described by Public Law 102-389 (42 U.S.C. 4370d) or an entity owned and controlled by a socially and economically disadvantaged individual as described by Title X of the Clean Air Act Amendments of 1990 (42 U.S.C. 7601 note); a Small Business Enterprise (SBE); a Small Business in a Rural Area (SBRA); or a Labor Surplus Area Firm (LAF), a Historically Underutilized Business (HUB) Zone Small Business Concern, or a concern under a successor program.

I. Equipment Rental Firm - A firm that owns equipment and assumes actual and contractual responsibility for renting said equipment to perform a useful function of the work of the contract consistent with normal industry practice

J. Good Faith Efforts – The race and/or gender neutral measures described in 40 CFR 33, subpart C.

K. HUBZone - A historically underutilized business zone, which is an area located within one or more qualified census tracts, qualified metropolitan counties, or lands within the external boundaries of an Indian reservation.

L. HUBZone small business concern - A small business concern that appears on the List of Qualified HUBZone Small Business Concerns maintained by the Small Business Administration.

M. Joint Venture - An agreement between SDO certified DBE and a non-DBE or non-DBE controlled enterprise.

1. A pairing of companies will be considered a DBE joint venture if the SDO certified DBE which is part of the relationship has more than 51% of the profits that are derived from that project.

2. A joint venture between a certified DBE subcontractor and a non DBE subcontractor, in which the DBE for that proportion of the joint venture's contract equal to the DBE participation in the joint venture.

3. Whenever a general bid is filed by a joint venture with a certified DBE participant in the joint venture that does not exercise more than 51% control over management and profits, that joint venture shall be entitled to credit as a DBE for that portion of the joint venture's contract equal to the DBE participation in the joint venture. Minority As deemed by SDO.

N. Labor surplus area firm (LSAF) - A concern that together with its first-tier subcontractors will perform substantially in labor surplus areas (as identified by the Department of Labor in accordance with 20 CFR part 654). Performance is substantially in labor surplus areas if the costs incurred under the contract on account of manufacturing, production or performance of appropriate services in labor surplus areas exceed 50 percent of the contract price.

O. Letter of Intent – Certified document signed by the principal(s) of the DBE with respect to the work to be performed under contract.

P. Local Government Unit (LGU) – A city, town, or municipal district which applies for a loan under the Clean Water Trust Program.

Q. Material Supplier – A vendor certified by SDO as a DBE in sales to supply industry from an established place of business or source of supply, and that vendor.

1. Manufactures goods from raw materials, or substantially utilizes them in the work, or substantially alters them before resale, entitling the general contractor to DBE credit for 100% of the purchase order.

2. Provides and maintains a storage facility for materials utilized in the work, entitling the general contractor to DBE credit for 10% of the purchase order

R. Minority and Women Business Enterprise (M/WBE) – Any business concern certified by the SDO as a bona-fide M/WBE. A bona-fide M/WBE is a business whose minority group/women ownership interests are real, which have at least 51% ownership and control over management and operation.

S. Percent of Total Price – Is the percentage to be paid to the DBE, work they perform, as compared to the total bid price

T. Recipient - An agency, person or political subdivision which has been awarded or received financial assistance by the Trust or MassDEP.

U. Small business, small business concern or small business enterprise (SBE) - A concern, including its affiliates, that is independently owned and operated, not dominant in the field of operation in which it is bidding, and qualified as a small business under the criteria and size standards in 13 CFR part 121.

V. Small business in a rural area (SBRA) - A small business operating in an area identified as a rural county with a code 6-9 in the Rural-Urban continuum Classification Code developed by the United States Department of Agriculture in 1980.

W. SDO – The Supplier Diversity Office.

X. Subcontractor – A company, firm, joint venture, or individual who enters into an agreement with a contractor to provide services pursuant to an award of financial assistance.

Y. Total Contract Price – The total amount of compensation to be paid for all materials, work or services rendered in the performance of the contract

Z. Trust – The Massachusetts Clean Water Trust established by M.G.L. c.29.

III. REQUIREMENTS FOR CONTRACT AWARD

DBE packages must be submitted by the two lowest bidders on the project. Following bid opening, the LGU shall notify the two lowest bidders to submit DBE packages to the LGU or the LGUs consultant, as directed. By the close of business on the third business day after notification, the two lowest bidders, including a bidder who is a MBE, WBE or DBE, shall submit the following information:

A. A Schedule of Participation (Form EEO-DEP-190). The Schedule of Participation shall list those certified DBEs the bidder intends to use in fulfilling the contract obligations, the nature of the work to be performed by each certified DBE subcontractor and the total price they are to be paid.

1. A listing of bona-fide services such as a professional, technical, consultant or managerial services, assistance in the procurement of essential personnel, facilities, equipment, materials, or supplies required for performance of the contract, and reasonable fees or commissions charged.

2. A listing of haulers, truckers, or delivery services, not the contractors, including reasonable fees for delivery of said materials or supplies to be included on the project.

A. A Letter of Intent (Form EEO-DEP-191) for each DBE the bidder intends to use on the project. The Letter of Intent shall include, among other things, a reasonable description of the work the certified DBE is proposing to perform and the prices the certified DBE proposes to charge for the work. A Letter of Intent shall be jointly signed by the certified DBE and the General Contractor who proposes to use them in the performance of the Contract.

B. Each DBE must also sign and return the DBE Certification of United States Citizenship form to verify that the firm is owned or controlled by a United States citizen.

C. The SDO "DBE Certification" as prepared by each certified DBE.

D. A completed Request for Waiver form and backup documentation should the goals not be achieved (See IV below).

IV. REQUIREMENTS FOR MODIFICATION OR WAIVERS.

The bidder shall make every possible effort to meet the minimum requirements of certified DBE participation. If the percentage of DBE participation submitted by the bidder on its Schedule of Participation (EEO-DEP-190) does not meet the minimum requirements, the bid may be rejected by the Awarding Authority and found not to be eligible for award of the contract.

In the event that the bidder is unable to meet the minimum requirements of DBE participation, the bidder shall submit with his/her submittal required in Section III.

Requirement of Contract Award a Request for Waiver form (EEO-DEP-490). The Awarding Authority shall review the waiver request to determine if the request should proceed. If approved by the Awarding Authority, the Awarding Authority shall submit the waiver request and supporting documentation, with a recommendation to MassDEP within five days of receipt of the Request for Waiver. MassDEP in conjunction with the project manager, Compliance Unit, will determine whether the waiver will be granted.

The waiver request shall include detailed information as specified below to establish that the bidder has made a good faith effort to comply with the minimum requirements of DBE participation specified in Part I. In addition, the bidder must show that such efforts were undertaken well in advance of the time set for opening of bids to allow adequate response. A waiver request shall include the following:

A. A detailed record of the effort made to contact and negotiate with the certified DBE, including, but not limited to:

   1. names, addresses and telephone numbers of all such companies contacted;

   2. copies of written notices(s) which were sent to certified DBE potential subcontractors, prior to bid opening;

   3. a detailed statement as to why each subcontractor contacted (i) was not willing to do the job or (ii) was not qualified to perform the work as solicited; and

   4. in the case(s) where a negotiated price could not be reached the bidder should detail what efforts were made to reach an agreement on a competitive price;

   5. copies of advertisements, dated not less than ten (10) days prior to bid opening, as appearing in general publications, trade-oriented publications, and applicable minority/ women-focused media detailing the opportunities for participation.

B. MassDEP may require the bidder to produce such additional information as it deems appropriate.

C. No later than fifteen (15) days after MassDEP receives all required information and documentation, it shall make a decision in writing, whether the waiver is granted and shall provide that determination to the bidder and Awarding Authority. If the waiver request is denied, the facts upon which a denial is based will be set forth in writing. If the waiver request is denied, the bid shall be rejected by the Awarding Authority, or the contract will be determined ineligible for SRF funding.

   If a Request for Waiver is denied by MassDEP and the bid is rejected by the Awarding Authority, the Awarding Authority may then move to the second bidder on the project. At the Awarding Authority's discretion, it may collect a DBE package from the third bidder on the project.

V. DISADVANTAGED BUSINESS ENTERPRISES PARTICIPATION

A. Reporting Requirements

1. The Contractor's utilization of certified DBEs will be documented based upon submittal of the LGU's monthly Payment Requisitions as reported on Form-2000. The Form-2000 form will show all certified DBEs performing work on the project regardless of any billing activity for that month. For auditing and accounting purposes, the Contractor periodically may be required to submit copies of canceled checks verifying that payments have been made to the certified DBE as listed on the schedule. The Contractor may also be required to submit current schedules on utilization of all DBEs to indicate when their services will commence and be billed for.

2. During the life of the Contract, the Contractor's fulfillment of the percentage requirements in Part I shall be determined with reference to the Contract price as follows:

   A. If the price in the Contract executed exceeds the base bid price (e.g., because an alternate was selected or because unit prices were used in awarding the Contract), the Contractor shall submit for approval by MassDEP a revised Schedule of Participation by certified DBEs satisfying the percentage requirements and such other information concerning additional DBE participation as may be requested by MassDEP.

   B. If the Contract price increases after execution due to change orders or other adjustments, MassDEP may require the Contractor to subcontract additional work or to purchase additional goods and services from certified DBEs up to the percentages stated in Part I.

VI. COMPLIANCE

A. If the Schedule or any of the Letters of Intent are materially incomplete or not submitted in a timely manner, the LGU may rescind its vote of award; treat the bid informal as to substance and reject the bid. If the bid is incomplete in any other respect than the Schedule the LGU with the approval of MassDEP may waive the informalities upon satisfactory completion of the required information by the Contractor and the certified DBE as applicable.

B. If the LGU finds that the percentage of certified DBE participation submitted by the contractor on its Schedule does not meet the percentage requirement in Part I, it shall rescind its vote of award and find such contractor not to be eligible for award of the contract.

C. The Contractor shall not perform with its own organization, or subcontract to any other primary or subcontractor any work designated for the named certified DBEs on the schedule submitted by the Contractor under Part III without the approval of MassDEP.

D. A Contractor's compliance with the percentage requirement in Part I shall continue to be determined by reference to the required percentage of the total contract price as stated in Section I even though the total of actual contract payments may be greater or less than the bid price.

E. If the Contractor for reasons beyond its control cannot comply with Part III in accordance with the Schedule submitted under Part III, Section B, the contractor must submit to MassDEP as soon as they are aware of the deficiency, the reason for its inability to comply. Proposed revisions to the Schedule stating how the contractor intends to meet its obligations under these conditions must be submitted within ten (10) working days of notification.

F. If the Contractor is becomes aware by any means that that DBE is no longer certified, the Contractor shall immediately notify MassDEP. The Contractor shall use good faith efforts to retain a substitute certified DBE.

G. If a certified DBE listed by the bidder in its Schedule of M/WBE contractors fails to obtain a performance or payment bond requested by the bidder, said failure shall not entitle the bidder to avoid the requirements of Part III (A). After a bidder has been awarded the contract, he shall not change the certified DBE listed in its Schedule at the time of the award or make any other such substitutions without the written approval of MassDEP.

VII. SANCTIONS

A. If the Contractor does not comply with the terms of these Special Provisions, the Awarding Authority may (1) suspend any payment for the work that should have been performed by a certified DBE pursuant to the schedule, or (2) require specific performance of the Contractor's obligation by requiring the Contractor to subcontract with a DBE for any contract or specialty item at the contract price established for that item in the proposal submitted by the Contractor.

B. To the extent that the Contractor has not complied with the terms of these Special Provisions, the Awarding Authority may retain in connection with Estimates and Payments an amount determined by multiplying the bid price of this contract by the percentage in Section I, less the amount paid to DBE's for work performed under the contract and any payments already suspended under VII A.

C. The Awarding Authority may suspend, terminate or cancel this contract, in whole or in part, or may call upon the Contractor's surety to perform all terms and conditions in the contract, unless the contractor is able to demonstrate his compliance with the terms

of these Special Provisions, and further deny to the Contractor, the right to participate in any future contracts awarded by the Awarding Authority for a period of up to three years.

D. In any proceeding involving the imposition of sanctions by the Awarding Authority, no sanctions shall be imposed if the Awarding Authority finds that the contractor has taken every possible measure to comply with these Special Provisions or that some other justifiable reason exists for waiving these Special Provisions in whole or in part.

E. The contract shall provide such information as is necessary in the judgment of the Awarding Authority to ascertain its compliance with the terms of these Special Provisions.

F. A contractor shall have the right to request suspension of any sanctions imposed under this section upon demonstrating that he is in compliance with these Special Provisions.

DISADVANTAGED BUSINESS ENTERPRISE PARTICIPATION
MASSACHUSETTS DEPARTMENT OF ENVIRONMENTAL PROTECTION
DIVISION OF MUNICIPAL SERVICES

SCHEDULE OF PARTICIPATION FOR SRF CONSTRUCTION

Project Title: _____ **Project Location:** _____

Disadvantaged Minority Business Enterprise Participation in the SRF Loan Work

Name & Address of D/MBE	Nature of Participation	Dollar Value of Participation
1.		
2.		
3.		
	Total D/MBE Commitment:	**$**
Percentage D/MBE Participation = (Total D/MBE Commitment) / (Bid Price) =		**%**

Disadvantaged Women Business Enterprise Participation in the SRF Loan Work

Name & Address of D/WBE	Nature of Participation	Dollar Value of Participation
1.		
2.		
3.		
	Total D/WBE Commitment:	**$**
Percentage D/WBE Participation = (Total D/WBE Commitment) / (Bid Price) =		**%**

The Bidder agrees to furnish implementation reports as required by MassDEP to indicate the D/MBEs and D/WBE(s) which it has used or intends to use. Breach of this commitment constitutes a breach of the contract.

Name of Bidder: _____

Date: _____ By: _____
Signature

NOTE: Participation of a DBE may be counted in only their certified category; the same dollar participation cannot be used in computing the percentage of D/MBE participation and again of D/WBE participation.

LETTER OF INTENT FOR SRF CONSTRUCTION

This form is to be completed by the D/MBE and D/WBE and must be submitted by the Bidder no later than close of business on the third business day after notification by the LGU. A separate form must be completed for each D/MBE and D/WBE involved in the project.

Project Title: _____ Project Location: _____

TO: _____
(Name of Bidder)

FROM: _____
(Please Indicate Status [ ] D/MBE or [ ] D/WBE)

º I/we intend to perform work in connection with the above project as (check one):

[ ] An individual
[ ] A corporation
[ ] Other (explain): _____
[ ] A partnership
[ ] A joint venture with: _____

º It is understood that if you are awarded the contract, you intend to enter into an agreement to perform the activity described below for the prices indicated.

DBE PARTICIPATION

Description of Activity	Date of Project Commencement	$ Amount	% Bid Price
		$	**%**

º The undersigned certify that they will enter into a formal agreement upon execution of the contract for the above referenced project.

BIDDER	**DBE**
(Authorized Original Signature) Date ADDRESS:	(Authorized Original Signature) Date ADDRESS:
TELEPHONE #:	TELEPHONE #:
FEIN:	FEIN:

ORIGINALS:

- **º Compliance Mgr. City/Town Project Location**
- **º DEP Program Manager for DEP's AAO Director**

*** Attach a copy of current (within 2 years) DBE Certification**

DBE CERTIFICATION OF UNITED STATES CITIZENSHIP

For the SRF program, under the EPA Disadvantage Business Enterprise (DBE) Rule, a DBE must be owned or controlled by a socially and economically disadvantaged person that is also a **citizen of the United States** (*See* 40 CFR 33.202). "Ownership" is defined at 13 CFR 124.105 and "control" is defined at 13 CFR 124.106.

DBEs are certified for the SRF program through the Supplier Diversity Office using the federal Department of Transportation (DOT) DBE rules. EPA allows the use of DBEs certified under the DOT rules as long as they are also United States citizens. To ensure compliance with the EPA rule, MassDEP must verify United States citizenship through the completion of the following form for each DBE used on the project.

SRF Project Number _____

Contract Number _____

Contract Title _____

DBE Subcontractor _____

The undersigned, on behalf of the above named DBE subcontractor, hereby certifies that the DBE firm is either owned or controlled by a person or persons that are citizens of the United States.

_____
Printed Name and Title of DBE Signatory

_____
DBE Signature

_____
Date

DISADVANTABED BUSINESS ENTERPRISE PROGRAM
DBE SUBCONTRACTOR PARTICIPATION FORM

The United States Environmental Protection Agency (EPA) requires that this form be provided to all subcontractors on the project. At the option of the subcontractor, this form may be filled out and submitted directly to the EPA DBE Coordinator.

NAME OF SUBCONTRACTOR	PROJECT NAME
ADDRESS	CONTRACT NO.
TELEPHONE NO.	E-MAIL ADDRESS
PRIME CONTRACTOR NAME:	

Please use the space below to report any concerns regarding the above EPA-funded project (e.g., reason for termination by prime contractor, late payment, etc.).

_____

_____

_____

_____

_____

CONTRACT ITEM NO.	ITEM OF WORK OR DESCRIPTION OF SERVICES RECEIVED FROM THE PRIME CONTRACTOR	AMOUNT SUBCONTRACTOR WAS PAID BY PRIME CONTRACTOR

_____ _____

Subcontractor Signature Title/Date

Equivalent to EPA form 6100-2

REQUEST FOR WAIVER FOR SRF CONSTRUCTION

Upon exhausting all known sources and making every possible effort to meet the minimum requirements for DBE participation, the Bidder may seek relief either partially or entirely from these requirements by submitting a completed waiver package by the close of business on the third business day after notification by the LGU. Failure to comply with this process shall be cause to reject the bid thereby rendering the Bidder not eligible for award of the contract.

General Information

Project Title: _____ Project Location: _____

Bid Opening (time/date) _____

Bidder: _____

Mailing Address: _____

Contact Person: _____ Telephone No. ( ) _____ Ext. _____

Minimum Requirements

The bidder must demonstrate that good faith efforts were undertaken to comply with the percentage goals as specified. The firm seeking relief must show that such efforts were taken appropriately in advance of the time set for opening bid proposals to allow adequate time for response(s) by submitting the following:

A. A detailed record of the effort made to contact and negotiate with disadvantaged minority and/or woman owned businesses, including:

1. names, addresses, telephone numbers and contact dates of all such companies contacted;

2. copies of written notice(s) which were sent to DBE potential subcontractors prior to bid opening;

3. a detailed statement as to why each subcontractor contacted (i) was not willing to do the job or (ii) was not qualified to perform the work as solicited; and

4. in the case(s) where a negotiated price could not be reached the bidder should detail what efforts were made to reach an agreement on a competitive price.

5. copies of advertisements, dated not less than ten (10) days prior to bid opening, as appearing in general publications, trade-oriented publications, and applicable minority/women-focused media detailing the opportunities for participation;

B. MassDEP may require the bidder to produce such additional information as it deems appropriate.

C. No later than fifteen (15) days after submission of all required information and documentation, MassDEP shall make a determination, in writing, whether the waiver request is granted and shall provide that determination to the bidder and Awarding Authority. If the waiver request is denied, the facts upon which a denial is based will be set forth in writing.

CERTIFICATION

The undersigned herewith certifies that the above information and appropriate attachments are true and accurate to the best of my knowledge and that I have been authorized to act on behalf of the bidder in this matter.

_____ _____

(authorized original signature) DATE

STATE REVOLVING FUND LOAN PROGRAM – SCHEDULE OF SUBCONTRACTOR PARTICIPATION

Local Governmental Unit _____

Project Name _____

SRF Identification Number _____

Subcontractor	Point of Contact	Mailing Address	Telephone Number	E-Mail Address	MBE	WBE	DBE	Subcontract Value

General Contractor _____

Contract Value _____

The United States Environmental Protection Agency (EPA) requires that all SRF borrowers develop and maintain a list of all MBE/WBE and non MBE/WBE subcontractors on the project.

This form must be completed and returned to MassDEP within 90 days of award of the contract.

BID BOND

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

Signed, this _____ day of _____

The Condition of the above obligation is such that whereas the Principal has submitted to

_____

a certain BID, attached hereto and hereby made a part hereof to enter into a contract in writing, for the Sea Street Pump Station Force Main No.3

_____

_____

NOW, THEREFORE,

(a) If said BID shall be rejected, or

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

.

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

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

_____
Principal

By: _____

_____
Surety

By: _____

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

NOTICE OF AWARD

Dated _____ , 20 ____

TO: _____
(BIDDER)

ADDRESS: _____

OWNER'S PROJECT NO: _____

PROJECT: **Sea Street Pump Station Force Main No.3**

SRF CONTRACT NO: **CWSRF 6722**

CONTRACT FOR: Sea Street Pump Station Force Main No.3

_____
(Insert name of contract as it appears in the Bid Documents)

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

_____

_____
(Indicate total Work, alternates or sections of Work awarded)

The Contract Price of your contract is _____

_____ Dollars ($ _____).

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

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

1. You must deliver to the OWNER all of the fully executed counterparts of the Agreement including all the Contract Documents. This includes the sets of Drawings. Each of the Contract Documents must bear your signature on (the cover) (every) page.

2. You must deliver with the executed Agreement the Contract Security (Bonds) as specified in the Information for Bidders and General Conditions.

3. (List other conditions precedent).

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

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

Town of Nantucket, Massachusetts
(OWNER)

By _____
(AUTHORIZED SIGNATURE)

_____
(TITLE)

ACCEPTANCE OF NOTICE

Receipt of the above NOTICE OF AWARD is hereby acknowledged

By _____

The _____ day of _____ , 20 _____

By _____

Title _____

Copy to ENGINEER:
Environmental Partners Group, Inc.
1900 Crown Colony Drive, Suite 402, Quincy, MA 02169 ATTN: Ziad F. Kary
(Use Certified Mail, Return Receipt Requested)

AGREEMENT BETWEEN
THE TOWN OF NANTUCKET, MASSACHUSETTS
AND
_____

THIS AGREEMENT made effective _____ by and between the **TOWN OF NANTUCKET, MASSACHUSETTS**, a municipal corporation, acting by and through its Town Manager, with offices at Town Hall, Nantucket, Massachusetts 02554 (hereinafter called the "TOWN"), and _____ whose principal office address and state of incorporation are as set forth on Exhibit A (hereinafter called the "CONTRACTOR").

RECITALS:

WHEREAS, the TOWN desires to retain the CONTRACTOR to provide certain services for the TOWN, as described below, and the CONTRACTOR is willing to accept such engagement, all on the terms hereinafter set forth,

NOW, THEREFORE, in consideration of the mutual covenants hereinafter set forth, and other good and valuable consideration, the receipt and sufficiency of which is hereby acknowledged, the parties agree as follows:

ARTICLE 1 - ENGAGEMENT OF THE CONTRACTOR

1.1 The TOWN hereby engages the CONTRACTOR, and the CONTRACTOR hereby accepts the engagement to perform certain services for the TOWN, as described in Article 2.

1.2. In the performance of any service under this Agreement, the CONTRACTOR acts at all times as an independent contractor. There is no relationship of employment or agency between the TOWN, on the one hand, and the CONTRACTOR, on the other, and the TOWN shall not have or exercise any control or direction over the method by which the CONTRACTOR performs its work or functions aside from such control or directions which are consistent with the independent contractor relationship contemplated in the Agreement.

ARTICLE 2 - SERVICES OF THE CONTRACTOR

2.1 The CONTRACTOR will perform the services described in the Scope of Services set forth on Exhibit A (the "Work").

2.2 The CONTRACTOR shall report, and be responsible, to the TOWN and its designee (if any) as set forth on Exhibit A.

2.3 There shall be no amendment to the Scope of Services or Work provided for in this Agreement without the written approval of the TOWN. The TOWN shall be under no obligation to pay for any services performed by the CONTRACTOR which are not explicitly agreed to by the TOWN in writing.

2.4 The CONTRACTOR represents and warrants to the TOWN that the CONTRACTOR (including all of its personnel, whether employees, agents or independent contractors) will

be qualified and duly licensed (if necessary) to perform the services required by this Agreement and further agrees to perform its services in a professional manner, and in accordance with the reasonable standard of care implied by law and all applicable local, state or federal ordinances, laws, rules and regulations, all of which are incorporated herein by reference. The CONTRACTOR will obtain and pay for any and all permits, bonds and other items required for the proper and legal performance of the Work.

2.5 The CONTRACTOR represents and warrants to the TOWN that it is not a party to any agreement contract or understanding which would in any way restricts or prohibits it from undertaking or performing its obligations hereunder in accordance with the terms and conditions of this Agreement.

2.6 All written materials and any other documents (whether in the form of "hard" copies, graphics, magnetic media or otherwise) which are received and produced by the CONTRACTOR pursuant to this Agreement shall be deemed to be "work for hire" and shall be and become the property of the TOWN upon the receipt and production of such items by the CONTRACTOR. The TOWN acknowledges that such materials are being prepared with respect to the specific project contemplated hereby and that any reuse of such materials by the TOWN in connection with any other project shall be at the TOWN's sole risk, unless otherwise agreed to by the CONTRACTOR in writing.

2.7 The CONTRACTOR shall be responsible for the professional and technical accuracy, and for the coordination, of all designs, drawings, specifications, estimates and other work or services furnished by CONTRACTOR or its consultants and subcontractors. The CONTRACTOR shall perform its work under this Agreement in such a competent and professional manner that detail checking and reviewing by the TOWN shall not be necessary. The CONTRACTOR shall supervise and direct the Work, using its best skills and attention, which shall not be less than such state of skill and attention generally rendered by the design and engineering profession for projects similar to the subject project in scope, difficulty and location.

2.8 The CONTRACTOR shall not use any subcontractors or sub-consultants (not identified herein) for any work required under this Agreement unless such use has been approved in advance in writing by the TOWN.

2.9 Notwithstanding anything to the contrary in this Agreement, the CONTRACTOR shall not be relieved of its obligations under this Agreement by the TOWN's performance, or failure to perform, any of the TOWN's administrative duties under this Agreement, including, but not limited to, the TOWN's review and/or approval of plans, estimates, programs, documents, materials, work and services furnished by CONTRACTOR.

ARTICLE 3 - PERIOD OF SERVICES

3.1 Unless otherwise provided on Exhibit A, the term of this Agreement shall commence on the date hereof and continue until the Work is completed to the TOWN's reasonable satisfaction.

3.2 The CONTRACTOR shall proceed with the Work promptly after receiving Notice to Proceed and will diligently and faithfully prosecute the Work to completion in accordance with the provisions hereof. In any event, the Work shall be completed no later than the date set forth on Exhibit A. The CONTRACTOR acknowledges that time is of the essence of this Agreement.

3.3 If the CONTRACTOR is delayed in the performance of any of its obligations under this Agreement by the occurrence of an unforeseen event beyond its control such as fire or other casualty, abnormal adverse weather conditions, acts of God (collectively, "Unavoidable Events") which materially and adversely affect its ability to perform the Work, then the time for the CONTRACTOR to perform the Work shall be extended for such time as the TOWN shall reasonably determine is necessary to permit the CONTRACTOR to perform in light of the effects of the Unavoidable Event.

If an Unavoidable Event occurs which, in the TOWN's reasonable determination, makes the performance of the Agreement impossible without the expenditure of additional TOWN funds, the TOWN may, at its option, elect to terminate this Agreement upon thirty (30) days written notice.

ARTICLE 4 - PAYMENTS TO THE CONTRACTOR

4.1 The compensation due to the CONTRACTOR shall be paid in the amounts, and in the manner, set forth on Exhibit B, attached hereto.

4.2 The CONTRACTOR will bill the TOWN at the completion of the work unless otherwise provided on Exhibit B, with one or more invoices broken down to show the quantity of work performed and the percentage of the entire project completed, categories and amount of reimbursable expenses (if any), and provide such supporting data as may be required by the TOWN.

4.3 The TOWN will pay the CONTRACTOR upon review and approval of such invoices by the TOWN or its designee.

4.4 This engagement may be subject to budgetary restrictions which may limit the total amount of funds available for the Work. Accordingly, unless otherwise stated on Exhibit B, the TOWN will not be obligated to pay any amount in excess of the maximum project amount without the express written approval of the TOWN.

4.5 The CONTRACTOR and its sub-contractors shall not be compensated for any services involved in preparing changes that are required for additional work that should have been anticipated by the CONTRACTOR in the preparation of the documents, as reasonably determined by the TOWN.

ARTICLE 5 TERMINATION

5.1 This Agreement may be terminated, with cause, by either the TOWN or CONTRACTOR, upon written notice given by the non-defaulting party. For the purposes of this provision,

"cause" shall include the failure of a party to fulfill its material duties hereunder in a timely and proper manner.

5.2 The TOWN shall have the right to terminate this Agreement for its convenience and without cause upon ten (10) days written notice.

5.3 Following termination of this Agreement, the parties shall be relieved of all further obligations hereunder except:

(a) unless the TOWN terminates for cause under paragraph 5.1, in which event the TOWN shall be under no obligation to make any payments to CONTRACTOR except for those services satisfactorily provided, the TOWN shall remain responsible for payments for the services satisfactorily performed and, unless this Agreement is for a lump-sum, expenses of CONTRACTOR reasonably accrued prior to the effective date of the notice of termination in compliance with this Agreement (less the value of any claims of the TOWN), all as determined by the TOWN in its sole discretion, but for no other amounts, including, without limitation, claims for lost profits on Work not performed; and

(b) The CONTRACTOR shall remain liable for any damages, expenses or liabilities arising under this Agreement (including its indemnity obligations) with respect to WORK performed pursuant to the Agreement.

ARTICLE 6 - INSURANCE AND INDEMNIFICATION

6.1 The CONTRACTOR agrees to indemnify and save the TOWN harmless from any and all manner of suits, claims, or demands arising out of any errors, omissions or negligence by CONTRACTOR (including all its employees, agents and independent contractors) in performing the Work, or any breach of the terms of this Agreement by such CONTRACTOR and shall reimburse the TOWN for any and all costs, damages and expenses, including reasonable attorney's fees, which the TOWN pays or becomes obligated to pay, by reason of such activities, or breach. The provisions of this Section 6.1 shall be in addition to, and shall not be construed as a limitation on, any other legal rights of the TOWN with respect to the CONTRACTOR, in connection with this Agreement, and shall survive termination or expiration of this Agreement.

6.2 Before commencing work the CONTRACTOR shall obtain and maintain at its expense and from insurance companies of a Best Rating of A or better, which are licensed to do business in the Commonwealth of Massachusetts, insurance as set forth below. If the CONTRACTOR is permitted to sub-contract a material portion of the Work, or is otherwise identifying a third party to perform services for the Town, the CONTRACTOR shall assure that such sub-contractor or other third party also has such insurance.

(a) Workers' Compensation:

(1) State Workers Compensation Benefits: Statutory Limits

(2) Employer Liability:
$1,000,000 Bodily Injury by Accident
$1,000,000 Bodily Injury by Disease – policy limit
$1,000,000 Bodily Injury by Disease – each employee

(b) Commercial General Liability (including Premises-Operations; Independent Contractor's Protective; Products and Completed Operations; Broad Form Property Damage, Contractual Liability):

(1) Bodily Injury and Property Damage Liability (including coverage for XCU hazards):
$1,000,000 Each Occurrence
$2,000,000 General Aggregate Per Project
$2,000,000 Aggregate, Products and Completed Operations

(2) Products and Completed Operations insurance shall be maintained for a minimum period of 6 years after final payment and Contractor shall continue to provide evidence of such coverage to Owner on an annual basis during the aforementioned.

(c) Commercial Automobile Liability (owned, non-owned, hired):$1,000,000 Bodily Injury and Property Damage Each Accident

(d) Umbrella Liability Coverage
$5,000,000 per Occurrence;
$5,000,000 General Aggregate
$5,000,000 Products and Completed Operations Aggregate

Coverage shall be excess to the Contractor's General Liability, Auto Liability, and Employers Liability coverages.

(e) Builders Risk Insurance: Builder's Risk (Fire Insurance) in an amount equal to the insurable value of the Contract.

(f) Such additional insurance as the TOWN may reasonably require, as set forth on Exhibit A.

CONTRACTOR shall maintain such insurance during the term of Agreement and give the TOWN twenty (20) days written notice of any change or cancellation of coverage. Each insurer providing policies hereunder shall waive its rights to subrogate claims against the TOWN. The TOWN will be added as an additional named insured with respect to each such policy and such endorsement shall be reflected on a Certificate of Insurance to be delivered to the TOWN upon the execution of this Agreement and at such times thereafter as the TOWN may reasonably request.

ARTICLE 7 - GENERAL PROVISIONS

7.1 Upon the expiration or the termination of this Agreement for any reason, all data, drawings, specifications, reports, estimates, summaries and other work product which have been accumulated, developed or prepared by the CONTRACTOR (whether completed or in process) shall become the property of the TOWN upon payment for such to the CONTRACTOR and the CONTRACTOR shall immediately deliver or otherwise make available all such material to the TOWN.

7.2 Neither party may assign, transfer or otherwise dispose of this Agreement or any of its rights hereunder or otherwise delegate any of its duties hereunder without the prior written consent of the other party, and any such attempted assignment or other disposition without such consent shall be null and void and of no force and effect.

7.3 Except as otherwise expressly provided in this Agreement, any decision or action made by the TOWN relating to this Agreement, its operation, amendment or termination, shall be made by the Board, Committee or Authority of the TOWN specified in the initial paragraph of this Agreement, unless specifically authorized or delegated by a lawful vote of such body.

7.4 This Agreement, together with Exhibit A (Contractor, Scope of Work, Term), Exhibit B (Payments), and Exhibit C (Tax Compliance Certificate), and any additional exhibits referred to therein, constitute the entire agreement of TOWN and CONTRACTOR with respect to the matters set forth therein and may not be changed, amended, modified or terms waived except by a writing signed by TOWN and CONTRACTOR. If there is any conflict among the terms set forth in the body of this Agreement and the terms or provisions set forth in Exhibit A or Exhibit B, or in any other attachment hereto, or in any other document or law incorporated by reference herein, such conflict shall be resolved by giving precedence to the party's address above by certified mail, return receipt requested Terms or provisions contained in the following documents in accordance with the following hierarchy, with the topmost document of the highest priority:

A. Applicable federal, state and local laws, rules and regulations.

B. Amendments to this Agreement, if any.

C. Exhibits A and B.

D. This Agreement.

E. Any other attachments to this Agreement.

To the extent the conflict is not resolved by applying the above hierarchy, the conflict shall be resolved in a manner that results in the highest quantity and best quality of goods and services to the TOWN.

7.5 This Agreement is governed by the law of The Commonwealth of Massachusetts and shall be construed in accordance therewith. The parties agree that exclusive jurisdiction for any action arising out of or relating to this Agreement shall lie with the state and federal courts having jurisdiction over the county and state in which the Town is located and the parties hereby irrevocably waive, to the fullest extent permitted by law, any objection which they

may now or hereafter have to the venue of any proceeding brought in such location and further irrevocably waive any claims that any such proceeding has been brought in an inconvenient forum.

7.6 Any notices required or allowed shall be to the person's address above by certified mail, return receipt requested.

7.7 Notwithstanding anything to the contrary in this Agreement, this Agreement is subject to the appropriation and availability of funds.

ARTICLE 8 STATE REVOLVING LOAN FUND PROGRAM PROVISIONS

8.1 The fair share goals for disadvantaged business enterprise (DBE) participation for this contract are a minimum of 4.2 percent Disadvantaged Minority Business Enterprise (D/MBE) participation and 4.5 percent Disadvantaged Women Business Enterprise (D/WBE) participation, applicable to the total dollar amount paid for the construction contract. The Contractor shall take all affirmative steps necessary to achieve this goal, and shall provide reports documenting the portion of contract and subcontract dollars paid to DBEs, and its efforts to achieve the goals, with each invoice submitted or at such greater intervals as specified by the (municipality). The contractor shall require similar reports from its subcontractors.

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

(a) 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 by the contracting officer setting forth the provisions of this nondiscrimination clause.

(b) The CONTRACTOR will, in all solicitations or advancements 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 or national origin.

(c) 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 by the agency contracting officer, advising the labor union or workers' representative of the contractor's commitments under Section 202 of Executive Order No. 11246 of September 24, 1965, and shall post

copies of the notice in conspicuous places available to employees and applicants for employment.

(d) The CONTRACTOR will comply with all provisions of Executive Order No. 11246 of Sept. 24, 1965, and of the rules, regulations, and relevant orders of the Secretary of Labor.

(e) The CONTRACTOR will furnish all information and reports required by Executive Order No. 11246 of September 24, 1965, and by the rules, regulations, and orders of the Secretary of Labor, or pursuant thereto, and will permit access to his books, records, and accounts by the contracting agency and the Secretary of Labor for purposes of investigation to ascertain compliance with such rules, regulations, and orders. Comp., p. 684, EO 12086 of Oct. 5, 1978, 43 FR 46501, 3 CFR, 1978 Comp., p. 230]

(f) In the event of the contractor's noncompliance with the nondiscrimination clauses of this contract or with any of such rules, regulations, or orders, this contract may be cancelled, terminated, or suspended in whole or in part and the contractor may be declared ineligible for further Government contracts in accordance with procedures authorized in Executive Order No. 11246 of Sept. 24, 1965, and such other sanctions may be imposed and remedies invoked as provided in Executive Order No. 11246 of September 24, 1965, or by rule, regulation, or order of the Secretary of Labor, or as otherwise provided by law.

(g) The CONTRACTOR will include 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 No. 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 may be directed by the Secretary of Labor as a means of enforcing such provisions including sanctions for noncompliance: Provided, however, that in the event the contractor becomes involved in, or is threatened with, litigation with a subcontractor or vendor as a result of such direction, the CONTRACTOR may request the United States to enter into such litigation to protect the interests of the United States." [Sec. 202 amended by EO 11375 of Oct. 13, 1967, 32 FR 14303, 3 CFR, 1966-1970.

8.3 The CONTRACTOR shall not participate in or cooperate with an international boycott, as defined in Section 999 (b)(3) and (4) of the Internal Revenue code 1986, as amended, or engage in conduct declared to be unlawful by Section 2 of Chapter 151E of the Massachusetts General Laws.

8.4 The CONTRACTOR agrees that it will fully comply with Subpart C of 2 CFR Part 180 and 2 CFR Part1532, entitled Responsibilities of Participants Regarding Transactions (Doing Business with Other Persons). The CONTRACTOR shall not award any subcontracts or purchase any materials from suppliers that appear on the Excluded Parties List System. The CONTRACTOR shall include this requirement in each subcontract and require it to be

included in all subcontracts regardless of tier. The CONTRACTOR shall maintain reasonable records to demonstrate compliance with these requirements.

8.5 The CONTRACTOR acknowledges to and for the benefit of the Town of Nantucket ("Purchaser") and the Commonwealth of Massachusetts (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 CONTRACTOR 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.

8.6 The CONTRACTOR acknowledges that Minimum Wage Rates as determined by the Commissioner of Department of Workforce Development under the provision of the Massachusetts General Laws, Chapter 149, Sections 26 to 27D, as amended, apply to this project. It is the responsibility of the CONTRACTOR, before bid opening, to request if necessary, any additional information on Minimum Wage Rates for those trades people who may be employed for the proposed work under this contract. Federal Minimum Wage Rates as determined by the United States Department of Labor under the Davis-Bacon Act also apply to this Project. The CONTRACTOR shall comply with all requirements of the Davis-Bacon Act included in Section 00820 of these Specifications.

8.7 Price adjustment clauses for diesel fuel and gasoline; liquid asphalt; and Portland cement contained in cast-in-place concrete are included in Section 01170 of these Specifications and shall be considered part of the AGREEMENT.

IN WITNESS WHEREOF, the parties hereto have executed this Agreement the day and year first written above.

TOWN OF NANTUCKET, MASSACHUSETTS:	CONTRACTOR:
C. Elizabeth Gibson Town Manager	_____ President
Funding Org/Obj:	FEIN:
Approved as to Funds Available	PO#_____

Pursuant to M.G.L. c.44, s31C, I certify that an appropriation has been made in the total amount of the contract.

Brian E. Turbitt – Director of Municipal Finance

Approved as to Form

Town Counsel

Contract EXHIBIT A

CONTRACTOR, SCOPE OF WORK, TERM

1. **Name of Contractor**: _____

2. **State of Incorporation**: _____

3. **Principal Office Address**: _____

4. **Description of Services**:

   A. The Work under this Contract includes, but is not necessarily limited to the following major items:

      1. Furnishing all labor, services, equipment, and materials for the installation, testing, and commissioning of approximately 18,200 linear feet of new 20-inch and 24-inch SDR18 C900 PVC/ductile iron sewer force main including all connections and appurtenances (plug valves, check valves, intermediate access point manholes and fittings, air valve manholes and fittings, blow-off/clean out manholes and fittings).

      2. Furnishing all labor, services, equipment and materials for removal and legal disposal of existing water mains and installation, testing and chlorination of approximately 5,400 linear feet of new 6-inch, 8-inch, and 12-inch ductile iron water mains including all connections, services, and appurtenances (gate valves, hydrant assemblies, gate boxes, water services, curb boxes, fittings, etc.). Confirm all existing water services have been reconnected.

      3. Furnish all labor, services, equipment, and materials for removal and legal disposal of existing water services and installation of new curb boxes and PE tubing water services up to the property line.

      4. Furnishing, installation, testing, chlorination, operation, and maintenance of water bypass system and appurtenances to maintain uninterrupted water service to abutting properties throughout the duration of construction.

      5. Furnishing all labor, services, equipment and materials for removal and legal disposal of existing gravity sewer mains and installation and testing of approximately 4,400 linear feet of new 8-inch, 10-inch, and 12-inch SDR35 PVC gravity sewer mains.

      6. Furnishing all labor, services, equipment, and materials for the installation, testing, and commissioning of approximately 325 linear feet of new 8-inch and 12-inch C909 PVC gravity sewer including all connections and appurtenances (plug valves, check valves, intermediate access point

manholes and fittings, air valve manholes and fittings, blow-off/clean out manholes and fittings).

7. Furnishing all labor, services, equipment, and materials for removal and legal disposal of existing precast concrete sewer manholes and appurtenances and installation of new precast concrete sewer manholes including frames and covers.

8. Furnishing all labor, services, equipment, and materials for the removal and legal disposal of existing gravity sewer services and installation of new PVC gravity sewer services and cleanouts up to the property line. Confirm all existing non-capped sewer services have been reconnected or stubbed at the property line.

9. Furnishing all labor, services, equipment, and materials for upgrades to the existing stormwater system, including installation of piping, catch basins, leaching catch basins, gutter inlets, and drain manholes.

10. Installation of environmental protection systems at the site for erosion and sediment control within the limits of work.

11. Furnishing all materials, labor and equipment for the relocation, protection, or temporary disturbance of existing utilities (i.e. telecommunications, electric) to permit construction activities.

12. Furnishing, installation and maintenance of all traffic control and site safety measures during the construction period, including signs, barricades, detours, variable message boards, maintenance of safe vehicular and pedestrian access to abutting properties, and assuring an uninterrupted supply of utility services to all abutters within the project area, at all times.

13. Furnishing, installation, testing, operation, and maintenance of sewer bypass pumping system and appurtenances to maintain uninterrupted sewer service throughout the duration of construction.

14. Furnishing, permitting, installation, operation and maintenance of construction dewatering system and appurtenances in accordance with various regulatory approvals.

15. Restoration of public and private property including, but not limited to, granite curbing, bituminous concrete cape cod berms, cobblestone roadways, private asphalt driveways, brick driveways, brick/stone paths and sidewalks, lawns, plantings, stone walls, and other surficial features.

16. Furnishing all labor, services, materials, and equipment required for pre-construction videos and photographs.

17. Furnishing all labor, services, materials, and equipment required for asbestos cement contaminated material management and legal disposal.

18. Furnishing all labor, services, materials, and equipment required for geotechnical instrumentation and monitoring.

19. Furnishing all materials and performing all excavations, backfilling and compaction of excavated areas, restoration of pavement sub-base and installation of temporary and permanent pavement as specified herein and indicated on the Drawings.

20. Performing test pits as shown on the Contract Drawings and reporting all results to the Engineer.

B. A general description of the Work to be performed under this Contract shall include, but will not be limited to, the following construction operations:

1. Coordination of all construction activities with the appropriate local and State authorities and utilities.

2. Attending the pre-construction conference and required job progress meetings.

3. Submission of a construction schedule, list of subcontractors and submission of all required Shop Drawings, in a timely manner, to the Engineer for review.

4. Perform all field engineering associated with the project work including, but not limited to: construction layout and elevations; preparation of as-built plans at the completion of the project.

5. Pre-construction and post-construction video and photographs of the site. Monthly construction photos shall be submitted to the Engineer of all installation activities.

6. Mobilization and Demobilization from the Site.

7. Provide site security, temporary fencing, and other construction site control measures, as needed.

8. On-site and laboratory testing, as specified.

9. Coordination of environmental protection procedures in accordance with local, state, and federal regulatory approvals.

10. Protection of existing structures, facilities and equipment and installation of protection systems to mitigate potential interferences.

11. Restoration of disturbed areas, landscaping, hardscapes, and appurtenances on residential properties to pre-construction conditions and elevations within the limits of work.

12. Coordination with other entities owning infrastructure within the limits of work, in particular potable water, telecommunications, and electrical and appurtenances.

13. Obtaining necessary permits and licenses, maintaining all items required by applicable permits, compliance with existing permits, and payment of fees.

5. **Person, Department, or Committee, if any, to whom CONTRACTOR reports** (§ 2.2):

6. **Term of Agreement** (§3.1):

   a. The time for completion of this contract is:
      1,035 calendar days from notice to proceed for substantial completion.
      1,095 calendar days from notice to proceed for final completion.

7. **Completion Date** (§3.2):

   a. Liquidated damages will be in the amounts shown below for each calendar day of delay beyond the dates established below:

      Substantial completion (1,035 calendar days from notice to proceed) $1,000 per day
      Final completion (1,095 calendar days from notice to proceed) $1,000 per day

8. **Additional Insurance Coverage** (§6.2(e)):

9. Massachusetts DEP Policy Memorandum # 10

   a. As per MassDEP's Policy Memorandum #10 – the agreed upon DIRECT LABOR MARKUP (percentage) for Change Orders on this project shall be 5% percent.

CERTIFICATE OF VOTE
(to be filed if Contractor is a Corporation)

I, _____, hereby certify that I am the duly qualified
(Secretary of the Corporation)

and acting Secretary of _____ and I further certify that a meeting of the
(Name of Corporation)

Directors of said Company, duly called and held on _____, at which
(Date of Meeting)

all Directors were present and voting, the following vote was unanimously passed:

VOTED: To authorize and empower

_____

_____

_____

_____

_____

Anyone acting singly, to execute Bid Forms, Contracts or Bonds on behalf of the Corporation.

I further certify that the above vote is still in effect and has not been changed or modified in any respect.

By:_____
(Secretary of Corporation)

A True Copy:

Attest:_____
(Notary Public)

My Commission Expires:_____
(Date)

AGREEMENT EXHIBIT B

PAYMENTS

1. **Contract Price**: Owner shall pay Contractor for completion of the Work in accordance with the Contract Documents an amount in current funds as follows:

LUMP SUM PRICE (*INCLUDING BASE BID AND ALTERNATES _____)

_____

_____

2. **Payment Procedures**:

2.01 Submittal and Processing of Payments

A. Contractor shall submit Applications for Payment in accordance with Article 14 of the Standard General Conditions and Project Specific Conditions, if any. Applications for Payment will be processed by Engineer as provided in the Standard General Conditions and Project Specific Conditions, if any, and the General Requirements.

2.02 Progress Payments; Retainage

A. Owner shall make progress payments on account of the Contract Price on the basis of Contractor's Applications for Payment on or about the 21st day of each month during performance of the Work as provided in Paragraph 6.02.A.1 below. All such payments will be measured by the schedule of values established as provided in Paragraph 2.07.A of the Standard General Conditions and Project Specific Conditions, if any, (and in the case of Unit Price Work based on the number of units completed).

1. Prior to Substantial Completion, progress payments will be made in an amount equal to the percentage indicated below but, in each case, less the aggregate of payments previously made and less such amounts as Engineer may determine or Owner may withhold, including but not limited to liquidated damages, in accordance with Paragraph 14.02 of the Standard General Conditions and Project Specific Conditions, if any, and additional retainage allowed by Laws and Regulations.

Progress Payments of 95 percent for Work completed (with the balance of 5 percent being retainage).

2. Upon Substantial Completion, Owner shall pay an amount sufficient to increase total payments to Contractor to 99 percent of the Work completed (with the balance of 1 percent being retainage), less such amounts as Engineer shall determine in accordance with Paragraph 14.02.B.5 of the General Conditions and Project Specific Conditions, if any, and less the Engineer's estimate of the value of Work to be completed or corrected as shown on the tentative list of items to be completed or corrected (Punch List) attached to the certificate of Substantial Completion and subject to Paragraph 14.04 of the General Conditions and Project Specific Conditions, if any.

   However, retainage for items planted in the ground shall remain at 5 percent of the cost of such items until Final Payment per Massachusetts General Laws Chapter 30, Section 39G.

2.03 Final Payment

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

TAX COMPLIANCE CERTIFICATION
EXHIBIT C

Pursuant to M.G.L. 62C, Sec.49A, the undersigned certifies under the penalties of perjury that it, to the best knowledge and belief of management, has filed all state tax returns and paid all state taxes required under law (if any, are so required).

By:

_____

_____

_____, President

_____
Date

_____
FEIN:

SECTION 00510

CERTIFICATIONS REQUIRED BY LAW FOR PUBLIC CONSTRUCTION CONTRACTS

CERTIFICATIONS REQUIRED BY LAW FOR PUBLIC CONSTRUCTION CONTRACTS

You must COMPLETE and SIGN the following certifications. You must also print, at the bottom of this page, the name of the contractor for whom these certifications are submitted.

TAX COMPLIANCE

Pursuant to Chapter 62C of the Massachusetts General Laws, Section 49A(b), I, the undersigned, authorized signatory for the below named contractor, do hereby certify under the pains and penalties of perjury that said contractor has complied with all laws of the Commonwealth of Massachusetts relating to taxes, reporting of employees and contractors, and withholding and remitting child support.

NON-COLLUSION

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

PUBLIC CONTRACTOR DEBARMENT

The undersigned certifies under penalty of perjury that the below named contractor is not presently debarred from doing public construction work in the commonwealth under the provisions of section twenty-nine F of chapter twenty-nine, or any other applicable debarment provisions of any other chapter of the General Laws or any rule or regulation promulgated thereunder.

OSHA TRAINING

Pursuant to G.L. c. 30, §39S, the Contractor hereby certifies under penalties of perjury as follows:

(1) Contractor is able to furnish labor that can work in harmony with all other elements of labor employed or to be employed in the work;

(2) All employees to be employed at the worksite will have successfully completed a course in construction safety and health approved by the United States Occupational Safety and Health Administration that is at least 10 hours in duration at the time the employee begins work and they shall furnish documentation of successful completion of said course with the first certified payroll report for each employee; and

(3) All employees to be employed in the work subject to this contract have successfully completed a course in construction safety and health approved by the United States Occupational Safety and Health Administration that is at least 10 hours in duration.

COMPLETE AND SIGN BELOW:

_____ _____

Authorized Person's Signature Date

_____

Print Name & Title of Signatory

_____

Name of Contractor

PAYMENT BOND

KNOW ALL MEN BY THESE PRESENTS: That we _____

_____ a _____
(Name of Contractor) (Corporation, Partnership, Joint Venture or Individual)

Hereinafter called "Principal" and _____ of _____,
(Surety) (City)
State of _____ hereinafter called the 'Surety" and licensed by the State Division of Insurance to de business under the laws of the Commonwealth of Massachusetts, are held and firmly bound to the Town of Nantucket, Massachusetts, hereinafter called "Owner", in the penal sum of _____ Dollars ($_____) in lawful money of the United States, for the payment of which sum well and truly to be made, we bind ourselves, our heirs, executors, administrators and Successors, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION is such that whereas, the Principal entered into a certain contract with the Owner, dated the _____day of _____, 20___, for the construction described as follows: Sea Street Pump Station Force Main No.3.

NOW, THEREFORE, if the Principal 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 extension or modification thereof, including all amounts due for materials, lubricants, oil, gasoline, coal and coke, repairs on machinery, equipment and tools, consumed or used in connection with the construction of such work, and all insurance premiums on said work, and for all labor, performed in such work whether by subcontractor or otherwise, then this obligation shall be void; otherwise to remain in full force and effect.

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

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

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

ATTEST:

_____
Principal

_____ By _____
(Principal Secretary)

_____

_____

_____
(Address-Zip Code)

_____ (SEAL)
Witness as to Principal

_____

_____
(Address-Zip Code)

ATTEST:

_____
Surety

_____ By _____
(Attorney-in-Fact)

_____

_____
(Address-Zip Code)

_____ (SEAL)
Witness as to Surety

_____

_____
(Address-Zip Code)

NOTE: Date of Bond must not be prior to date of Contract. If Contractor is a Partnership, all partners should execute Bond.

PERFORMANCE BOND

KNOW ALL MEN BY THESE PRESENTS: That we _____

_____ a _____
(Name of Contractor) (Corporation, Partnership, Joint Venture or Individual)

Hereinafter called "Principal" and _____ of _____,
(Surety) (City)
State of _____ hereinafter called the 'Surety" and licensed by the State Division of Insurance to de business under the laws of the Commonwealth of Massachusetts, are held and firmly bound to the Town of Nantucket, Massachusetts, hereinafter called "Owner", in the penal sum of _____ Dollars ($_____) in lawful money of the United States, for the payment of which sum well and truly to be made, we bind ourselves, our heirs, executors, administrators and Successors, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION is such that whereas, the Principal entered into a certain contract with the Owner, dated the _____day of _____, 20___, for the construction described as follows: Sea Street Pump Station Force Main No.3.

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

PROVIDED, FURTHER, that the Surety's obligation under this Bond shall arise after (1) the Owner has declared the Principal in default of the Construction Contract or any provision thereof or (2) has declared that the Principal has failed, or is otherwise unable or unwilling, to execute the work consistent with, and in conformance to, the Construction Contract (collectively referred to as a "Contractor Default"). The determination of a Contractor Default shall be made solely by the Owner. The Owner need not terminate the Construction Contract to declare a Contractor Default or to invoke its rights under this Bond.

When the Surety's obligation under this Bond arises, the Surety, at its sole expense and at the consent and election of the Owner, shall promptly take one of the following steps: (1) arrange for the Principal to perform and complete the work of the Construction Contract: (2) arrange for a contractor other than the Principal to perform and complete the work of the Construction Contract; (3) reimburse the Owner, in a manner and at such time as the Owner shall decide, for all costs and expenses incurred by the Owner in performing and completing the work of the Construction Contract. Surety will keep Owner reasonably informed of the progress, status and results of any investigation of any claim of the Owner.

If the Surety does not proceed as provided in this Bond with due diligence and all deliberate speed, the Surety shall be deemed to be in default of this Bond, and the Owner shall be entitled to enforce any remedy available to the Owner.

After the Surety's obligation under this Bond arises, the Surety is obligated, to the limit of the amounts of this Bond, for (1) the correction of defective work and completion of the Construction Contract; (2) additional design, professional services, and legal costs, including attorneys' fees, resulting from the Contractor Default or from the default of the Surety under this Bond; (3) any additional work beyond the Construction Contract made necessary by the Contractor Default or default of the Surety under this Bond; (4) indemnification obligation of the Principal, if any, as provided in the Construction Contract; and (5) liquidated damages as provided in the Construction Contract, or if none are so specified, actual and foreseeable consequential damages resulting from the Contractor Default or default of the Surety under this Bond.

Any proceeding, legal or equitable, under this Bond shall be instituted in any court of competent jurisdiction in the Commonwealth of Massachusetts.

The Surety, for value received, hereby stipulates and agrees that no change, extension of time, alteration or addition to the terms of the Construction Contract or to the work to be performed thereunder or the specifications accompanying the same shall in any way affect its obligation on this Bond, and it does hereby waive notice of any such change, extension of time, alteration or addition to the terms of the Construction Contract or to the work or to the specifications.

IN WITNESS WHEREOF, this instrument is executed in _____ ( ) counterparts, each one of which shall be deemed an original, this the _____ day of _____, 20___.

ATTEST:

_____
Principal

_____ By _____
(Principal Secretary)

_____

_____

_____
(Address-Zip Code)

_____ (SEAL)
Witness as to Principal

_____

_____
(Address-Zip Code)

ATTEST:

_____
Surety

_____ By _____
(Attorney-in-Fact)

_____

_____
(Address-Zip Code)

_____ (SEAL)
Witness as to Surety

_____

_____
(Address-Zip Code)

NOTE: Date of Bond must not be prior to date of Contract. If Contractor is a Partnership, all partners should execute Bond.

NOTICE TO PROCEED

To: _____ Date: _____

_____

_____ Project: CWSRF 6722
Title: Sea Street Pump Station
Force Main No.3

You are hereby notified to commence Work in accordance with the Agreement dated

_____, on or before _____,_____.

and you are to complete the Work within 1,095 consecutive calendar days. The date of Completion of all Work is therefore_____.

Owner: Town of Nantucket
16 Broad Street
Nantucket, Massachusetts 02554

By:

_____
Brian E. Turbitt, Director of Municipal Finance

Acceptance of Notice to Proceed:

Receipt of the above Notice to Proceed is hereby

acknowledged by _____, this

_____day of_____, 20___

By: _____
(Authorized Signature)

Title: _____

SECTION 00700
STANDARD GENERAL CONDITIONS OF THE CONSTRUCTION CONTRACT

TABLE OF CONTENTS

Page

Article 1 – Definitions and Terminology 1
1.01 Defined Terms 1
1.02 Terminology 5

Article 2 – Preliminary Matters 6
2.01 Delivery of Bonds and Evidence of Insurance 6
2.02 Copies of Documents 7
2.03 Commencement of Contract Times; Notice to Proceed 7
2.04 Starting the Work 7
2.05 Before Starting Construction 7
2.06 Preconstruction Conference; Designation of Authorized Representatives 7
2.07 Initial Acceptance of Schedules 8

Article 3 – Contract Documents: Intent, Amending, Reuse 8
3.01 Intent 8
3.02 Reference Standards 8
3.03 Reporting and Resolving Discrepancies 9
3.04 Amending and Supplementing Contract Documents 10
3.05 Reuse of Documents 10
3.06 Electronic Data 10

Article 4 – Availability of Lands; Subsurface and Physical Conditions; Hazardous Environmental Conditions; Reference Points 11
4.01 Availability of Lands 11
4.02 Subsurface and Physical Conditions 11
4.03 Differing Subsurface or Physical Conditions 12
4.04 Underground Facilities 13
4.05 Reference Points 14
4.06 Hazardous Environmental Condition at Site 14

Article 5 – Bonds and Insurance 16
5.01 Performance, Payment, and Other Bonds 16
5.02 Licensed Sureties and Insurers 16
5.03 Certificates of Insurance 16
5.04 Contractor's Insurance 17
5.05 Owner's Liability Insurance 19
5.06 Property Insurance 19
5.07 Waiver of Rights 21
5.08 Receipt and Application of Insurance Proceeds (Not used) 21

EJCDC C-700 Standard General Conditions of the Construction Contract
Copyright © 2007 National Society of Professional Engineers for EJCDC. All rights reserved.
Revisions highlighted within the text have been approved by Owner's legal counsel Kopelman & Paige, P.C.

5.09 Acceptance of Bonds and Insurance; Option to Replace 22
5.10 Partial Utilization, Acknowledgment of Property Insurer 22

Article 6 – Contractor's Responsibilities 22
6.01 Supervision and Superintendence 22
6.02 Labor; Working Hours 22
6.03 Services, Materials, and Equipment 23
6.04 Progress Schedule 23
6.05 Substitutes and "Or-Equals" 23
6.06 Concerning Subcontractors, Suppliers, and Others 26
6.07 Patent Fees and Royalties 27
6.08 Permits 28
6.09 Laws and Regulations 28
6.10 Taxes 28
6.11 Use of Site and Other Areas 28
6.12 Record Documents 29
6.13 Safety and Protection 29
6.14 Safety Representative 30
6.15 Hazard Communication Programs 30
6.16 Emergencies 31
6.17 Shop Drawings and Samples 31
6.18 Continuing the Work 32
6.19 Contractor's General Warranty and Guarantee 33
6.20 Indemnification 34
6.21 Delegation of Professional Design Services 35

Article 7 – Other Work at the Site 35
7.01 Related Work at Site 35
7.02 Coordination 36
7.03 Legal Relationships 36

Article 8 – Owner's Responsibilities 36
8.01 Communications to Contractor 36
8.02 Replacement of Engineer 37
8.03 Furnish Data 37
8.04 Pay When Due 37
8.05 Lands and Easements; Reports and Tests 37
8.06 Insurance 37
8.07 Change Orders 37
8.08 Inspections, Tests, and Approvals 37
8.09 Limitations on Owner's Responsibilities 37
8.10 Undisclosed Hazardous Environmental Condition 37
8.11 Evidence of Financial Arrangements 38
8.12 Compliance with Safety Program 38

Article 9 – Engineer's Status during Construction 38
9.01 Owner's Representative 38
9.02 Visits to Site 38
9.03 Project Representative 38

EJCDC C-700 Standard General Conditions of the Construction Contract
Copyright © 2007 National Society of Professional Engineers for EJCDC. All rights reserved.
Revisions highlighted within the text have been approved by Owner's legal counsel Kopelman & Paige, P.C.

9.04 Authorized Variations in Work....39
9.05 Rejecting Defective Work....39
9.06 Shop Drawings, Change Orders and Payments....39
9.07 Determinations for Unit Price Work....39
9.08 Decisions on Requirements of Contract Documents and Acceptability of Work....39
9.09 Limitations on Engineer's Authority and Responsibilities....40
9.10 Compliance with Safety Program....40

Article 10 – Changes in the Work; Claims....41
10.01 Authorized Changes in the Work....41
10.02 Unauthorized Changes in the Work....41
10.03 Execution of Change Orders....41
10.04 Notification to Surety....41
10.05 Claims....42

Article 11 – Cost of the Work; Allowances; Unit Price Work....43
11.01 Cost of the Work....43
11.02 Allowances....45
11.03 Unit Price Work....46

Article 12 – Change of Contract Price; Change of Contract Times....46
12.01 Change of Contract Price....46
12.02 Change of Contract Times....47
12.03 Delays....47

Article 13 – Tests and Inspections; Correction, Removal or Acceptance of Defective Work....48
13.01 Notice of Defects....48
13.02 Access to Work....48
13.03 Tests and Inspections....48
13.04 Uncovering Work....49
13.05 Owner May Stop the Work....50
13.06 Correction or Removal of Defective Work....50
13.07 Correction Period....50
13.08 Acceptance of Defective Work....51
13.09 Owner May Correct Defective Work....51

Article 14 – Payments to Contractor and Completion....52
14.01 Schedule of Values....52
14.02 Progress Payments....52
14.03 Contractor's Warranty of Title....55
14.04 Substantial Completion....55
14.05 Partial Utilization....56
14.06 Final Inspection....56
14.07 Final Payment....56
14.08 Final Completion Delayed....57
14.09 Waiver of Claims....58

Article 15 – Suspension of Work and Termination....58
15.01 Owner May Suspend Work....58

EJCDC C-700 Standard General Conditions of the Construction Contract
Copyright © 2007 National Society of Professional Engineers for EJCDC. All rights reserved.
Revisions highlighted within the text have been approved by Owner's legal counsel Kopelman & Paige, P.C.

15.02 Owner May Terminate for Cause 58
15.03 Owner May Terminate For Convenience 60
15.04 Contractor May Stop Work or Terminate 60

Article 16 – Dispute Resolution 60
16.01 Methods and Procedures 60

Article 17 – Miscellaneous 61
17.01 Giving Notice 61
17.02 Computation of Times 61
17.03 Cumulative Remedies 61
17.04 Survival of Obligations 62
17.05 Controlling Law 62
17.06 Headings 62

EJCDC C-700 Standard General Conditions of the Construction Contract
Copyright © 2007 National Society of Professional Engineers for EJCDC. All rights reserved.
Revisions highlighted within the text have been approved by Owner's legal counsel Kopelman & Paige, P.C.

ARTICLE 1 – DEFINITIONS AND TERMINOLOGY

1.01 *Defined Terms*

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

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

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

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

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

5. *Bid*—The offer or proposal of a Bidder submitted on the prescribed form setting forth the prices for the Work to be performed. May also be referred to as "Proposal" which may be used interchangeably and shall have the same meaning.

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

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

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

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

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

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

12. *Contract Documents*—Those items so designated in the Agreement. Only printed or hard copies of the items listed in the Agreement are Contract Documents. Approved Shop

EJCDC C-700 Standard General Conditions of the Construction Contract
Copyright © 2007 National Society of Professional Engineers for EJCDC. All rights reserved.
Revisions highlighted within the text have been approved by Owner's legal counsel Kopelman & Paige, P.C.

Drawings, other Contractor submittals, and the reports and drawings of subsurface and physical conditions are not Contract Documents.

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

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

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

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

17. *Drawings*—That part of the Contract Documents prepared or approved by Engineer which graphically shows the scope, extent, and character of the Work to be performed by Contractor and complement the Specifications. Shop Drawings and other Contractor submittals are not Drawings as so defined. May also referred to as "Plans", which may be used interchangeably and shall have the same meaning. Notes on Drawings are directed to Contractor unless specifically noted otherwise.

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

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

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

21. *General Requirements*—Sections of Division 01 of the Specifications which govern the Work in all sections of the Specifications.

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

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

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

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

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

EJCDC C-700 Standard General Conditions of the Construction Contract
Copyright © 2007 National Society of Professional Engineers for EJCDC. All rights reserved.
Revisions highlighted within the text have been approved by Owner's legal counsel Kopelman & Paige, P.C.

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

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

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

30. *PCBs*—Polychlorinated biphenyls.

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

32. *Progress Schedule*—A schedule, prepared and maintained by Contractor, describing the sequence and duration of the activities comprising the Contractor's plan to accomplish the Work within the Contract Times. May also be referred to as "Construction Schedule", which may be used interchangeably and shall have the same meaning.

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

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

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

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

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

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

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

EJCDC C-700 Standard General Conditions of the Construction Contract
Copyright © 2007 National Society of Professional Engineers for EJCDC. All rights reserved.
Revisions highlighted within the text have been approved by Owner's legal counsel Kopelman & Paige, P.C.

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

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

42. *Specifications*—That part of the Contract Documents consisting of written requirements for materials, equipment, systems, standards and workmanship as applied to the Work, and certain administrative requirements and procedural matters applicable thereto. The Specifications are based on the guidelines of the Construction Specifications Institute (CSI) Project Resource Manual, and are directed to Contractor unless specifically noted otherwise. The words "shall be" are included by inference where a colon (:) is used within sentences or phrases in the Specifications.

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

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

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

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

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

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

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

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

EJCDC C-700 Standard General Conditions of the Construction Contract
Copyright © 2007 National Society of Professional Engineers for EJCDC. All rights reserved.
Revisions highlighted within the text have been approved by Owner’s legal counsel Kopelman & Paige, P.C.

51. *Work Change Directive*—A written statement to Contractor issued on or after the Effective Date of the Agreement and signed by Owner and recommended by Engineer ordering an addition, deletion, or revision in the Work, or responding to differing or unforeseen subsurface or physical conditions under which the Work is to be performed or to emergencies. A Work Change Directive will not change the Contract Price or the Contract Times but is evidence that the parties expect that the change ordered or documented by a Work Change Directive will be incorporated in a subsequently issued Change Order following negotiations by the parties as to its effect, if any, on the Contract Price or Contract Times.

B. Additional Terms

1. *Final Completion*—The time at which all Work is completed and ready for final payment in accordance with Paragraph 14.07 of these General Conditions.

2. *Industry Practice*—The written practices, methods, materials, supplies and equipment, as changed from time to time, that are commonly used in the industry applicable to the project to design, construct and operate facilities and plants, or any practices, methods and acts, which in the exercise of reasonable judgment in light of the facts known at the time, could have been expected to accomplish the desired results consistent with good business practices, reliability, safety and expedition.

3. *Punch List*—A list of open items representing portions of the Work which Contractor, Engineer, Owner reasonably agree is not complete on the date of Substantial Completion or Final Completion, but which items will not significantly interfere with the safe, reliable operation and integrity of the Project or its intended use.

4. *Purchase Order*—A written agreement between Contractor and a Supplier for provision of material and equipment.

5. *Warranty Period*—The correction period after the date of Substantial Completion per Paragraph 13.07 of these General Conditions.

1.02 *Terminology*

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

B. Intent of Certain Terms or Adjectives:

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

EJCDC C-700 Standard General Conditions of the Construction Contract
Copyright © 2007 National Society of Professional Engineers for EJCDC. All rights reserved.
Revisions highlighted within the text have been approved by Owner’s legal counsel Kopelman & Paige, P.C.

or authority to supervise or direct the performance of the Work, or any duty or authority to undertake responsibility contrary to the provisions of Paragraph 9.09 or any other provision of the Contract Documents.

C. Day:

1. The word "day" means a calendar day of 24 hours measured from midnight to the next midnight. See also Paragraph 17.02 of these General Conditions.

D. Defective:

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

a. does not conform to the Contract Documents; or

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

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

E. Furnish, Install, Perform, Provide:

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

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

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

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

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

ARTICLE 2 – PRELIMINARY MATTERS

2.01 *Delivery of Bonds and Evidence of Insurance*

EJCDC C-700 Standard General Conditions of the Construction Contract
Copyright © 2007 National Society of Professional Engineers for EJCDC. All rights reserved.
Revisions highlighted within the text have been approved by Owner's legal counsel Kopelman & Paige, P.C.

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

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

2.02 *Copies of Documents*

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

2.03 *Commencement of Contract Times; Notice to Proceed*

A. The Contract Times will commence to run on the thirtieth day after the Effective Date of the Agreement or, if a Notice to Proceed is given, on the day indicated in the Notice to Proceed. A Notice to Proceed may be given at any time within 30 days after the Effective Date of the Agreement. In no event will the Contract Times commence to run later than the 90th day after the day of Bid opening or the thirtieth day after the Effective Date of the Agreement, unless mutually agreed otherwise, whichever date is earlier.

2.04 *Starting the Work*

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

2.05 *Before Starting Construction*

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

1. a preliminary Progress Schedule indicating the times (numbers of days or dates) for starting and completing the various stages of the Work, including any Milestones specified in the Contract Documents and the lead times for equipment and materials per the listing in subparagraph 2.05.A.4;

2. a preliminary Schedule of Submittals; and

3. a preliminary Schedule of Values for all of the Work which includes quantities and prices of items which when added together equal the Contract Price and subdivides the Work into component parts in sufficient detail to serve as the basis for progress payments during performance of the Work which will be confirmed in writing by Contractor at the time of

EJCDC C-700 Standard General Conditions of the Construction Contract
Copyright © 2007 National Society of Professional Engineers for EJCDC. All rights reserved.
Revisions highlighted within the text have been approved by Owner's legal counsel Kopelman & Paige, P.C.

submission. Such prices will include an appropriate amount of overhead and profit applicable to each item of Work; and

4. a complete listing of equipment and materials with lead times between placing orders and delivery, including normal allowances of time for processing and correcting Shop Drawings. All orders for long lead items shall be placed within 30 days after Effective Date of the Agreement if delivery is critical to scheduling. Failure to place orders promptly may result in full liability for liquidated damages if Contract Times are not met.

B. *Evidence of Insurance*: In accordance with Paragraph 2.01.

2.06 *Preconstruction Conference; Designation of Authorized Representatives*

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

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

2.07 *Initial Acceptance of Schedules*

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

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

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

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

ARTICLE 3 – CONTRACT DOCUMENTS: INTENT, AMENDING, REUSE

3.01 *Intent*

EJCDC C-700 Standard General Conditions of the Construction Contract
Copyright © 2007 National Society of Professional Engineers for EJCDC. All rights reserved.
Revisions highlighted within the text have been approved by Owner's legal counsel Kopelman & Paige, P.C.

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

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

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

3.02 *Reference Standards*

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

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

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

3.03 *Reporting and Resolving Discrepancies*

A. Reporting Discrepancies:

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

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

EJCDC C-700 Standard General Conditions of the Construction Contract
Copyright © 2007 National Society of Professional Engineers for EJCDC. All rights reserved.
Revisions highlighted within the text have been approved by Owner's legal counsel Kopelman & Paige, P.C.

Paragraph 6.16.A) until an amendment or supplement to the Contract Documents has been issued by one of the methods indicated in Paragraph 3.04.

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

B. Resolving Discrepancies:

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

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

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

3.04 *Amending and Supplementing Contract Documents*

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

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

1. A Field Order;

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

3. Engineer's written interpretation or clarification.

3.05 *Reuse of Documents*

A. Contractor and any Subcontractor or Supplier shall not:

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

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

EJCDC C-700 Standard General Conditions of the Construction Contract
Copyright © 2007 National Society of Professional Engineers for EJCDC. All rights reserved.
Revisions highlighted within the text have been approved by Owner's legal counsel Kopelman & Paige, P.C.

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

3.06 *Electronic Data*

A. Unless otherwise stated in the Supplementary Conditions, the data furnished by Owner or Engineer to Contractor, or by Contractor to Owner or Engineer, that may be relied upon are limited to the printed copies (also known as hard copies), files transmitted in in portable document format (PDF), and other electronic media formats of text, data, graphics or other file types supported by any digital document exchange system implemented for the Project, all of which are understood by all parties to constitute official Project correspondence and submittals. Files in electronic media format of text, data, graphics, or other types are furnished only for the convenience of the receiving party. Any conclusion or information obtained or derived from such electronic files will be at the user's sole risk. If there is a discrepancy between the electronic files and the hard copies, the hard copies govern.

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

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

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

4.01 *Availability of Lands*

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

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

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

4.02 *Subsurface and Physical Conditions*

EJCDC C-700 Standard General Conditions of the Construction Contract
Copyright © 2007 National Society of Professional Engineers for EJCDC. All rights reserved.
Revisions highlighted within the text have been approved by Owner's legal counsel Kopelman & Paige, P.C.

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

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

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

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

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

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

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

4.03 *Differing Subsurface or Physical Conditions*

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

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

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

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

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

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

B. *Engineer's Review*: After receipt of written notice as required by Paragraph 4.03.A, Engineer will promptly review the pertinent condition, determine the necessity of Owner's obtaining

EJCDC C-700 Standard General Conditions of the Construction Contract
Copyright © 2007 National Society of Professional Engineers for EJCDC. All rights reserved.
Revisions highlighted within the text have been approved by Owner's legal counsel Kopelman & Paige, P.C.

additional exploration or tests with respect thereto, and advise Owner in writing (with a copy to Contractor) of Engineer's findings and conclusions.

C. Possible Price and Times Adjustments:

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

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

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

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

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

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

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

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

4.04 *Underground Facilities*

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

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

a. reviewing and checking all such information and data;

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

EJCDC C-700 Standard General Conditions of the Construction Contract
Copyright © 2007 National Society of Professional Engineers for EJCDC. All rights reserved.
Revisions highlighted within the text have been approved by Owner's legal counsel Kopelman & Paige, P.C.

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

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

B. Not Shown or Indicated:

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

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

3. Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them, shall not be liable to Contractor for any claims, losses, or damages incurred by Contractor (including but not limited to all fees and changes of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) related to Underground Facilities not shown or indicated.

4.05 *Reference Points*

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

4.06 *Hazardous Environmental Condition at Site*

EJCDC C-700 Standard General Conditions of the Construction Contract
Copyright © 2007 National Society of Professional Engineers for EJCDC. All rights reserved.
Revisions highlighted within the text have been approved by Owner's legal counsel Kopelman & Paige, P.C.

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

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

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

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

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

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

D. If Contractor encounters a Hazardous Environmental Condition or if Contractor or anyone for whom Contractor is responsible creates a Hazardous Environmental Condition, Contractor shall immediately: (i) secure or otherwise isolate such condition; (ii) stop all Work in connection with such condition and in any area affected thereby (except in an emergency as required by Paragraph 6.16.A); and (iii) notify Owner and Engineer (and promptly thereafter confirm such notice in writing). Owner shall promptly consult with Engineer concerning the necessity for Owner to retain a qualified expert to evaluate such condition or take corrective action, if any. Promptly after consulting with Engineer, Owner shall take such actions as are necessary to permit Owner to timely obtain required permits and provide Contractor the written notice required by Paragraph 4.06.E.

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

EJCDC C-700 Standard General Conditions of the Construction Contract
Copyright © 2007 National Society of Professional Engineers for EJCDC. All rights reserved.
Revisions highlighted within the text have been approved by Owner's legal counsel Kopelman & Paige, P.C.

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

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

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

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

ARTICLE 5 – BONDS AND INSURANCE

5.01 *Performance, Payment, and Other Bonds*

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

B. All bonds shall be in the form prescribed by the Contract Documents except as provided otherwise by Laws or Regulations, and shall be executed by such sureties as are named in the list of "Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies" as published in Circular 570 (amended) by the Financial

EJCDC C-700 Standard General Conditions of the Construction Contract
Copyright © 2007 National Society of Professional Engineers for EJCDC. All rights reserved.
Revisions highlighted within the text have been approved by Owner's legal counsel Kopelman & Paige, P.C.

Management Service, Surety Bond Branch, U.S. Department of the Treasury. All bonds signed by an agent or attorney-in-fact must be accompanied by a certified copy of that individual's authority to bind the surety. The evidence of authority shall show that it is effective on the date the agent or attorney-in-fact signed each bond.

C. If the surety on any bond furnished by Contractor is declared bankrupt or becomes insolvent or its right to do business is terminated in any state where any part of the Project is located or it ceases to meet the requirements of Paragraph 5.01.B, Contractor shall promptly notify Owner and Engineer and shall, within 5 days after the event giving rise to such notification, provide another bond and surety, both of which shall comply with the requirements of Paragraphs 5.01.B and 5.02.

5.02 *Licensed Sureties and Insurers*

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

5.03 *Certificates of Insurance*

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

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

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

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

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

5.04 *Contractor's Insurance*

A. Contractor shall purchase and maintain such insurance as is appropriate for the Work being performed, complies with the requirements of Article 5, and as will provide protection from claims set forth below which may arise out of or result from Contractor's performance of the Work and Contractor's other obligations under the Contract Documents, whether it is to be

EJCDC C-700 Standard General Conditions of the Construction Contract
Copyright © 2007 National Society of Professional Engineers for EJCDC. All rights reserved.
Revisions highlighted within the text have been approved by Owner's legal counsel Kopelman & Paige, P.C.

performed by Contractor, any Subcontractor or Supplier, or by anyone directly or indirectly employed by any of them to perform any of the Work, or by anyone for whose acts any of them may be liable:

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

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

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

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

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

   b. by any other person for any other reason;

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

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

7. claims arising out of violation of Laws or Regulations; and

8. claims for damages because of negligent acts, errors and omissions arising out of performing or providing professional services.

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

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

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

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

EJCDC C-700 Standard General Conditions of the Construction Contract
Copyright © 2007 National Society of Professional Engineers for EJCDC. All rights reserved.
Revisions highlighted within the text have been approved by Owner's legal counsel Kopelman & Paige, P.C.

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

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

6. include completed operations coverage:

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

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

C. The limits of liability for the insurance required by Paragraph 5.04 of the General Conditions shall provide coverage for not less than the following amounts or greater where required by Laws and Regulations:

1. Workers' Compensation and related coverage:

Minimum limit of liability	$100,000
Applicable Federal (e.g., Longshoreman's)	Statutory
Employer's Liability	$500,000

2. Contractor’s General Liability:

   $1,000,000 per occurrence; $2,000,000 general aggregate; $2,000,000 per project aggregate, including:

   - Broad Form Property Damage Liability including coverage for acts of terrorism
   - Completed Operations and Product Liability
   - Contractual Liability
   - Independent Contractors
   - Explosion, Collapse & Underground Hazards
   - Personal Injury Coverage, Exclusion "C" Deleted
   - Fire Legal Liability - $1,000,000
   - Medical payments - $1,000,000

   Pollution Liability (covering third-party injury and property damage claims, including clean-up costs, as a result of pollution conditions arising from the Contractor's operations and completed operations maintained for no less than three years after final completion): $1,000,000

EJCDC C-700 Standard General Conditions of the Construction Contract
Copyright © 2007 National Society of Professional Engineers for EJCDC. All rights reserved.
Revisions highlighted within the text have been approved by Owner’s legal counsel Kopelman & Paige, P.C.

Excess or Umbrella Liability: $5,000,000 per occurrence; $5,000,000 general aggregate

3. Automobile Liability under Paragraph 5.04.A.6 of the General Conditions:

   Combined Single Limit of $1,000,000 for bodily injury & property damage covering Contractor and any vehicles owned, hired and non-owned by the Contractor

4. Professional Liability (E&O for engineers, architects or surveyors): $1,000,000 for each claim with an annual aggregate of at least $2,000,000 if professional services are required under the Specifications.

5. Owners Protective Liability: as may be specified in the Supplementary Conditions Any self-insured retention (not allowed for Worker's Compensation) and/or deductibles must be identified and cannot exceed $100,000 per occurrence without the prior approval of the Owner. Contractor must provide either an audited financial statement to confirm solvency or a letter of credit guaranteeing the $100,000 in case of loss for the duration of the Project and for the Correction Period.

5.05 *Owner's Liability Insurance*

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

5.06 *Property Insurance*

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

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

2. be written on a Builder's Risk "all risk" Special Forms policy form that shall at least include insurance for physical loss or damage to the Work, temporary buildings, falsework, and materials and equipment in transit, and shall insure against at least the following special form perils or causes of loss, including but not limited to: fire, lightning, flood, extended coverage, theft, vandalism and malicious mischief, earthquake, collapse, debris removal, demolition occasioned by enforcement of Laws and Regulations, water damage (other than that caused by flood), and such other perils or causes of loss as may be specifically required by the Supplementary Conditions.

EJCDC C-700 Standard General Conditions of the Construction Contract
Copyright © 2007 National Society of Professional Engineers for EJCDC. All rights reserved.
Revisions highlighted within the text have been approved by Owner's legal counsel Kopelman & Paige, P.C.

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

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

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

6. include testing and startup; and

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

8. comply with the requirements of Paragraph 5.06.C of the General Conditions.

B. (Not used)Owner shall purchase and maintain such equipment breakdown insurance or additional property insurance as may be required by the Supplementary Conditions or Laws and Regulations which will include the interests of Owner, Contractor, Subcontractors, and Engineer, and any other individuals or entities identified in the Supplementary Conditions, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them, each of whom is deemed to have an insurable interest and shall be listed as a loss payee.

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

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

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

5.07 *Waiver of Rights*

A. Owner and Contractor intend that all policies purchased in accordance with Paragraph 5.06 will protect Owner, Contractor, Subcontractors, and Engineer, and all other individuals or entities identified in the Supplementary Conditions as loss payees (and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them) in such

EJCDC C-700 Standard General Conditions of the Construction Contract
Copyright © 2007 National Society of Professional Engineers for EJCDC. All rights reserved.
Revisions highlighted within the text have been approved by Owner's legal counsel Kopelman & Paige, P.C.

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

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

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

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

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

5.08 *Receipt and Application of Insurance Proceeds (Not used)*

A. (Not used)

B. (Not used)

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

A. If either Owner or Contractor has any objection to the coverage afforded by or other provisions of the bonds or insurance required to be purchased and maintained by the other party in accordance with Article 5 on the basis of non-conformance with the Contract Documents, the objecting party shall so notify the other party in writing within 10 days after receipt of the certificates (or other evidence requested) required by Paragraph 2.01.B. Owner and Contractor shall each provide to the other such additional information in respect of insurance provided as the other may reasonably request. If either party does not purchase or maintain all of the bonds

EJCDC C-700 Standard General Conditions of the Construction Contract
Copyright © 2007 National Society of Professional Engineers for EJCDC. All rights reserved.
Revisions highlighted within the text have been approved by Owner's legal counsel Kopelman & Paige, P.C.

and insurance required of such party by the Contract Documents, such party shall notify the other party in writing of such failure to purchase prior to the start of the Work, or of such failure to maintain prior to any change in the required coverage. Without prejudice to any other right or remedy, the other party may elect to obtain equivalent bonds or insurance to protect such other party's interests at the expense of the party who was required to provide such coverage, and a Change Order shall be issued to adjust the Contract Price accordingly.

5.10 *Partial Utilization, Acknowledgment of Property Insurer*

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

ARTICLE 6 – CONTRACTOR'S RESPONSIBILITIES

6.01 *Supervision and Superintendence*

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

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

6.02 *Labor; Working Hours*

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

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

6.03 *Services, Materials, and Equipment*

A. Unless otherwise specified in the Contract Documents, Contractor shall provide and assume full responsibility for all services, materials, equipment, labor, transportation, construction equipment and machinery, tools, appliances, fuel, power, light, heat, telephone, water, sanitary facilities,

EJCDC C-700 Standard General Conditions of the Construction Contract
Copyright © 2007 National Society of Professional Engineers for EJCDC. All rights reserved.
Revisions highlighted within the text have been approved by Owner's legal counsel Kopelman & Paige, P.C.

temporary facilities, and all other facilities and incidentals necessary for the performance, testing, start-up, and completion of the Work.

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

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

D. Provision of any instructions:

1. will not be effective to assign to Owner, or any of Owner'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 Paragraph 8.09; and

2. will not be effective to assign to Engineer, or any of 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 Paragraph 9.09.

6.04 *Progress Schedule*

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

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

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

6.05 *Substitutes and "Or-Equals"*

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

EJCDC C-700 Standard General Conditions of the Construction Contract
Copyright © 2007 National Society of Professional Engineers for EJCDC. All rights reserved.
Revisions highlighted within the text have been approved by Owner's legal counsel Kopelman & Paige, P.C.

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

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

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

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

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

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

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

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

2. Substitute Items:

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

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

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

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

        1) shall certify that the proposed substitute item will:

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

EJCDC C-700 Standard General Conditions of the Construction Contract
Copyright © 2007 National Society of Professional Engineers for EJCDC. All rights reserved.
Revisions highlighted within the text have been approved by Owner's legal counsel Kopelman & Paige, P.C.

b) be similar in substance to that specified, and

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

2) will state:

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

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

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

3) will identify:

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

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

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

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

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

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

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

EJCDC C-700 Standard General Conditions of the Construction Contract
Copyright © 2007 National Society of Professional Engineers for EJCDC. All rights reserved.
Revisions highlighted within the text have been approved by Owner's legal counsel Kopelman & Paige, P.C.

substitute. Contractor shall also reimburse Owner for the reasonable charges of Engineer for making changes in the Contract Documents (or in the provisions of any other direct contract with Owner) resulting from the acceptance of each proposed substitute.

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

6.06 *Concerning Subcontractors, Suppliers, and Others*

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

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

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

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

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

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

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

EJCDC C-700 Standard General Conditions of the Construction Contract
Copyright © 2007 National Society of Professional Engineers for EJCDC. All rights reserved.
Revisions highlighted within the text have been approved by Owner's legal counsel Kopelman & Paige, P.C.

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

G. All Work performed for Contractor by a Subcontractor or Supplier will be pursuant to an appropriate agreement between Contractor and the Subcontractor or Supplier which specifically binds the Subcontractor or Supplier to the applicable terms and conditions of the Contract Documents for the benefit of Owner and Engineer.

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

6.07 *Patent Fees and Royalties*

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

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

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

EJCDC C-700 Standard General Conditions of the Construction Contract
Copyright © 2007 National Society of Professional Engineers for EJCDC. All rights reserved.
Revisions highlighted within the text have been approved by Owner's legal counsel Kopelman & Paige, P.C.

D. At the Owner's option, Contractor shall defend claims in connection with any alleged infringement of such rights.

6.08 *Permits*

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

6.09 *Laws and Regulations*

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

B. If Contractor observes that the Specifications or Drawings are at variance with any Laws or Regulations, Contractor shall give Engineer prompt written notice thereof, and any necessary changes will be authorized by one of the methods set forth in Paragraph 3.04. If Contractor performs any Work knowing or having reason to know that it is contrary to Laws or Regulations, Contractor shall bear all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such Work. However, it shall not be Contractor's responsibility to make certain that the Specifications and Drawings are in accordance with Laws and Regulations, but this shall not relieve Contractor of Contractor's obligations under Paragraph 3.03.

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

6.10 *Taxes*

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

6.11 *Use of Site and Other Areas*

A. Limitation on Use of Site and Other Areas:

1. Contractor shall confine construction equipment, the storage of materials and equipment, and the operations of workers to the Site and other areas permitted by Laws and Regulations, and shall not unreasonably encumber the Site and other areas with construction equipment or other materials or equipment. Contractor shall assume full responsibility for any damage to any such

EJCDC C-700 Standard General Conditions of the Construction Contract
Copyright © 2007 National Society of Professional Engineers for EJCDC. All rights reserved.
Revisions highlighted within the text have been approved by Owner's legal counsel Kopelman & Paige, P.C.

land or area, or to the owner or occupant thereof, or of any adjacent land or areas resulting from the performance of the Work.

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

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

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

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

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

6.12 *Record Documents*

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

6.13 *Safety and Protection*

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

EJCDC C-700 Standard General Conditions of the Construction Contract
Copyright © 2007 National Society of Professional Engineers for EJCDC. All rights reserved.
Revisions highlighted within the text have been approved by Owner's legal counsel Kopelman & Paige, P.C.

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

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

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

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

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

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

E. All damage, injury, or loss to any property referred to in Paragraph 6.13.A.2 or 6.13.A.3 caused, directly or indirectly, in whole or in part, by Contractor, any Subcontractor, Supplier, or any other individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, shall be remedied by Contractor (except damage or loss attributable to the fault of Drawings or Specifications or to the acts or omissions of Owner or Engineer or anyone employed by any of them, or anyone for whose acts any of them may be liable, and not attributable, directly or indirectly, in whole or in part, to the fault or negligence of Contractor or any Subcontractor, Supplier, or other individual or entity directly or indirectly employed by any of them).

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

6.14 *Safety Representative*

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

6.15 *Hazard Communication Programs*

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

EJCDC C-700 Standard General Conditions of the Construction Contract
Copyright © 2007 National Society of Professional Engineers for EJCDC. All rights reserved.
Revisions highlighted within the text have been approved by Owner's legal counsel Kopelman & Paige, P.C.

6.16 *Emergencies*

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

6.17 *Shop Drawings and Samples*

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

1. Shop Drawings:

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

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

2. Samples:

a. Submit number of Samples specified in the Specifications.

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

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

C. Submittal Procedures:

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

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

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

EJCDC C-700 Standard General Conditions of the Construction Contract
Copyright © 2007 National Society of Professional Engineers for EJCDC. All rights reserved.
Revisions highlighted within the text have been approved by Owner's legal counsel Kopelman & Paige, P.C.

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

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

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

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

D. Engineer's Review:

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

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

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

E. Resubmittal Procedures:

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

6.18 *Continuing the Work*

EJCDC C-700 Standard General Conditions of the Construction Contract
Copyright © 2007 National Society of Professional Engineers for EJCDC. All rights reserved.
Revisions highlighted within the text have been approved by Owner's legal counsel Kopelman & Paige, P.C.

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

6.19 *Contractor's General Warranty and Guarantee*

A. Contractor warrants and guarantees to Owner that all Work will be in accordance with the Contract Documents and in accordance with Subcontractor warranties, manufacturers and Suppliers warranties on equipment and material, and extended or special warranties and will not be defective for the correction period specified in 13.07. Owner and Engineer and their officers, directors, members, partners, employees, agents, consultants, and subcontractors shall be entitled to rely on representation of Contractor's warranty and guarantee.

1. Contractor shall obtain and preserve for the benefit of the Owner:

a. manufacturers' and Suppliers' written warranties and guarantees on equipment and material incorporated into the Work;

b. written warranties and guarantees from each Subcontractor engaged in the performance of the Work; and

2. extended or special warranties.

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

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

2. normal wear and tear under normal usage.

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

1. observations by Engineer;

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

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

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

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

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

EJCDC C-700 Standard General Conditions of the Construction Contract
Copyright © 2007 National Society of Professional Engineers for EJCDC. All rights reserved.
Revisions highlighted within the text have been approved by Owner's legal counsel Kopelman & Paige, P.C.

7. any correction of defective Work by Owner; or.

8. any acceptance by Owner or any failure to do so.

D. Contractor shall prepare and execute a written general warranty and guarantee applicable to the Work reflecting the provisions of this Paragraph 6.19, Article 13 and other applicable provisions of the Contract Documents pertaining to warranties and guarantees, Subcontractor, manufacturers and Supplier warranties and guarantees, and extended or special warranties and guarantees. Contractor shall submit this written general warranty and guarantee in accordance with Article 14 and the General Requirements.

E. Provision of any warranties or guarantees:

1. will not be effective to assign to Owner, or any of Owner'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 Paragraph 8.09; and

2. will not be effective to assign to Engineer, or any of 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 Paragraph 9.09.

F. The warranty and guarantee provisions of this Paragraph 6.19 shall be in addition to and not in limitation of any other warranties, guarantees or remedies allowed by Law or the Contract Documents.

6.20 *Indemnification*

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

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

EJCDC C-700 Standard General Conditions of the Construction Contract
Copyright © 2007 National Society of Professional Engineers for EJCDC. All rights reserved.
Revisions highlighted within the text have been approved by Owner's legal counsel Kopelman & Paige, P.C.

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

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

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

3. caused by the negligent acts, errors or omissions of any of them

6.21 *Delegation of Professional Design Services*

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

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

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

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

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

ARTICLE 7 – OTHER WORK AT THE SITE

7.01 *Related Work at Site*

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

EJCDC C-700 Standard General Conditions of the Construction Contract
Copyright © 2007 National Society of Professional Engineers for EJCDC. All rights reserved.
Revisions highlighted within the text have been approved by Owner's legal counsel Kopelman & Paige, P.C.

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

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

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

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

7.02 *Coordination*

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

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

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

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

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

7.03 *Legal Relationships*

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

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

EJCDC C-700 Standard General Conditions of the Construction Contract
Copyright © 2007 National Society of Professional Engineers for EJCDC. All rights reserved.
Revisions highlighted within the text have been approved by Owner's legal counsel Kopelman & Paige, P.C.

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

ARTICLE 8 – OWNER'S RESPONSIBILITIES

8.01 *Communications to Contractor*

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

8.02 *Replacement of Engineer*

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

8.03 *Furnish Data*

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

8.04 *Pay When Due*

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

8.05 *Lands and Easements; Reports and Tests*

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

8.06 *Insurance*

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

8.07 *Change Orders*

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

8.08 *Inspections, Tests, and Approvals*

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

8.09 *Limitations on Owner's Responsibilities*

EJCDC C-700 Standard General Conditions of the Construction Contract
Copyright © 2007 National Society of Professional Engineers for EJCDC. All rights reserved.
Revisions highlighted within the text have been approved by Owner's legal counsel Kopelman & Paige, P.C.

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

8.10 *Undisclosed Hazardous Environmental Condition*

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

8.11 *Evidence of Financial Arrangements*

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

8.12 *Compliance with Safety Program*

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

ARTICLE 9 – ENGINEER'S STATUS DURING CONSTRUCTION

9.01 *Owner's Representative*

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

9.02 *Visits to Site*

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

B. Engineer's visits and observations are subject to all the limitations on Engineer's authority and responsibility set forth in Paragraph 9.09. Particularly, but without limitation, during or as a result of Engineer's visits or observations of Contractor's Work, Engineer will not supervise, direct, control, or have authority over or be responsible for Contractor's means, methods,

EJCDC C-700 Standard General Conditions of the Construction Contract
Copyright © 2007 National Society of Professional Engineers for EJCDC. All rights reserved.
Revisions highlighted within the text have been approved by Owner's legal counsel Kopelman & Paige, P.C.

techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work. However, the Engineer shall have the right to direct the Contractor to perform the Work according to any sequence schedule set forth in the Contract Documents or established pursuant thereto.

9.03 *Project Representative*

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

9.04 *Authorized Variations in Work*

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

9.05 *Rejecting Defective Work*

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

9.06 *Shop Drawings, Change Orders and Payments*

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

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

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

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

EJCDC C-700 Standard General Conditions of the Construction Contract
Copyright © 2007 National Society of Professional Engineers for EJCDC. All rights reserved.
Revisions highlighted within the text have been approved by Owner's legal counsel Kopelman & Paige, P.C.

9.07 *Determinations for Unit Price Work*

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

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

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

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

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

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

9.09 *Limitations on Engineer's Authority and Responsibilities*

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

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

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

EJCDC C-700 Standard General Conditions of the Construction Contract
Copyright © 2007 National Society of Professional Engineers for EJCDC. All rights reserved.
Revisions highlighted within the text have been approved by Owner's legal counsel Kopelman & Paige, P.C.

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

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

9.10 *Compliance with Safety Program*

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

ARTICLE 10 – CHANGES IN THE WORK; CLAIMS

10.01 *Authorized Changes in the Work*

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

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

10.02 *Unauthorized Changes in the Work*

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

10.03 *Execution of Change Orders*

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

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

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

EJCDC C-700 Standard General Conditions of the Construction Contract
Copyright © 2007 National Society of Professional Engineers for EJCDC. All rights reserved.
Revisions highlighted within the text have been approved by Owner's legal counsel Kopelman & Paige, P.C.

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

10.04 *Notification to Surety*

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

10.05 *Claims*

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

B. *Notice:* Written notice stating the general nature of each Claim shall be delivered by the claimant to Engineer and the other party to the Contract promptly (but in no event later than 14 days) after the start of the event giving rise thereto. Failure to comply with this notice requirement shall constitute a waiver of the Claim. The responsibility to substantiate a Claim shall rest with the party making the Claim. Notice of the amount or extent of the Claim, with supporting data shall be delivered to the Engineer and the other party to the Contract within 30 days after the start of such event (unless Engineer allows additional time for claimant to submit additional or more accurate data in support of such Claim). A Claim for an adjustment in Contract Price shall be prepared in accordance with the provisions of Paragraph 12.01.B. A Claim for an adjustment in Contract Times shall be prepared in accordance with the provisions of Paragraph 12.02.B. Each Claim shall be accompanied by claimant's written statement that the adjustment claimed is the entire adjustment to which the claimant believes it is entitled as a result of said event. The opposing party shall submit any response to Engineer and the claimant within 30 days after receipt of the claimant's last submittal (unless Engineer allows additional time).

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

1. deny the Claim in whole or in part;

2. approve the Claim; or

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

EJCDC C-700 Standard General Conditions of the Construction Contract
Copyright © 2007 National Society of Professional Engineers for EJCDC. All rights reserved.
Revisions highlighted within the text have been approved by Owner's legal counsel Kopelman & Paige, P.C.

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

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

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

G. Contractor shall not have the right to stop performance of the Work pending resolution of a Claim.

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

11.01 *Cost of the Work*

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

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

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

EJCDC C-700 Standard General Conditions of the Construction Contract
Copyright © 2007 National Society of Professional Engineers for EJCDC. All rights reserved.
Revisions highlighted within the text have been approved by Owner's legal counsel Kopelman & Paige, P.C.

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

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

5. Supplemental costs including the following:

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

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

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

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

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

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

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

EJCDC C-700 Standard General Conditions of the Construction Contract
Copyright © 2007 National Society of Professional Engineers for EJCDC. All rights reserved.
Revisions highlighted within the text have been approved by Owner's legal counsel Kopelman & Paige, P.C.

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

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

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

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

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

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

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

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

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

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

11.02 *Allowances*

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

EJCDC C-700 Standard General Conditions of the Construction Contract
Copyright © 2007 National Society of Professional Engineers for EJCDC. All rights reserved.
Revisions highlighted within the text have been approved by Owner's legal counsel Kopelman & Paige, P.C.

B. Cash Allowances:

1. Contractor agrees that:

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

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

C. Contingency Allowance:

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

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

11.03 *Unit Price Work*

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

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

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

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

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

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

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

EJCDC C-700 Standard General Conditions of the Construction Contract
Copyright © 2007 National Society of Professional Engineers for EJCDC. All rights reserved.
Revisions highlighted within the text have been approved by Owner's legal counsel Kopelman & Paige, P.C.

12.01 *Change of Contract Price*

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

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

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

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

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

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

1. a mutually acceptable fixed fee; or

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

a. for costs incurred under Paragraphs 11.01.A.1 and 11.01.A.2, the Contractor's fee shall be 10 percent;

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

c. where one or more tiers of subcontracts are on the basis of Cost of the Work plus a fee and no fixed fee is agreed upon, the intent of Paragraphs 12.01.C.2.a and 12.01.C.2.b is that the Subcontractor who actually performs the Work, at whatever tier, will be paid a fee of 10 percent of the costs incurred by such Subcontractor under Paragraphs 11.01.A.1 and 11.01.A.2 and that any higher tier Subcontractor and Contractor will each be paid a fee of five percent of the amount paid to the next lower tier Subcontractor, provided, however, that on any subcontracted work the total maximum fee to be paid by Owner under this subparagraph shall be no greater than 27 percent of the costs incurred by the Subcontractor who actually performs the Work;

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

e. the amount of credit to be allowed by Contractor to Owner for any change which results in a net decrease in cost will be the amount of the actual net decrease in cost

EJCDC C-700 Standard General Conditions of the Construction Contract
Copyright © 2007 National Society of Professional Engineers for EJCDC. All rights reserved.
Revisions highlighted within the text have been approved by Owner's legal counsel Kopelman & Paige, P.C.

plus a deduction in Contractor's fee by an amount equal to five percent of such net decrease; and

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

12.02 *Change of Contract Times*

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

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

12.03 *Delays*

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

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

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

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

EJCDC C-700 Standard General Conditions of the Construction Contract
Copyright © 2007 National Society of Professional Engineers for EJCDC. All rights reserved.
Revisions highlighted within the text have been approved by Owner's legal counsel Kopelman & Paige, P.C.

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

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

13.01 *Notice of Defects*

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

13.02 *Access to Work*

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

13.03 *Tests and Inspections*

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

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

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

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

3. as otherwise specifically provided in the Contract Documents.

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

D. Except as provided in 13.03.B above and where responsibility for a specific inspection or test is expressly allocated to Owner in the Specifications or by Laws and Regulations, Contractor shall be responsible for arranging and obtaining and shall pay all costs in connection with any inspections, tests, or approvals required for Owner's and Engineer's acceptance of materials or equipment to be incorporated in the Work; or acceptance of materials, mix designs, or

EJCDC C-700 Standard General Conditions of the Construction Contract
Copyright © 2007 National Society of Professional Engineers for EJCDC. All rights reserved.
Revisions highlighted within the text have been approved by Owner's legal counsel Kopelman & Paige, P.C.

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

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

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

13.04 *Uncovering Work*

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

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

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

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

13.05 *Owner May Stop the Work*

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

13.06 *Correction or Removal of Defective Work*

EJCDC C-700 Standard General Conditions of the Construction Contract
Copyright © 2007 National Society of Professional Engineers for EJCDC. All rights reserved.
Revisions highlighted within the text have been approved by Owner's legal counsel Kopelman & Paige, P.C.

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

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

13.07 *Correction Period*

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

1. repair such defective land or areas; or

2. correct such defective Work; or

3. if the defective Work has been rejected by Owner, remove it from the Project and replace it with Work that is not defective, and

4. satisfactorily correct or repair or remove and replace any damage to other Work, to the work of others or other land or areas resulting therefrom.

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

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

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

EJCDC C-700 Standard General Conditions of the Construction Contract
Copyright © 2007 National Society of Professional Engineers for EJCDC. All rights reserved.
Revisions highlighted within the text have been approved by Owner's legal counsel Kopelman & Paige, P.C.

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

13.08 *Acceptance of Defective Work*

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

13.09 *Owner May Correct Defective Work*

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

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

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

EJCDC C-700 Standard General Conditions of the Construction Contract
Copyright © 2007 National Society of Professional Engineers for EJCDC. All rights reserved.
Revisions highlighted within the text have been approved by Owner's legal counsel Kopelman & Paige, P.C.

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

ARTICLE 14 – PAYMENTS TO CONTRACTOR AND COMPLETION

14.01 *Schedule of Values*

A. The Schedule of Values established as provided in Paragraph 2.07.A will serve as the basis for progress payments and will be incorporated into a form of Application for Payment acceptable to Engineer. Progress payments on account of Unit Price Work will be based on the number of units completed.

14.02 *Progress Payments*

A. Applications for Payments:

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

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

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

B. Review of Applications:

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

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

EJCDC C-700 Standard General Conditions of the Construction Contract
Copyright © 2007 National Society of Professional Engineers for EJCDC. All rights reserved.
Revisions highlighted within the text have been approved by Owner's legal counsel Kopelman & Paige, P.C.

a. the Work has progressed to the point indicated;

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

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

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

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

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

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

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

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

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

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

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

5. Engineer may refuse to recommend the whole or any part of any payment if, in Engineer's opinion, it would be incorrect to make the representations to Owner stated in Paragraph 14.02.B.2. Engineer may also refuse to recommend any such payment or, because of subsequently discovered evidence or the results of subsequent inspections or tests, revise or revoke any such payment recommendation previously made, to such extent as may be necessary in Engineer's opinion to protect Owner from loss because:

a. the Work is defective, or completed Work has been damaged, requiring correction or replacement;

b. the Contract Price has been reduced by Change Orders;

EJCDC C-700 Standard General Conditions of the Construction Contract
Copyright © 2007 National Society of Professional Engineers for EJCDC. All rights reserved.
Revisions highlighted within the text have been approved by Owner's legal counsel Kopelman & Paige, P.C.

c. Owner has been required to correct defective Work or complete Work in accordance with Paragraph 13.09; or

d. Engineer has actual knowledge of the occurrence of any of the events enumerated in Paragraph 15.02.A.

C. Payment Becomes Due:

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

D. Reduction in Payment:

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

a. claims have been made against Owner on account of Contractor's performance or furnishing of the Work;

b. Liens have been filed in connection with the Work, except where Contractor has delivered a specific bond satisfactory to Owner to secure the satisfaction and discharge of such Liens and provides an indemnity satisfactory to Owner for all claims, costs, losses and damages arising out of such Liens;

c. there are other items entitling Owner to a set-off against the amount recommended including liability for liquidated damages and correction of defective work by Owner or others; or

d. Owner has actual knowledge of the occurrence of any of the events enumerated in Paragraphs 14.02.B.5.a through 14.02.B.5.c or Paragraph 15.02.A.

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

3. Upon a subsequent determination that Owner's refusal of payment was not justified, the amount wrongfully withheld shall be treated as an amount due as determined by Paragraph 14.02.C.1 and subject to interest as provided in the Agreement.

14.03 *Contractor's Warranty of Title*

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

14.04 *Substantial Completion*

EJCDC C-700 Standard General Conditions of the Construction Contract
Copyright © 2007 National Society of Professional Engineers for EJCDC. All rights reserved.
Revisions highlighted within the text have been approved by Owner's legal counsel Kopelman & Paige, P.C.

A. When Contractor considers the entire Work ready for its intended use and final testing has been completed in accordance with the General Requirements, Contractor shall notify Owner and Engineer in writing that the entire Work is substantially complete (except for items specifically listed by Contractor in the punch list as incomplete) using the Notice of Substantial Completion form included in the Contract Documents, submit the Contractor's written general warranty and guarantee per Paragraph 6.19.D., and request that Engineer issue a certificate of Substantial Completion.

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

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

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

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

14.05 *Partial Utilization*

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

1. Owner at any time may request Contractor in writing to permit Owner to use or occupy any such part of the Work which Owner believes to be ready for its intended use and substantially

EJCDC C-700 Standard General Conditions of the Construction Contract
Copyright © 2007 National Society of Professional Engineers for EJCDC. All rights reserved.
Revisions highlighted within the text have been approved by Owner's legal counsel Kopelman & Paige, P.C.

complete. If and when Contractor agrees that such part of the Work is substantially complete, Contractor, Owner, and Engineer will follow the procedures of Paragraph 14.04.A through D for that part of the Work.

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

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

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

14.06 *Final Inspection*

A. Upon written notice from Contractor that the entire Work or an agreed portion thereof is complete, Engineer will promptly make a final inspection with Owner and Contractor and will notify Contractor in writing of all particulars in which this inspection reveals that the Work is incomplete or defective. Contractor shall immediately take such measures as are necessary to complete such Work or remedy such deficiencies.

14.07 *Final Payment*

A. Application for Payment:

1. After Contractor has, in the opinion of Engineer, satisfactorily completed all corrections identified during the final inspection and has delivered, in accordance with the Contract Documents, all maintenance and operating instructions, schedules, guarantees, warranties, updated Contractor's written general warranty and guarantee per Paragraph 6.19.D if modified, bonds, certificates or other evidence of insurance, certificates of inspection, marked-up record documents (as provided in Paragraph 6.12), and other documents, and Engineer has indicated that the Work is acceptable (subject to the provisions of Paragraph 14.09), Contractor may make application for final payment following the procedure for progress payments.

2. The final Application for Payment shall be accompanied (except as previously delivered) by: all documentation called for in the Contract Documents, including but not limited to the evidence of insurance required by Paragraph 5.04.B.6;

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

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

EJCDC C-700 Standard General Conditions of the Construction Contract
Copyright © 2007 National Society of Professional Engineers for EJCDC. All rights reserved.
Revisions highlighted within the text have been approved by Owner's legal counsel Kopelman & Paige, P.C.

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

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

B. Engineer's Review of Application and Acceptance:

1. If, on the basis of Engineer's observation of the Work during construction and final inspection, and Engineer's review of the final Application for Payment and accompanying documentation as required by the Contract Documents, Engineer is satisfied that the Work has been completed and Contractor's other obligations under the Contract Documents have been fulfilled, Engineer will, within ten days after receipt of the final Application for Payment, indicate in writing Engineer's recommendation of payment and present the Application for Payment to Owner for payment. At the same time Engineer will also give written notice to Owner and Contractor that the Work is acceptable using the Certificate of Completion form included in the Contract Documents, subject to the provisions of Paragraph 14.09. Otherwise, Engineer will return the Application for Payment to Contractor, indicating in writing the reasons for refusing to recommend final payment, in which case Contractor shall make the necessary corrections and resubmit the Application for Payment.

C. Payment Becomes Due:

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

14.08 *Final Completion Delayed*

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

14.09 *Waiver of Claims*

EJCDC C-700 Standard General Conditions of the Construction Contract
Copyright © 2007 National Society of Professional Engineers for EJCDC. All rights reserved.
Revisions highlighted within the text have been approved by Owner's legal counsel Kopelman & Paige, P.C.

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

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

2. a waiver of all Claims by Contractor against Owner other than those previously made in accordance with the requirements herein and expressly acknowledged by Owner in writing as still unsettled.

ARTICLE 15 – SUSPENSION OF WORK AND TERMINATION

15.01 *Owner May Suspend Work*

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

15.02 *Owner May Terminate for Cause*

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

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

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

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

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

5. Contractor commences a voluntary case under any chapter of the Bankruptcy Code (Title 11, United States Code), as now or hereafter in effect, or if Contractor takes any equivalent or similar action by filing a petition or otherwise under any Laws and Regulations in effect at such time relating to the bankruptcy or insolvency; or

6. a petition is filed against Contractor under any chapter of the Bankruptcy Code as now or hereafter in effect at the time of filing, or if a petition is filed seeking any such equivalent or similar relief against Contractor under any Laws and Regulations in effect at the time relating to bankruptcy or insolvency; or

7. Contractor makes a general assignment for the benefit of creditors; or

EJCDC C-700 Standard General Conditions of the Construction Contract
Copyright © 2007 National Society of Professional Engineers for EJCDC. All rights reserved.
Revisions highlighted within the text have been approved by Owner's legal counsel Kopelman & Paige, P.C.

8. a trustee, receiver, custodian or agent of Contractor is appointed under applicable law or under contract, whose appointment or authority to take charge of property of Contractor is for the purpose of enforcing a Lien against such property or for the purpose of general administration of such property for the benefit of Contractor's creditors; or

9. Contractor admits in writing its inability to pay its debts generally as they become due.

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

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

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

3. complete the Work as Owner may deem expedient.

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

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

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

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

15.03 *Owner May Terminate For Convenience*

EJCDC C-700 Standard General Conditions of the Construction Contract
Copyright © 2007 National Society of Professional Engineers for EJCDC. All rights reserved.
Revisions highlighted within the text have been approved by Owner's legal counsel Kopelman & Paige, P.C.

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

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

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

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

4. reasonable expenses directly attributable to termination.

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

15.04 *Contractor May Stop Work or Terminate*

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

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

ARTICLE 16 – DISPUTE RESOLUTION

16.01 *Methods and Procedures*

A. Either Owner or Contractor may request mediation of any Claim submitted to Engineer for a decision under Paragraph 10.05 before such decision becomes final and binding. The mediation will be governed by the Construction Industry Mediation Rules of the American Arbitration Association in effect as of the Effective Date of the Agreement. The request for mediation shall

EJCDC C-700 Standard General Conditions of the Construction Contract
Copyright © 2007 National Society of Professional Engineers for EJCDC. All rights reserved.
Revisions highlighted within the text have been approved by Owner's legal counsel Kopelman & Paige, P.C.

be submitted in writing to the American Arbitration Association and the other party to the Contract. Timely submission of the request shall stay the effect of Paragraph 10.05.E.

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

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

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

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

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

ARTICLE 17 – MISCELLANEOUS

17.01 *Giving Notice*

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

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

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

17.02 *Computation of Times*

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

17.03 *Cumulative Remedies*

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

17.04 *Survival of Obligations*

EJCDC C-700 Standard General Conditions of the Construction Contract
Copyright © 2007 National Society of Professional Engineers for EJCDC. All rights reserved.
Revisions highlighted within the text have been approved by Owner's legal counsel Kopelman & Paige, P.C.

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

17.05 *Controlling Law*

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

17.06 *Headings*

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

END OF SECTION

EJCDC C-700 Standard General Conditions of the Construction Contract
Copyright © 2007 National Society of Professional Engineers for EJCDC. All rights reserved.
Revisions highlighted within the text have been approved by Owner's legal counsel Kopelman & Paige, P.C.

SECTION 00800

PROJECT SPECIFIC REQUIREMENTS

GENERAL

The address system used herein is the same as the address system used in the General Conditions, with the prefix "SC" added thereto. Additional terms used in this Section have the meanings stated below, which are applicable to both the singular and plural thereof.

This Section may include certain provisions required by Laws and Regulations, but does not represent or reflect all applicable provisions and policies or Laws and Regulations, and may only include excerpts and portions thereof. Other required provisions and policies, and Laws and Regulations, shall be deemed to be so included and incorporated herein. Contractor is solely responsible to determine, obtain, review and interpret the full text of applicable provisions and policies, Regulations, and Laws.

SC-1.01 *Defined Terms*

Add the following to A.15 *Contractor*:

> Also referred to as "General Contractor" or "general Contractor" in applicable statutory provisions which may be used interchangeably and shall have the same meaning.

Add the following to A.29. *Owner*:

> Also referred to as "Awarding Authority", "awarding authority", "Contracting Authority" or "contracting authority" in applicable statutory provisions which may be used interchangeably and shall have the same meaning.

Add the following new definitions to Paragraph 1.01.B.

6. *material or Material* -- shall include "any article, assembly, system, included in the Work, or any component part thereof" regarding items equal to those specified in accordance with statutory requirements.

SC- 2.01 *Delivery of Bonds and Evidence of Insurance*

Replace Paragraph 2.01.B. with the following:

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

SC-2.03 *Commencement of Contract Times; Notice to Proceed*

In Paragraph 2.03.A., delete the last sentence in its entirety.

SC-3.02 ***Reference Standards***

In subparagraph 3.02.A.1., replace the phrase "in effect at the time of opening of Bids (or on the Effective Date of the Agreement if there were no Bids)," with:

"in effect and applicable at the time in question,"

SC 4.01 ***Availability of Lands***

In Paragraph 4.01.A., delete the last sentence in its entirety.
Delete Paragraph 4.01.B. in its entirety.

SC-4.02 ***Subsurface and Physical Conditions***

Pursuant to Paragraph 4.02.A.,

3. The following reports of explorations and tests of subsurface conditions in the vicinity of the Site are known to Owner:

   a. Report dated December 2020 prepared by Environmental Partners Group, Inc. for the Town of Nantucket, entitled "Geotechnical Memorandum."

      The "technical data" contained in such report upon which Contractor may rely shall be limited to facts, measurements, field observations, boring logs, soil type and similar data. "Technical data" shall not include opinions regarding suitability of material, dewatering methodologies, soil stability, slope stabilization methods and other opinions or professional judgments.

4. The following drawings of physical conditions relating to existing surface or subsurface structures at the Site (except Underground Facilities) are known to Owner:

   NONE

5. The reports identified above are not part of the Contract Documents, but the "technical data" contained therein upon which Contractor may rely, as expressly identified and established above, are incorporated in the Contract Documents by reference and may be reflected in the Drawings. Contractor is not entitled to rely upon any other information and data known to or identified by Owner or Engineer.

6. Copies of reports identified above are included as an attachment to these Specifications under Appendix A.

SC-4.03 ***Differing Subsurface or Physical Conditions***

Delete subparagraph 4.03.C.3. in its entirety.

SC-4.04 ***Underground Facilities***

In subparagraph 4.04.B.2., delete the last sentence in its entirety.

SC 4.05 ***Reference Points***

Pursuant to Paragraph 4.05.A., surveys exist for the Project and are reflected on the Drawings.

SC-4.06 ***Hazardous Environmental Conditions at Site***

Pursuant to Paragraph 4.06.A.,

1. The following reports regarding Hazardous Environmental Conditions at the Site are known to Owner:

    a. NONE

2. The following drawings regarding Hazardous Environmental Conditions at the Site are known to Owner:

    a. NONE

In Paragraph 4.06.D., delete the last sentence in its entirety.

In Paragraph 4.06.E., delete the last sentence in its entirety.
In Paragraph 4.06.F., delete the second sentence in its entirety.
In Paragraph 4.06.G., replace the language in its entirety with "(Not used)".
In Paragraph 4.06.H., delete the last sentence in its entirety.

SC-5.03 ***Certificates of Insurance***
In Paragraph 5.03.B., replace the language in its entirety with "(Not used)".

SC-5.04 ***Contractor's Insurance***
In subparagraph 5.04.B.1., line 1, replace "5.04.A.6 inclusive" with "5.04.A.7 inclusive".

In subparagraph 5.04.B.4. line 2, delete the words "materially changed" per Massachusetts insurance Laws.

Replace Paragraph 5.04.B.6., in its entirety with the following:

6. include products and completed operations coverage:

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

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

In Paragraph 5.04.B., add the following new subparagraph.

7. All coverage shall be written on an occurrence basis.

In Paragraph 5.04.C.1, replace "Employer's Liability 1,000,000" with the following.

Employer's Liablity:

$1,000,000 Bodily Injury by Accident
$1,000,000 Bodily Injury by Disease – policy limit
$1,000,000 Bodily Injury by Disease – each employee

In Paragraph 5.04.C.2,.

Insert the following as the third bullet item.

- Premises-Operations

Insert the following at the end of Excess or Umbrella Liability.

and $5,000,000 products and completed operations aggregate. Coverage shall be excess to the Contractor's General Liability, Auto Liability, and Employers Liability coverages.

In Paragraph 5.04.C.3. after "property damage, insert "each accident".

SC-5.06 ***Property Insurance***

In Paragraph C. line 3, delete the words "or materially changed" per Massachusetts insurance Laws.

Replace Paragraph 5.06.D. in its entirety, with the following.

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

SC-5.07 ***Waiver of Rights***

In Paragraph 5.07.A., delete the second, third, and fourth sentences in their entirety.
Delete Paragraphs 5.07.B. and 5.07.C. in their entirety.

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

At the end of the Article heading, insert "(Not Used)" and delete Paragraph 5.09.A. in its entirety.

SC-5.10 ***Partial Utilization, Acknowledgment of Property Insurer***

In the Article heading, delete the words "Acknowledgment of Property Insurer", and replace Paragraph 5.10.A. in its entirety with the following.

A. Owner may occupy or use a portion of the Work prior to Substantial Completion.

SC-6.02 ***Labor; Working Hours***

Pursuant to Paragraph 6.02.B., regular working hours for this Project are defined in Section 01063 1.7.A.

SC-6.05 ***Substitutes and "Or-Equals"***

In Paragraph 6.05.A., add the following language at the end of the Paragraph.

", and in accordance with MGL Chapter 30, Section 39M (b)"

SC-6.06 ***Concerning Subcontractors, Suppliers, and Others***

In Paragraph 6.06.F., add the following language at the beginning of the Paragraph.

"Except as required by and indicated in the Specifications and Contract Documents pursuant to MGL Chapter 149, Section 44F (if applicable to the Project),"

SC-6.07 ***Patent Fees and Royalties***

In Paragraph 6.07.A., delete the second sentence in its entirety.
In Paragraph 6.07.B., replace the language in its entirety with "(Not used)".

SC-6.08 ***Permits***

Pursuant to subparagraph 6.08.A.1, Owner has not obtained any permits for the Project.

SC-6.09 ***Laws and Regulations***

Pursuant to Paragraph 6.09, the Contractor shall comply with additional requirements included in Section 00 73 73 and 00 73 76.

In Paragraph 6.09.C., delete the last sentence in its entirety.

SC-6.10 ***Taxes***

Add the following new Paragraph after Paragraph 6.10.A.

B. Owner is exempt from payment of Commonwealth of Massachusetts sales taxes on building materials and supplies to be used in the Work.

1. The words "building materials and supplies" shall include all materials and supplies consumed, employed or expended in the construction, reconstruction, alteration, remodeling or repair of any building, structure, public highway, bridge, or other such public work, as well as such materials and supplies physically incorporated therein. Said words shall also include rental charges for construction vehicles, equipment and machinery rented specifically for use on the Project Site, or while being used exclusively for the transportation of materials for the Project.

2. Owner will furnish the required certificates of tax exemption to Contractor for use in the purchases of building materials and supplies.

SC-6.13 ***Safety and Protection***

Add the following immediately after Paragraph 6.13.B.

1. Contractor shall comply with the following minimum requirements and is solely responsible to determine, obtain, review and interpret the full text of applicable Laws and Regulations.

    - Code of Federal Regulations, Chapter XVII-Occupational Safety and Health Administration (OSHA), Department of Labor, Title 29, Part 1926, Safety and Health Regulations for Construction
    - Hazard Communication Standard 1910.1200 regulated by OSHA, including providing and maintaining Safety Data Sheets, labeling of hazardous substances, and providing required protective equipment and training and instruction to personnel on the Site including Owner and Engineer's personnel
    - OSHA General Industry 1910.146: Permit Required Confined Space Entry
    - ANSI/ASSE A10 series of safety construction standards including the "Manual of Accident Prevention In Construction" published by The Associated General Contractors of America
    - AASHTO Guide on Occupational Safety on Highway Construction Projects, Subpart N, 1926.550, relating to protection of personnel and equipment under electric lines and construction equipment clearances at overhead electric lines especially during operations using large vehicles

2. Pursuant to *MGL Chapter 30, Section 39S*, all employees to be employed at the Work Site will have successfully completed a course in construction safety and health approved by the United States Occupational Safety and Health Administration that is at least 10 hours in duration at the time the employee begins Work, and who shall furnish documentation of successful completion of said course with the first certified payroll report for each employee. Any employee found on a Work Site subject to this section without documentation of successful completion of a course in construction safety and health approved by the United States Occupational Safety and Health Administration that is at least 10 hours in duration shall be subject to immediate removal.

3. This Project is also subject to the following.

    - MGL Chapter 82, *The Laying Out, Alteration, Relocation and Discontinuance Of Public Ways, And Specific Repairs Thereon*, *Section 40*
      Section 40 Definitions
      Section 40A Excavations; notice
      Section 40B Designation of location of underground facilities
      Section 40C Excavator's responsibility to maintain designation markings; damage caused by excavator
      Section 40D Local laws requiring excavation permits; public ways
    - MGL Chapter 82A, *Excavation and Trench Safety*
      Section 1 Unattended open trenches; safety hazards; rules and regulations; fines
      Section 2 Trench excavating permits; permits issued by board or officer; certificate of insurance; fees

Section 3 Form of trench excavation permits; required statements
Section 4 Definitions
Section 5 Additional requirements

- MGL Chapter 149
  Section 6C Health and safety of general public and asbestos workers; rules and regulations
  Section 18A Sanitary and safety conditions; tools
  Section 18B Confined spaces; ventilation
  Section 18C Power transmission equipment
  Section 18D Ropes, hooks and cranes; use and operation
  Section 18E Safety precautions in dangerous undertakings
  Section 18G Industrial truck and internal combustion equipment
  Section 129A Shoring Trenches for local governments
- Massachusetts Department of Labor and Industries, Division of Occupational Safety (Chapter 454 CMR 10.00 et seq.)
- Massachusetts Department of Public Safety "*Excavation and Trench Safety*" (Chapter 520 CMR 14.00 et seq.)

In Paragraph 6.13.E., fourth sentence, insert a period after the word "Contractor" and delete the remaining language in parenthesis in its entirety.

SC-7.01 ***Related Work at Site***

In subparagraph 7.01.A.1., delete the word "and" and insert a period. Delete subparagraph 7.01.A.2. in its entirety.

Pursuant to Paragraph 7.01, Owner has not and does not intend to separately contract for other work on the Project at the Site.

In subparagraph 7.01, Add the following paragraph.

D. In additions to the shared use of the site indicated in Article 7.01.A, the Owner's Representatives, Wastewater Operators, and the designee shall have UNRESTRICTED ACCESS to the Site at any time to be able to perform daily duties, inspections, and any other work deemed necessary to maintain pump station operations.

SC-7.02 ***Coordination***

At the end of the Article heading, insert "(Not Used)" and delete Paragraphs 7.02.A. and 7.02.B. in their entirety.

SC-8.07 ***Change Orders***

At the end of the Article heading, insert "(Not Used)" and delete Paragraph 8.07.A. in its entirety.

SC-9.03 ***Project Representative***

In Paragraph 9.03.A., delete the last sentence in its entirety.

Add the following new Paragraph.

B. The Resident Project Representative (RPR) will be Engineer's employee or agent at the Site, will act as directed by and under the supervision of Engineer, and will confer with Engineer regarding RPR's actions. RPR's dealings in matters pertaining to the Work in general shall be with Engineer and Contractor. RPR's dealings with Subcontractors shall be through or with the full knowledge and approval of Contractor. The RPR shall:

1. *Schedules:* Review the Progress Schedule, schedule of Shop Drawing and Samples submittals, and Schedule of Values prepared by Contractor and consult with Engineer concerning acceptability.

2. *Conferences and Meetings:* Attend meetings with Contractor, such as preconstruction conferences, progress meetings, job conferences and other Project-related meetings, and prepare and circulate copies of minutes thereof.

3. *Liaison*:

   a. Serve as Engineer's liaison with Contractor, working principally through Contractor's authorized representative, to assist in providing information regarding the intent of the Contract Documents.

   b. Assist Engineer in serving as Owner's liaison with Contractor when Contractor's operations affect Owner's on-Site operations.

   c. Assist in obtaining from Owner additional details or information, when required for proper execution of the Work.

4. *Interpretation of Contract Documents:* Report to Engineer when clarifications and interpretations of the Contract Documents are needed and transmit to Contractor clarifications and interpretations as issued by Engineer.

5. *Shop Drawings and Samples:*

   a. Record date of receipt of Samples and approved Shop Drawings.

   b. Receive Samples which are furnished at the Site by Contractor, and notify Engineer of availability of Samples for examination.

6. *Modifications*:

   a. Consider and evaluate Contractor's suggestions for modifications in Drawings or Specifications and report such suggestions, together with RPR's recommendations, to Engineer.

   b. Transmit to Contractor in writing, decisions as issued by Engineer.

7. *Review of Work and Rejection of Defective Work:*

   a. Conduct on-Site observations of Contractor's Work in progress to assist Engineer in determining if the Work is in general proceeding in accordance with the Contract Documents.

   b. Report to Engineer whenever RPR believes that any part of Contractor's Work in progress will not produce a completed Project that conforms generally to the Contract Documents or will imperil the integrity of the design concept of the completed Project as a functioning whole as indicated in the Contract Documents, or has been damaged,

or does not meet the requirements of any inspection, test or approval required to be made; and advise Engineer of that part of Work in progress that RPR believes should be corrected or rejected or should be uncovered for observation, or requires special testing, inspection or approval.

8. *Inspections, Tests, and System Startups*:

   a. Verify that tests, equipment, and systems start-ups and operating and maintenance training are conducted in the presence of appropriate Owner's personnel, and that Contractor maintains adequate records thereof.

   b. Observe, record, and report to Engineer appropriate details relative to the test procedures and systems start-ups.

9. *Records:*

   a. Record names, addresses, fax numbers, e-mail addresses, web site locations, and telephone numbers of Contractor, Subcontractors, and major Suppliers.

   b. Maintain records for use in preparing Project documentation.

10. *Reports:*

    a. Furnish periodic reports to Engineer as required of progress of the Work and of Contractor's compliance with the Progress Schedule and schedule of Shop Drawing and Sample submittals.

    b. Draft and recommend to Engineer proposed Change Orders, Work Change Directives, and Field Orders. Obtain backup material from Contractor.

    c. Immediately notify Engineer of the occurrence of any Site accidents, emergencies, acts of God endangering the Work, damage to property by fire or other causes, or the discovery of any Hazardous Environmental Condition or conditions that may impede the compliant operation of existing facilities on Site.

11. *Payment Requests:* Review Applications for Payment with Contractor for compliance with the established procedure for their submission and forward with recommendations to Engineer, noting particularly the relationship of the payment requested to the Schedule of Values, Work completed, and materials and equipment delivered at the Site but not incorporated in the Work.

12. *Certificates, Operation and Maintenance Manuals:* During the course of the Work, verify that materials and equipment certificates, operation and maintenance manuals and other data required by the Specifications to be assembled and furnished by Contractor are applicable to the items actually installed and in accordance with the Contract Documents, and have these documents delivered to Engineer for review and forwarding to Owner prior to payment for that part of the Work.

13. *Completion:*

a. Participate in a Substantial Completion inspection, assist in the determination of Substantial Completion and the preparation of the Punch List (lists of items to be completed or corrected).

b. Participate in a final inspection in the company of Engineer, Owner, and Contractor and prepare a final Punch List (list of items to be completed and deficiencies to be remedied).

c. Observe whether all items on the final Punch List have been completed or corrected and make recommendations to Engineer concerning acceptance and issuance of the Notice of Acceptability of the Work.

C. The RPR shall not:

1. Authorize any deviation from the Contract Documents or substitution of materials or equipment, including "or-equal" items.

2. Exceed limitations of Engineer's authority as set forth in the Contract Documents.

3. Undertake any of the responsibilities of Contractor, Subcontractors, Suppliers, or Contractor's superintendent.

4. Advise on, issue directions relative to, or assume control over any aspect of the means, methods, techniques, sequences or procedures of Contractor's Work unless such advice or directions are specifically required by the Contract Documents.

5. Advise on, issue directions regarding, or assume control over safety practices, precautions, and programs in connection with the activities or operations of Owner or Contractor.

6. Participate in specialized field or laboratory tests or inspections conducted off-Site by others except as specifically authorized by Engineer.

7. Accept Shop Drawing or Sample submittals from anyone other than Contractor.

8. Authorize Owner to occupy the Project in whole or in part or determine operational protocol that may affect the compliant operation of existing facilities.

SC-9.04 ***Authorized Variations in Work***

In Paragraph 9.04.A, delete the last sentence in its entirety.

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

In Paragraph 9.08.C., insert a period after the word "Contractor" and delete the remaining language in its entirety.

SC-10.03 ***Execution of Change Orders***

At the end of subparagraph 10.03.A.1., insert the word "and".

At the end of subparagraph 10.03.A.2., delete the word “and”.
Delete subparagraph 10.03.A.3. in its entirety.

SC-11.01 ***Cost of the Work***

In subparagraph 11.01.A.5., item a., replace the language in its entirety with “(Not used)”and in item b., replace the language in its entirety with “(Not used)”.
Delete items d, e, f, g, and h in their entirety.

SC-11.02 ***Allowances***

At the end of the Article heading, insert “(Not Used)” and delete Paragraphs 11.02.A., B., C., and D. in their entirety.

SC-12.03 ***Delays***

In Paragraph 12.03.B., replace the language in its entirety with “(Not used)”. Add the following new Paragraph 12.03.F.

F. In the event of delays caused by or within the control of the Owner, the Contractor’s sole remedy shall be an extension of Contract Times. Notwithstanding anything to the contrary in the Contract Documents, Contractor shall not be eligible for any increase in the Contract Price on account of any delay in the Work, no matter by whom such delay is caused, and Contractor shall make no Claim for such an increase, whether such Claim is styled as a Claim for delay damages, acceleration of Work, loss of production, or otherwise, except as provided by MGL Chapter 30, Section 39O in the case of certain written orders by the Owner.

SC-13.01 ***Notice of Defects***

In Paragraph 13.01.A., replace “Prompt notice” with “Notice”.

SC-13.04 ***Uncovering Work***

Delete Paragraph 13.04.D. in its entirety.

SC-13.08 ***Acceptance of Defective Work***

In Paragraph 13.08.A., delete the last sentence in its entirety.

SC-13.09 ***Owner May Correct Defective Work***

In Paragraph 13.09.C., delete the second sentence in its entirety.

SC-14.02 ***Progress Payments***

In subparagraph 14.02.A.1, replace the first phrase (“At least. . . once a month),”) with the following.

“On a monthly basis and in accordance with MGL Chapter 30, Section 39G or Section 39K as applicable,”

Replace subparagraph 14.02.A.3 in its entirety with the following.

3. Retainage shall be in accordance with MGL Chapter 30, Section 39G or Section 39K as applicable.

Replace Paragraph 14.02.C. in its entirety with the following.

C. Payment shall be made in accordance with MGL Chapter 30, Section 39G or Section 39K as applicable.

In subparagraph 14.02.D.2., delete the word "immediate" in line 2 and delete the word "promptly" in line 3.

Delete subparagraph 14.02.D.3. in its entirety.

SC-14.04 ***Substantial Completion***

In Paragraph 14.04.C.,
Third sentence, replace the words "shall have seven days after receipt of" with "shall review" and replace "during which to" with "and".
Fourth sentence, delete the words "within 14 days after submission of the tentative certificate to Owner," in their entirety.
Fifth sentence, delete the words "within said 14 days," in their entirety.

SC-14.05 ***Partial Utilization***

At the end of Paragraph 14.05.A, delete the words ", subject to the following conditions:".
In subparagraph 14.05.A.1., replace the language in its entirety with "(Not used)".
In subparagraph 14.05.A.2., replace the language in its entirety with "(Not used)".
In subparagraph 14.05.A.3., delete the words "Within a reasonable time after either such request," in their entirety.

SC-14.07 ***Final Payment***

Pursuant to Paragraph 14.07.A.2.a., documentation shall include Certificate(s) of Occupancy required for building(s).

In subparagraph 14.07.B.1., line 5, delete the words "within ten days after receipt of the final Application for Payment,".

Replace subparagraph 14.07.C.1. in its entirety with the following.

9. Final payment shall be made in accordance with MGL Chapter 30, Section 39G or Section 39K as applicable.

SC-14.09 ***Waiver of Claims***

In subparagraph 14.09.A.1., replace the language in its entirety with "(Not used)".

SC-15.01 ***Owner May Suspend Work***

Replace Paragraph 15.01.A in its entirety with the following.

A. Owner may suspend the Work or any portion thereof in accordance with MGL Chapter 30, Section 39O.

SC-15.03 ***Owner May Terminate For Convenience***

In subparagraph 15.03.A.1., replace "including fair and reasonable sums for overhead and profit on such Work" with the word "and".

In subparagraph 15.03.A.2., insert a period after the word "Work", and delete the words "plus fair and reasonable sums for overhead and profit on such expenses" in their entirety.

Delete subparagraphs 15.03.A.3. and 15.03.A.4. in their entirety.

SC-15.04 ***Contractor May Stop Work or Terminate***

In Paragraph 15.04.B., delete the last sentence in its entirety.

SC-16 DISPUTE RESOLUTION

After the Article heading, insert the words "(Not Used)".

Delete Paragraph 16.01 in its entirety.

END OF SECTION

SECTION 00820

SPECIAL CONDITIONS –
FEDERAL AND STATE WAGE RATE SCHEDULES

1.01 MINIMUM WAGE RATES

101.1 Minimum Wage Rates as determined by the Commissioner of Department of Workforce Development under the provision of the Massachusetts General Laws, Chapter 149, Sections 26 to 27D, as amended, apply to this project. It is the responsibility of the contractor, before bid opening, to request if necessary, any additional information on Minimum Wage Rates for those trades people who may be employed for the proposed work under this contract. Federal Minimum Wage Rates as determined by the United States Department of Labor under the Davis-Bacon Act also apply to this project.

101.2 Required contract language for projects in the 2016 Intended Use Plan is included following this page.

101.03 The Federal and State Wage Rate Schedules follow at the end of this section.

Attachment A
Davis Bacon Act Requirements

All construction projects are subject to the Davis Bacon wage rate requirements and must include the appropriate sections of the following document in its entirety in the contract documents.

The vast majority of SRF projects will be bid by Governmental Entities (i.e., Cities, Towns, Authorities, Water Districts, Wastewater Districts). These projects must include the following language in construction contracts:

I.3. Contract and Subcontract Provisions
I.4. Contract Provisions for Contracts in Excess of $100,000 (if applicable)
I.5. Compliance Verification

This language may be found on pages DB-3-DB-11.

In certain cases, SRF projects may be bid by non-Governmental Entities (i.e., private water companies, private PWSs, etc.). These projects must include the following language in construction contracts:

II.3. Contract and Subcontract Provisions
II.4. Contract Provisions for Contracts in Excess of $100,000 (if applicable)
II.5. Compliance Verification

This language may be found on pages DB-11-DB-21

Preamble

With respect to the Clean Water and Safe Drinking Water State revolving Funds, EPA provides capitalization grants to each State which in turn provides subgrants or loans to eligible entities within the State. Typically, the subrecipients are municipal or other local governmental entities that manage the funds. For these types of recipients, the provisions set forth under Roman Numeral I, below, shall apply. Although EPA and the State remain responsible for ensuring subrecipients' compliance with the wage rate requirements set forth herein, those subrecipients shall have the primary responsibility to maintain payroll records as described in Section 3(ii)(A), below and for compliance as described in Section I-5.

Occasionally, the subrecipient may be a private for profit or not for profit entity. For these types of recipients, the provisions set forth in Roman Numeral II, below, shall apply. Although EPA and the State remain responsible for ensuring subrecipients' compliance with the wage rate requirements set forth herein, those subrecipients shall have the primary responsibility to maintain payroll records as described in Section II-3(ii)(A), below and for

compliance as described in Section II-5.

I. Requirements For Subrecipients That Are Governmental Entities

The following terms and conditions specify how recipients will assist EPA in meeting its Davis-Bacon (DB) responsibilities when DB applies to EPA awards of financial assistance with respect to State recipients and subrecipients that are governmental entities. If a subrecipient has questions regarding when DB applies, obtaining the correct DB wage determinations, DB provisions, or compliance monitoring, it may contact the State recipient. If a State recipient needs guidance, the recipient may contact Valerie Marshall at EPA Region 1 (617-918-1674) for guidance. The recipient or subrecipient may also obtain additional guidance from DOL's web site at http://www.dol.gov/esa/whd/recovery/

1. Applicability of the Davis- Bacon (DB) prevailing wage requirements.

DB prevailing wage requirements apply to the construction, alteration, and repair of treatment works carried out in whole or in part with assistance made available by a State water pollution control revolving fund and to any construction project carried out in whole or in part by assistance made available by a drinking water treatment revolving loan fund. If a subrecipient encounters a unique situation at a site that presents uncertainties regarding DB applicability, the subrecipient must discuss the situation with the recipient State before authorizing work on that site.

2. Obtaining Wage Determinations.

(a) Subrecipients shall obtain the wage determination for the locality in which a covered activity subject to DB will take place prior to issuing requests for bids, proposals, quotes or other methods for soliciting contracts (solicitation) for activities subject to DB. These wage determinations shall be incorporated into solicitations and any subsequent contracts. Prime contracts must contain a provision requiring that subcontractors follow the wage determination incorporated into the prime contract.

(i) While the solicitation remains open, the subrecipient shall monitor www.wdol.gov weekly to ensure that the wage determination contained in the solicitation remains current. The subrecipients shall amend the solicitation if DOL issues a modification more than 10 days prior to the closing date (i.e. bid opening) for the solicitation. If DOL modifies or supersedes the applicable wage determination less than 10 days prior to the closing date, the subrecipients may request a finding from the State recipient that there is not a reasonable time to notify interested contractors of the modification of the wage determination. The State recipient will provide a report of its findings to the subrecipient.

(ii) If the subrecipient does not award the contract within 90 days of the closure of

the solicitation, any modifications or supersedes DOL makes to the wage determination contained in the solicitation shall be effective unless the State recipient, at the request of the subrecipient, obtains an extension of the 90 day period from DOL pursuant to 29 CFR 1.6(c)(3)(iv). The subrecipient shall monitor www.wdol.gov on a weekly basis if it does not award the contract within 90 days of closure of the solicitation to ensure that wage determinations contained in the solicitation remain current.

(b) If the subrecipient carries out activity subject to DB by issuing a task order, work assignment or similar instrument to an existing contractor (ordering instrument) rather than by publishing a solicitation, the subrecipient shall insert the appropriate DOL wage determination from www.wdol.gov into the ordering instrument.

(c) Subrecipients shall review all subcontracts subject to DB entered into by prime contractors to verify that the prime contractor has required its subcontractors to include the applicable wage determinations.

(d) As provided in 29 CFR 1.6(f), DOL may issue a revised wage determination applicable to a subrecipient's contract after the award of a contract or the issuance of an ordering instrument if DOL determines that the subrecipient has failed to incorporate a wage determination or has used a wage determination that clearly does not apply to the contract or ordering instrument. If this occurs, the subrecipient shall either terminate the contract or ordering instrument and issue a revised solicitation or ordering instrument or incorporate DOL's wage determination retroactive to the beginning of the contract or ordering instrument by change order. The subrecipient's contractor must be compensated for any increases in wages resulting from the use of DOL's revised wage determination.

3. Contract and Subcontract provisions.

(a) The Recipient shall insure that the subrecipient(s) shall insert in full in 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 2012 Appropriations Act, the following clauses:

(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. Subrecipients may obtain wage determinations from the U.S. Department of Labor’s web site, www.dol.gov.

(ii)(A) The subrecipient(s), on behalf of 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 a request for an additional classification and wage rate and fringe benefits therefore only when the following criteria have been met:
(1) The work to be performed by the classification requested is not performed by a classification in the wage determination; and
(2) The classification is utilized in the area by the construction industry; and
(3) The proposed wage rate, including any bona fide fringe benefits, bears a reasonable relationship to the wage rates contained in the wage determination.

(B) If the contractor and the laborers and mechanics to be employed in the classification (if known), or their representatives, and the subrecipient(s) agree

on the classification and wage rate (including the amount designated for fringe benefits where appropriate), documentation of the action taken and the request, including the local wage determination shall be sent by the subrecipient (s) to the State award official. The State award official will transmit the request, to the Administrator of the Wage and Hour Division, Employment Standards Administration, U.S. Department of Labor, Washington, DC 20210 and to the EPA DB Regional Coordinator concurrently. The Administrator, or an authorized representative, will approve, modify, or disapprove every additional classification request within 30 days of receipt and so advise the State award official or will notify the State award official within the 30-day period that additional time is necessary.

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

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

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

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

(2) Withholding. The subrecipient(s), 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 subrecipient, 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 subrecipient shall provide written confirmation in a form satisfactory to the State indicating whether or not the project is in compliance with the requirements of 29 CFR 5.5(a)(1) based on the most recent payroll copies for the specified week. The payrolls shall set out accurately and completely all of the information required to be maintained under 29 CFR 5.5(a)(3)(i), except that

full social security numbers and home addresses shall not be included on the weekly payrolls. Instead the payrolls shall only need to include an individually identifying number for each employee (e.g., the last four digits of the employee's social security number). The required weekly payroll information may be submitted in any form desired. Optional Form WH-347 is available for this purpose from the Wage and Hour Division Web site at http://www.dol.gov/esa/whd/forms/wh347instr.htm or its successor site. The prime contractor is responsible for the submission of copies of payrolls by all subcontractors. Contractors and subcontractors shall maintain the full social security number and current address of each covered worker, and shall provide them upon request to the subrecipient(s) for transmission to the State or EPA if requested by EPA , the State, the contractor, or the Wage and Hour Division of the Department of Labor for purposes of an investigation or audit of compliance with prevailing wage requirements. It is not a violation of this section for a prime contractor to require a subcontractor to provide addresses and social security numbers to the prime contractor for its own records, without weekly submission to the subrecipient(s).

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

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

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

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

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

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

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

(4) Apprentices and trainees--

(i) Apprentices. Apprentices will be permitted to work at less than the predetermined rate for the work they performed when they are employed pursuant to and individually registered in a bona fide apprenticeship program registered with the U.S. Department of Labor, Employment and Training Administration, Office of Apprenticeship Training, Employer and Labor Services, or with a State Apprenticeship Agency recognized by the Office, or if a person is employed in his or her first 90 days of probationary employment as an apprentice in such an apprenticeship program, who is not individually registered in the program, but who has been certified by the Office of Apprenticeship Training, Employer and Labor Services or a State Apprenticeship Agency (where appropriate) to be eligible for probationary employment as an apprentice. The allowable ratio of apprentices to journeymen on the job site in any craft classification shall not be greater than the ratio permitted to the contractor as to the entire work force under the registered program. Any worker listed on a payroll at an apprentice wage rate, who is not registered or otherwise employed as stated above, shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any apprentice performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. Where a contractor is performing construction on a project in a locality other than that in which its program is registered, the ratios and wage rates (expressed in percentages of the journeyman's hourly rate) specified in the contractor's or subcontractor's registered program shall be observed. Every apprentice must be paid at not less than the rate specified in the registered program for the apprentice's level of progress, expressed as a percentage of the journeymen hourly rate specified in the applicable wage determination. Apprentices shall be paid fringe benefits in accordance with the provisions of the apprenticeship program. If the apprenticeship program does

not specify fringe benefits, apprentices must be paid the full amount of fringe benefits listed on the wage determination for the applicable classification. If the Administrator determines that a different practice prevails for the applicable apprentice classification, fringes shall be paid in accordance with that determination. In the event the Office of Apprenticeship Training, Employer and Labor Services, or a State Apprenticeship Agency recognized by the Office, withdraws approval of an apprenticeship program, the contractor will no longer be permitted to utilize apprentices at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

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

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

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

(6) Subcontracts. The contractor or subcontractor shall insert in any subcontracts the

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

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

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

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

(10) Certification of eligibility.

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

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

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

4. Contract Provision for Contracts in Excess of $100,000.

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

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

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

(3) Withholding for unpaid wages and liquidated damages. The subrecipient**,** 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 (a)(1) through (4) of this section and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for compliance by any subcontractor or lower tier subcontractor with the clauses set forth in paragraphs (a)(1) through (4) of this section.

(b) In addition to the clauses contained in Item 3, above, in any contract subject only to the Contract Work Hours and Safety Standards Act and not to any of the other statutes cited in 29 CFR 5.1, the Subrecipient shall insert a clause requiring that 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. Further, the Subrecipient shall insert in any such contract a clause providing that 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 (write the name of agency) and the Department of Labor, and the contractor or subcontractor will permit such representatives to interview employees during working hours on the job.

5. Compliance Verification

(a) The subrecipient 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 subrecipient 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.

(b) The subrecipient 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 subrecipient 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. Subrecipients 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. Subrecipients shall immediately conduct necessary interviews in response to an alleged violation of the prevailing wage requirements. All interviews shall be conducted in confidence.

(c) The subrecipient 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 subrecipient 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 subrecipient 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. Subrecipients 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 subrecipient shall verify evidence of fringe benefit

plans and payments thereunder by contractors and subcontractors who claim credit for fringe benefit contributions.

(d) The subrecipient 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.

(e) Subrecipients 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.

II. Requirements For Subrecipients That Are Not Governmental Entities

The following terms and conditions specify how recipients will assist EPA in meeting its DB responsibilities when DB applies to EPA awards of financial assistance with respect to subrecipients that are not governmental entities. If a subrecipient has questions regarding when DB applies, obtaining the correct DB wage determinations, DB provisions, or compliance monitoring, it may contact the State recipient for guidance. If a State recipient needs guidance, the recipient may contact Valerie Marshall at EPA Region 1 (617-918-1674) for guidance. The recipient or subrecipient may also obtain additional guidance from DOL's web site at http://www.dol.gov/esa/whd/recovery/

Under these terms and conditions, the subrecipient must submit its proposed DB wage determinations to the State recipient for approval prior to including the wage determination in any solicitation, contract task orders, work assignments, or similar instruments to existing contractors.

1. Applicability of the Davis- Bacon (DB) prevailing wage requirements.

DB prevailing wage requirements apply to the construction, alteration, and repair of treatment works carried out in whole or in part with assistance made available by a State water pollution control revolving fund and to any construction project carried out in whole or in part by assistance made available by a drinking water treatment revolving loan fund. If a subrecipient encounters a unique situation at a site that presents uncertainties regarding DB applicability, the subrecipient must discuss the situation with the recipient State before authorizing work on that site.

2. Obtaining Wage Determinations.

(a) Subrecipients must obtain proposed wage determinations for specific localities at www.wdol.gov. After the Subrecipient obtains its proposed wage determination, it must submit the wage determination to (insert contact information for State recipient DB point of contact for wage determination) for approval prior to inserting the wage determination into a solicitation, contract or issuing task orders, work assignments or similar instruments to existing contractors (ordering instruments unless subsequently directed otherwise by the State recipient Award Official.

(b) Subrecipients shall obtain the wage determination for the locality in which a covered activity subject to DB will take place prior to issuing requests for bids, proposals, quotes or other methods for soliciting contracts (solicitation) for activities subject to DB. These wage determinations shall be incorporated into solicitations and any subsequent contracts. Prime contracts must contain a provision requiring that subcontractors follow the wage determination incorporated into the prime contract.

(i) While the solicitation remains open, the subrecipient shall monitor www.wdol.gov. on a weekly basis to ensure that the wage determination contained in the solicitation remains current. The subrecipients shall amend the solicitation if DOL issues a modification more than 10 days prior to the closing date (i.e. bid opening) for the solicitation. If DOL modifies or supersedes the applicable wage determination less than 10 days prior to the closing date, the subrecipients may request a finding from the State recipient that there is not a reasonable time to notify interested contractors of the modification of the wage determination. The State recipient will provide a report of its findings to the subrecipient.

(ii) If the subrecipient does not award the contract within 90 days of the closure of the solicitation, any modifications or supersedes DOL makes to the wage determination contained in the solicitation shall be effective unless the State recipient, at the request of the subrecipient, obtains an extension of the 90 day period from DOL pursuant to 29 CFR 1.6(c)(3)(iv). The subrecipient shall monitor www.wdol.gov on a weekly basis if it does not award the contract within 90 days of closure of the solicitation to ensure that wage determinations contained in the solicitation remain current.

(c) If the subrecipient carries out activity subject to DB by issuing a task order, work assignment or similar instrument to an existing contractor (ordering instrument) rather than by publishing a solicitation, the subecipient shall insert the appropriate DOL wage determination from www.wdol.gov into the ordering instrument.

(d) Subrecipients shall review all subcontracts subject to DB entered into by prime contractors to verify that the prime contractor has required its subcontractors to include the applicable wage determinations.

(e) As provided in 29 CFR 1.6(f), DOL may issue a revised wage determination applicable to a subrecipient's contract after the award of a contract or the issuance of an ordering instrument if DOL determines that the subrecipient has failed to incorporate a wage determination or has used a wage determination that clearly does not apply to the contract or ordering instrument. If this occurs, the subecipient shall either terminate the contract or ordering instrument and issue a revised solicitation or ordering instrument or incorporate DOL's wage determination retroactive to the beginning of the contract or ordering instrument by change order. The subrecipient's contractor must be compensated for any increases in wages resulting from the use of DOL's revised wage determination.

3. Contract and Subcontract provisions.

(a) The Recipient shall insure that the subrecipient(s) shall insert in full in 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 2011 Full-Year Continuing Appropriation, the following clauses:

(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. Subrecipients may obtain wage determinations from the U.S. Department of Labor's web site, www.dol.gov.

(ii)(A) The subrecipient(s), on behalf of 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 a request for an additional classification and wage rate and fringe benefits therefore only when the following criteria have been met:

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

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

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

(B) If the contractor and the laborers and mechanics to be employed in the classification (if known), or their representatives, and the subrecipient(s) agree on the classification and wage rate (including the amount designated for fringe benefits where appropriate), documentation of the action taken and the request, including the local wage determination shall be sent by the subrecipient(s) to the State award official. The State award official will transmit the report, to the Administrator of the Wage and Hour Division, Employment Standards Administration, U.S. Department of Labor, Washington, DC 20210 and to the EPA DB Regional Coordinator concurrently. The Administrator, or an authorized representative, will approve, modify, or disapprove every additional classification request within 30 days of receipt and so advise the State award official or will notify the State award official within the 30-day period that additional time is necessary.

(C) In the event the contractor, the laborers or mechanics to be employed in the classification or their representatives, and the and the subrecipient(s) do not agree on the proposed classification and wage rate (including the amount

designated for fringe benefits, where appropriate), the award official shall refer the request, and the local wage determination, including the views of all interested parties and the recommendation of the State award official, to the Administrator for determination. The request shall be sent to the EPA Regional Coordinator concurrently. The Administrator, or an authorized representative, will issue a determination within 30 days of receipt of the request and so advise the contracting officer or will notify the contracting officer within the 30-day period that additional time is necessary.

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

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

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

(2) Withholding. The subrecipient(s) 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 subrecipient, 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 subrecipient shall provide written confirmation in a form satisfactory to the State indicating whether or not the project is in compliance with the requirements of 29 CFR 5.5(a)(1) based on the most recent payroll copies for the specified week. The payrolls shall set out accurately and completely all of the information required to be maintained under 29 CFR 5.5(a)(3)(i), except that full social security numbers and home addresses shall not be included on the weekly payrolls. Instead the payrolls shall only need to include an individually identifying number for each employee (e.g., the last four digits of the employee's social security number). The required weekly payroll information may be submitted in any form desired. Optional Form WH-347 is available for this purpose from the Wage and Hour Division Web site at http://www.dol.gov/esa/whd/forms/wh347instr.htm or its successor site. The prime contractor is responsible for the submission of copies of payrolls by all subcontractors. Contractors and subcontractors shall maintain the full social security number and current address of each covered worker, and shall provide them upon request to the subrecipient(s) for transmission to the State or EPA if requested by EPA , the State, the contractor, or the Wage and Hour Division of the Department of Labor for purposes of an investigation or audit of compliance with prevailing wage requirements. It is not a violation of this section for a prime

contractor to require a subcontractor to provide addresses and social security numbers to the prime contractor for its own records, without weekly submission to the subrecipient(s).

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

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

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

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

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

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

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

records available may be grounds for debarment action pursuant to 29 CFR 5.12.

(4) Apprentices and trainees--

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

(ii) Trainees. Except as provided in 29 CFR 5.16, trainees will not be permitted to

work at less than the predetermined rate for the work performed unless they are employed pursuant to and individually registered in a program which has received prior approval, evidenced by formal certification by the U.S. Department of Labor, Employment and Training Administration. The ratio of trainees to journeymen on the job site shall not be greater than permitted under the plan approved by the Employment and Training Administration. Every trainee must be paid at not less than the rate specified in the approved program for the trainee's level of progress, expressed as a percentage of the journeyman hourly rate specified in the applicable wage determination. Trainees shall be paid fringe benefits in accordance with the provisions of the trainee program. If the trainee program does not mention fringe benefits, trainees shall be paid the full amount of fringe benefits listed on the wage determination unless the Administrator of the Wage and Hour Division determines that there is an apprenticeship program associated with the corresponding journeyman wage rate on the wage determination which provides for less than full fringe benefits for apprentices. Any employee listed on the payroll at a trainee rate who is not registered and participating in a training plan approved by the Employment and Training Administration shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any trainee performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. In the event the Employment and Training Administration withdraws approval of a training program, the contractor will no longer be permitted to utilize trainees at less than the applicable predetermined rate for the work performed until an acceptable program is approved. (iii) Equal employment opportunity. The utilization of apprentices, trainees and journeymen under this part shall be in conformity with the equal employment opportunity requirements of Executive Order 11246, as amended, and 29 CFR part 30.

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

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

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

(8) Compliance with Davis-Bacon and Related Act requirements. All rulings and

interpretations of the Davis-Bacon and Related Acts contained in 29 CFR parts 1, 3, and 5 are herein incorporated by reference in this contract.

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

(10) Certification of eligibility.

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

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

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

4. Contract Provision for Contracts in Excess of $100,000.

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

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

(2) Violation; liability for unpaid wages; liquidated damages. In the event of any violation of the clause set forth in paragraph (b)(1) of this section the contractor and

any subcontractor responsible therefore shall be liable for the unpaid wages. In addition, such contractor and subcontractor shall be liable to the United States (in the case of work done under contract for the District of Columbia or a territory, to such District or to such territory), for liquidated damages. Such liquidated damages shall be computed with respect to each individual laborer or mechanic, including watchmen and guards, employed in violation of the clause set forth in paragraph (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 subrecipient shall upon the request of the EPA Award Official or an authorized representative of the Department of Labor, 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) In addition to the clauses contained in Item 3, above, in any contract subject only to the Contract Work Hours and Safety Standards Act and not to any of the other statutes cited in 29 CFR 5.1, the Subrecipient shall insert a clause requiring that 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. Further, the Subrecipient shall insert in any such contract a clause providing that 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 (write the name of agency) and the Department of Labor, and the contractor or subcontractor will permit such representatives to interview employees during working hours on the job.

5. Compliance Verification

(a). The subrecipient 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 subrecipient 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.

(b) The subrecipient 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 subrecipient 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. Subrecipients 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. Subrecipients shall immediately conduct necessary interviews in response to an alleged violation of the prevailing wage requirements. All interviews shall be conducted in confidence.

(c). The subrecipient 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 subrecipient 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 subrecipient 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. Subrecipients 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 subrecipient shall verify evidence of fringe benefit plans and payments thereunder by contractors and subcontractors who claim credit for fringe benefit contributions.

(d). The subrecipient 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.

(e) Subrecipients 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.

- END OF SECTION -

"General Decision Number: MA20210008 07/16/2021

Superseded General Decision Number: MA20200008

State: Massachusetts

Construction Types: Heavy (Heavy and Marine)

Counties: Barnstable, Bristol, Dukes, Essex, Middlesex, Nantucket, Norfolk, Plymouth and Suffolk Counties in Massachusetts.

HEAVY AND MARINE CONTRUCTION PROJECTS

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

Modification Number	Publication Date
0	01/01/2021
1	02/12/2021
2	03/19/2021
3	04/30/2021
4	07/16/2021

BOIL0029-001 01/01/2017

	Rates	Fringes
BOILERMAKER	$ 42.42	24.92

BRMA0001-011 08/01/2020

FOXBORO CHAPTER

BRISTOL (Attleboro, Berkley, Dighton, Mansfield, North Attleboro, Norton, Raynham, Rehoboth, Seekonk, Taunton); NORFOLK, (Bellingham, Canton, Dedham, Foxboro, Franklin, Norfolk, Norwood, Plainville, Sharon, Walpole, Westrwood, Wrentham); and PLYMOUTH (Lakeville)

	Rates	Fringes
Bricklayer/Cement Mason.....	$ 53.16	34.95

BRMA0001-012 08/01/2020

LOWELL CHAPTER

MIDDLESEX (Acton, Ashby, Ayer, Bedford, Billerica, Boxboro, Carlisle, Chemsford, Dracut, Dunstabale, Ft Devens, Groton, Littleton, Lowell, North Acton, Pepperell, Shirley, South Acton, Tewksbury, Townsend, Tyngsboro, West Acton, Westford, Wilmington)

	Rates	Fringes
BRICKLAYER.....	$ 53.16	34.95

BRMA0001-013 08/01/2020

LOWELL CHAPTER
MIDDLESEX (Ashland, Framingham, Holliston, Hopkinton, Hudson, Maynard, Natick, Sherbvorn, Stow); and NORFOLK (Medfield, Medway, Millis)

	Rates	Fringes
BRICKLAYER.....	$ 53.16	34.95

BRMA0003-001 02/01/2021

	Rates	Fringes
Marble & Tile Finisher.....	$ 42.57	32.00
Marble, Tile & Terrazzo Workers.....	$ 54.69	33.80
TERRAZZO FINISHER.....	$ 55.77	34..47

BRMA0003-003 08/01/2020

BOSTON CHAPTER
MIDDLESEX (Arlington, Cambridge, Everett, Malden, Medford, Melrose, Somerville); NORFOLK (Brookline, Milton); and SUFFOLK

	Rates	Fringes
BRICKLAYER.....	$ 55.75	35.16

BRMA0003-011 08/01/2020

LYNN CHAPTER

ESSEX (Amesbury, Andover, Beverly, Boxford, Danvers, Essex, Georgetown, Gloucester, Groveland, Hamilton, Haverhill, Ipswich, Lawrence, Lynn, Lynnfield, Manchester, Marblehead, Merrimac, Methuen, Middleton, Nahant, Newbury, Newburyport, North Andover, Peabody, Rockport, Rowley, Salisbury, Salem, Saugus, Swampscott, Topsfield, Wakefield, Wenham, West Newbury); and MIDDLESEX (North Reading, Reading, Wakefield)

	Rates	Fringes
Bricklayer/Cement Mason.....	$ 55.75	35.16

BRMA0003-012 08/01/2020

	Rates	Fringes
BRICKLAYER WALTHAM CHAPTER - MIDDLESEX (Belmont, Burlington, Concord, Lexington, Lincoln, Stoneham, Sudbury, Waltham, Watertown, Wayland, Weston, Winchester, Woburn).....	$ 55.75	35.16

BRMA0003-014 08/01/2020

QUINCY CHAPTER

PLYMOUTH COUNTY (Abington, Bridgewater, Brockton, Carver, Duxbury, East Bridgewater, Halifax, Hanover, Hanson, Hingham, Hull, Kingston, Marshfield, Middleboro, Norwell, Pembroke, Plymouth, Rockland, Scituate, West Bridgewater, Whitman)

	Rates	Fringes
Bricklayer/Cement Mason.....	$ 55.75	35.16

BRMA0003-025 08/01/2020

NEW BEDFORD CHAPTER

BARNSTABLE; BRISTOL (Acushnet, Darmouth, Fairhaven, Fall River, Freetown, New Bedford, Somerset, Swansea, Westport); DUKES; NANTUCKET; PLYMOUTH (Marion, Mattapoisett, Rochester, Wareham)

	Rates	Fringes
Bricklayer/Cement Mason.....	$ 55.75	35.16

BRMA0003-033 08/01/2020

NEWTON CHAPTER
MIDDLESEX (Newton); NORFOLK (Dover, Needham, Wellesley)

	Rates	Fringes
Bricklayer, Plasterer.....	$ 55.75	35.16

CARP0056-001 08/01/2020

All of SUFFOLK COUNTY; and those areas of BARNSTABLE, BRISTOL, ESSEX, MIDDLESEX, NORFOLK, and PLYMOUTH COUNTIES situated INSIDE Boston Beltway (I-495) and North of Cape Cod Canal. ALL of DUKES and NANTUCKET COUNTIES

	Rates	Fringes

PILEDRIVERMAN.....$ 49.07 35.57

CARP0056-002 08/01/2020

The areas of BARNSTABLE, BRISTOL, PLYMOUTH, and NORFOLK COUNTIES situated OUTSIDE Boston Beltway (I-495) and South of Cape Cod Canal

	Rates	Fringes
PILEDRIVERMAN.....	$ 49.07	35.57

CARP0056-003 08/01/2020

Those areas of ESSEX and MIDDLESEX COUNTIES situated OUTSIDE Boston Beltway (I-495)

	Rates	Fringes
PILEDRIVERMAN.....	$ 49.07	35.57

CARP0056-004 08/01/2020

	Rates	Fringes
DIVER TENDER.....	$ 49.07	35.57
DIVER.....	$ 68.70	35.57

CARP0327-002 03/01/2020

MIDDLESEX (Belmont, Cambridge, Everett, Malden, Medford, Somerville); NORFOLK (Brookline, Dedham, Milton); AND SUFFOLK COUNTIES

	Rates	Fringes
CARPENTER.....	$ 50.64	29.30

CARP0339-002 03/01/2020

BRISTOL (Attleborough, North Attleborough); ESSEX; MIDDLESEX (Except Belmont, Cambridge, Everett, Malden, Medford, Somerville); AND NORFOLK (Bellingham, Braintree, Canton, Cohassett, Foxboro, Franklin, Medfield, Medway, Millis, Needham, Norfolk, Norwood, Plainville, Quincy, Sharon, Walpole, Wellesley, Westwood, Weymouth, Wrentham) COUNTIES

	Rates	Fringes
CARPENTER.....	$ 42.40	29.10

CARP0346-001 03/01/2020

NORFOLK (Braintree, Quincy, Cohasset, Weymouth, etc.) PLYMOUTH (Duxbury, Hanover, Hull, Hingham, Marshfield, Norwell, Pembroke Rockland, Scituate)

	Rates	Fringes
CARPENTER.....	$ 42.40	29.10

CARP0624-002 09/01/2017

DUKES; NANTUCKET

	Rates	Fringes
CARPENTER	$ 46.43	28.35

CARP0624-006 09/01/2017

BARNSTABLE; BRISTOL (Except Attleboro & North Attleboro); NORFOLK (Avon, Holbrook, Randolph, Stoughton); PLYMOUTH (Bridgewater, Kingston, Lakeville, Middleboro, Plymouth, S. Hanover, Whitman)

	Rates	Fringes
CARPENTER	$ 39.28	27.90

CARP1121-001 01/06/2020

SUFFOLK COUNTY

	Rates	Fringes
MILLWRIGHT	$ 42.32	31.15

CARP1121-005 01/06/2020

BARNSTABLE, BRISTOL, DUKES, ESSEX, MIDDLESEX, NANTUCKET, NORFOLK and PLYMOUTH COUNTIES

	Rates	Fringes
MILLWRIGHT	$ 38.47	31.15

ELEC0096-001 09/06/2020

MIDDLESEX (Ashby, Ashland, Ayer, Ft. Devens, Groton, Hopkinton, Hudson, Marlboro, Pepperell, Shirley, Stow, Townsend)

	Rates	Fringes
ELECTRICIAN	$ 44.42	29.07
Teledata System Installer	$ 31.54	27.27

ELEC0099-001 06/01/2020

BRISTOL (Attleboro, North Attleboro, Seekonk)

	Rates	Fringes
ELECTRICIAN	$ 41.61	60.24%
Teledata System Installer	$ 31.21	13.1%+14.93

ELEC0103-002 03/01/2021

ESSEX (Amesbury, Andover, Boxford, Georgetown, Groveland, Haverhill, Lawrence, Merrimac, Methuen, Newbury, Newburyport, North Andover, Rowley, Salisbury, West Newbury); MIDDLESEX (Bedford, Billerica, Boxboro, Burlington, Carlisle, Chelmsford,

Dracut, Dunstable littleton, Lowell, North Reading, Tewksbury, Tyngsboro, Westford, Wilmington)

	Rates	Fringes
ELECTRICIAN	$ 55.41	33.84

ELEC0103-004 03/01/2021

ESSEX (Beverly, Danvers, Essex, Gloucester, Hamilton, Ipswich, Manchester, Marblehead, Middleton, Peabody, Rockport, Salem, Topsfield, Wenham)

	Rates	Fringes
ELECTRICIAN	$ 55.41	33.84

ELEC0103-005 03/01/2021

ESSEX (Lynn, Lynnfield, Nahant, Saugus, Swampscott); MIDDLESEX (Acton, Arlington, Belmont, Cambridge, Concord, Everett, Framingham, Holliston, Lexington, Lincoln, Malden, Maynard, Medford, Melrose, Natick, Newton, Reading, Sherborn, Somerville, Stoneham, Sudbury, Wakefield, Waltham, Watertown, Wayland, Weston, Winchester, Woburn); NORFOLK (Bellingham, Braintree, Brookline, Canton, Cohasset, Dedham, Dover, Foxboro, Frankloin, Medfield, Medway, Millis, Milton, Needham, Norfolk, Norwood, Quincy, Sharon, Walpole, Wellesley, Westwood, Weymouth, Wrentham); PLYMOUTH (Hingham and Hull);SUFFOLK

	Rates	Fringes
ELECTRICIAN	$ 55.41	33.84

ELEC0104-001 09/03/2017

	Rates	Fringes
Line Construction:		
Cableman	$ 38.45	18.42+A
Equipment Operator	$ 38.45	22.50+A
Groundman	$ 24.88	10.24+A
Lineman	$ 45.23	25.71+A

A. PAID HOLIDAYS: New Year's Day; Memorial Day; Independence Day; Labor Day; Thanksgiving Day; Christmas Day and Columbus Day, provided the employee has been employed 5 working days prior to any one of the listed holidays.

ELEC0223-002 09/01/2020

BARNSTABLE, BRISTOL (Except Attleboro, North Attleboro, Seekonk); DUKES; NANTUCKET; PLYMOUTH (Except Hingham and Hull Twps); NORFOLK (Avon, Halbrook, Randolph, Sloughton)

	Rates	Fringes
ELECTRICIAN	$ 43.66	31.18%%+13.15

ENGI0004-009 06/01/2020

	Rates	Fringes
Power equipment operators:		
Group 1	$ 49.33	29.75+a
Group 2	$ 48.81	29.75+a
Group 3	$ 32.72	29.75+a
Group 4	$ 40.30	29.75+a
Group 5	$ 23.13	29.75+a
Group 6	$ 27.79	29.75+a

HOURLY PREMIUM FOR BOOM LENGTHS (Including Jib):
Over 150 ft. +2.18
Over 185 ft. +3.84
Over 210 ft. +5.39
Over 250 ft. +8.16
Over 295 ft. +11.29
Over 350 ft. +13.14

FOOTNOTE FOR POWER EQUIPMENT OPERATORS:
A. PAID HOLIDAYS: New Year's Day, Washington,s Birthday, Labor Day, Memorial Day, Independence Day, Patriot's Day, Columbus Day, Veteran's Day, Thanksgiving Day, Christmas Day

POWER EQUIPMENT OPERATORS CLASSIFICATIONS [HEAVY CONSTRUCTION]
GROUP 1: Power shovel; crane; truck crane; derrick; pile driver; trenching machine; mechanical hoist pavement breaker; cement concrete paver; dragline; hoisting engine; three drum machine; pumpcrete machine; loaders; shovel dozer; front end loader; mucking machine; shaft hoist; steam engine; backhoe; gradall; cable way; fork lift; cherry picker; boring machine; rotary drill; post hole hammer; post hole digger; asphalt plant on job site; concrete batching and/or mixing plant on job site; crusher plant on job site; paving concrete mixer; timber jack
GROUP 2: Sonic or vibratory hammer; grader; scraper; tandem scraper; bulldozer; tractor; mechanic - maintenance; York rake; mulching machine; paving screed machine;stationary steam boiler; paving concrete finishing machine; grout pump; portable steam boiler; portable steam generator; roller; spreader; asphalt paver; locomotives or machines used in place thereof; tamper (self propelled or tractor-draw); cal tracks; ballast regulator;rail anchor machine; switch tamper; tire truck
GROUP 3: Pumps (1-3 grouped); compressor; welding machines (1-3 grouped); generator; sighting plant; heaters (power driven, 1- 5); syphon-pulsometer; concrete mixer; valves controlling permanent plant air steam, conveyor, wellpoint system (operating)
GROUP 4: Assitant engineer (fireman)
GROUP 5: Oiler (other than truck cranes and gradalls)
GROUP 6: Oiler (on truck cranes and gradalls)

IRON0007-001 03/16/2020

AREA 1: BRISTOL (Easton); ESSEX (Beverly,Gloucester,Lynn, Lynnfield, Manchester,Marblehead, Nahant, Rockport, Salem, Saugus, Swampscott); MIDDLESEX (Arlington, Bedford, Belmont, Burlington, Cambridge, Carlisle, Concord, Dunstable, Everett, Framingham, Lexington, Lincoln, Malden, Maynard, Medford, Melrose, Natick, Newton, Reading, Sherborn, Somerville, Stoneham, Sudbury, Wakefield, Waltham, Watertown, Wayland,

Weston, Winchester, Woburn); NORFOLK (Except Medway); PLYMOUTH (Abington, Bridgewater, Brocton, Duxbury, East Bridgewater, Halifax, Hanover, Hanson, Hingham, Hull, Kingston, Marshfield, Norwell, Pembroke, Plymouth, Plympton, Rockland, Scituate, West Bridgewater, Whitman); SUFFOLK

AREA 2: ESSEX (Amesbury, Andover, Boxford, Danvers, Essex, Georgetown, Hamilton, Haverhill, Ipswich, Lawrence, Merrimac, Methuen, Newbury, Newburyport, North Andover, Rowley, Salisbury, Topsfield, Wenham, West Newbury); MIDDLESEX (Action,Billerica, Chelmsford, Dracut, Groton, Groveland, Littleton, Lowell, Middleton, North Reading, Pepperell, Tewksbury, Tyngsboro, Westford, Wilminton)

	Rates	Fringes
IRONWORKER		
AREA 1	$ 48.02	33.43
AREA 2	$ 43.61	33.43

IRON0007-010 03/16/2020

MIDDLESEX (Ashby, Ashland, Ayer, Boxboro, Holliston, Hopkinton, Hudson, Marlboro, Shirley, Stow, Townsend); NORFOLK (Medway)

	Rates	Fringes
IRONWORKER	$ 47.72	33.43

IRON0037-002 09/16/2020

BARNSTABLE; BRISTOL (Acushnet, Attleboro, Berkley, Dartmouth, Dighton, Fairhaven, Fall River, Freetown, Mansfield, New Bedford, North Attleboro, Norton, Raynham, Rehoboth, Seekonk, Somerset, Swansea, Taunton, Westport); DUKES; NANTUCKET; NORFOLK (Billingham, Franklin, Plainville, Wrentham); PLYMOUTH (Lakeville, Marion, Mattapoisett, Middleboro, Rochester, Wareham)

	Rates	Fringes
IRONWORKER	$ 37.43	33.07

LABO0022-006 06/01/2018

SUFFOLK COUNTY (Boston, Chelsea, Revere, Winthrop, Deer & Nut Islands); MIDDLESEX COUNTY (Arlington, Belmont, Burlington, Cambridge, Everett, Malden, Medford, Melrose, Reading, Somerville, Stoneham, Wakefield, Winchester, Winthrop and Woburn only); NORFOLK COUNTY (Brookline, Dedham, and Milton only)

	Rates	Fringes
Laborers:		
GROUP 1	$ 38.00	24.10
GROUP 2	$ 38.25	24.10
GROUP 3	$ 38.75	24.10
GROUP 4	$ 39.00	24.10
GROUP 5	$ 21.50	24.10
GROUP 6	$ 39.00	24.10

LABORERS CLASSIFICATIONS

GROUP 1: Laborers; carpenter tenders; cement finisher tenders

GROUP 2: Asphalt raker; fence and guard rail erector; laser beam operator; mason tender; pipelayer; pneumatic drill operator; pneumatic tool operator; wagon drill operator

GROUP 3: Air track operator; block paver; rammer; curb setter

GROUP 4: Blaster; powderman

GROUP 5: Flagger

GROUP 6: Asbestos Abatement; Toxic and Hazardous Waste Laborers

---

LABO0022-012 06/01/2018

Counties of BARNSTABLE; BRISTOL; DUKES; ESSEX; NANTUCKET; PLYMOUTH; MIDDLESEX (With the exception of Arlington, Belmont, Burlington, Cambridge, Everett, Malden, Melrose, Reading, Somerville, Stoneham, Wakefield, Winchester, Winthrop and Woburn); NORFOLK (With the exception of Brookline, Dedham, and Milton)

	Rates	Fringes
Laborers:		
GROUP 1	$ 33.25	22.92
GROUP 2	$ 33.50	22.92
GROUP 3	$ 34.00	22.92
GROUP 4	$ 34.25	22.92
GROUP 5	$ 21.50	22.92
GROUP 6	$ 34.25	22.92

LABORERS CLASSIFICATIONS

GROUP 1: Laborers; carpenter tenders; cement finisher tenders

GROUP 2: Asphalt raker; fence and guard rail erector; laser beam operator; mason tender; pipelayer; pneumatic drill operator; pneumatic tool operator; wagon drillperator

GROUP 3: Air track operator; block paver; rammer; curb setter; hydraulic & similar self powere drills

GROUP 4: Blaster; powderman

GROUP 5: Flagger

GROUP 6: Asbestos Abatement; Toxic and Hazardous Waste Laborers

---

LABO0022-013 06/01/2018

	Rates	Fringes

Laborers:
(FREE AIR OPERATION):
SHIELD DRIVEN AND LINER
PLATE IN FREE AIR)
GROUP 1.....$ 39.40 21.80+a
GROUP 2.....$ 39.40 21.80+a
(OPEN AIR CASSONS,
UNDERPINNING AND TEST
BORING INDUSTRIES):

TEST BORING & WELL DRILLING
Driller.....$ 39.35 24.30+A
Laborer.....$ 37.95 24.30+A
(OPEN AIR CASSONS,
UNDERPINNING AND TEST
BORING INDUSTRIES):

OPEN AIR CASSON,
UNDERPINNING WORK & BORING
CREW
Bottom man.....$ 39.10 24.30+A
Laborers; Top man.....$ 37.95 24.30+A
(TUNNELS, CAISSON &
CYLINDER WORK IN
COMPRESSED AIR)
GROUP 1.....$ 39.75 24.70+a
GROUP 2.....$ 42.30 24.70+a
GROUP 3.....$ 42.30 24.70+a
GROUP 4.....$ 42.30 24.70+a
GROUP 5.....$ 42.30 24.70+a
GROUP 6.....$ 44.30 24.70+a
CLEANING CONCRETE AND
CAULKING TUNNEL (Both New
& Existing)
GROUP 1.....$ 39.40 21.80+a
GROUP 2.....$ 39.40 21.80+a
ROCK SHAFT, CONCRETE
LINING OF SAME AND TUNNEL
IN FREE AIR
GROUP 1.....$ 36.85 21.80+a
GROUP 2.....$ 39.40 21.80+a
GROUP 3.....$ 39.40 21.80+a
GROUP 4.....$ 39.40 21.80+a
GROUP 5.....$ 41.40 21.80+a

LABORERS CLASSIFICATIONS for TUNNELS, CAISSON & CYLINDER WORK IN COMPRESSED AIR

GROUP 1: Powder watchman; Top man on iron bolt; change house attendant

GROUP 2: Brakeman; trackman; groutman; tunnel laborer; outside lock tender; lock tender; guage tender

GROUP 3: Motorman, miner

GROUP 4: Blaster

GROUP 5: Mucking machine operator

GROUP 6: Hazardous Waste work within the ""HOT"" zone. (A

premium of two dollars $2.00 per hour over the basic wage rate.

LABORERS CLASSIFICATIONS for (FREE AIR OPERATION): SHIELD DRIVEN AND LINER PLATE IN FREE AIR

GROUP 1: Miner; miner welder; conveyor operator; motorman; mucking machine operator; nozzle man; grout man-; pumps, shaft and tunnel steel and rodman; shield and erector arm operators, mole nipper, outside motorman, burner, TBM operator, safety miner; laborer topside; heading motormen; erecting operators; top signal men

GROUP 2: Brakeman; trackman

LABORERS CLASSIFICATIONS FOR CLEANING CONCRETE AND CAULKING TUNNEL (Both New & Existing)

GROUP 1: Concrete workers; strippers and form movers (wood & steel), cement finisher

GROUP 2: Form erector (wood & steel and all accessories)

LABORERS CLASSIFICATIONS for ROCK SHAFT, CONCRETE LINING OF SAME AND TUNNE IN FREE AIR

GROUP 1: Change house attendants

GROUP 2: Laborers, topside, bottom men (when heading is 50 ft. from shaft) and all other laborers

GROUP 3: Brakeman; trackman; tunnel laborers; shaft laborers

GROUP 4: Miner; cage tender; bellman

GROUP 5: Hazardous Waste work within the ""HOT"" zone. (A premium of two dollars $2.00 per hour over the basic wage rate)

FOOTNOTE FOR LABORERS:

A. PAID HOLIDAYS: New Year's Day, Washington's Birthday, Patriot's Day, Memorial Day, Independence Day, Labor Day, Columbus Day, Veteran's Day, Thanksgiving Day, and Christmas Day

---

LABO1421-001 06/01/2018

WRECKING LABORERS:

	Rates	Fringes
Laborers: (Wrecking)		
Group 1	$ 38.15	24.10
Group 2	$ 38.90	24.10
Group 3	$ 39.15	24.10
Group 4	$ 34.15	24.10
Group 5	$ 37.25	24.10

Group 6.....$ 38.15 24.10

Group 1: Adzeman, Wrecking Laborer.
Group 2: Burners, Jackhammers.
Group 3: Small Backhoes, Loaders on tracks, Bobcat Type Loaders, Hydraulic ""Brock"" Type Hammer Operators, Concrete Cutting Saws.
Group 4: Yardman (Salvage Yard Only).
Group 5: Yardman, Burners, Sawyers.
Group 6: Asbestos, Lead Paint, Toxic and Hazardous Waste.

PAIN0035-001 07/01/2019

BARNSTABLE BRISTOL; DUKES; ESSEX; NANTUCKET; PLYMOUTH (Remainder of NORFOLK; MIDDLESEX AND SUFFOLK COUNTIES)

	Rates	Fringes
PAINTER		
NEW CONSTRUCTION:		
Bridge	$ 50.36	30.25
Brush, Taper	$ 39.86	30.25
Spray, Sandblast	$ 41.26	30.25
REPAINT:		
Bridge	$ 50.66	30.90
Brush, Taper	$ 37.92	30.25
Spray, Sandblast	$ 39.32	30.25

PAIN0035-015 07/01/2019

MIDDLESEX (Cambridge, Everett, Malden, Medford, Sommerville) SUFFOLK COUNTY (Boston, Chelsea) NORFOLK COUNTY (Brookline)

	Rates	Fringes
PAINTER		
NEW CONSTRUCTION:		
Brush, Taper	$ 45.65	30.25
Spray, Sandblast	$ 47.05	30.25
REPAINT:		
Bridge	$ 50.66	30.90
Brush, Taper	$ 43.71	30.25
Spray, Sandblast	$ 45.11	30.25

PLAS0534-001 01/01/2020

ESSEX; MIDDLESEX; NORFOLK AND SUFFOLK COUNTY

	Rates	Fringes
CEMENT MASON/CONCRETE FINISHER	$ 43.00	37.66

PLUM0004-001 03/01/2021

MIDDLESEX (Ashby, Ayer-West of Greenville branch of Boston and Maine Railroad, Ft. Devens, Groton, Shirley, Townsend)

	Rates	Fringes
Plumbers and Pipefitters	$ 47.85	26.92

PLUM0012-001 03/01/2019

ESSEX (Ames, Andover, Beverly, Boxford, Byfield, Danvers, Essex, Georgetown, Gloucester, Groveland, Hamilton, Haverhill, Ipswich, Lawrence,Manchester, Marblehead, Merrimac, Methuem, Middleton, Newbury, Newburyport, North Andover, Peabody, Rockport, Rowley, Salem, Salisbury, Topsfieild, Wenham, West Newbury)

	Rates	Fringes
PLUMBER	$ 52.61	29.93

PLUM0012-003 03/01/2019

ESSEX (Ames, Andover, Beverly, Boxford, Byfield, Danvers, Essex, Georgetown, Gloucester, Groveland, Hamilton, Haverhill, Ipswich, Lawrence, Manchester, Marblehead, Merrimac, Methuen, Middleton, Newbury, Newburyport, North Andover, Peabody, Rockport, Rowley, Salem, Salisbury, Topsfield, Wenham, West Newbury)

	Rates	Fringes
Plumber, Pipefitter, Steamfitter	$ 52.61	29.93

PLUM0012-006 03/01/2019

ESSEX (Lynn, Lynnfield, Nahant, Saugus, and Swampscott); MIDDLESEX (Acton, Arlington, Ashland, Ayer - except W. of Greenville Branch of Boston & Maine RR, Bedford, Belmont, Billerica, Boxboro, Burlington, Cambridge, Carlisle, Chelmsford, Concord, Dracut, Dunstable, Everett, Framingham, Hudson, Holliston, Hopkinton, Lexington, Lincoln, Littleton, Lowell, Malden, Marlboro, Maynard, Medford, Melrose, Natick, Newton, North Reading, Pepperell, Reading, Sherborn, Somerville, Stoneham, Stow, Sudbury, Tewksbury, Tyngsboro, Wakefield, Waltham, Watertown, Wayland, Westford, Wilmington, Winchester, Woburn); NORFOLK (Bellingham, Braintree, Brookline, Canton, Cohasset, Dedham, Dover,Foxboro, Franklin, Medfield, Medway, Millis, Milton, Needham, Norfolk, Norwood, Plainville, Quincy, Sharon, Walpole, Wellesley, Westwood, Weymouth, Wrentham); PLYMOUTH (Hingham, Hull, Scituate); SUFFOLK

	Rates	Fringes
PLUMBER	$ 56.69	29.93

PLUM0051-005 09/01/2018

BARNSTABLE; BRISTOL; DUKES; NANTUCKET; NORFOLK (Avon, Holbrook, Randolph, Stoughton) PLYMOUTH(Remainder of County)

	Rates	Fringes
Plumbers and Pipefitters	$ 42.04	29.91

---

* PLUM0537-001 03/01/2021

MIDDLESEX (Arlington, Cambridge, Everett, Malden, Medford, Melrose, Reading, Wakefield, Winchester and Woburn); NORFOLK (Bellingham, Braintree, Brookline, Canton Cashasset, Dedham, Foxboro, Franklin, Millis, Milton, Sharon, Walpole, Westwood, and Wrenthan); PLYMOUTH (Hingham, Hull, Scituate); ESSEX (Ames, Andover, Beverly, Boxford, Byfield, Danvers, Essex, Georgetown, Gloucester, Groveland, Hamilton, Haverhill, Ipswich, Lawrence,Lynn, Lynnfield, Manchester, Marblehead, Merrimac, Methuem, Middleton, Nahant, Newbury, Newburyport, North Andover, Peabody, Rockport, Rowley, Salem, Salisbury, Saugus, Swampscott, Topsfieild, Wenham, West Newbury)

	Rates	Fringes
PIPEFITTER	$ 52.75	34.97

TEAM0379-001 08/01/2020

	Rates	Fringes
Truck drivers:		
Group 1	$ 34.98	26.6325+A+B
Group 2	$ 35.15	26.6325+A+B
Group 3	$ 35.22	26.6325+A+B
Group 4	$ 34.44	26.6325+A+B
Group 5	$ 35.44	26.6325+A+B
Group 6	$ 35.73	26.6325+A+B
Group 7	$ 36.02	26.6325+A+B

POWER TRUCKS $.25 DIFFERENTIAL BY AXLE
TUNNEL WORK (UNDERGROUND ONLY) $.40 DIFFERENTIAL BY AXLE
HAZARDOUS MATERIALS (IN HOT ZONE ONLY) $2.00 PREMIUM

TRUCK DRIVERS CLASSIFICATIONS

Group 1: Station wagons; panel trucks; and pickup trucks

Group 2: Two axle equipment; & forklift operator

Group 3: Three axle equipment and tireman

Group 4: Four and Five Axle equipment

Group 5: Specialized earth moving equipment under 35 tons other than conventional type trucks; low bed; vachual; mechanics, paving restoration equipment

Group 6: Specialized earth moving equipment over 35 tons

Group 7: Trailers for earth moving equipment (double hookup)

FOOTNOTES:

A. PAID HOLIDAYS: New Year's Day, Washington's Birthday, Memorial Day, Independence Day, Labor Day, Patriot's Day, Columbus Day, Veteran's Day, Thanksgiving Day and Christmas Day

B. PAID VACATION: Employees with 4 months to 1 year of service receive 1/2 day's pay per month; 1 week vacation for 1 - 5 years of service; 2 weeks vacation for 5 - 10 years of service; and 3 weeks vacation for more than 10

years of service

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

==========

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

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

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

Union Rate Identifiers

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

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

Survey Rate Identifiers

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

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

Union Average Rate Identifiers

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

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

WAGE DETERMINATION APPEALS PROCESS

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

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

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

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

Branch of Construction Wage Determinations

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

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

Wage and Hour Administrator
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

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

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

Administrative Review Board
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

4.) All decisions by the Administrative Review Board are final.

==========

END OF GENERAL DECISION"

CHARLES D. BAKER
Governor

KARYN E. POLITO
Lt. Governor

THE COMMONWEALTH OF MASSACHUSETTS
EXECUTIVE OFFICE OF LABOR AND WORKFORCE DEVELOPMENT
DEPARTMENT OF LABOR STANDARDS

Prevailing Wage Rates

As determined by the Director under the provisions of the Massachusetts General Laws, Chapter 149, Sections 26 to 27H

ROSALIN ACOSTA
Secretary
MICHAEL FLANAGAN
Director

Awarding Authority: Town of Nantucket

Contract Number: 360-2001 **City/Town:** NANTUCKET

Description of Work: Pump Station Force Main No.3 - Install sewer force main, water main, gravity sewer main, stormwater improvements & appurtenances; temporary water/sewer bypass systems; restoration work & paving

Job Location: Sea St through S. Shore Rd (Multiple Streets)

Information about Prevailing Wage Schedules for Awarding Authorities and Contractors

- This wage schedule applies only to the specific project referenced at the top of this page and uniquely identified by the "Wage Request Number" on all pages of this schedule.
- An Awarding Authority must request an updated wage schedule from the Department of Labor Standards ("DLS") if it has not opened bids or selected a contractor within 90 days of the date of issuance of the wage schedule. For CM AT RISK projects (bid pursuant to G.L. c.149A), the earlier of: (a) the execution date of the GMP Amendment, or (b) the bid for the first construction scope of work must be within 90-days of the wage schedule issuance date.
- The wage schedule shall be incorporated in any advertisement or call for bids for the project as required by M.G.L. c. 149, § 27. The wage schedule shall be made a part of the contract awarded for the project. The wage schedule must be posted in a conspicuous place at the work site for the life of the project in accordance with M.G.L. c. 149 § 27. The wages listed on the wage schedule must be paid to employees performing construction work on the project whether they are employed by the prime contractor, a filed sub-bidder, or any sub-contractor.
- All apprentices working on the project are required to be registered with the Massachusetts Department of Labor Standards, Division of Apprentice Standards (DLS/DAS). Apprentice must keep his/her apprentice identification card on his/her person during all work hours on the project. An apprentice registered with DAS may be paid the lower apprentice wage rate at the applicable step as provided on the prevailing wage schedule. **Any apprentice not registered with DLS/DAS regardless of whether or not they are registered with any other federal, state, local, or private agency must be paid the journeyworker's rate for the trade.**
- The wage rates will remain in effect for the duration of the project, except in the case of multi-year public construction projects. For construction projects lasting longer than one year, awarding authorities must request an updated wage schedule. Awarding authorities are required to request these updates no later than two weeks before the anniversary of the date the contract was executed by the awarding authority and the general contractor. For multi-year CM AT RISK projects, awarding authority must request an annual update no later than two weeks before the anniversary date, determined as the earlier of: (a) the execution date of the GMP Amendment, or (b) the execution date of the first amendment to permit procurement of construction services. Contractors are required to obtain the wage schedules from awarding authorities, and to pay no less than these rates to covered workers. The annual update requirement is not applicable to 27F "rental of equipment" contracts.
- Every contractor or subcontractor which performs construction work on the project is required to submit weekly payroll reports and a Statement of Compliance directly to the awarding authority by mail or email and keep them on file for three years. Each weekly payroll report must contain: the employee's name, address, occupational classification, hours worked, and wages paid. Do not submit weekly payroll reports to DLS. A sample of a payroll reporting form may be obtained at http://www.mass.gov/dols/pw.
- Contractors with questions about the wage rates or classifications included on the wage schedule have an affirmative obligation to inquire with DLS at (617) 626-6953.
- Employees not receiving the prevailing wage rate set forth on the wage schedule may report the violation to the Fair Labor Division of the office of the Attorney General at (617) 727-3465.
- Failure of a contractor or subcontractor to pay the prevailing wage rates listed on the wage schedule to all employees who perform construction work on the project is a violation of the law and subjects the contractor or subcontractor to civil and criminal penalties.

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
Construction						
(2 AXLE) DRIVER - EQUIPMENT *TEAMSTERS JOINT COUNCIL NO. 10 ZONE B*	06/01/2021	$35.95	$12.91	$14.82	$0.00	$63.68
	08/01/2021	$35.95	$13.41	$14.82	$0.00	$64.18
	12/01/2021	$35.95	$13.41	$16.01	$0.00	$65.37
(3 AXLE) DRIVER - EQUIPMENT *TEAMSTERS JOINT COUNCIL NO. 10 ZONE B*	06/01/2021	$36.02	$12.91	$14.82	$0.00	$63.75
	08/01/2021	$36.02	$13.41	$14.82	$0.00	$64.25
	12/01/2021	$36.02	$13.41	$16.01	$0.00	$65.44
(4 & 5 AXLE) DRIVER - EQUIPMENT *TEAMSTERS JOINT COUNCIL NO. 10 ZONE B*	06/01/2021	$36.14	$12.91	$14.82	$0.00	$63.87
	08/01/2021	$36.14	$13.41	$14.82	$0.00	$64.37
	12/01/2021	$36.14	$13.41	$16.01	$0.00	$65.56
ADS/SUBMERSIBLE PILOT *PILE DRIVER LOCAL 56 (ZONE 1)*	08/01/2020	$103.05	$9.40	$23.12	$0.00	$135.57
For apprentice rates see "Apprentice- PILE DRIVER"						
AIR TRACK OPERATOR *LABORERS - ZONE 2*	06/01/2021	$35.75	$8.60	$16.64	$0.00	$60.99
	12/01/2021	$36.66	$8.60	$16.64	$0.00	$61.90
	06/01/2022	$37.56	$8.60	$16.64	$0.00	$62.80
	12/01/2022	$38.41	$8.60	$16.64	$0.00	$63.65
	06/01/2023	$39.31	$8.60	$16.64	$0.00	$64.55
	12/01/2023	$40.21	$8.60	$16.64	$0.00	$65.45
For apprentice rates see "Apprentice- LABORER"						
AIR TRACK OPERATOR (HEAVY & HIGHWAY) *LABORERS - ZONE 2 (HEAVY & HIGHWAY)*	06/01/2021	$35.75	$8.60	$16.64	$0.00	$60.99
	12/01/2021	$36.66	$8.60	$16.64	$0.00	$61.90
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"						
ASBESTOS WORKER (PIPES & TANKS) *HEAT & FROST INSULATORS LOCAL 6 (SOUTHERN MASS)*	12/01/2020	$38.10	$12.80	$9.45	$0.00	$60.35
ASPHALT RAKER *LABORERS - ZONE 2*	06/01/2021	$35.25	$8.60	$16.64	$0.00	$60.49
	12/01/2021	$36.16	$8.60	$16.64	$0.00	$61.40
	06/01/2022	$37.06	$8.60	$16.64	$0.00	$62.30
	12/01/2022	$37.91	$8.60	$16.64	$0.00	$63.15
	06/01/2023	$38.81	$8.60	$16.64	$0.00	$64.05
	12/01/2023	$39.71	$8.60	$16.64	$0.00	$64.95
For apprentice rates see "Apprentice- LABORER"						
ASPHALT RAKER (HEAVY & HIGHWAY) *LABORERS - ZONE 2 (HEAVY & HIGHWAY)*	06/01/2021	$35.25	$8.60	$16.64	$0.00	$60.49
	12/01/2021	$36.16	$8.60	$16.64	$0.00	$61.40
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"						
ASPHALT/CONCRETE/CRUSHER PLANT-ON SITE *OPERATING ENGINEERS LOCAL 4*	06/01/2021	$50.73	$13.75	$15.80	$0.00	$80.28
	12/01/2021	$51.88	$13.75	$15.80	$0.00	$81.43
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
BACKHOE/FRONT-END LOADER *OPERATING ENGINEERS LOCAL 4*	06/01/2021	$50.73	$13.75	$15.80	$0.00	$80.28
	12/01/2021	$51.88	$13.75	$15.80	$0.00	$81.43
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
BARCO-TYPE JUMPING TAMPER *LABORERS - ZONE 2*	06/01/2021	$35.25	$8.60	$16.64	$0.00	$60.49
	12/01/2021	$36.16	$8.60	$16.64	$0.00	$61.40
	06/01/2022	$37.06	$8.60	$16.64	$0.00	$62.30
	12/01/2022	$37.91	$8.60	$16.64	$0.00	$63.15
	06/01/2023	$38.81	$8.60	$16.64	$0.00	$64.05
	12/01/2023	$39.71	$8.60	$16.64	$0.00	$64.95

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
For apprentice rates see "Apprentice- LABORER"						
BLOCK PAVER, RAMMER / CURB SETTER *LABORERS - ZONE 2*	06/01/2021	$35.75	$8.60	$16.64	$0.00	$60.99
	12/01/2021	$36.66	$8.60	$16.64	$0.00	$61.90
	06/01/2022	$37.56	$8.60	$16.64	$0.00	$62.80
	12/01/2022	$38.41	$8.60	$16.64	$0.00	$63.65
	06/01/2023	$39.31	$8.60	$16.64	$0.00	$64.55
	12/01/2023	$40.21	$8.60	$16.64	$0.00	$65.45
For apprentice rates see "Apprentice- LABORER"						
BLOCK PAVER, RAMMER / CURB SETTER (HEAVY & HIGHWAY) *LABORERS - ZONE 2 (HEAVY & HIGHWAY)*	06/01/2021	$35.75	$8.60	$16.64	$0.00	$60.99
	12/01/2021	$36.66	$8.60	$16.64	$0.00	$61.90
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"						
BOILER MAKER *BOILERMAKERS LOCAL 29*	01/01/2020	$46.10	$7.07	$17.98	$0.00	$71.15

Apprentice - *BOILERMAKER - Local 29*

Effective Date - 01/01/2020

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	65	$29.97	$7.07	$11.69	$0.00	$48.73
2	65	$29.97	$7.07	$11.69	$0.00	$48.73
3	70	$32.27	$7.07	$12.59	$0.00	$51.93
4	75	$34.58	$7.07	$13.49	$0.00	$55.14
5	80	$36.88	$7.07	$14.38	$0.00	$58.33
6	85	$39.19	$7.07	$15.29	$0.00	$61.55
7	90	$41.49	$7.07	$16.18	$0.00	$64.74
8	95	$43.80	$7.07	$17.09	$0.00	$67.96

Notes:

Apprentice to Journeyworker Ratio:1:4

BRICK/STONE/ARTIFICIAL MASONRY (INCL. MASONRY WATERPROOFING) *BRICKLAYERS LOCAL 3 (NEW BEDFORD)*	02/01/2021	$55.75	$11.39	$22.09	$0.00	$89.23
	08/01/2021	$57.15	$11.39	$22.25	$0.00	$90.79
	02/01/2022	$57.74	$11.39	$22.25	$0.00	$91.38

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *BRICK/PLASTER/CEMENT MASON - Local 3 New Bedford*

Effective Date - 02/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$27.88	$11.39	$22.09	$0.00	$61.36
2	60	$33.45	$11.39	$22.09	$0.00	$66.93
3	70	$39.03	$11.39	$22.09	$0.00	$72.51
4	80	$44.60	$11.39	$22.09	$0.00	$78.08
5	90	$50.18	$11.39	$22.09	$0.00	$83.66

Effective Date - 08/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$28.58	$11.39	$22.25	$0.00	$62.22
2	60	$34.29	$11.39	$22.25	$0.00	$67.93
3	70	$40.01	$11.39	$22.25	$0.00	$73.65
4	80	$45.72	$11.39	$22.25	$0.00	$79.36
5	90	$51.44	$11.39	$22.25	$0.00	$85.08

Notes:

Apprentice to Journeyworker Ratio:1:5

BULLDOZER/GRADER/SCRAPER *OPERATING ENGINEERS LOCAL 4*	06/01/2021	$50.19	$13.75	$15.80	$0.00	$79.74
	12/01/2021	$51.33	$13.75	$15.80	$0.00	$80.88
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
CAISSON & UNDERPINNING BOTTOM MAN *LABORERS - FOUNDATION AND MARINE*	06/01/2021	$41.82	$8.60	$17.72	$0.00	$68.14
	12/01/2021	$42.83	$8.60	$17.72	$0.00	$69.15
For apprentice rates see "Apprentice- LABORER"						
CAISSON & UNDERPINNING LABORER *LABORERS - FOUNDATION AND MARINE*	06/01/2021	$40.67	$8.60	$17.72	$0.00	$66.99
	12/01/2021	$41.68	$8.60	$17.72	$0.00	$68.00
For apprentice rates see "Apprentice- LABORER"						
CAISSON & UNDERPINNING TOP MAN *LABORERS - FOUNDATION AND MARINE*	06/01/2021	$40.67	$8.60	$17.72	$0.00	$66.99
	12/01/2021	$41.68	$8.60	$17.72	$0.00	$68.00
For apprentice rates see "Apprentice- LABORER"						
CARBIDE CORE DRILL OPERATOR *LABORERS - ZONE 2*	06/01/2021	$35.25	$8.60	$16.64	$0.00	$60.49
	12/01/2021	$36.16	$8.60	$16.64	$0.00	$61.40
	06/01/2022	$37.06	$8.60	$16.64	$0.00	$62.30
	12/01/2022	$37.91	$8.60	$16.64	$0.00	$63.15
	06/01/2023	$38.81	$8.60	$16.64	$0.00	$64.05
	12/01/2023	$39.71	$8.60	$16.64	$0.00	$64.95
For apprentice rates see "Apprentice- LABORER"						
CARPENTER *CARPENTERS -ZONE 1 (Metro Boston)*	03/01/2021	$52.38	$9.40	$18.95	$0.00	$80.73
	09/01/2021	$53.28	$9.40	$18.95	$0.00	$81.63
	03/01/2022	$54.13	$9.40	$18.95	$0.00	$82.48
	09/01/2022	$55.03	$9.40	$18.95	$0.00	$83.38
	03/01/2023	$55.88	$9.40	$18.95	$0.00	$84.23

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *CARPENTER - Zone 1 Metro Boston*

Effective Date - 03/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$26.19	$9.40	$1.73	$0.00	$37.32
2	60	$31.43	$9.40	$1.73	$0.00	$42.56
3	70	$36.67	$9.40	$13.76	$0.00	$59.83
4	75	$39.29	$9.40	$13.76	$0.00	$62.45
5	80	$41.90	$9.40	$15.49	$0.00	$66.79
6	80	$41.90	$9.40	$15.49	$0.00	$66.79
7	90	$47.14	$9.40	$17.22	$0.00	$73.76
8	90	$47.14	$9.40	$17.22	$0.00	$73.76

Effective Date - 09/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$26.64	$9.40	$1.73	$0.00	$37.77
2	60	$31.97	$9.40	$1.73	$0.00	$43.10
3	70	$37.30	$9.40	$13.76	$0.00	$60.46
4	75	$39.96	$9.40	$13.76	$0.00	$63.12
5	80	$42.62	$9.40	$15.49	$0.00	$67.51
6	80	$42.62	$9.40	$15.49	$0.00	$67.51
7	90	$47.95	$9.40	$17.22	$0.00	$74.57
8	90	$47.95	$9.40	$17.22	$0.00	$74.57

Notes:

% Indentured After 10/1/17; 45/45/55/55/70/70/80/80
Step 1&2 $34.70/ 3&4 $41.61/ 5&6 $61.56/ 7&8 $68.52

Apprentice to Journeyworker Ratio:1:5

CARPENTER WOOD FRAME *CARPENTERS-ZONE 3 (Wood Frame)*	04/01/2021	$23.16	$7.21	$4.80	$0.00	$35.17
	04/01/2022	$23.66	$7.21	$4.80	$0.00	$35.67
	04/01/2023	$24.16	$7.21	$4.80	$0.00	$36.17

All Aspects of New Wood Frame Work

Apprentice - *CARPENTER (Wood Frame) - Zone 3*

Effective Date - 04/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	$13.90	$7.21	$0.00	$0.00	$21.11
2	60	$13.90	$7.21	$0.00	$0.00	$21.11
3	65	$15.05	$7.21	$0.00	$0.00	$22.26
4	70	$16.21	$7.21	$0.00	$0.00	$23.42
5	75	$17.37	$7.21	$3.80	$0.00	$28.38
6	80	$18.53	$7.21	$3.80	$0.00	$29.54
7	85	$19.69	$7.21	$3.80	$0.00	$30.70
8	90	$20.84	$7.21	$3.80	$0.00	$31.85

Effective Date - 04/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	$14.20	$7.21	$0.00	$0.00	$21.41
2	60	$14.20	$7.21	$0.00	$0.00	$21.41
3	65	$15.38	$7.21	$0.00	$0.00	$22.59
4	70	$16.56	$7.21	$0.00	$0.00	$23.77
5	75	$17.75	$7.21	$3.80	$0.00	$28.76
6	80	$18.93	$7.21	$3.80	$0.00	$29.94
7	85	$20.11	$7.21	$3.80	$0.00	$31.12
8	90	$21.29	$7.21	$3.80	$0.00	$32.30

Notes:

% Indentured After 10/1/17; 45/45/55/55/70/70/80/80
Step 1&2 $17.63/ 3&4 $19.95/ 5&6 $27.22/ 7&8 $29.54

Apprentice to Journeyworker Ratio:1:5

CEMENT MASONRY/PLASTERING *BRICKLAYERS LOCAL 3 (NEW BEDFORD)*	01/01/2020	$49.07	$12.75	$22.41	$0.62	$84.85

Apprentice - *CEMENT MASONRY/PLASTERING - Eastern Mass (New Bedford)*

Effective Date - 01/01/2020

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$24.54	$12.75	$15.41	$0.00	$52.70
2	60	$29.44	$12.75	$17.41	$0.62	$60.22
3	65	$31.90	$12.75	$18.41	$0.62	$63.68
4	70	$34.35	$12.75	$19.41	$0.62	$67.13
5	75	$36.80	$12.75	$20.41	$0.62	$70.58
6	80	$39.26	$12.75	$21.41	$0.62	$74.04
7	90	$44.16	$12.75	$22.41	$0.62	$79.94

Notes:

Steps 3,4 are 500 hrs. All other steps are 1,000 hrs.

Apprentice to Journeyworker Ratio:1:3

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
CHAIN SAW OPERATOR *LABORERS - ZONE 2*	06/01/2021	$35.25	$8.60	$16.64	$0.00	$60.49
	12/01/2021	$36.16	$8.60	$16.64	$0.00	$61.40
	06/01/2022	$37.06	$8.60	$16.64	$0.00	$62.30
	12/01/2022	$37.91	$8.60	$16.64	$0.00	$63.15
	06/01/2023	$38.81	$8.60	$16.64	$0.00	$64.05
	12/01/2023	$39.71	$8.60	$16.64	$0.00	$64.95
For apprentice rates see "Apprentice- LABORER"						
CLAM SHELLS/SLURRY BUCKETS/HEADING MACHINES *OPERATING ENGINEERS LOCAL 4*	06/01/2021	$51.73	$13.75	$15.80	$0.00	$81.28
	12/01/2021	$52.88	$13.75	$15.80	$0.00	$82.43
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
COMPRESSOR OPERATOR *OPERATING ENGINEERS LOCAL 4*	06/01/2021	$33.40	$13.75	$15.80	$0.00	$62.95
	12/01/2021	$34.19	$13.75	$15.80	$0.00	$63.74
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
DELEADER (BRIDGE) *PAINTERS LOCAL 35 - ZONE 2*	01/01/2021	$52.06	$8.25	$22.75	$0.00	$83.06

Apprentice - *PAINTER Local 35 - BRIDGES/TANKS*

Effective Date - 01/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$26.03	$8.25	$0.00	$0.00	$34.28
2	55	$28.63	$8.25	$6.16	$0.00	$43.04
3	60	$31.24	$8.25	$6.72	$0.00	$46.21
4	65	$33.84	$8.25	$7.28	$0.00	$49.37
5	70	$36.44	$8.25	$19.39	$0.00	$64.08
6	75	$39.05	$8.25	$19.95	$0.00	$67.25
7	80	$41.65	$8.25	$20.51	$0.00	$70.41
8	90	$46.85	$8.25	$21.63	$0.00	$76.73

Notes:

Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

DEMO: ADZEMAN *LABORERS - ZONE 2*	06/01/2021	$40.82	$8.60	$17.57	$0.00	$66.99
	12/01/2021	$41.83	$8.60	$17.57	$0.00	$68.00
	06/01/2022	$42.83	$8.60	$17.57	$0.00	$69.00
	12/01/2022	$43.83	$8.60	$17.57	$0.00	$70.00
	06/01/2023	$44.83	$8.60	$17.57	$0.00	$71.00
	12/01/2023	$46.08	$8.60	$17.57	$0.00	$72.25
For apprentice rates see "Apprentice- LABORER"						
DEMO: BACKHOE/LOADER/HAMMER OPERATOR *LABORERS - ZONE 2*	06/01/2021	$41.82	$8.60	$17.57	$0.00	$67.99
	12/01/2021	$42.83	$8.60	$17.57	$0.00	$69.00
	06/01/2022	$43.83	$8.60	$17.57	$0.00	$70.00
	12/01/2022	$44.83	$8.60	$17.57	$0.00	$71.00
	06/01/2023	$45.83	$8.60	$17.57	$0.00	$72.00
	12/01/2023	$47.08	$8.60	$17.57	$0.00	$73.25
For apprentice rates see "Apprentice- LABORER"						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
DEMO: BURNERS *LABORERS - ZONE 2*	06/01/2021	$41.57	$8.60	$17.57	$0.00	$67.74
	12/01/2021	$42.58	$8.60	$17.57	$0.00	$68.75
	06/01/2022	$43.58	$8.60	$17.57	$0.00	$69.75
	12/01/2022	$44.58	$8.60	$17.57	$0.00	$70.75
	06/01/2023	$45.58	$8.60	$17.57	$0.00	$71.75
	12/01/2023	$46.83	$8.60	$17.57	$0.00	$73.00
For apprentice rates see "Apprentice- LABORER"						
DEMO: CONCRETE CUTTER/SAWYER *LABORERS - ZONE 2*	06/01/2021	$41.82	$8.60	$17.57	$0.00	$67.99
	12/01/2021	$42.83	$8.60	$17.57	$0.00	$69.00
	06/01/2022	$43.83	$8.60	$17.57	$0.00	$70.00
	12/01/2022	$44.83	$8.60	$17.57	$0.00	$71.00
	06/01/2023	$45.83	$8.60	$17.57	$0.00	$72.00
	12/01/2023	$47.08	$8.60	$17.57	$0.00	$73.25
For apprentice rates see "Apprentice- LABORER"						
DEMO: JACKHAMMER OPERATOR *LABORERS - ZONE 2*	06/01/2021	$41.57	$8.60	$17.57	$0.00	$67.74
	12/01/2021	$42.58	$8.60	$17.57	$0.00	$68.75
	06/01/2022	$43.58	$8.60	$17.57	$0.00	$69.75
	12/01/2022	$44.58	$8.60	$17.57	$0.00	$70.75
	06/01/2023	$45.58	$8.60	$17.57	$0.00	$71.75
	12/01/2023	$46.83	$8.60	$17.57	$0.00	$73.00
For apprentice rates see "Apprentice- LABORER"						
DEMO: WRECKING LABORER *LABORERS - ZONE 2*	06/01/2021	$40.82	$8.60	$17.57	$0.00	$66.99
	12/01/2021	$41.83	$8.60	$17.57	$0.00	$68.00
	06/01/2022	$42.83	$8.60	$17.57	$0.00	$69.00
	12/01/2022	$43.83	$8.60	$17.57	$0.00	$70.00
	06/01/2023	$44.83	$8.60	$17.57	$0.00	$71.00
	12/01/2023	$46.08	$8.60	$17.57	$0.00	$72.25
For apprentice rates see "Apprentice- LABORER"						
DIRECTIONAL DRILL MACHINE OPERATOR *OPERATING ENGINEERS LOCAL 4*	06/01/2021	$50.19	$13.75	$15.80	$0.00	$79.74
	12/01/2021	$51.33	$13.75	$15.80	$0.00	$80.88
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
DIVER *PILE DRIVER LOCAL 56 (ZONE 1)*	08/01/2020	$68.70	$9.40	$23.12	$0.00	$101.22
For apprentice rates see "Apprentice- PILE DRIVER"						
DIVER TENDER *PILE DRIVER LOCAL 56 (ZONE 1)*	08/01/2020	$49.07	$9.40	$23.12	$0.00	$81.59
For apprentice rates see "Apprentice- PILE DRIVER"						
DIVER TENDER (EFFLUENT) *PILE DRIVER LOCAL 56 (ZONE 1)*	08/01/2020	$73.60	$9.40	$23.12	$0.00	$106.12
For apprentice rates see "Apprentice- PILE DRIVER"						
DIVER/SLURRY (EFFLUENT) *PILE DRIVER LOCAL 56 (ZONE 1)*	08/01/2020	$103.05	$9.40	$23.12	$0.00	$135.57
For apprentice rates see "Apprentice- PILE DRIVER"						
DRAWBRIDGE OPERATOR (Construction) *DRAWBRIDGE - SEIU LOCAL 888*	07/01/2020	$26.77	$6.67	$3.93	$0.16	$37.53
ELECTRICIAN *ELECTRICIANS LOCAL 223*	09/01/2020	$43.66	$10.90	$14.66	$0.00	$69.22

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *ELECTRICIAN - Local 223*

Effective Date - 09/01/2020

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	40	$17.46	$10.90	$0.52	$0.00	$28.88
2	45	$19.65	$10.90	$0.59	$0.00	$31.14
3	50	$21.83	$10.90	$0.65	$0.00	$33.38
4	55	$24.01	$10.90	$6.28	$0.00	$41.19
5	60	$26.20	$10.90	$6.77	$0.00	$43.87
6	65	$28.38	$10.90	$7.24	$0.00	$46.52
7	70	$30.56	$10.90	$7.73	$0.00	$49.19
8	75	$32.75	$10.90	$8.21	$0.00	$51.86

Notes:

Apprentice to Journeyworker Ratio:2:3***

ELEVATOR CONSTRUCTOR *ELEVATOR CONSTRUCTORS LOCAL 4*	01/01/2021	$63.47	$15.88	$19.31	$0.00	$98.66
	01/01/2022	$65.62	$16.03	$20.21	$0.00	$101.86

Apprentice - *ELEVATOR CONSTRUCTOR - Local 4*

Effective Date - 01/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$31.74	$15.88	$0.00	$0.00	$47.62
2	55	$34.91	$15.88	$19.31	$0.00	$70.10
3	65	$41.26	$15.88	$19.31	$0.00	$76.45
4	70	$44.43	$15.88	$19.31	$0.00	$79.62
5	80	$50.78	$15.88	$19.31	$0.00	$85.97

Effective Date - 01/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$32.81	$16.03	$0.00	$0.00	$48.84
2	55	$36.09	$16.03	$20.21	$0.00	$72.33
3	65	$42.65	$16.03	$20.21	$0.00	$78.89
4	70	$45.93	$16.03	$20.21	$0.00	$82.17
5	80	$52.50	$16.03	$20.21	$0.00	$88.74

Notes:

Steps 1-2 are 6 mos.; Steps 3-5 are 1 year

Apprentice to Journeyworker Ratio:1:1

ELEVATOR CONSTRUCTOR HELPER *ELEVATOR CONSTRUCTORS LOCAL 4*	01/01/2021	$44.43	$15.88	$19.31	$0.00	$79.62
	01/01/2022	$45.93	$16.03	$20.21	$0.00	$82.17
For apprentice rates see "Apprentice - ELEVATOR CONSTRUCTOR"						
FENCE & GUARD RAIL ERECTOR (HEAVY & HIGHWAY) *LABORERS - ZONE 2 (HEAVY & HIGHWAY)*	06/01/2021	$35.25	$8.60	$16.64	$0.00	$60.49
	12/01/2021	$36.16	$8.60	$16.64	$0.00	$61.40

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)						
FIELD ENG.INST.PERSON-BLDG,SITE,HVY/HWY *OPERATING ENGINEERS LOCAL 4*	05/01/2021	$45.88	$13.50	$15.70	$0.00	$75.08
	11/01/2021	$46.88	$13.50	$15.70	$0.00	$76.08
	05/01/2022	$48.03	$13.50	$15.70	$0.00	$77.23
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
FIELD ENG.PARTY CHIEF-BLDG,SITE,HVY/HWY *OPERATING ENGINEERS LOCAL 4*	05/01/2021	$47.40	$13.50	$15.70	$0.00	$76.60
	11/01/2021	$48.41	$13.50	$15.70	$0.00	$77.61
	05/01/2022	$49.57	$13.50	$15.70	$0.00	$78.77
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
FIELD ENG.ROD PERSON-BLDG,SITE,HVY/HWY *OPERATING ENGINEERS LOCAL 4*	05/01/2021	$22.91	$13.50	$15.70	$0.00	$52.11
	11/01/2021	$23.51	$13.50	$15.70	$0.00	$52.71
	05/01/2022	$24.18	$13.50	$15.70	$0.00	$53.38
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
FIRE ALARM INSTALLER *ELECTRICIANS LOCAL 223*	09/01/2020	$43.66	$10.90	$14.66	$0.00	$69.22
For apprentice rates see "Apprentice- ELECTRICIAN"						
FIRE ALARM REPAIR / MAINTENANCE / COMMISSIONING*ELECTRICIANS LOCAL 223*	09/01/2020	$36.86	$10.90	$12.45	$0.00	$60.21
For apprentice rates see "Apprentice- TELECOMMUNICATIONS TECHNICIAN"						
FIREMAN (ASST. ENGINEER) *OPERATING ENGINEERS LOCAL 4*	06/01/2021	$41.31	$13.75	$15.80	$0.00	$70.86
	12/01/2021	$42.26	$13.75	$15.80	$0.00	$71.81
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
FLAGGER & SIGNALER (HEAVY & HIGHWAY) *LABORERS - ZONE 2 (HEAVY & HIGHWAY)*	06/01/2021	$24.50	$8.60	$16.64	$0.00	$49.74
	12/01/2021	$24.50	$8.60	$16.64	$0.00	$49.74
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)						
FLOORCOVERER *FLOORCOVERERS LOCAL 2168 ZONE I*	03/01/2021	$48.59	$9.40	$19.25	$0.00	$77.24
	09/01/2021	$49.39	$9.40	$19.25	$0.00	$78.04
	03/01/2022	$50.19	$9.40	$19.25	$0.00	$78.84

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *FLOORCOVERER - Local 2168 Zone I*

Effective Date - 03/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$24.30	$9.40	$1.79	$0.00	$35.49
2	55	$26.72	$9.40	$1.79	$0.00	$37.91
3	60	$29.15	$9.40	$13.88	$0.00	$52.43
4	65	$31.58	$9.40	$13.88	$0.00	$54.86
5	70	$34.01	$9.40	$15.67	$0.00	$59.08
6	75	$36.44	$9.40	$15.67	$0.00	$61.51
7	80	$38.87	$9.40	$17.46	$0.00	$65.73
8	85	$41.30	$9.40	$17.46	$0.00	$68.16

Effective Date - 09/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$24.70	$9.40	$1.79	$0.00	$35.89
2	55	$27.16	$9.40	$1.79	$0.00	$38.35
3	60	$29.63	$9.40	$13.88	$0.00	$52.91
4	65	$32.10	$9.40	$13.88	$0.00	$55.38
5	70	$34.57	$9.40	$15.67	$0.00	$59.64
6	75	$37.04	$9.40	$15.67	$0.00	$62.11
7	80	$39.51	$9.40	$17.46	$0.00	$66.37
8	85	$41.98	$9.40	$17.46	$0.00	$68.84

Notes: Steps are 750 hrs.
% After 09/1/17; 45/45/55/55/70/70/80/80 (1500hr Steps)
Step 1&2 $33.03/ 3&4 $39.64/ 5&6 $59.08/ 7&8 $65.73

Apprentice to Journeyworker Ratio:1:1

FORK LIFT/CHERRY PICKER *OPERATING ENGINEERS LOCAL 4*	06/01/2021	$50.73	$13.75	$15.80	$0.00	$80.28
	12/01/2021	$51.88	$13.75	$15.80	$0.00	$81.43
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
GENERATOR/LIGHTING PLANT/HEATERS *OPERATING ENGINEERS LOCAL 4*	06/01/2021	$33.40	$13.75	$15.80	$0.00	$62.95
	12/01/2021	$34.19	$13.75	$15.80	$0.00	$63.74
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
GLAZIER (GLASS PLANK/AIR BARRIER/INTERIOR SYSTEMS) *GLAZIERS LOCAL 1333*	06/01/2020	$39.18	$10.80	$10.45	$0.00	$60.43

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *GLAZIER - Local 1333*

Effective Date - 06/01/2020

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$19.59	$10.80	$1.80	$0.00	$32.19
2	56	$22.04	$10.80	$1.80	$0.00	$34.64
3	63	$24.49	$10.80	$2.45	$0.00	$37.74
4	69	$26.94	$10.80	$2.45	$0.00	$40.19
5	75	$29.39	$10.80	$3.15	$0.00	$43.34
6	81	$31.83	$10.80	$3.15	$0.00	$45.78
7	88	$34.28	$10.80	$10.45	$0.00	$55.53
8	94	$36.73	$10.80	$10.45	$0.00	$57.98

Notes:

Apprentice to Journeyworker Ratio:1:3

HOISTING ENGINEER/CRANES/GRADALLS *OPERATING ENGINEERS LOCAL 4*	06/01/2021	$50.73	$13.75	$15.80	$0.00	$80.28
	12/01/2021	$51.88	$13.75	$15.80	$0.00	$81.43

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *OPERATING ENGINEERS - Local 4*

Effective Date - 06/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	55	$27.90	$13.75	$0.00	$0.00	$41.65
2	60	$30.44	$13.75	$15.80	$0.00	$59.99
3	65	$32.97	$13.75	$15.80	$0.00	$62.52
4	70	$35.51	$13.75	$15.80	$0.00	$65.06
5	75	$38.05	$13.75	$15.80	$0.00	$67.60
6	80	$40.58	$13.75	$15.80	$0.00	$70.13
7	85	$43.12	$13.75	$15.80	$0.00	$72.67
8	90	$45.66	$13.75	$15.80	$0.00	$75.21

Effective Date - 12/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	55	$28.53	$13.75	$0.00	$0.00	$42.28
2	60	$31.13	$13.75	$15.80	$0.00	$60.68
3	65	$33.72	$13.75	$15.80	$0.00	$63.27
4	70	$36.32	$13.75	$15.80	$0.00	$65.87
5	75	$38.91	$13.75	$15.80	$0.00	$68.46
6	80	$41.50	$13.75	$15.80	$0.00	$71.05
7	85	$44.10	$13.75	$15.80	$0.00	$73.65
8	90	$46.69	$13.75	$15.80	$0.00	$76.24

Notes:

Apprentice to Journeyworker Ratio:1:6

HVAC (DUCTWORK) *SHEETMETAL WORKERS LOCAL 17 - B*	07/01/2021	$36.91	$13.65	$17.15	$2.03	$69.74
	10/01/2021	$37.91	$13.65	$17.15	$2.06	$70.77
	04/01/2022	$38.91	$13.65	$17.15	$2.09	$71.80
For apprentice rates see "Apprentice- SHEET METAL WORKER"						
HVAC (ELECTRICAL CONTROLS) *ELECTRICIANS LOCAL 223*	09/01/2020	$43.66	$10.90	$14.66	$0.00	$69.22
For apprentice rates see "Apprentice- ELECTRICIAN"						
HVAC (TESTING AND BALANCING - AIR) *SHEETMETAL WORKERS LOCAL 17 - B*	07/01/2021	$36.91	$13.65	$17.15	$2.03	$69.74
	10/01/2021	$37.91	$13.65	$17.15	$2.06	$70.77
	04/01/2022	$38.91	$13.65	$17.15	$2.09	$71.80
For apprentice rates see "Apprentice- SHEET METAL WORKER"						
HVAC (TESTING AND BALANCING -WATER) *PLUMBERS & PIPEFITTERS LOCAL 51*	08/31/2020	$44.69	$10.15	$19.80	$0.00	$74.64
	08/30/2021	$46.69	$10.15	$19.80	$0.00	$76.64
For apprentice rates see "Apprentice- PIPEFITTER" or "PLUMBER/PIPEFITTER"						
HVAC MECHANIC *PLUMBERS & PIPEFITTERS LOCAL 51*	08/31/2020	$44.69	$10.15	$19.80	$0.00	$74.64
	08/30/2021	$46.69	$10.15	$19.80	$0.00	$76.64
For apprentice rates see "Apprentice- PIPEFITTER" or "PLUMBER/PIPEFITTER"						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
HYDRAULIC DRILLS *LABORERS - ZONE 2*	06/01/2021	$35.75	$8.60	$16.64	$0.00	$60.99
	12/01/2021	$36.66	$8.60	$16.64	$0.00	$61.90
	06/01/2022	$37.56	$8.60	$16.64	$0.00	$62.80
	12/01/2022	$38.41	$8.60	$16.64	$0.00	$63.65
	06/01/2023	$39.31	$8.60	$16.64	$0.00	$64.55
	12/01/2023	$40.21	$8.60	$16.64	$0.00	$65.45
For apprentice rates see "Apprentice- LABORER"						
HYDRAULIC DRILLS (HEAVY & HIGHWAY) *LABORERS - ZONE 2 (HEAVY & HIGHWAY)*	06/01/2021	$35.75	$8.60	$16.64	$0.00	$60.99
	12/01/2021	$36.66	$8.60	$16.64	$0.00	$61.90
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"						
INSULATOR (PIPES & TANKS) *HEAT & FROST INSULATORS LOCAL 6 (SOUTHERN MASS)*	09/01/2020	$44.10	$13.80	$17.14	$0.00	$75.04
	09/01/2021	$46.50	$13.80	$17.14	$0.00	$77.44
	09/01/2022	$48.95	$13.80	$17.14	$0.00	$79.89

Apprentice - *ASBESTOS INSULATOR (Pipes & Tanks) - Local 6 Southern MA*

Effective Date - 09/01/2020

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$22.05	$13.80	$12.42	$0.00	$48.27
2	60	$26.46	$13.80	$13.36	$0.00	$53.62
3	70	$30.87	$13.80	$14.31	$0.00	$58.98
4	80	$35.28	$13.80	$15.25	$0.00	$64.33

Effective Date - 09/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$23.25	$13.80	$12.42	$0.00	$49.47
2	60	$27.90	$13.80	$13.36	$0.00	$55.06
3	70	$32.55	$13.80	$14.31	$0.00	$60.66
4	80	$37.20	$13.80	$15.25	$0.00	$66.25

Notes:

Steps are 1 year

Apprentice to Journeyworker Ratio:1:4

IRONWORKER/WELDER *IRONWORKERS LOCAL 37*	03/16/2021	$42.46	$7.70	$17.10	$0.00	$67.26

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *IRONWORKER - Local 37*

Effective Date - 03/16/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	70	$29.72	$7.70	$17.10	$0.00	$54.52
2	75	$31.85	$7.70	$17.10	$0.00	$56.65
3	80	$33.97	$7.70	$17.10	$0.00	$58.77
4	85	$36.09	$7.70	$17.10	$0.00	$60.89
5	90	$38.21	$7.70	$17.10	$0.00	$63.01
6	95	$40.34	$7.70	$17.10	$0.00	$65.14

Notes:

Apprentice to Journeyworker Ratio:1:4

JACKHAMMER & PAVING BREAKER OPERATOR *LABORERS - ZONE 2*	06/01/2021	$35.25	$8.60	$16.64	$0.00	$60.49
	12/01/2021	$36.16	$8.60	$16.64	$0.00	$61.40
	06/01/2022	$37.06	$8.60	$16.64	$0.00	$62.30
	12/01/2022	$37.91	$8.60	$16.64	$0.00	$63.15
	06/01/2023	$38.81	$8.60	$16.64	$0.00	$64.05
	12/01/2023	$39.71	$8.60	$16.64	$0.00	$64.95
For apprentice rates see "Apprentice- LABORER"						
LABORER *LABORERS - ZONE 2*	06/01/2021	$35.00	$8.60	$16.64	$0.00	$60.24
	12/01/2021	$35.91	$8.60	$16.64	$0.00	$61.15
	06/01/2022	$36.81	$8.60	$16.64	$0.00	$62.05
	12/01/2022	$37.66	$8.60	$16.64	$0.00	$62.90
	06/01/2023	$38.56	$8.60	$16.64	$0.00	$63.80
	12/01/2023	$39.46	$8.60	$16.64	$0.00	$64.70

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *LABORER - Zone 2*

Effective Date - 06/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	$21.00	$8.60	$16.64	$0.00	$46.24
2	70	$24.50	$8.60	$16.64	$0.00	$49.74
3	80	$28.00	$8.60	$16.64	$0.00	$53.24
4	90	$31.50	$8.60	$16.64	$0.00	$56.74

Effective Date - 12/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	$21.55	$8.60	$16.64	$0.00	$46.79
2	70	$25.14	$8.60	$16.64	$0.00	$50.38
3	80	$28.73	$8.60	$16.64	$0.00	$53.97
4	90	$32.32	$8.60	$16.64	$0.00	$57.56

Notes:

Apprentice to Journeyworker Ratio:1:5

LABORER (HEAVY & HIGHWAY) *LABORERS - ZONE 2 (HEAVY & HIGHWAY)*	06/01/2021	$35.00	$8.60	$16.64	$0.00	$60.24
	12/01/2021	$35.91	$8.60	$16.64	$0.00	$61.15

Apprentice - *LABORER (Heavy & Highway) - Zone 2*

Effective Date - 06/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	$21.00	$8.60	$16.64	$0.00	$46.24
2	70	$24.50	$8.60	$16.64	$0.00	$49.74
3	80	$28.00	$8.60	$16.64	$0.00	$53.24
4	90	$31.50	$8.60	$16.64	$0.00	$56.74

Effective Date - 12/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	$21.55	$8.60	$16.64	$0.00	$46.79
2	70	$25.14	$8.60	$16.64	$0.00	$50.38
3	80	$28.73	$8.60	$16.64	$0.00	$53.97
4	90	$32.32	$8.60	$16.64	$0.00	$57.56

Notes:

Apprentice to Journeyworker Ratio:1:5

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
LABORER: CARPENTER TENDER *LABORERS - ZONE 2*	06/01/2021	$35.00	$8.60	$16.64	$0.00	$60.24
	12/01/2021	$35.91	$8.60	$16.64	$0.00	$61.15
	06/01/2022	$36.81	$8.60	$16.64	$0.00	$62.05
	12/01/2022	$37.66	$8.60	$16.64	$0.00	$62.90
	06/01/2023	$38.56	$8.60	$16.64	$0.00	$63.80
	12/01/2023	$39.46	$8.60	$16.64	$0.00	$64.70
For apprentice rates see "Apprentice- LABORER"						
LABORER: CEMENT FINISHER TENDER *LABORERS - ZONE 2*	06/01/2021	$35.00	$8.60	$16.64	$0.00	$60.24
	12/01/2021	$35.91	$8.60	$16.64	$0.00	$61.15
	06/01/2022	$36.81	$8.60	$16.64	$0.00	$62.05
	12/01/2022	$37.66	$8.60	$16.64	$0.00	$62.90
	06/01/2023	$38.56	$8.60	$16.64	$0.00	$63.80
	12/01/2023	$39.46	$8.60	$16.64	$0.00	$64.70
For apprentice rates see "Apprentice- LABORER"						
LABORER: HAZARDOUS WASTE/ASBESTOS REMOVER *LABORERS - ZONE 2*	06/01/2021	$35.09	$8.60	$16.70	$0.00	$60.39
	12/01/2021	$36.00	$8.60	$16.70	$0.00	$61.30
	06/01/2022	$36.90	$8.60	$16.70	$0.00	$62.20
	12/01/2022	$37.75	$8.60	$16.70	$0.00	$63.05
	06/01/2023	$38.65	$8.60	$16.70	$0.00	$63.95
	12/01/2023	$39.55	$8.60	$16.70	$0.00	$64.85
For apprentice rates see "Apprentice- LABORER"						
LABORER: MASON TENDER *LABORERS - ZONE 2*	06/01/2021	$35.25	$8.60	$16.64	$0.00	$60.49
	12/01/2021	$36.16	$8.60	$16.64	$0.00	$61.40
	06/01/2022	$37.06	$8.60	$16.64	$0.00	$62.30
	12/01/2022	$37.91	$8.60	$16.64	$0.00	$63.15
	06/01/2023	$38.81	$8.60	$16.64	$0.00	$64.05
	12/01/2023	$39.71	$8.60	$16.64	$0.00	$64.95
For apprentice rates see "Apprentice- LABORER"						
LABORER: MASON TENDER (HEAVY & HIGHWAY) *LABORERS - ZONE 2 (HEAVY & HIGHWAY)*	06/01/2021	$35.25	$8.60	$16.64	$0.00	$60.49
	12/01/2021	$36.16	$8.60	$16.64	$0.00	$61.40
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"						
LABORER: MULTI-TRADE TENDER *LABORERS - ZONE 2*	06/01/2021	$35.00	$8.60	$16.64	$0.00	$60.24
	12/01/2021	$35.91	$8.60	$16.64	$0.00	$61.15
	06/01/2022	$36.81	$8.60	$16.64	$0.00	$62.05
	12/01/2022	$37.66	$8.60	$16.64	$0.00	$62.90
	06/01/2023	$38.56	$8.60	$16.64	$0.00	$63.80
	12/01/2023	$39.46	$8.60	$16.64	$0.00	$64.70
For apprentice rates see "Apprentice- LABORER"						
LABORER: TREE REMOVER *LABORERS - ZONE 2*	06/01/2021	$35.00	$8.60	$16.64	$0.00	$60.24
	12/01/2021	$35.91	$8.60	$16.64	$0.00	$61.15
	06/01/2022	$36.81	$8.60	$16.64	$0.00	$62.05
	12/01/2022	$37.66	$8.60	$16.64	$0.00	$62.90
	06/01/2023	$38.56	$8.60	$16.64	$0.00	$63.80
	12/01/2023	$39.46	$8.60	$16.64	$0.00	$64.70
This classification applies to the removal of standing trees, and the trimming and removal of branches and limbs when related to public works construction or site clearance incidental to construction . For apprentice rates see "Apprentice- LABORER"						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
LASER BEAM OPERATOR *LABORERS - ZONE 2*	06/01/2021	$35.25	$8.60	$16.64	$0.00	$60.49
	12/01/2021	$36.16	$8.60	$16.64	$0.00	$61.40
	06/01/2022	$37.06	$8.60	$16.64	$0.00	$62.30
	12/01/2022	$37.91	$8.60	$16.64	$0.00	$63.15
	06/01/2023	$38.81	$8.60	$16.64	$0.00	$64.05
	12/01/2023	$39.71	$8.60	$16.64	$0.00	$64.95
For apprentice rates see "Apprentice- LABORER"						
LASER BEAM OPERATOR (HEAVY & HIGHWAY) *LABORERS - ZONE 2 (HEAVY & HIGHWAY)*	06/01/2021	$35.25	$8.60	$16.64	$0.00	$60.49
	12/01/2021	$36.16	$8.60	$16.64	$0.00	$61.40
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"						
MARBLE & TILE FINISHERS *BRICKLAYERS LOCAL 3 - MARBLE & TILE*	02/01/2021	$42.57	$11.39	$20.14	$0.00	$74.10
	08/01/2021	$43.69	$11.39	$20.30	$0.00	$75.38
	02/01/2022	$44.16	$11.39	$20.30	$0.00	$75.85

Apprentice - *MARBLE & TILE FINISHER - Local 3 Marble & Tile*

Effective Date - 02/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$21.29	$11.39	$20.14	$0.00	$52.82
2	60	$25.54	$11.39	$20.14	$0.00	$57.07
3	70	$29.80	$11.39	$20.14	$0.00	$61.33
4	80	$34.06	$11.39	$20.14	$0.00	$65.59
5	90	$38.31	$11.39	$20.14	$0.00	$69.84

Effective Date - 08/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$21.85	$11.39	$20.30	$0.00	$53.54
2	60	$26.21	$11.39	$20.30	$0.00	$57.90
3	70	$30.58	$11.39	$20.30	$0.00	$62.27
4	80	$34.95	$11.39	$20.30	$0.00	$66.64
5	90	$39.32	$11.39	$20.30	$0.00	$71.01

Notes:

Apprentice to Journeyworker Ratio:1:3

MARBLE MASONS,TILELAYERS & TERRAZZO MECH *BRICKLAYERS LOCAL 3 - MARBLE & TILE*	02/01/2021	$55.77	$11.39	$22.08	$0.00	$89.24
	08/01/2021	$57.17	$11.39	$22.24	$0.00	$90.80
	02/01/2022	$57.74	$11.39	$22.24	$0.00	$91.37

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *MARBLE-TILE-TERRAZZO MECHANIC - Local 3 Marble & Tile*

Effective Date - 02/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$27.89	$11.39	$22.08	$0.00	$61.36
2	60	$33.46	$11.39	$22.08	$0.00	$66.93
3	70	$39.04	$11.39	$22.08	$0.00	$72.51
4	80	$44.62	$11.39	$22.08	$0.00	$78.09
5	90	$50.19	$11.39	$22.08	$0.00	$83.66

Effective Date - 08/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$28.59	$11.39	$22.24	$0.00	$62.22
2	60	$34.30	$11.39	$22.24	$0.00	$67.93
3	70	$40.02	$11.39	$22.24	$0.00	$73.65
4	80	$45.74	$11.39	$22.24	$0.00	$79.37
5	90	$51.45	$11.39	$22.24	$0.00	$85.08

Notes:

Apprentice to Journeyworker Ratio:1:5

MECH. SWEEPER OPERATOR (ON CONST. SITES) *OPERATING ENGINEERS LOCAL 4*	06/01/2021	$50.19	$13.75	$15.80	$0.00	$79.74
	12/01/2021	$51.33	$13.75	$15.80	$0.00	$80.88
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
MECHANICS MAINTENANCE *OPERATING ENGINEERS LOCAL 4*	06/01/2021	$50.19	$13.75	$15.80	$0.00	$79.74
	12/01/2021	$51.33	$13.75	$15.80	$0.00	$80.88
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
MILLWRIGHT (Zone 2) *MILLWRIGHTS LOCAL 1121 - Zone 2*	03/01/2021	$39.42	$8.58	$21.57	$0.00	$69.57
	01/03/2022	$40.67	$8.58	$21.57	$0.00	$70.82
	01/02/2023	$41.92	$8.58	$21.57	$0.00	$72.07

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *MILLWRIGHT - Local 1121 Zone 2*

Effective Date - 03/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	55	$21.68	$8.58	$5.72	$0.00	$35.98
2	65	$25.62	$8.58	$17.93	$0.00	$52.13
3	75	$29.57	$8.58	$18.98	$0.00	$57.13
4	85	$33.51	$8.58	$20.01	$0.00	$62.10

Effective Date - 01/03/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	55	$22.37	$8.58	$5.72	$0.00	$36.67
2	65	$26.44	$8.58	$17.93	$0.00	$52.95
3	75	$30.50	$8.58	$18.98	$0.00	$58.06
4	85	$34.57	$8.58	$20.01	$0.00	$63.16

Notes: Step 1&2 Appr. indentured after 1/6/2020 receive no pension, but do receive annuity. (Step 1 $5.72, Step 2 $6.66)
Steps are 2,000 hours

Apprentice to Journeyworker Ratio:1:5

MORTAR MIXER *LABORERS - ZONE 2*	06/01/2021	$35.25	$8.60	$16.64	$0.00	$60.49
	12/01/2021	$36.16	$8.60	$16.64	$0.00	$61.40
	06/01/2022	$37.06	$8.60	$16.64	$0.00	$62.30
	12/01/2022	$37.91	$8.60	$16.64	$0.00	$63.15
	06/01/2023	$38.81	$8.60	$16.64	$0.00	$64.05
	12/01/2023	$39.71	$8.60	$16.64	$0.00	$64.95
For apprentice rates see "Apprentice- LABORER"						
OILER (OTHER THAN TRUCK CRANES,GRADALLS) *OPERATING ENGINEERS LOCAL 4*	06/01/2021	$23.40	$13.75	$15.80	$0.00	$52.95
	12/01/2021	$23.98	$13.75	$15.80	$0.00	$53.53
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
OILER (TRUCK CRANES, GRADALLS) *OPERATING ENGINEERS LOCAL 4*	06/01/2021	$28.26	$13.75	$15.80	$0.00	$57.81
	12/01/2021	$28.94	$13.75	$15.80	$0.00	$58.49
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
OTHER POWER DRIVEN EQUIPMENT - CLASS II *OPERATING ENGINEERS LOCAL 4*	06/01/2021	$50.19	$13.75	$15.80	$0.00	$79.74
	12/01/2021	$51.33	$13.75	$15.80	$0.00	$80.88
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
PAINTER (BRIDGES/TANKS) *PAINTERS LOCAL 35 - ZONE 2*	01/01/2021	$52.06	$8.25	$22.75	$0.00	$83.06

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *PAINTER Local 35 - BRIDGES/TANKS*

Effective Date - 01/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$26.03	$8.25	$0.00	$0.00	$34.28
2	55	$28.63	$8.25	$6.16	$0.00	$43.04
3	60	$31.24	$8.25	$6.72	$0.00	$46.21
4	65	$33.84	$8.25	$7.28	$0.00	$49.37
5	70	$36.44	$8.25	$19.39	$0.00	$64.08
6	75	$39.05	$8.25	$19.95	$0.00	$67.25
7	80	$41.65	$8.25	$20.51	$0.00	$70.41
8	90	$46.85	$8.25	$21.63	$0.00	$76.73

Notes:
Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

PAINTER (SPRAY OR SANDBLAST, NEW) * * If 30% or more of surfaces to be painted are new construction, NEW paint rate shall be used.*PAINTERS LOCAL 35 - ZONE 2*	01/01/2021	$42.96	$8.25	$22.75	$0.00	$73.96

Apprentice - *PAINTER Local 35 Zone 2 - Spray/Sandblast - New*

Effective Date - 01/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$21.48	$8.25	$0.00	$0.00	$29.73
2	55	$23.63	$8.25	$6.16	$0.00	$38.04
3	60	$25.78	$8.25	$6.72	$0.00	$40.75
4	65	$27.92	$8.25	$7.28	$0.00	$43.45
5	70	$30.07	$8.25	$19.39	$0.00	$57.71
6	75	$32.22	$8.25	$19.95	$0.00	$60.42
7	80	$34.37	$8.25	$20.51	$0.00	$63.13
8	90	$38.66	$8.25	$21.63	$0.00	$68.54

Notes:
Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

PAINTER (SPRAY OR SANDBLAST, REPAINT) *PAINTERS LOCAL 35 - ZONE 2*	01/01/2021	$41.02	$8.25	$22.75	$0.00	$72.02

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *PAINTER Local 35 Zone 2 - Spray/Sandblast - Repaint*

Effective Date - 01/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$20.51	$8.25	$0.00	$0.00	$28.76
2	55	$22.56	$8.25	$6.16	$0.00	$36.97
3	60	$24.61	$8.25	$6.72	$0.00	$39.58
4	65	$26.66	$8.25	$7.28	$0.00	$42.19
5	70	$28.71	$8.25	$19.39	$0.00	$56.35
6	75	$30.77	$8.25	$19.95	$0.00	$58.97
7	80	$32.82	$8.25	$20.51	$0.00	$61.58
8	90	$36.92	$8.25	$21.63	$0.00	$66.80

Notes:
Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

PAINTER / TAPER (BRUSH, NEW) *	01/01/2021	$41.56	$8.25	$22.75	$0.00	$72.56

* If 30% or more of surfaces to be painted are new construction, NEW paint rate shall be used.*PAINTERS LOCAL 35 - ZONE 2*

Apprentice - *PAINTER - Local 35 Zone 2 - BRUSH NEW*

Effective Date - 01/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$20.78	$8.25	$0.00	$0.00	$29.03
2	55	$22.86	$8.25	$6.16	$0.00	$37.27
3	60	$24.94	$8.25	$6.72	$0.00	$39.91
4	65	$27.01	$8.25	$7.28	$0.00	$42.54
5	70	$29.09	$8.25	$19.39	$0.00	$56.73
6	75	$31.17	$8.25	$19.95	$0.00	$59.37
7	80	$33.25	$8.25	$20.51	$0.00	$62.01
8	90	$37.40	$8.25	$21.63	$0.00	$67.28

Notes:
Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

PAINTER / TAPER (BRUSH, REPAINT) *PAINTERS LOCAL 35 - ZONE 2*	01/01/2021	$39.62	$8.25	$22.75	$0.00	$70.62

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *PAINTER Local 35 Zone 2 - BRUSH REPAINT*

Effective Date - 01/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$19.81	$8.25	$0.00	$0.00	$28.06
2	55	$21.79	$8.25	$6.16	$0.00	$36.20
3	60	$23.77	$8.25	$6.72	$0.00	$38.74
4	65	$25.75	$8.25	$7.28	$0.00	$41.28
5	70	$27.73	$8.25	$19.39	$0.00	$55.37
6	75	$29.72	$8.25	$19.95	$0.00	$57.92
7	80	$31.70	$8.25	$20.51	$0.00	$60.46
8	90	$35.66	$8.25	$21.63	$0.00	$65.54

Notes:
Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

PAINTER TRAFFIC MARKINGS (HEAVY/HIGHWAY) *LABORERS - ZONE 2 (HEAVY & HIGHWAY)* For apprentice rates see "Apprentice- LABORER (Heavy and Highway)	06/01/2021	$35.00	$8.60	$16.64	$0.00	$60.24
	12/01/2021	$35.91	$8.60	$16.64	$0.00	$61.15
PANEL & PICKUP TRUCKS DRIVER *TEAMSTERS JOINT COUNCIL NO. 10 ZONE B*	06/01/2021	$35.78	$12.91	$14.82	$0.00	$63.51
	08/01/2021	$35.78	$13.41	$14.82	$0.00	$64.01
	12/01/2021	$35.78	$13.41	$16.01	$0.00	$65.20
PIER AND DOCK CONSTRUCTOR (UNDERPINNING AND DECK) *PILE DRIVER LOCAL 56 (ZONE 1)* For apprentice rates see "Apprentice- PILE DRIVER"	08/01/2020	$49.07	$9.40	$23.12	$0.00	$81.59
PILE DRIVER *PILE DRIVER LOCAL 56 (ZONE 1)*	08/01/2020	$49.07	$9.40	$23.12	$0.00	$81.59

Apprentice - *PILE DRIVER - Local 56 Zone 1*

Effective Date - 08/01/2020

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$24.54	$9.40	$23.12	$0.00	$57.06
2	60	$29.44	$9.40	$23.12	$0.00	$61.96
3	70	$34.35	$9.40	$23.12	$0.00	$66.87
4	75	$36.80	$9.40	$23.12	$0.00	$69.32
5	80	$39.26	$9.40	$23.12	$0.00	$71.78
6	80	$39.26	$9.40	$23.12	$0.00	$71.78
7	90	$44.16	$9.40	$23.12	$0.00	$76.68
8	90	$44.16	$9.40	$23.12	$0.00	$76.68

Notes:
% Indentured After 10/1/17; 45/45/55/55/70/70/80/80
Step 1&2 $34.01/ 3&4 $41.46/ 5&6 $62.80/ 7&8 $69.25

Apprentice to Journeyworker Ratio:1:5

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
PIPELAYER *LABORERS - ZONE 2*	06/01/2021	$35.25	$8.60	$16.64	$0.00	$60.49
	12/01/2021	$36.16	$8.60	$16.64	$0.00	$61.40
	06/01/2022	$37.06	$8.60	$16.64	$0.00	$62.30
	12/01/2022	$37.91	$8.60	$16.64	$0.00	$63.15
	06/01/2023	$38.81	$8.60	$16.64	$0.00	$64.05
	12/01/2023	$39.71	$8.60	$16.64	$0.00	$64.95
For apprentice rates see "Apprentice- LABORER"						
PIPELAYER (HEAVY & HIGHWAY) *LABORERS - ZONE 2 (HEAVY & HIGHWAY)*	06/01/2021	$35.25	$8.60	$16.64	$0.00	$60.49
	12/01/2021	$36.16	$8.60	$16.64	$0.00	$61.40
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"						
PLUMBER & PIPEFITTER *PLUMBERS & PIPEFITTERS LOCAL 51*	08/31/2020	$44.69	$10.15	$19.80	$0.00	$74.64
	08/30/2021	$46.69	$10.15	$19.80	$0.00	$76.64

Apprentice - *PLUMBER/PIPEFITTER - Local 51*

Effective Date - 08/31/2020

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	40	$17.88	$10.15	$2.50	$0.00	$30.53
2	50	$22.35	$10.15	$2.50	$0.00	$35.00
3	60	$26.81	$10.15	$8.73	$0.00	$45.69
4	70	$31.28	$10.15	$10.60	$0.00	$52.03
5	80	$35.75	$10.15	$17.45	$0.00	$63.35

Effective Date - 08/30/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	40	$18.68	$10.15	$2.50	$0.00	$31.33
2	50	$23.35	$10.15	$2.50	$0.00	$36.00
3	60	$28.01	$10.15	$8.73	$0.00	$46.89
4	70	$32.68	$10.15	$10.60	$0.00	$53.43
5	80	$37.35	$10.15	$17.45	$0.00	$64.95

Notes:

Steps 2000hrs. Prior 9/1/05; 40/40/45/50/55/60/65/75/80/85

Apprentice to Journeyworker Ratio:1:3

PNEUMATIC CONTROLS (TEMP.) *PLUMBERS & PIPEFITTERS LOCAL 51*	08/31/2020	$44.69	$10.15	$19.80	$0.00	$74.64
	08/30/2021	$46.69	$10.15	$19.80	$0.00	$76.64
For apprentice rates see "Apprentice- PIPEFITTER" or "PLUMBER/PIPEFITTER"						
PNEUMATIC DRILL/TOOL OPERATOR *LABORERS - ZONE 2*	06/01/2021	$35.25	$8.60	$16.64	$0.00	$60.49
	12/01/2021	$36.16	$8.60	$16.64	$0.00	$61.40
	06/01/2022	$37.06	$8.60	$16.64	$0.00	$62.30
	12/01/2022	$37.91	$8.60	$16.64	$0.00	$63.15
	06/01/2023	$38.81	$8.60	$16.64	$0.00	$64.05
	12/01/2023	$39.71	$8.60	$16.64	$0.00	$64.95
For apprentice rates see "Apprentice- LABORER"						
PNEUMATIC DRILL/TOOL OPERATOR (HEAVY & HIGHWAY) *LABORERS - ZONE 2 (HEAVY & HIGHWAY)*	06/01/2021	$35.25	$8.60	$16.64	$0.00	$60.49
	12/01/2021	$36.16	$8.60	$16.64	$0.00	$61.40

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)						
POWDERMAN & BLASTER *LABORERS - ZONE 2*	06/01/2021	$36.00	$8.60	$16.64	$0.00	$61.24
	12/01/2021	$36.91	$8.60	$16.64	$0.00	$62.15
	06/01/2022	$37.81	$8.60	$16.64	$0.00	$63.05
	12/01/2022	$38.66	$8.60	$16.64	$0.00	$63.90
	06/01/2023	$39.56	$8.60	$16.64	$0.00	$64.80
	12/01/2023	$40.46	$8.60	$16.64	$0.00	$65.70
For apprentice rates see "Apprentice- LABORER"						
POWDERMAN & BLASTER (HEAVY & HIGHWAY) *LABORERS - ZONE 2 (HEAVY & HIGHWAY)*	06/01/2021	$36.00	$8.60	$16.64	$0.00	$61.24
	12/01/2021	$36.91	$8.60	$16.64	$0.00	$62.15
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)						
POWER SHOVEL/DERRICK/TRENCHING MACHINE *OPERATING ENGINEERS LOCAL 4*	06/01/2021	$50.73	$13.75	$15.80	$0.00	$80.28
	12/01/2021	$51.88	$13.75	$15.80	$0.00	$81.43
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
PUMP OPERATOR (CONCRETE) *OPERATING ENGINEERS LOCAL 4*	06/01/2021	$50.73	$13.75	$15.80	$0.00	$80.28
	12/01/2021	$51.88	$13.75	$15.80	$0.00	$81.43
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
PUMP OPERATOR (DEWATERING, OTHER) *OPERATING ENGINEERS LOCAL 4*	06/01/2021	$33.40	$13.75	$15.80	$0.00	$62.95
	12/01/2021	$34.19	$13.75	$15.80	$0.00	$63.74
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
READY-MIX CONCRETE DRIVER *TEAMSTERS 653 - Southeastern Concrete (Weymouth)*	05/01/2021	$24.00	$12.41	$6.90	$0.00	$43.31
	08/01/2021	$24.00	$12.91	$6.90	$0.00	$43.81
	05/01/2022	$24.50	$12.91	$6.90	$0.00	$44.31
	08/01/2022	$24.50	$13.41	$6.90	$0.00	$44.81
	05/01/2023	$25.00	$13.41	$6.90	$0.00	$45.31
	08/01/2023	$25.00	$13.91	$6.90	$0.00	$45.81
RECLAIMERS *OPERATING ENGINEERS LOCAL 4*	06/01/2021	$50.19	$13.75	$15.80	$0.00	$79.74
	12/01/2021	$51.33	$13.75	$15.80	$0.00	$80.88
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
RIDE-ON MOTORIZED BUGGY OPERATOR *LABORERS - ZONE 2*	06/01/2021	$35.25	$8.60	$16.64	$0.00	$60.49
	12/01/2021	$36.16	$8.60	$16.64	$0.00	$61.40
	06/01/2022	$37.06	$8.60	$16.64	$0.00	$62.30
	12/01/2022	$37.91	$8.60	$16.64	$0.00	$63.15
	06/01/2023	$38.81	$8.60	$16.64	$0.00	$64.05
	12/01/2023	$39.71	$8.60	$16.64	$0.00	$64.95
For apprentice rates see "Apprentice- LABORER"						
ROLLER/SPREADER/MULCHING MACHINE *OPERATING ENGINEERS LOCAL 4*	06/01/2021	$50.19	$13.75	$15.80	$0.00	$79.74
	12/01/2021	$51.33	$13.75	$15.80	$0.00	$80.88
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
ROOFER (Inc.Roofer Waterproofng &Roofer Damproofg) *ROOFERS LOCAL 33*	02/01/2021	$46.60	$12.28	$17.15	$0.00	$76.03
	08/01/2021	$48.03	$12.28	$17.15	$0.00	$77.46
	02/01/2022	$49.46	$12.28	$17.15	$0.00	$78.89

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *ROOFER - Local 33*

Effective Date - 02/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$23.30	$12.28	$4.31	$0.00	$39.89
2	60	$27.96	$12.28	$17.15	$0.00	$57.39
3	65	$30.29	$12.28	$17.15	$0.00	$59.72
4	75	$34.95	$12.28	$17.15	$0.00	$64.38
5	85	$39.61	$12.28	$17.15	$0.00	$69.04

Effective Date - 08/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$24.02	$12.28	$4.31	$0.00	$40.61
2	60	$28.82	$12.28	$17.15	$0.00	$58.25
3	65	$31.22	$12.28	$17.15	$0.00	$60.65
4	75	$36.02	$12.28	$17.15	$0.00	$65.45
5	85	$40.83	$12.28	$17.15	$0.00	$70.26

Notes: ** 1:5, 2:6-10, the 1:10; Reroofing: 1:4, then 1:1
Step 1 is 2000 hrs.; Steps 2-5 are 1000 hrs.
(Hot Pitch Mechanics' receive $1.00 hr. above ROOFER)

Apprentice to Journeyworker Ratio:**

ROOFER SLATE / TILE / PRECAST CONCRETE *ROOFERS LOCAL 33*	02/01/2021	$46.85	$12.28	$17.15	$0.00	$76.28
	08/01/2021	$48.28	$12.28	$17.15	$0.00	$77.71
	02/01/2022	$49.71	$12.28	$17.15	$0.00	$79.14
For apprentice rates see "Apprentice- ROOFER"						
SHEETMETAL WORKER *SHEETMETAL WORKERS LOCAL 17 - B*	07/01/2021	$36.91	$13.65	$17.15	$2.03	$69.74
	10/01/2021	$37.91	$13.65	$17.15	$2.06	$70.77
	04/01/2022	$38.91	$13.65	$17.15	$2.09	$71.80

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *SHEET METAL WORKER - Local 17-B*

Effective Date - 07/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	40	$14.76	$13.65	$4.02	$0.99	$33.42
2	45	$16.61	$13.65	$4.52	$1.07	$35.85
3	50	$18.46	$13.65	$11.08	$1.32	$44.51
4	55	$20.30	$13.65	$11.08	$1.38	$46.41
5	60	$22.15	$13.65	$14.12	$1.50	$51.42
6	65	$23.99	$13.65	$14.38	$1.56	$53.58
7	70	$25.84	$13.65	$14.63	$1.62	$55.74
8	75	$27.68	$13.65	$14.88	$1.69	$57.90
9	80	$29.53	$13.65	$15.14	$1.75	$60.07
10	85	$31.37	$13.65	$15.39	$1.81	$62.22

Effective Date - 10/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	40	$15.16	$13.65	$4.02	$0.98	$33.81
2	45	$17.06	$13.65	$4.52	$1.06	$36.29
3	50	$18.96	$13.65	$11.08	$1.31	$45.00
4	55	$20.85	$13.65	$11.08	$1.37	$46.95
5	60	$22.75	$13.65	$14.12	$1.52	$52.04
6	65	$24.64	$13.65	$14.38	$1.58	$54.25
7	70	$26.54	$13.65	$14.63	$1.64	$56.46
8	75	$28.43	$13.65	$14.88	$1.71	$58.67
9	80	$30.33	$13.65	$15.14	$1.77	$60.89
10	85	$32.22	$13.65	$15.39	$1.84	$63.10

Notes:

Apprentice to Journeyworker Ratio:1:3

SPECIALIZED EARTH MOVING EQUIP < 35 TONS *TEAMSTERS JOINT COUNCIL NO. 10 ZONE B*	06/01/2021	$36.24	$12.91	$14.82	$0.00	$63.97
	08/01/2021	$36.24	$13.41	$14.82	$0.00	$64.47
	12/01/2021	$36.24	$13.41	$16.01	$0.00	$65.66
SPECIALIZED EARTH MOVING EQUIP > 35 TONS *TEAMSTERS JOINT COUNCIL NO. 10 ZONE B*	06/01/2021	$36.53	$12.91	$14.82	$0.00	$64.26
	08/01/2021	$36.53	$13.41	$14.82	$0.00	$64.76
	12/01/2021	$36.53	$13.41	$16.01	$0.00	$65.95
SPRINKLER FITTER *SPRINKLER FITTERS LOCAL 550 - (Section B) Zone 2*	03/01/2021	$56.21	$10.00	$21.25	$0.00	$87.46

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *SPRINKLER FITTER - Local 550 (Section B) Zone 2*

Effective Date - 03/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	35	$19.67	$10.00	$11.99	$0.00	$41.66
2	40	$22.48	$10.00	$12.70	$0.00	$45.18
3	45	$25.29	$10.00	$13.41	$0.00	$48.70
4	50	$28.11	$10.00	$14.13	$0.00	$52.24
5	55	$30.92	$10.00	$14.84	$0.00	$55.76
6	60	$33.73	$10.00	$15.55	$0.00	$59.28
7	65	$36.54	$10.00	$16.26	$0.00	$62.80
8	70	$39.35	$10.00	$16.98	$0.00	$66.33
9	75	$42.16	$10.00	$17.69	$0.00	$69.85
10	80	$44.97	$10.00	$18.40	$0.00	$73.37

Notes: Apprentice entered prior 9/30/10:
40/45/50/55/60/65/70/75/80/85
Steps are 850 hours

Apprentice to Journeyworker Ratio:1:3

STEAM BOILER OPERATOR *OPERATING ENGINEERS LOCAL 4*	06/01/2021	$50.19	$13.75	$15.80	$0.00	$79.74
	12/01/2021	$51.33	$13.75	$15.80	$0.00	$80.88
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
TAMPERS, SELF-PROPELLED OR TRACTOR DRAWN *OPERATING ENGINEERS LOCAL 4*	06/01/2021	$50.19	$13.75	$15.80	$0.00	$79.74
	12/01/2021	$51.33	$13.75	$15.80	$0.00	$80.88
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
TELECOMMUNICATION TECHNICIAN *ELECTRICIANS LOCAL 223*	09/01/2020	$36.86	$10.90	$12.45	$0.00	$60.21

Apprentice - *TELECOMMUNICATION TECHNICIAN - Local 223*

Effective Date - 09/01/2020

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	0	$0.00	$0.00	$0.00	$0.00	$0.00

Notes: See Electrician Apprentice Wages

Telecom Apprentice Wages shall be the same as the Electrician Apprentice Wages

Apprentice to Journeyworker Ratio:2:3***

TERRAZZO FINISHERS *BRICKLAYERS LOCAL 3 - MARBLE & TILE*	02/01/2021	$54.69	$11.39	$22.09	$0.00	$88.17
	08/01/2021	$56.09	$11.39	$22.25	$0.00	$89.73
	02/01/2022	$56.68	$11.39	$22.25	$0.00	$90.32

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *TERRAZZO FINISHER - Local 3 Marble & Tile*

Effective Date - 02/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$27.35	$11.39	$22.09	$0.00	$60.83
2	60	$32.81	$11.39	$22.09	$0.00	$66.29
3	70	$38.28	$11.39	$22.09	$0.00	$71.76
4	80	$43.75	$11.39	$22.09	$0.00	$77.23
5	90	$49.22	$11.39	$22.09	$0.00	$82.70

Effective Date - 08/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$28.05	$11.39	$22.25	$0.00	$61.69
2	60	$33.65	$11.39	$22.25	$0.00	$67.29
3	70	$39.26	$11.39	$22.25	$0.00	$72.90
4	80	$44.87	$11.39	$22.25	$0.00	$78.51
5	90	$50.48	$11.39	$22.25	$0.00	$84.12

Notes:

Apprentice to Journeyworker Ratio:1:3

TEST BORING DRILLER *LABORERS - FOUNDATION AND MARINE*	06/01/2021	$42.07	$8.60	$17.72	$0.00	$68.39
	12/01/2021	$43.08	$8.60	$17.72	$0.00	$69.40
For apprentice rates see "Apprentice- LABORER"						
TEST BORING DRILLER HELPER *LABORERS - FOUNDATION AND MARINE*	06/01/2021	$40.79	$8.60	$17.72	$0.00	$67.11
	12/01/2021	$41.80	$8.60	$17.72	$0.00	$68.12
For apprentice rates see "Apprentice- LABORER"						
TEST BORING LABORER *LABORERS - FOUNDATION AND MARINE*	06/01/2021	$40.67	$8.60	$17.72	$0.00	$66.99
	12/01/2021	$41.68	$8.60	$17.72	$0.00	$68.00
For apprentice rates see "Apprentice- LABORER"						
TRACTORS/PORTABLE STEAM GENERATORS *OPERATING ENGINEERS LOCAL 4*	06/01/2021	$50.19	$13.75	$15.80	$0.00	$79.74
	12/01/2021	$51.33	$13.75	$15.80	$0.00	$80.88
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
TRAILERS FOR EARTH MOVING EQUIPMENT *TEAMSTERS JOINT COUNCIL NO. 10 ZONE B*	06/01/2021	$36.82	$12.91	$14.82	$0.00	$64.55
	08/01/2021	$36.82	$13.41	$14.82	$0.00	$65.05
	12/01/2021	$36.82	$13.41	$16.01	$0.00	$66.24
TUNNEL WORK - COMPRESSED AIR *LABORERS (COMPRESSED AIR)*	06/01/2021	$52.90	$8.60	$18.17	$0.00	$79.67
	12/01/2021	$53.91	$8.60	$18.17	$0.00	$80.68
For apprentice rates see "Apprentice- LABORER"						
TUNNEL WORK - COMPRESSED AIR (HAZ. WASTE) *LABORERS (COMPRESSED AIR)*	06/01/2021	$54.90	$8.60	$18.17	$0.00	$81.67
	12/01/2021	$55.91	$8.60	$18.17	$0.00	$82.68
For apprentice rates see "Apprentice- LABORER"						
TUNNEL WORK - FREE AIR *LABORERS (FREE AIR TUNNEL)*	06/01/2021	$44.97	$8.60	$18.17	$0.00	$71.74
	12/01/2021	$45.98	$8.60	$18.17	$0.00	$72.75
For apprentice rates see "Apprentice- LABORER"						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
TUNNEL WORK - FREE AIR (HAZ. WASTE) *LABORERS (FREE AIR TUNNEL)*	06/01/2021	$46.97	$8.60	$18.17	$0.00	$73.74
	12/01/2021	$47.98	$8.60	$18.17	$0.00	$74.75
For apprentice rates see "Apprentice- LABORER"						
VAC-HAUL *TEAMSTERS JOINT COUNCIL NO. 10 ZONE B*	06/01/2021	$36.24	$12.91	$14.82	$0.00	$63.97
	08/01/2021	$36.24	$13.41	$14.82	$0.00	$64.47
	12/01/2021	$36.24	$13.41	$16.01	$0.00	$65.66
WAGON DRILL OPERATOR *LABORERS - ZONE 2*	06/01/2021	$35.25	$8.60	$16.64	$0.00	$60.49
	12/01/2021	$36.16	$8.60	$16.64	$0.00	$61.40
	06/01/2022	$37.06	$8.60	$16.64	$0.00	$62.30
	12/01/2022	$37.91	$8.60	$16.64	$0.00	$63.15
	06/01/2023	$38.81	$8.60	$16.64	$0.00	$64.05
	12/01/2023	$39.71	$8.60	$16.64	$0.00	$64.95
For apprentice rates see "Apprentice- LABORER"						
WAGON DRILL OPERATOR (HEAVY & HIGHWAY) *LABORERS - ZONE 2 (HEAVY & HIGHWAY)*	06/01/2021	$35.25	$8.60	$16.64	$0.00	$60.49
	12/01/2021	$36.16	$8.60	$16.64	$0.00	$61.40
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"						
WASTE WATER PUMP OPERATOR *OPERATING ENGINEERS LOCAL 4*	06/01/2021	$50.73	$13.75	$15.80	$0.00	$80.28
	12/01/2021	$51.88	$13.75	$15.80	$0.00	$81.43
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
WATER METER INSTALLER *PLUMBERS & PIPEFITTERS LOCAL 51*	08/31/2020	$44.69	$10.15	$19.80	$0.00	$74.64
	08/30/2021	$46.69	$10.15	$19.80	$0.00	$76.64
For apprentice rates see "Apprentice- PLUMBER/PIPEFITTER" or "PLUMBER/GASFITTER"						
Outside Electrical - East						
CABLE TECHNICIAN (Power Zone) *OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104*	08/30/2020	$29.67	$9.25	$1.89	$0.00	$40.81
For apprentice rates see "Apprentice- LINEMAN"						
CABLEMAN (Underground Ducts & Cables) *OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104*	08/30/2020	$42.03	$9.25	$10.27	$0.00	$61.55
For apprentice rates see "Apprentice- LINEMAN"						
DRIVER / GROUNDMAN CDL *OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104*	08/30/2020	$34.62	$9.25	$10.07	$0.00	$53.94
For apprentice rates see "Apprentice- LINEMAN"						
DRIVER / GROUNDMAN -Inexperienced (<2000 Hrs) *OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104*	08/30/2020	$27.20	$9.25	$1.82	$0.00	$38.27
For apprentice rates see "Apprentice- LINEMAN"						
EQUIPMENT OPERATOR (Class A CDL) *OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104*	08/30/2020	$42.03	$9.25	$14.35	$0.00	$65.63
For apprentice rates see "Apprentice- LINEMAN"						
EQUIPMENT OPERATOR (Class B CDL) *OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104*	08/30/2020	$37.09	$9.25	$10.87	$0.00	$57.21
For apprentice rates see "Apprentice- LINEMAN"						
GROUNDMAN *OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104*	08/30/2020	$27.20	$9.25	$1.82	$0.00	$38.27
For apprentice rates see "Apprentice- LINEMAN"						
GROUNDMAN -Inexperienced (<2000 Hrs.) *OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104*	08/30/2020	$22.25	$9.25	$1.82	$0.00	$33.32
For apprentice rates see "Apprentice- LINEMAN"						
JOURNEYMAN LINEMAN *OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104*	08/30/2020	$49.45	$9.25	$17.48	$0.00	$76.18

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *LINEMAN (Outside Electrical) - East Local 104*

Effective Date - 08/30/2020

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	$29.67	$9.25	$3.39	$0.00	$42.31
2	65	$32.14	$9.25	$3.46	$0.00	$44.85
3	70	$34.62	$9.25	$3.54	$0.00	$47.41
4	75	$37.09	$9.25	$5.11	$0.00	$51.45
5	80	$39.56	$9.25	$5.19	$0.00	$54.00
6	85	$42.03	$9.25	$5.26	$0.00	$56.54
7	90	$44.51	$9.25	$7.34	$0.00	$61.10

Notes:

Apprentice to Journeyworker Ratio:1:2

TELEDATA CABLE SPLICER *OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104*	02/04/2019	$30.73	$4.70	$3.17	$0.00	$38.60
TELEDATA LINEMAN/EQUIPMENT OPERATOR *OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104*	02/04/2019	$28.93	$4.70	$3.14	$0.00	$36.77
TELEDATA WIREMAN/INSTALLER/TECHNICIAN *OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104*	02/04/2019	$28.93	$4.70	$3.14	$0.00	$36.77

Additional Apprentice Information:

Minimum wage rates for apprentices employed on public works projects are listed above as a percentage of the pre-determined hourly wage rate established by the Commissioner under the provisions of the M.G.L. c. 149, ss. 26-27D. Apprentice ratios are established by the Division of Apprenticeship Training pursuant to M.G.L. c. 23, ss. 11E-11L.

All apprentices must be registered with the Division of Apprenticeship Training in accordance with M.G.L. c. 23, ss. 11E-11L.

All steps are six months (1000 hours.)
Ratios are expressed in allowable number of apprentices to journeymen or fraction thereof, unless otherwise specified.

** Multiple ratios are listed in the comment field.
*** APP to JM; 1:1, 2:2, 2:3, 3:4, 4:4, 4:5, 4:6, 5:7, 6:7, 6:8, 6:9, 7:10, 8:10, 8:11, 8:12, 9:13, 10:13, 10:14, etc.
**** APP to JM; 1:1, 1:2, 2:3, 2:4, 3:5, 4:6, 4:7, 5:8, 6:9, 6:10, 7:11, 8:12, 8:13, 9:14, 10:15, 10:16, etc.

SECTION 00822

SPECIAL CONDITIONS
MASSACHUSETTS GENERAL LAWS (EXCERPTS)

INDEX

Massachusetts General Laws

(Provided for Reference/convenience)
General Laws are codified according to subject matter in a multi-volume publication entitled the General Laws of Massachusetts. The official version of the General Laws is now published every two years, with cumulative pamphlets released periodically. This following online site provides an unofficial version of the General Laws, available through the online index below or search feature: https://malegislature.gov/Laws/GeneralLaws/Search"

Item 1 – Debarment from bidding; definitions; lists; notice; affiliates; mitigating circumstances (MGL C.29, S.29F)

Item 2 – Construction contracts; assignment and subrogation; subcontractor defined; enforcement of claim for direct payment; deposit, reduction of disputed amounts (MGL C.30, S.39F)

Item 3 – Completion of public works; semi-final and final estimates; payments; extra work; disputed items (MGL C.30, S.39G)

Item 4 – Deviations from plans and specifications (MGL C.30, S.39I)

Item 5 – Public construction contracts; effect of decisions of contracting body or administrative board (MGL C.30, S.39J)

Item 6 – Public building construction contracts; payments (MGL C.30, S.39K)

Item 7 – Public Construction Work by Foreign Corporations; restrictions and reports (MGL C.30, S.39L)

Item 8 – Contracts for construction and materials; manner of awarding (MGL C.30, S.39M)

Item 9 – Construction contracts; equitable adjustment in contract price for differing subsurface or latent physical conditions (MGL C.30, S.39N)

Item 10 – Contracts for construction and materials; suspension, delay or interruption due to order of awarding authority; adjustment in contract price; written claim
(MGL C.30, S.39O)

Item 11 – Contracts for construction and materials; awarding authority's decision on interpretation of specifications, etc; time limit; notice
(MGL C.30, S.39P)

Item 12 – Keeping and maintaining of books, records and accounts; statement of management on internal accounting control; financial statements; enforcement
(MGL C.30, S.39R)

Item 13 – (Notice Requirements for Excavations in Public Ways)
(MGL C.82, S.40-40E)

Item 14 – Material safety data sheets; filing copies
(MGL C111F, S.16)

Item 15 – Public works; preference to veterans and citizens; wages
(MGL C.149, S.26 in part)

Item 16 – Minimum wage rates
(MGL C.149, S.27 to 27H)

Item 17 – Public contracts; stipulation as to hours and days of work; void contracts
(MGL C.149, S.34)

Item 18 – Definitions applicable to Secs 44A to 44H; competitive bids on construction, etc., of public works; award; bonds; extreme emergency situations; records contracts no subject to competitive bid process
(MGL C. 149, S. 44A)

Item 19 – Allowances; alternates; weather protection devices
(MGL C.149, S.44G)

Item 20 – Invitations to bid; notice; contents; violations; penalty
(MGL C.149, S.44J)

SPECIAL CONDITIONS - COMMONWEALTH OF MASSACHUSETTS

Item 1. Debarment for bidding; definitions; lists; notice; affiliates; mitigating circumstances

(General Laws, Chapter 29, Section 29F - "Online edition including all amendments to the General Laws passed through July 31, 2019")

(a) As used in this section the following words shall, unless the context clearly requires otherwise, have the following meanings:—

"Affiliates", entities which are affiliates of each other when either 11 directly or indirectly one concern or individual controls or has the power to control another, or when a third party controls or has the power to control both.

"Commissioner", the commissioner of the division of capital asset management and maintenance or the commissioner's designee within such division.

"Contractor", any person that has furnished or seeks to furnish supplies or services under a contract with a public agency or with a person under a contract with a public agency.

"Debarment", an exclusion from public contracting or subcontracting for a reasonable, specified period of time commensurate with the seriousness of the offense.

"Person", any natural person, business, partnership, corporation, union, committee, club or other organization, entity or group of individuals.

"Public agency", a department, agency, board, commission, authority, activity or instrumentality of the commonwealth, or of any political subdivision of the commonwealth, or of 2 or more subdivisions of the commonwealth.

"Public contract", a contract for the furnishing of supplies or services to any public agency.

"Secretary", the head of an executive office established under chapter 6A or such head's designee within such executive office, or the secretary of administration and finance appointed under section 4 of chapter 7 or a designee within the executive office.

"Suspension", the temporary disqualification of a contractor who is suspected upon adequate evidence of engaging or having engaged in conduct which constitutes grounds for debarment.

(b) The secretary of administration and finance shall establish and maintain a consolidated list of contractors to whom public contracts shall not be awarded and from whom offers, bids or proposals shall not be solicited.

The list shall show at a minimum the following information: (1) the names of those persons debarred or suspended in alphabetical order with appropriate cross reference where more than one name is involved in a single debarment or suspension; (2) the basis of authority for each debarment or suspension, including the secretary or other official who imposed the debarment or suspension; (3) the extent of restrictions imposed; (4) the termination date of each debarment or suspension; and (5) in the case of a suspension, the hearing date, if and when set, for debarment proceedings.

The secretary of administration and finance shall cause the list to be kept current by the issuance of notices of additions and deletions. The list shall be published on a periodic basis, together with notices of additions to and deletions from the list, in the goods and services bulletin and the central register published by the state secretary and in such other publications as the secretary of

administration and finance shall designate. The secretary of administration and finance shall also forward said list to the inspector general, the attorney general and the state auditor. A secretary or the commissioner, as the case may be, upon imposing a debarment or suspension or removing a suspension shall forthwith notify the secretary of administration and finance of all information required for inclusion on such list.

(c) Debarment may be imposed for the following causes but debarment shall be imposed in all causes where debarment is required by law:

(1) conviction or final adjudication by a court or administrative agency of competent jurisdiction of any of the following offenses: (i) a criminal offense incident to obtaining or attempting to obtain a public or private contract or subcontract, or in the performance of such contract or subcontract; (ii) a criminal offense involving embezzlement, theft, forgery, bribery, falsification or destruction of records, receiving stolen property or any other offense indicating a lack of business integrity or business honesty which seriously and directly affects the contractor's present responsibility as a public contractor; (iii) a violation of state or federal antitrust laws arising out of the submission of bids or proposals; (iv) a violation of state or federal laws regulating campaign contributions; (v) a violation of chapter 268A; (vi) a violation of any state or federal law regulating hours of labor, prevailing wages, minimum wages, overtime pay, equal pay, child labor, or worker's compensation; (vii) a violation of any state or federal law prohibiting discrimination in employment; or (viii) repeated or aggravated violation of any state or federal law regulating labor relations or occupational health or safety; or (ix) repeated or aggravated violation of any state or federal law protecting the environment; or (x) a violation of federal law prohibiting the employment of unauthorized aliens; or

(2) substantial evidence, as determined by a secretary or the commissioner, of any of the following acts: (i) willfully supplying materially false information incident to obtaining or attempting to obtain or performing any public contract or subcontract; (ii) willful failure to comply with record-keeping and accounting requirements prescribed by law or regulation; (iii) a record of failure to perform or of unsatisfactory performance under the terms of 1 or more public contracts, provided that such failure to perform or unsatisfactory performance has occurred within a reasonable period of time preceding the determination to debar and provided further that such failure to perform or unsatisfactory performance was not caused by factors beyond the contractor's control; (iv) a record of health and safety or environmental violations of a sufficient frequency and severity so as to evidence a pattern of noncompliance with existing state and federal laws, or any rules and regulations applicable thereto; (v) any other cause affecting the responsibility of a contractor which the secretary or the commissioner determines to be of such serious and compelling nature as to warrant debarment. Notwithstanding any other provision of this section, any contractor debarred or suspended by any agency of the United States shall by reason of such debarment or suspension be simultaneously debarred or suspended under this section, with respect to non-federally aided contracts; the secretary or the commissioner may determine in writing that special circumstances exist which justify contracting with the affected contractor. The secretary or the commissioner shall give written notice to the secretary of administration and finance of any such determination.

(d) No contractor may be suspended unless a secretary or the commissioner has first informed the contractor by written notice of the proposed suspension mailed by registered or certified mail to the contractor's last known address, except when the secretary or the commissioner determines that immediate suspension is necessary to prevent serious harm to the commonwealth, in which case the suspension shall take effect immediately upon signing by the secretary or the commissioner of an order of suspension, and notice shall be mailed to the contractor at the earliest opportunity. The

notice shall inform the contractor of the reasons for the proposed suspension and shall state that the contractor may within 14 days respond in writing and may in such response request a hearing. The secretary or the commissioner may extend the period for response at the request of the contractor. The secretary or the commissioner shall determine whether to impose the suspension or, in the case of an emergency suspension imposed prior to notice to the contractor, whether to continue the suspension after reviewing the contractor's response, if any, and making such investigation as the secretary or the commissioner determines is necessary and appropriate. An indictment, or any information or other filing by a public agency charging a criminal offense, for any of the offenses listed in paragraph (1) of subsection (c) shall constitute adequate evidence to support a suspension.

If the contractor requests a hearing, and the suspension is not based on an indictment, the secretary or the commissioner shall conduct a hearing according to the rules for the conduct of adjudicatory hearings established by the secretary of administration and finance under chapter 30A. Such hearing shall be initiated within 30 days of the imposition of the suspension, unless the contractor requests that the hearing be delayed. Officers and employees of the office of the inspector general and records of said office shall not be subject to subpoena for such hearing, if in the opinion of the inspector general production of records or testimony would prejudice any pending investigation by said office.

A suspension shall not exceed 12 months unless a pending administrative or judicial proceeding in which the contractor is a party may result in a conviction or final adjudication of an offense listed in paragraph (1) of subsection (c).

(e) No contractor may be debarred under this section unless a secretary or the commissioner proposing the debarment has first informed the contractor by written notice of the proposed debarment mailed by registered or certified mail to the contractor's last known address. The notice shall inform the contractor of the reasons for the debarment and shall state that the contractor will be afforded an opportunity for a hearing if the contractor so requests within 14 days of receipt of the notice. A hearing requested under this subsection shall be conducted by the secretary or the commissioner within 60 days of receipt of the request, unless the secretary or the commissioner grants additional time for the hearing at the request of the contractor. The hearing shall be conducted according to the rules for the conduct of adjudicatory hearings established by the secretary of administration and finance under chapter 30A. A debarment shall not be imposed until (i) 14 days after receipt by the contractor of notice of the proposed debarment if no hearing is requested, or (ii) the issuance of a written decision by the secretary or the commissioner which makes specific findings that there is sufficient evidence to support the debarment and that debarment for the period specified in the decision is required to protect the integrity of the public contracting process. A contractor shall be notified forthwith of the decision by registered or certified mail, and of the contractor's right to judicial review in the event that the decision is adverse to the contractor. If a suspension precedes a debarment, the suspension period shall be considered in determining the debarment period.

(f) A debarment or suspension may include all known affiliates of a contractor. The decision to include a known affiliate within the scope of a debarment or suspension shall be made on a case-by-case basis, after giving due regard to all relevant facts and circumstances. The offense or act of an individual justifying suspension, or the evidence justifying a suspension, may be imputed to the entity with which the individual is connected when such offense or act occurred in connection with the individual's performance of duties for or on behalf of the entity or with the knowledge, approval, or acquiescence of the entity or 1 or more of its principals. The entity's acceptance of the benefits derived from the conduct shall be evidence of such knowledge, approval, or acquiescence. The offense or act of an entity justifying debarment, or the evidence justifying a suspension, may be

imputed to any officer, director, shareholder, partner, employee or other individual associated with the entity who participated in, knew of, or had reason to know of the entity's act. An entity or individual shall not be suspended or debarred except under the procedures in this section, provided that a public agency may reject a bid or proposal from any contractor when the public agency reasonably determines that such contractor is not responsible or eligible.

(g) In determining whether to debar a contractor, or the period of a debarment, all mitigating facts and circumstances shall be taken into consideration. Except as precluded by law, a debarment may be removed or the period of debarment may be reduced by the secretary or the commissioner who imposed the debarment or suspension upon the submission of an application supported by documentary evidence setting forth appropriate grounds for the granting of relief, such as newly discovered material evidence, reversal of a judgment or conviction, bona fide change of ownership or management or the elimination of the cause for which the debarment was imposed.

(h) During the period for which a person has been debarred or suspended, that person shall not submit or cause to be submitted offers, bids or proposals to any public agency, nor shall any public agency solicit or consider offers, bids or proposals from, nor execute, renew or extend any contract with, a debarred or suspended contractor and a contractor shall not contract for supplies or services from a debarred or suspended subcontractor on any public contract.

(i) The secretary of administration and finance shall by regulation drawn up in consultation with each secretary and the commissioner provide for, upon the request of any secretary or the commissioner the timely commencement by, the removal to, or consolidation at the executive office for administration and finance of debarment or suspension proceedings. Such regulations also shall provide that the contractor against whom debarment or suspension proceedings have been initiated may apply to the secretary of administration and finance for consolidation of such proceedings at the executive office for administration and finance. Such proceedings shall be conducted by the secretary of administration and finance or the secretary's designee under this section

Item 2. Construction contracts; assignment subrogation; subcontractor defined; enforcement of claim for direct payment; deposit, reduction of disputed amounts

(General Laws, Chapter 30, Section 39F - "Online edition including all amendments to the General Laws passed through July 31, 2019")

(1) Every contract awarded pursuant to sections forty-four A to L, inclusive, of chapter one hundred and forty-nine shall contain the following subparagraphs (a) through (i) and every contract awarded pursuant to section thirty-nine M of chapter thirty shall contain the following subparagraphs (a) through (h) and in each case those subparagraphs shall be binding between the general contractor and each subcontractor.

(a) Forthwith after the general contractor receives payment on account of a periodic estimate, the general contractor shall pay to each subcontractor the amount paid for the labor performed and the materials furnished by that subcontractor, less any amount specified in any court proceedings barring such payment and also less any amount claimed due from the subcontractor by the general contractor.

(b) Not later than the sixty-fifth day after each subcontractor substantially completes his work in accordance with the plans and specifications, the entire balance due under the subcontract less amounts retained by the awarding authority as the estimated cost of completing the incomplete and

unsatisfactory items of work, shall be due the subcontractor; and the awarding authority shall pay that amount to the general contractor. The general contractor shall forthwith pay to the subcontractor the full amount received from the awarding authority less any amount specified in any court proceedings barring such payment and also less any amount claimed due from the subcontractor by the general contractor.

(c) Each payment made by the awarding authority to the general contractor pursuant to subparagraphs (a) and (b) of this paragraph for the labor performed and the materials furnished by a subcontractor shall be made to the general contractor for the account of that subcontractor; and the awarding authority shall take reasonable steps to compel the general contractor to make each such payment to each such subcontractor. If the awarding authority has received a demand for direct payment from a subcontractor for any amount which has already been included in a payment to the general contractor or which is to be included in a payment to the general contractor for payment to the subcontractor as provided in subparagraphs (a) and (b), the awarding authority shall act upon the demand as provided in this section.

(d) If, within seventy days after the subcontractor has substantially completed the subcontract work, the subcontractor has not received from the general contractor the balance due under the subcontract including any amount due for extra labor and materials furnished to the general contractor, less any amount retained by the awarding authority as the estimated cost of completing the incomplete and unsatisfactory items of work, the subcontractor may demand direct payment of that balance from the awarding authority. The demand shall be by a sworn statement delivered to or sent by certified mail to the awarding authority, and a copy shall be delivered to or sent by certified mail to the general contractor at the same time. The demand shall contain a detailed breakdown of the balance due under the subcontract and also a statement of the status of completion of the subcontract work. Any demand made after substantial completion of the subcontract work shall be valid even if delivered or mailed prior to the seventieth day after the subcontractor has substantially completed the subcontract work. Within ten days after the subcontractor has delivered or so mailed the demand to the awarding authority and delivered or so mailed a copy to the general contractor, the general contractor may reply to the demand. The reply shall be by a sworn statement delivered to or sent by certified mail to the awarding authority and a copy shall be delivered to or sent by certified mail to the subcontractor at the same time. The reply shall contain a detailed breakdown of the balance due under the subcontract including any amount due for extra labor and materials furnished to the general contractor and of the amount due for each claim made by the general contractor against the subcontractor.

(e) Within fifteen days after receipt of the demand by the awarding authority, but in no event prior to the seventieth day after substantial completion of the subcontract work, the awarding authority shall make direct payment to the subcontractor of the balance due under the subcontract including any amount due for extra labor and materials furnished to the general contractor, less any amount (i) retained by the awarding authority as the estimated cost of completing the incomplete or unsatisfactory items of work, (ii) specified in any court proceedings barring such payment, or (iii) disputed by the general contractor in the sworn reply; provided, that the awarding authority shall not deduct from a direct payment any amount as provided in part (iii) if the reply is not sworn to, or for which the sworn reply does not contain the detailed breakdown required by subparagraph (d). The awarding authority shall make further direct payments to the subcontractor forthwith after the removal of the basis for deductions from direct payments made as provided in parts (i) and (ii) of this subparagraph.

(f) The awarding authority shall forthwith deposit the amount deducted from a direct payment as provided in part (iii) of subparagraph (e) in an interest-bearing joint account in the names of the general contractor and the subcontractor in a bank in Massachusetts selected by the awarding authority or agreed upon by the general contractor and the subcontractor and shall notify the general contractor and the subcontractor of the date of the deposit and the bank receiving the deposit. The bank shall pay the amount in the account, including accrued interest, as provided in an agreement between the general contractor and the subcontractor or as determined by decree of a court of competent jurisdiction.

(g) All direct payments and all deductions from demands for direct payments deposited in an interest-bearing account or accounts in a bank pursuant to subparagraph (f) shall be made out of amounts payable to the general contractor at the time of receipt of a demand for direct payment from a subcontractor and out of amounts which later become payable to the general contractor and in the order of receipt of such demands from subcontractors. All direct payments shall discharge the obligation of the awarding authority to the general contractor to the extent of such payment.

(h) The awarding authority shall deduct from payments to a general contractor amounts which, together with the deposits in interest-bearing accounts pursuant to subparagraph (f), are sufficient to satisfy all unpaid balances of demands for direct payment received from subcontractors. All such amounts shall be earmarked for such direct payments, and the subcontractors shall have a right in such deductions prior to any claims against such amounts by creditors of the general contractor.

(i) If the subcontractor does not receive payment as provided in subparagraph (a) or if the general contractor does not submit a periodic estimate for the value of the labor or materials performed or furnished by the subcontractor and the subcontractor does not receive payment for same when due less the deductions provided for in subparagraph (a), the subcontractor may demand direct payment by following the procedure in subparagraph (d) and the general contractor may file a sworn reply as provided in that same subparagraph. A demand made after the first day of the month following that for which the subcontractor performed or furnished the labor and materials for which the subcontractor seeks payment shall be valid even if delivered or mailed prior to the time payment was due on a periodic estimate from the general contractor. Thereafter the awarding authority shall proceed as provided in subparagraph (e), (f), (g) and (h).

(2) Any assignment by a subcontractor of the rights under this section to a surety company furnishing a bond under the provisions of section twenty-nine of chapter one hundred forty-nine shall be invalid. The assignment and subrogation rights of the surety to amounts included in a demand for direct payment which are in the possession of the awarding authority or which are on deposit pursuant to subparagraph (f) of paragraph (1) shall be subordinate to the rights of all subcontractors who are entitled to be paid under this section and who have not been paid in full.

(3) "Subcontractor" as used in this section (i) for contracts awarded as provided in sections forty-four A to forty-four H, inclusive, of chapter one hundred forty-nine shall mean a person who files a sub-bid and receives a subcontract as a result of that filed sub-bid or who is approved by the awarding authority in writing as a person performing labor or both performing labor and furnishing materials pursuant to a contract with the general contractor, (ii) for contracts awarded as provided in paragraph (a) of section thirty-nine M of chapter thirty shall mean a person approved by the awarding authority in writing as a person performing labor or both performing labor and furnishing materials pursuant to a contract with the general contractor, and (iii) for contracts with the commonwealth not awarded as provided in forty-four A to forty-four H, inclusive, of chapter one hundred forty-nine shall also mean

a person contracting with the general contractor to supply materials used or employed in a public works project for a price in excess of five thousand dollars.

(4) A general contractor or a subcontractor shall enforce a claim to any portion of the amount of a demand for direct payment deposited as provided in subparagraph (f) of paragraph 1 by a petition in equity in the superior court against the other and the bank shall not be a necessary party. A subcontractor shall enforce a claim for direct payment or a right to require a deposit as provided in subparagraph (f) of paragraph 1 by a petition in equity in the superior court against the awarding authority and the general contractor shall not be a necessary party. Upon motion of any party the court shall advance for speedy trial any petition filed as provided in this paragraph. Sections fifty-nine and fifty-nine B of chapter two hundred thirty-one shall apply to such petitions. The court shall enter an interlocutory decree upon which execution shall issue for any part of a claim found due pursuant to sections fifty-nine and fifty-nine B and, upon motion of any party, shall advance for speedy trial the petition to collect the remainder of the claim. Any party aggrieved by such interlocutory decree shall have the right to appeal therefrom as from a final decree. The court shall not consolidate for trial the petition of any subcontractor with the petition of one or more subcontractors or the same general contract unless the court finds that a substantial portion of the evidence of the same events during the course of construction (other than the fact that the claims sought to be consolidated arise under the same general contract) is applicable to the petitions sought to be consolidated and that such consolidation will prevent unnecessary duplication of evidence. A decree in any such proceeding shall not include interest on the disputed amount deposited in excess of the interest earned for the period of any such deposit. No person except a subcontractor filing a demand for direct payment for which no funds due the general contractor are available for direct payment shall have a right to file a petition in court of equity against the awarding authority claiming a demand for direct payment is premature and such subcontractor must file the petition before the awarding authority has made a direct payment to the subcontractor and has made a deposit of the disputed portion as provided in part (iii) of subparagraph (e) and in subparagraph (f) of paragraph (1).

(5) In any petition to collect any claim for which a subcontractor has filed a demand for direct payment the court shall, upon motion of the general contractor, reduce by the amount of any deposit of a disputed amount by the awarding authority as provided in part (iii) of subparagraph (e) and in subparagraph (f) of paragraph (1) any amount held under a trustee writ or pursuant to a restraining order or injunction.

Item 3. Completion of public works; semi-final and final estimates; payments; extra work; disputed items

(General Laws, Chapter 30, Section 39G - "Online edition including all amendments to the General Laws passed through July 31, 2019")

Upon substantial completion of the work required by a contract with the commonwealth, or any agency or political subdivision thereof, for the construction, reconstruction, alteration, remodeling, repair or improvement of public ways, including bridges and other highway structures, sewers and, water mains, airports and other public works, the contractor shall present in writing to the awarding authority its certification that the work has been substantially completed. Within twenty-one days thereafter, the awarding authority shall present to the contractor either a written declaration that the work has been substantially completed or an itemized list of incomplete or unsatisfactory work items required by the contract sufficient to demonstrate that the work has not been substantially completed. The awarding authority may include with such list a notice setting forth a reasonable time, which

shall not in any event be prior to the contract completion date, within which the contractor must achieve substantial completion of the work. In the event that the awarding authority fails to respond, by presentation of a written declaration or itemized list as aforesaid, to the contractor's certification within the twenty-one day period, the contractor's certification shall take effect as the awarding authority's declaration that the work has been substantially completed.

Within sixty-five days after the effective date of a declaration of a substantial completion, the awarding authority shall prepare and forthwith send to the contractor for acceptance a substantial completion estimate for the quantity and price of the work done and all but one per cent retainage, if held by the awarding authority, on that work, including the quantity, price and all but one per cent retainage, if held by the awarding authority, for the undisputed part of each work item and extra work item in dispute but excluding the disputed part thereof, less the estimated cost of completing all incomplete and unsatisfactory work items and less the total periodic payments made to date for the work. The awarding authority also shall deduct from the substantial completion estimate an amount equal to the sum of all demands for direct payment filed by subcontractors and not yet paid to subcontractors or deposited in joint accounts pursuant to section thirty-nine F, but no contract subject to said section thirty-nine F shall contain any other provision authorizing the awarding authority to deduct any amount by virtue of claims asserted against the contract by subcontractors, material suppliers or others.

If the awarding authority fails to prepare and send to the contractor any substantial completion estimate required by this section on or before the date herein above set forth, the awarding authority shall pay to the contractor interest on the amount which would have been due to the contractor pursuant to such substantial completion estimate at the rate of three percentage points above the rediscount rate then charged by the Federal Reserve Bank of Boston from such date to the date on which the awarding authority sends that substantial completion estimate to the contractor for acceptance or to the date of payment therefor, whichever occurs first. The awarding authority shall include the amount of such interest in the substantial completion estimate.

Within fifteen days after the effective date of the declaration of substantial completion, the awarding authority shall send to the contractor by certified mail, return receipt requested, a complete list of all incomplete or unsatisfactory work items, and, unless delayed by causes beyond his control, the contractor shall complete all such work items within forty-five days after the receipt of such list or before the then contract completion date, whichever is later. If the contractor fails to complete such work within such time, the awarding authority may, subsequent to seven days' written notice to the contractor by certified mail, return receipt requested, terminate the contract and complete the incomplete or unsatisfactory work items and charge the cost of same to the contractor.

Within thirty days after receipt by the awarding authority of a notice from the contractor stating that all of the work required by the contract has been completed, the awarding authority shall prepare and forthwith send to the contractor for acceptance a final estimate for the quantity and price of the work done and all retainage, if held by the awarding authority, on that work less all payments made to date, unless the awarding authority's inspection shows that work items required by the contract remain incomplete or unsatisfactory, or that documentation required by the contract has not been completed. If the awarding authority fails to prepare and send to the contractor the final estimate within thirty days after receipt of notice of completion, the awarding authority shall pay to the contractor interest on the amount which would have been due to the contractor pursuant to such final estimate at the rate hereinabove provided from the thirtieth day after such completion until the date on which the awarding authority sends the final estimate to the contractor for acceptance or the date of payment

therefor, whichever occurs first, provided that the awarding authority's inspection shows that no work items required by the contract remain incomplete or unsatisfactory. Interest shall not be paid hereunder on amounts for which interest is required to be paid in connection with the substantial completion estimate as hereinabove provided. The awarding authority shall include the amount of the interest required to be paid hereunder in the final estimate.

The awarding authority shall pay the amount due pursuant to any substantial completion or final estimate within thirty-five days after receipt of written acceptance for such estimate from the contractor and shall pay interest on the amount due pursuant to such estimate at the rate hereinabove provided from that thirty-fifth day to the date of payment. Within 15 days, 30 days in the case of the commonwealth, after receipt from the contractor, at the place designated by the awarding authority, if such place is so designated, of a periodic estimate requesting payment of the amount due for the preceding periodic estimate period, the awarding authority shall make a periodic payment to the contractor for the work performed during the preceding periodic estimate period and for the materials not incorporated in the work but delivered and suitably stored at the site, or at some location agreed upon in writing, to which the contractor has title or to which a subcontractor has title and has authorized the contractor to transfer title to the awarding authority, upon certification by the contractor that he is the lawful owner and that the materials are free from all encumbrances. The awarding authority shall include with each such payment interest on the amount due pursuant to such periodic estimate at the rate herein above provided from the due date. In the case of periodic payments, the contracting authority may deduct from its payment a retention based on its estimate of the fair value of its claims against the contractor, a retention for direct payments to subcontractors based on demands for same in accordance with the provisions of section thirty-nine F, and a retention to secure satisfactory performance of the contractual work not exceeding five per cent of the approved amount of any periodic payment, and the same right to retention shall apply to bonded subcontractors entitled to direct payment under section thirty-nine F of chapter thirty; provided, that a five per cent value of all items that are planted in the ground shall be deducted from the periodic payments until final acceptance.

No periodic, substantial completion or final estimate or acceptance or payment thereof shall bar a contractor from reserving all rights to dispute the quantity and amount of, or the failure of the awarding authority to approve a quantity and amount of, all or part of any work item or extra work item.

Substantial completion, for the purposes of this section, shall mean either that the work required by the contract has been completed except for work having a contract price of less than one per cent of the then adjusted total contract price, or substantially all of the work has been completed and opened to public use except for minor incomplete or unsatisfactory work items that do not materially impair the usefulness of the work required by the contract.

Item 4. Deviations from plans and specifications

(General Laws, Chapter 30, Section 39I - "Online edition including all amendments to the General Laws passed through July 31, 2019")

Every contractor having a contract for the construction, alteration, maintenance, repair or demolition of, or addition to, any public building or public works for the commonwealth, or of any political subdivision thereof, shall perform all the work required by such contract in conformity with the plans and specifications contained therein. No wilful and substantial deviation from said plans and

specifications shall be made unless authorized in writing by the awarding authority or by the engineer or architect in charge of the work who is duly authorized by the awarding authority to approve such deviations. In order to avoid delays in the prosecution of the work required by such contract such deviation from the plans or specifications may be authorized by a written order of the awarding authority or such engineer or architect so authorized to approve such deviation. Within thirty days thereafter, such written order shall be confirmed by a certificate of the awarding authority stating: (1) If such deviation involves any substitution or elimination of materials, fixtures or equipment, the reasons why such materials, fixtures or equipment were included in the first instance and the reasons for substitution or elimination, and, if the deviation is of any other nature, the reasons for such deviation, giving justification therefor; (2) that the specified deviation does not materially injure the project as a whole; (3) that either the work substituted for the work specified is of the same cost and quality, or that an equitable adjustment has been agreed upon between the contracting agency and the contractor and the amount in dollars of said adjustment; and (4) that the deviation is in the best interest of the contracting authority.

Such certificate shall be signed under the penalties of perjury and shall be a permanent part of the file record of the work contracted for.

Whoever violates any provision of this section wilfully and with intent to defraud shall be punished by a fine of not more than five thousand dollars or by imprisonment for not more than six months, or both.

Item 5. Public construction contracts; effect of decisions of contracting body or administrative board

(General Laws, Chapter 30, Section 39J - "Online edition including all amendments to the General Laws passed through July 31, 2019")

Notwithstanding any contrary provision of any contract for the construction, reconstruction, alteration, remodeling, repair or demolition of any public building or public works by the commonwealth, or by any county, city, town, district, board, commission or other public body, when the amount of the contract is more than five thousand dollars in the case of the commonwealth and more than two thousand dollars in the case of any county, city, town, district, board, commission or other public body, a decision, by the contracting body or by any administrative board, official or agency, or by any architect or engineer, on a dispute, whether of fact or of law, arising under said contract shall not be final or conclusive if such decision is made in bad faith, fraudulently, capriciously, or arbitrarily is unsupported by substantial evidence, or is based upon error of law.

Item 6. Public building construction contracts; payments

(General Laws, Chapter 30, Section 39K - "Online edition including all amendments to the General Laws passed through July 31, 2019")

Section 39K. Every contract for the construction, reconstruction, alteration, remodeling, repair or demolition of any public building by the commonwealth, or by any county, city, town, district, board, commission or other public body, when the amount is more than five thousand dollars in the case of the commonwealth and more than two thousand dollars in the case of any county, city, town, district, board, commission or other public body, shall contain the following paragraph:— Within fifteen days (30 days in the case of the commonwealth, including local housing authorities) after receipt from the

contractor, at the place designated by the awarding authority if such a place is so designated, of a periodic estimate requesting payment of the amount due for the preceding month, the awarding authority will make a periodic payment to the contractor for the work performed during the preceding month and for the materials not incorporated in the work but delivered and suitably stored at the site (or at some location agreed upon in writing) to which the contractor has title or to which a subcontractor has title and has authorized the contractor to transfer title to the awarding authority, upon certification by the contractor that he is the lawful owner and that the materials are free from all encumbrances, but less (1) a retention based on its estimate of the fair value of its claims against the contractor and less (2) a retention for direct payments to subcontractors based on demands for same in accordance with the provisions of section thirty-nine F, and less (3) a retention not exceeding five per cent of the approved amount of the periodic payment. After the receipt of a periodic estimate requesting final payment and within sixty-five days after (a) the contractor fully completes the work or substantially completes the work so that the value of the work remaining to be done is, in the estimate of the awarding authority, less than one per cent of the original contract price, or (b) the contractor substantially completes the work and the awarding authority takes possession for occupancy, whichever occurs first, the awarding authority shall pay the contractor the entire balance due on the contract less (1) a retention based on its estimate of the fair value of its claims against the contractor and of the cost of completing the incomplete and unsatisfactory items of work and less (2) a retention for direct payments to subcontractors based on demands for same in accordance with the provisions of section thirty-nine F, or based on the record of payments by the contractor to the subcontractors under this contract if such record of payment indicates that the contractor has not paid subcontractors as provided in section thirty-nine F. If the awarding authority fails to make payment as herein provided, there shall be added to each such payment daily interest at the rate of three percentage points above the rediscount rate than charged by the Federal Reserve Bank of Boston commencing on the first day after said payment is due and continuing until the payment is delivered or mailed to the contractor; provided, that no interest shall be due, in any event, on the amount due on a periodic estimate for final payment until fifteen days (twenty-four days in the case of the commonwealth) after receipt of such a periodic estimate from the contractor, at the place designated by the awarding authority if such a place is so designated. The contractor agrees to pay to each subcontractor a portion of any such interest paid in accordance with the amount due each subcontractor.

The awarding authority may make changes in any periodic estimate submitted by the contractor and the payment due on said periodic estimate shall be computed in accordance with the changes so made, but such changes or any requirement for a corrected periodic estimate shall not affect the due date for the periodic payment or the date for the commencement of interest charges on the amount of the periodic payment computed in accordance with the changes made, as provided herein; provided, that the awarding authority may, within seven days after receipt, return to the contractor for correction, any periodic estimate which is not in the required form or which contains computations not arithmetically correct and, in that event, the date of receipt of such periodic estimate shall be the date of receipt of the corrected periodic estimate in proper form and with arithmetically correct computations. The date of receipt of a periodic estimate received on a Saturday shall be the first working day thereafter. The provisions of section thirty-nine G shall not apply to any contract for the construction, reconstruction, alteration, remodeling, repair or demolition of any public building to which this section applies.

All periodic estimates shall be submitted to the awarding authority, or to its designee as set forth in writing to the contractor, and the date of receipt by the awarding authority or its designee shall be

marked on the estimate. All periodic estimates shall contain a separate item for each filed subtrade and each sub-subtrade listed in sub-bid form as required by specifications and a column listing the amount paid to each subcontractor and sub-subcontractor as of the date the periodic estimate is filed. The person making payment for the awarding authority shall add the daily interest provided for herein to each payment for each day beyond the due date based on the date of receipt marked on the estimate.

A certificate of the architect to the effect that the contractor has fully or substantially completed the work shall, subject to the provisions of section thirty-nine J, be conclusive for the purposes of this section.

Notwithstanding the provisions of this section, at any time after the value of the work remaining to be done is, in the estimation of the awarding authority, less than 1 per cent of the adjusted contract price, or the awarding authority has determined that the contractor has substantially completed the work and the awarding authority has taken possession for occupancy, the awarding authority may send to the general contractor by certified mail, return receipt requested, a complete and final list of all incomplete and unsatisfactory work items, including, for each item on the list, a good faith estimate of the fair and reasonable cost of completing such item. The general contractor shall then complete all such work items within 30 days of receipt of such list or before the contract completion date, whichever is later. If the general contractor fails to complete all incomplete and unsatisfactory work items within 45 days after receipt of such items furnished by the awarding authority or before the contract completion date, whichever is later, subsequent to an additional 14 days' written notice to the general contractor by certified mail, return receipt requested, the awarding authority may terminate the contract and complete the incomplete and unsatisfactory work items and charge the cost of same to the general contractor and such termination shall be without prejudice to any other rights or remedies the awarding authority may have under the contract. The awarding authority shall note any such termination in the evaluation form to be filed by the awarding authority pursuant to the provisions of section 44D of chapter 149.

Item 7. Public Construction Work by Foreign Corporations, restrictions and reports

(General Laws Chapter 30, Section 39L) - “Online edition including all amendments to the General Laws passed through July 31, 2019”)

The commonwealth and every county, city, town, district, board, commission or other public body which, as the awarding authority, requests proposals, bids or sub-bids for any work in the construction, reconstruction, alteration, remodeling, repair or demolition of any public building or other public works (1) shall not enter into a contract for the work with, and shall not approve as a subcontractor furnishing labor and materials for a part of the work, a foreign corporation which has not filed with the awarding authority a certificate of the state secretary stating that the corporation has complied with requirements of section 15.03 of subdivision A of Part 15 of chapter 156D and the date of compliance, and further has filed all annual reports required by section 16.22 of subdivision B of Part 16 of said chapter 156D, and (2) shall report to the state secretary and to the department of corporations and taxation any foreign corporation performing work under such contract or subcontract, and any person, other than a corporation, performing work under such contract or subcontract, and residing or having a principal place of business outside the commonwealth.

Item 8. Contracts for construction and materials; manner of awarding

(General Laws, Chapter 30, Section 39M") - “Online edition including all amendments to the General Laws passed through July 31, 2019”)

(a) Every contract for the construction, reconstruction, alteration, remodeling or repair of any public work, or for the purchase of any material, as hereinafter defined, by the commonwealth, or political subdivision thereof, or by any county, city, town, district or housing authority that is and estimated by the awarding authority to cost less than $10,000 dollars shall be obtained through the exercise of sound business practices as defined in section 2 of chapter 30B. The awarding authority shall make and keep a record of each procurement that, at a minimum, shall include the name and address of the person from whom the services were procured. An awarding authority that utilizes a vendor on a statewide contract procured through the operational services division, or a blanket contract procured by the awarding authority pursuant to this section, shall be deemed to have obtained the contract through sound business practices.

Every contract for the construction, reconstruction, alteration, remodeling or repair of any public work, or for the purchase of any material, as hereinafter defined, by the commonwealth, or political subdivision thereof, or by any county, city, town, district or housing authority that is estimated by the awarding authority to cost not less than $10,000 but not more than $50,000 shall be awarded to the responsible bidder offering to perform the contract at the lowest price. The awarding authority shall make public notification of the contract and shall seek written responses from no fewer than 3 persons who customarily perform such work. For purposes of this subsection, the term "public notification" shall include, but need not be limited to, posting, at least 2 weeks before the time specified in the notification for the receipt of responses, the contract and scope-of-work statement: (1) on the website of the awarding authority, (2) on the COMMBUYS system administered by the operational services division, (3) in the central register published pursuant to section 20A of chapter 9 and (4) in a conspicuous place in or near the primary office of the awarding authority; provided, however, that if the awarding authority obtains a minimum of 2 written responses from a vendor list established through a blanket contract or a statewide contract procured through the operational services division, and the lowest of those written responses is deemed acceptable to the awarding authority, public notification is not required. The solicitation shall include a scope-of-work statement that defines the work to be performed and provides potential responders with sufficient information regarding the objectives and requirements of the awarding authority and the time period within which the work shall be completed. The awarding authority shall record the names and addresses of all persons from whom written responses were sought, the names of the persons submitting written responses and the date and amount of each written response.

An awarding authority may utilize a vendor list established through a statewide contract procured through the operational services division to identify 1 or more of the persons from whom it will seek written responses for purposes of this subsection. An awarding authority may also procure a blanket contract to establish a listing of vendors in certain defined categories of work that are under contract to provide services for multiple individual tasks of not more than $50,000 each, and from whom written responses will be sought. Any such blanket contract procured by the awarding authority shall be procured pursuant to this section or sections 44A to 44J, inclusive, of chapter 149 which are applicable to projects over $50,000.

Every contract for the construction, reconstruction, alteration, remodeling or repair of any public work, or for the purchase of any material, as hereinafter defined, by the commonwealth, or political subdivision thereof, or by any county, city, town, district or housing authority that is estimated by the awarding authority to cost more than $50,000, and every contract for the construction, reconstruction,

installation, demolition, maintenance or repair of any building by a public agency, as defined by subsection (1) of section 44A of chapter 149, estimated to cost more than $50,000 but not more than $150,000, shall be awarded to the lowest eligible responsible bidder on the basis of competitive bids publicly opened and read by the awarding authority forthwith upon expiration of the time for the filing thereof; provided, however, that such awarding authority may reject any and all bids, if it is in the public interest to do so. Every bid for such contract shall be accompanied by a bid deposit in the form of: (1) a bid bond, (2) cash, or (3) a certified check on, or a treasurer's or cashier's check issued by, a responsible bank or trust company, payable to the awarding authority. The amount of the bid deposit shall be 5 per cent of the value of the bid. Any person submitting a bid pursuant to this section shall, on such bid, certify as follows:

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

(Name of person signing bid)

(Company)

This subsection shall not apply to the award of any contract subject to the provisions of sections 44A to 44J, inclusive, of chapter 149 and every such contract shall continue to be awarded as provided therein. In cases of extreme emergency: (1) caused by enemy attack, sabotage or other such hostile actions or (2) resulting from an imminent security threat explosion, fire, flood, earthquake, hurricane, tornado or other such catastrophe, an awarding authority may, without competitive bids and notwithstanding any general or special law, award contracts otherwise subject to this subsection to perform work and to purchase or rent materials and equipment, all as may be necessary for temporary repair and restoration to service of any and all public work in order to preserve the health and safety of persons or property; provided, that this exception shall not apply to any permanent reconstruction, alteration, remodeling or repair of any public work.

(b) Specifications for such contracts, and specifications for contracts awarded pursuant to the provisions of said sections forty-four A to forty-four L of said chapter one hundred and forty-nine, shall be written to provide for full competition for each item of material to be furnished under the contract; except, however, that said specifications may be otherwise written for sound reasons in the public interest stated in writing in the public records of the awarding authority or promptly given in writing by the awarding authority to anyone making a written request therefor, in either instance such writing to be prepared after reasonable investigation. Every such contract shall provide that an item equal to that named or described in the said specifications may be furnished; and an item shall be considered equal to the item so named or described if, in the opinion of the awarding authority: (1) it is at least equal in quality, durability, appearance, strength and design, (2) it will perform at least equally the function imposed by the general design for the public work being contracted for or the material being purchased, and (3) it conforms substantially, even with deviations, to the detailed requirements for the item in the said specifications. For each item of material the specifications shall provide for either a minimum of three named brands of material or a description of material which can be met by a minimum of three manufacturers or producers, and for the equal of any one of said name or described materials.

(c) The term "lowest responsible and eligible bidder" shall mean the bidder: (1) whose bid is the lowest of those bidders possessing the skill, ability and integrity necessary for the faithful

performance of the work; (2) who shall certify, that he is able to furnish labor that can work in harmony with all other elements of labor employed or to be employed in the work; (3) who shall certify that all employees to be employed at the worksite will have successfully completed a course in construction safety and health approved by the United States Occupational Safety and Health Administration that is at least 10 hours in duration at the time the employee begins work and who shall furnish documentation of successful completion of said course with the first certified payroll report for each employee; (4) who, where the provisions of section 8B of chapter 29 apply, shall have been determined to be qualified thereunder; and (5) who obtains within 10 days of the notification of contract award the security by bond required under section 29 of chapter 149; provided that for the purposes of this section the term "security by bond" shall mean the bond of a surety company qualified to do business under the laws of the commonwealth and satisfactory to the awarding authority; provided further, that if there is more than 1 surety company, the surety companies shall be jointly and severally liable.

(d) The provisions of this section shall not apply (1) to the extent that they prevent the approval of such specifications by any contributing federal agency, (2) to materials purchased under specifications of the state department of highways at prices established by the said department pursuant to advertisement and bidding in connection with work to be performed under the provisions of chapter eighty-one or chapter ninety, (3) to any transaction between the commonwealth and any of its political subdivisions or between the commonwealth and any public service corporation, and (4) to any contract of not more than $50,000 awarded by a governmental body, as defined by section two of chapter thirty B, in accordance with the provisions of section five of said chapter thirty B; and (5) to any contract solely for the purchase of material awarded by a governmental body, as defined by section 2 of chapter 30B, in accordance with section 5 of said chapter 30B, or procured through the operational services division pursuant to sections 22 and 52 of chapter 7.

(e) The word "material" as used in this section shall mean and include any article, assembly, system, or any component part thereof.

Item 9. Construction contracts; equitable adjustment in contract price for differing subsurface or latent physical conditions

(General Laws, Chapter 30, Section 39N - “Online edition including all amendments to the General Laws passed through July 31, 2019”)

Every contract subject to section forty-four A of chapter one hundred and forty-nine or subject to section thirty-nine M of chapter thirty shall contain the following paragraph in its entirety and an awarding authority may adopt reasonable rules or regulations in conformity with that paragraph concerning the filing, investigation and settlement of such claims:

If, during the progress of the work, the contractor or the awarding authority discovers that the actual subsurface or latent physical conditions encountered at the site differ substantially or materially from those shown on the plans or indicated in the contract documents either the contractor or the contracting authority may request an equitable adjustment in the contract price of the contract applying to work affected by the differing site conditions. A request for such an adjustment shall be in writing and shall be delivered by the party making such claim to the other party as soon as possible after such conditions are discovered. Upon receipt of such a claim from a contractor, or upon its own initiative, the contracting authority shall make an investigation of such physical conditions, and, if they differ substantially or materially from those shown on the plans or indicated in the contract

documents or from those ordinarily encountered and generally recognized as inherent in work of the character provided for in the plans and contract documents and are of such a nature as to cause an increase or decrease in the cost of performance of the work or a change in the construction methods required for the performance of the work which results in an increase or decrease in the cost of the work, the contracting authority shall make an equitable adjustment in the contract price and the contract shall be modified in writing accordingly.

Item 10. Contracts for construction and materials; suspension, delay or interruption due to order of awarding authority; adjustment in contact price; written claim

(General Laws, Chapter 30, Section 39O - "- "Online edition including all amendments to the General Laws passed through July 31, 2019")

Every contract subject to the provisions of section thirty-nine M of this chapter or subject to section forty-four A of chapter one hundred forty-nine shall contain the following provisions (a) and (b) in their entirety and, in the event a suspension, delay, interruption or failure to act of the awarding authority increases the cost of performance to any subcontractor, that subcontractor shall have the same rights against the general contractor for payment for an increase in the cost of his performance as provisions (a) and (b) give the general contractor against the awarding authority, but nothing in provisions (a) and (b) shall in any way change, modify or alter any other rights which the general contractor or the subcontractor may have against each other.

(a) The awarding authority may order the general contractor in writing to suspend, delay, or interrupt all or any part of the work for such period of time as it may determine to be appropriate for the convenience of the awarding authority; provided however, that if there is a suspension, delay or interruption for fifteen days or more or due to a failure of the awarding authority to act within the time specified in this contract, the awarding authority shall make an adjustment in the contract price for any increase in the cost of performance of this contract but shall not include any profit to the general contractor on such increase; and provided further, that the awarding authority shall not make any adjustment in the contract price under this provision for any suspension, delay, interruption or failure to act to the extent that such is due to any cause for which this contract provides for an equitable adjustment of the contract price under any other contract provisions.

(b) The general contractor must submit the amount of a claim under provision (a) to the awarding authority in writing as soon as practicable after the end of the suspension, delay, interruption or failure to act and, in any event, not later than the date of final payment under this contract and, except for costs due to a suspension order, the awarding authority shall not approve any costs in the claim incurred more than twenty days before the general contractor notified the awarding authority in writing of the act or failure to act involved in the claim.

Item 11. Contracts for construction and materials; awarding authority's decision on interpretation of specifications, etc; time limit; notice

(General Laws, Chapter 30, Section 39P - "Online edition including all amendments to the General Laws passed through July 31, 2019")

Every contract subject to section thirty-nine M of this chapter or section forty-four A of chapter one hundred forty-nine which requires the awarding authority, any official, its architect or engineer to make a decision on interpretation of the specifications, approval of equipment, material or any other approval, or progress of the work, shall require that the decision be made promptly and, in any event,

no later than thirty days after the written submission for decision; but if such decision requires extended investigation and study, the awarding authority, the official, architect or engineer shall, within thirty days after the receipt of the submission, give the party making the submission written notice of the reasons why the decision cannot be made within the thirty day period and the date by which the decision will be made.

Item 12. Keeping and maintaining of books, records and accounts; statement of management on internal accounting control; financial statements; enforcement

(General Laws, Chapter 30, Section 39R - "Online edition including all amendments to the General Laws passed through July 31, 2019")

(a) The words defined herein shall have the meaning stated below whenever they appear in this section:

(1) "Contractor" means any person, corporation, partnership, joint venture, sole proprietorship, or other entity awarded a contract pursuant to sections thirty-eight A1/2 to thirty-eight O, inclusive, of chapter seven and any contract awarded or executed pursuant to section eleven C of chapter twenty-five A, section thirty-nine M of chapter thirty, or sections forty-four A to forty-four H, inclusive, of chapter one hundred and forty-nine, which is for an amount or estimated amount greater than one hundred thousand dollars.

(2) "Contract" means any contract awarded or executed pursuant to sections thirty-eight A1/2 to thirty-eight O, inclusive, of chapter seven and any contract awarded or executed pursuant to section eleven C of chapter twenty-five A, section thirty-nine M of chapter thirty, or sections forty-four A through forty-four H, inclusive, of chapter one hundred and forty-nine, which is for amount or estimated amount greater than one hundred thousand dollars.

(3) "Records" means books of original entry, accounts, checks, bank statements and all other banking documents, correspondence, memoranda, invoices, computer printouts, tapes, discs, papers and other documents or transcribed information of any type, whether expressed in ordinary or machine language.

(4) "Independent Certified Public Accountant" means a person duly registered in good standing and entitled to practice as a certified public accountant under the laws of the place of his residence or principal office and who is in fact independent. In determining whether an accountant is independent with respect to a particular person, appropriate consideration should be given to all relationships between the accountant and that person or any affiliate thereof. Determination of an accountant's independence shall not be confined to the relationships existing in connection with the filing of reports with the awarding authority.

(5) "Audit", when used in regard to financial statements, means an examination of records by an independent certified public accountant in accordance with generally accepted accounting principles and auditing standards for the purpose of expressing a *certified* opinion thereon, or, in the alternative, a qualified opinion or a declination to express an opinion for stated reasons.

(6) "Accountant's Report", when used in regard to financial statements, means a document in which an independent certified public accountant indicates the scope of the audit which he has made and sets forth his opinion regarding the financial statements taken as a whole with a listing of noted exceptions and qualifications, or an assertion to the effect that an overall opinion cannot be expressed. When an overall opinion cannot be expressed the reason therefor shall be stated. An

accountant's report shall include as a part thereof a signed statement by the responsible corporate officer attesting that management has fully disclosed all material facts to the independent certified public accountant, and that the audited financial statement is a true and complete statement of the financial condition of the contractor.

(7) "Management", when used herein, means the chief executive officers, partners, principals or other person or persons primarily responsible for the financial and operational policies and practices of the contractor.

(8) Accounting terms, unless otherwise defined herein, shall have a meaning in accordance with generally accepted accounting principles and auditing standards.

(b) Subsection (a)(2) hereof notwithstanding, every agreement or contract awarded or executed pursuant to sections thirty-eight A1/2 to thirty-eight O, inclusive, of chapter seven, or eleven C of chapter twenty-five A, and pursuant to section thirty-nine M of chapter thirty or to section forty-four A through H, inclusive, of chapter one hundred and forty-nine, shall provide that:

(1) The contractor shall make, and keep for at least six years after final payment, books, records, and accounts which in reasonable detail accurately and fairly reflect the transactions and dispositions of the contractor, and

(2) until the expiration of six years after final payment, the office of inspector general, and the commissioner of capital asset management and maintenance shall have the right to examine any books, documents, papers or records of the contractor or of his subcontractors that directly pertain to, and involve transactions relating to, the contractor or his subcontractors, and

(3) if the agreement is a contract as defined herein, the contractor shall describe any change in the method of maintaining records or recording transactions which materially affect any statements filed with the awarding authority, including in his description the date of the change and reasons therefor, and shall accompany said description with a letter from the contractor's independent certified public accountant approving or otherwise commenting on the changes, and

(4) if the agreement is a contract as defined herein, the contractor has filed a statement of management on internal accounting controls as set forth in paragraph (c) below prior to the execution of the contract, and

(5) if the agreement is a contract as defined herein, the contractor has filed prior to the execution of the contracts and will continue to file annually, an audited financial statement for the most recent completed fiscal year as set forth in paragraph (d) below.

(c) Every contractor awarded a contract shall file with the awarding authority a statement of management as to whether the system of internal accounting controls of the contractor and its subsidiaries reasonably assures that:

(1) transactions are executed in accordance with management's general and specific authorization;

(2) transactions are recorded as necessary

i. to permit preparation of financial statements in conformity with generally accepted accounting principles, and

ii. to maintain accountability for assets;

(3) access to assets is permitted only in accordance with management's general or specific authorization; and

(4) the recorded accountability for assets is compared with the existing assets at reasonable intervals and appropriate action was taken with respect to any difference.

Every contractor awarded a contract shall also file with the awarding authority a statement prepared and signed by an independent certified public accountant, stating that he has examined the statement of management on internal accounting controls, and expressing an opinion as to

(1) whether the representations of management in response to this paragraph and paragraph (b) above are consistent with the result of management's evaluation of the system of internal accounting controls; and

(2) whether such representations of management are, in addition, reasonable with respect to transactions and assets in amounts which would be material when measured in relation to the applicant's financial statements.

(d) Every contractor awarded a contract by the commonwealth or by any political subdivision thereof shall annually file with the commissioner of capital asset management and maintenance during the term of the contract a financial statement prepared by an independent certified public accountant on the basis of an audit by such accountant. The final statement filed shall include the date of final payment. All statements shall be accompanied by an accountant's report. Such statements shall be made available to the awarding authority upon request.

(e) The office of inspector general, the commissioner of capital asset management and maintenance and any other awarding authority shall enforce the provisions of this section. The commissioner of capital asset management and maintenance may after providing an opportunity for the inspector general and other interested parties to comment, promulgate pursuant to the provisions of chapter thirty A such rules, regulations and guidelines as are necessary to effectuate the purposes of this section. Such rules, regulations and guidelines may be applicable to all awarding authorities. A contractor's failure to satisfy any of the requirements of this section may be grounds for debarment pursuant to section forty-four C of chapter one hundred and forty-nine.

(f) Records and statements required to be made, kept or filed under the provisions of this section shall not be public records as defined in section seven of chapter four and shall not be open to public inspection; provided, however, that such records and statements shall be made available pursuant to the provisions of clause (2) of paragraph (b).

Item 13. (NOTICE REQUIREMENTS FOR EXCAVATIONS IN PUBLIC WAYS)

(General Laws, Chapter 82, Sections 40-40E - “Online edition including all amendments to the General Laws passed through July 31, 2019”)

Section 40 – Definitions: The following words, as used in this section and sections 40A to 40E, inclusive, shall have the following meanings:

"Company", natural gas pipeline company, petroleum or petroleum products pipeline company, public utility company, cable television company, and municipal utility company or department that supply gas, electricity, telephone, communication or cable television services or private water companies within the city or town where such excavation is to be made.

"Description of excavation location", such description shall include the name of the city or town, street, way, or route number where appropriate, the name of the streets at the nearest intersection to the excavation, the number of the buildings closest to the excavation or any other description, including landmarks, utility pole numbers or other information which will accurately define the location of the excavation.

"Emergency", a condition in which the safety of the public is in imminent danger, such as a threat to life or health or where immediate correction is required to maintain or restore essential public utility service.

"Excavation", an operation for the purpose of movement or removal of earth, rock or the materials in the ground including, but not limited to, digging, blasting, augering, backfilling, test boring, drilling, pile driving, grading, plowing in, hammering, pulling in, jacking in, trenching, tunneling and demolition of structures, excluding excavation by tools manipulated only by human power for gardening purposes and use of blasting for quarrying purposes.

"Excavator", any entity including, but not limited to, a person, partnership, joint venture, trust, corporation, association, public utility, company or state or local government body which performs excavation operations.

"Premark", to delineate the general scope of the excavation or boring on the paved surface of the ground using white paint, or stakes or other suitable white markings on nonpaved surfaces. No premarking shall be acceptable if such marks can reasonably interfere with traffic or pedestrian control or are misleading to the general public. Premarking shall not be required of any continuous excavation that is over 500 feet in length.

"Safety zone", a zone designated on the surface by the use of standard color-coded markings which contains the width of the facilities plus not more than 18 inches on each side.

"Standard color-coded markings", red - electric power lines, cables, conduit or light cables; yellow - gas, oil, street petroleum, or other gaseous materials; orange - communications cables or conduit, alarm or signal lines; blue - water, irrigation and slurry lines; green - sewer and drain lines; white - premark of proposed excavation.

"System", the underground plant damage prevention system as defined in section 76D of chapter 164.

Section 40A – Excavations, notice No excavator installing a new facility or an addition to an existing facility or the relay or repair of an existing facility shall, except in an emergency, make an excavation, in any public or private way, any company right-of-way or easement or any public or privately owned land or way, unless at least 72 hours, exclusive of Saturdays, Sundays and legal holidays but not more than 30 days before the proposed excavation is to be made, such excavator has premarked not more than 500 feet of the proposed excavation and given an initial notice to the system. Such initial notice shall set forth a description of the excavation location in the manner as herein defined. In addition, such initial notice shall indicate whether any such excavation will involve blasting and, if so, the date and the location at which such blasting is to occur.

The notice requirements shall be waived in an emergency as defined herein; provided, however, that before such excavation begins or during a life-threatening emergency, notification shall be given to the system and the initial point of boring or excavation shall be premarked. The excavator shall ensure that the underground facilities of the utilities in the area of such excavation shall not be damaged or jeopardized.

In no event shall any excavation by blasting take place unless notice thereof, either in the initial notice or a subsequent notice accurately specifying the date and location of such blasting shall have been given and received at least 72 hours in advance, except in the case of an unanticipated obstruction requiring blasting when such notice shall be not less than four hours prior to such blasting. If any such notice cannot be given as aforesaid because of an emergency requiring blasting, it shall be given as soon as may be practicable but before any explosives are discharged.

Section 40B – Designation of location of underground facilities: Within 72 hours, exclusive of Saturdays, Sundays and legal holidays, from the time the initial notice is received by the system or at such time as the company and the excavator agree, such company shall respond to the initial notice or subsequent notice by designating the location of the underground facilities within 15 feet in any direction of the premarking so that the existing facilities are to be found within a safety zone. Such safety zone shall be so designated by the use of standard color-coded markings. The providing of such designation by the company shall constitute prima facie evidence of an exercise of reasonable precaution by the company as required by this section; provided, however, that in the event that the excavator has given notice as aforesaid at a location at which because of the length of excavation the company cannot reasonably designate the entire location of its facilities within such 72 hour period, then such excavator shall identify for the company that portion of the excavation which is to be first made and the company shall designate the location of its facilities in such portion within 72 hours and shall designate the location of its facilities in the remaining portion of the location within a reasonable time thereafter. When an emergency notification has been given to the system, the company shall make every attempt to designate its facilities as promptly as possible.

Section 40C – Excavator's responsibility to maintain designation markings; damage caused by excavator: After a company has designated the location of its facilities at the location in accordance with section 40B, the excavator shall be responsible for maintaining the designation markings at such locations, unless such excavator requests remarking at the location due to the obliteration, destruction or other removal of such markings. The company shall then remark such location within 24 hours following receipt of such request.

When excavating in close proximity to the underground facilities of any company when such facilities are to be exposed, non-mechanical means shall be employed, as necessary, to avoid damage in locating such facility and any further excavation shall be performed employing reasonable precautions to avoid damage to any underground facilities including, but not limited to, any substantial weakening of structural or lateral support of such facilities, penetration or destruction of any pipe, main, wire or conduit or the protective coating thereof, or damage to any pipe, main, wire or conduit.

If any damage to such pipe, main, wire or conduit or its protective coating occurs, the company shall be notified immediately by the excavator responsible for causing such damage.

The making of an excavation without providing the notice required by section 40A with respect to any proposed excavation which results in any damage to a pipe, main, wire or conduit, or its protective coating, shall be prima facie evidence in any legal or administrative proceeding that such damage was caused by the negligence of such person.

Section 40D – Local laws requiring exaction permits; public ways: Nothing in this section shall affect or impair local ordinances or by-laws requiring a permit to be obtained before excavation in a public way or on private property; but notwithstanding any general or special law, ordinance or by-law to the contrary, to the extent that any permit issued under the provisions of the state building

code or state fire code requires excavation by an excavator on a public way or on private property, the permit shall not be valid unless the excavator notifies the system as required pursuant to sections 40 and 40A, before the commencement of the excavation, and has complied with the permitting requirements of chapter 82A.

Section 40E – Violations of Secs. 40A to 40E; punishment: Any person or company found by the department of telecommunications and energy, after a hearing, to have violated any provision of sections 40A to 40E, inclusive, shall be fined $1,000 for the first offense and not less than $5,000 nor more than $10,000 for any subsequent offense within 12 consecutive months as set forth by the rules of said department; provided, however, that nothing herein shall be construed to require forfeiture of any penal sum by a state or local government body for violation of section 40A or 40C; and provided, further, that nothing herein shall be construed to require the forfeiture of any penal sum by a residential property owner for the failure to premark for an excavation on such person's residential property.

Item 14. Material safety data sheets; filing copies

(General Laws, Chapter 111F, Section 16 - "Online edition including all amendments to the General Laws passed through July 31, 2019")

Every employer subject to the provisions of this chapter shall file with the regional office of DEP for the region in which the workplace of the employer is located, and upon request with the municipal coordinator for the city or town in which the workplace of the employer is located, a copy of an MSDS for each toxic or hazardous substance listed on the Massachusetts substance list and present in the employer's workplace. The municipal coordinator shall retain said MSDS's for at least five years and the regional office of DEP shall retain said MSDS's for forty years.

Item 15. Public works; Preference to veterans and citizens; wages

(General Laws, Chapter 149, Section 26 - "Online edition including all amendments to the General Laws passed through July 31, 2019")

In the employment of mechanics and apprentices, teamsters, chauffeurs and laborers in the construction of public works by the commonwealth, or by a county, town, authority or district, or by persons contracting or subcontracting for such works, preference shall first be given to citizens of the commonwealth who have been residents of the commonwealth for at least six months at the commencement of their employment who are veterans as defined in clause Forty-third of section 7 of chapter 4 and who are qualified to perform the work to which the employment relates and, within such preference, preference shall be given to service-disabled veterans; and secondly, to citizens of the commonwealth generally who have been residents of the commonwealth for at least six months at the commencement of their employment, and if they cannot be obtained in sufficient numbers, then to citizens of the United States, and every contract for such work shall contain a provision to this effect. Each county, town or district in the construction of public works, or persons contracting or sub-contracting for such works, shall give preference to veterans and citizens who are residents of such county, town, authority or district and, within such preference, preference shall be given to service-disabled veterans. The rate per hour of the wages paid to said mechanics and apprentices, teamsters, chauffeurs and laborers in the construction of public works shall not be less than the rate or rates of wages to be determined by the commissioner as hereinafter provided; provided, that the wages paid to laborers employed on said works shall not be less than those paid to laborers in the

municipal service of the town or towns where said works are being constructed; provided, further, that where the same public work is to be constructed in two or more towns, the wages paid to laborers shall not be less than those paid to laborers in the municipal service of the town paying the highest rate; provided, further, that if, in any of the towns where the works are to be constructed, a wage rate or wage rates have been established in certain trades and occupations by collective agreements or understandings in the private construction industry between organized labor and employers, the rate or rates to be paid on said works shall not be less than the rates so established; provided further, that in towns where no such rate or rates have been so established, the wages paid to mechanics, teamsters, chauffeurs and laborers on public works, shall not be less than the wages paid to the employees in the same trades and occupations by private employers engaged in the construction industry. This section shall also apply to regular employees of the commonwealth or of a county, town, authority or district, when such employees are employed in the construction, addition to or alteration of public buildings for which special appropriations of more than one thousand dollars are provided. Payments by employers to health and welfare plans, pension plans and supplementary unemployment benefit plans under collective bargaining agreements or understandings between organized labor and employers shall be included for the purpose of establishing minimum wage rates as herein provided.

Permanent and temporary laborers employed by the state department of highways and by the metropolitan district commission shall receive such salary or compensation as may be fixed under and in accordance with sections forty-five to fifty inclusive of chapter thirty.

Item 16. Minimum Wage Rates

(General Laws, Chapter 149, Sections 27 to 27H - "Online edition including all amendments to the General Laws passed through July 31, 2019")

In compliance with Massachusetts General Laws, Chapter 149, Section 27 to 27H inclusive, job classifications and determinations of the rate of wages applying thereto have been established by the Department of Labor of the Commonwealth of Massachusetts and said job classifications and determination of the rate of wages applicable to this Project are included as part of the Contract Documents.

Section 27 – List of jobs; classification; schedule of wages; penalty; civil action: The commissioner shall prepare, for the use of such public officials or public bodies whose duty it shall be to cause public works to be constructed, a list of the several jobs usually performed on various types of public works upon which mechanics and apprentices, teamsters, chauffeurs and laborers are employed, including the transportation of gravel or fill to the site of said public works or the removal of surplus gravel or fill from such site. The commissioner shall classify said jobs, and he may revise such classification from time to time, as he may deem advisable. Prior to awarding a contract for the construction of public works, said public official or public body shall submit to the commissioner a list of the jobs upon which mechanics and apprentices, teamsters, chauffeurs and laborers are to be employed, and shall request the commissioner to determine the rate of wages to be paid on each job. Each year after the awarding of the contract, the public official or public body shall submit to the commissioner a list of the jobs upon which mechanics and apprentices and laborers are to be employed and shall request that the commissioner update the determination of the rate of wages to be paid on each job. The general contractor shall annually obtain updated rates from the public official or public body and no contactor or subcontractor shall pay less than the rates so established. Said

rates shall apply to all persons engaged in transporting gravel or fill to the site of said public works or removing gravel or fill from such site, regardless of whether such persons are employed by a contractor or subcontractor or are independent contractors or owner-operators. The commissioner, subject to the provisions of section twenty-six, shall proceed forthwith to determine the same, and shall furnish said official or public body with a schedule of such rate or rates of wages as soon as said determination shall have been made. In advertising or calling for bids for said works, the awarding official or public body shall incorporate said schedule in the advertisement or call for bids by an appropriate reference thereto, and shall furnish a copy of said schedule, without cost, to any person requesting the same. Said schedule shall be made a part of the contract for said works and shall continue to be the minimum rate or rates of wages for said employees during the life of the contract. Any person engaged in the construction of said works shall cause a legible copy of said schedule and subsequent updates to be kept posted in a conspicuous place at the site of said works during the life of the contract. An apprentice performing work on a project subject to this section shall maintain in his possession an apprentice identification card issued pursuant to section 11W of chapter 23. The aforesaid rates of wages in the schedule of wage rates shall include payments by employers to health and welfare plans, pension plans and supplementary unemployment benefit plans as provided in said section twenty-six, and such payments shall be considered as payments to persons under this section performing work as herein provided. Any employer engaged in the construction of such works who does not make payments to a health and welfare plan, a pension plan and a supplementary unemployment benefit plan, where such payments are included in said rates of wages, shall pay the amount of said payments directly to each employee engaged in said construction. Whoever shall pay less than said rate or rates of wages, including payments to health and welfare funds and pension funds, or the equivalent payment in wages, on said works to any person performing work within classifications as determined by the commissioner, and whoever, for himself, or as representative, agent or officer of another, shall take or receive for his own use or the use of any other person, as a rebate, refund or gratuity, or in any other guise, any part or portion of the wages, including payments to health and welfare funds and pension funds, or the equivalent payment in wages, paid to any such person for work done or service rendered on said public works, shall have violated this section and shall be punished or shall be subject to a civil citation or order as provided in section 27C. The president and treasurer of a corporation and any officers or agents having the management of such corporation shall also be deemed to be employers of the employees of any corporation within the meaning of sections 26 to 27B, inclusive.

Offers of restitution or payment of restitution shall not be considered in imposing such punishment.

When an investigation by the attorney general's office reveals that a contractor or subcontractor has violated this section by failing to pay said rate or rates of wages, including payments to health and welfare funds and pension funds, or the equivalent payment in wages, on said works to any person performing work within classifications as determined by the commissioner, or that a contractor or subcontractor has, for himself, or as representative, agent or officer of another, taken or received for his own use or the use of any other person, as a rebate, refund or gratuity, or in any other guise, any portion of the wages, including payments to health and welfare funds and pension funds, or the equivalent payment in wages, paid to any such person for work done or service rendered on said public works, the attorney general may, upon written notice to the contractor or subcontractor and the sureties of the contractor or subcontractor, and after a hearing thereon, order work halted on the part of the contract on which such wage violations occurred, until the defaulting contractor or subcontractor has filed with the attorney general's office a bond in the amount of such penal sum as the attorney general shall determine, conditioned upon payment of said rate or rates of wages,

including payments to health and welfare funds and pension funds, or the equivalent payment in wages, on said works to any person performing work within classifications as determined by the commissioner.

An employee claiming to be aggrieved by a violation of this section may, 90 days after the filing of a complaint with the attorney general, or sooner if the attorney general assents in writing, and within 3 years after the violation, institute and prosecute in his own name and on his own behalf, or for himself and for others similarly situated, a civil action for injunctive relief, for any damages incurred, and for any lost wages and other benefits. An employee so aggrieved who prevails in such an action shall be awarded treble damages, as liquidated damages, for any lost wages and other benefits and shall also be awarded the costs of the litigation and reasonable attorneys' fees.

Section 27A – Appeals from classification and wage determinations: Within five days from the date of the first advertisement or call for bids, two or more employers of labor, or two or more members of a labor organization, or the awarding officer or official, or five or more residents of the town or towns where the public works are to be constructed, may appeal to the commissioner or his designee from a wage determination, or a classification of employment as made by the commissioner, by serving on the commissioner a written notice to that effect. Thereupon the commissioner or his designee shall immediately hold a public hearing on the action appealed from. The commissioner or his designee shall render his decision not later than three days after the closing of the hearing. The decision of the commissioner or his designee shall be final and notice thereof shall be given forthwith to the awarding official or public body.

Section 27B – Records of employees; payroll records statements of compliance: Every contractor, subcontractor or public body engaged in said public works project by an agency, executive office, department, board, commission, bureau, division or authority of the commonwealth or county, or municipality or any subdivision thereof to which sections twenty-seven and twenty-seven A apply shall keep a true and accurate record of all mechanics and apprentices, teamsters, chauffeurs and laborers employed thereon, showing the name, address and occupational classification of each such employee on said works, and the hours worked by, and the wages paid to, each such employee, and shall submit weekly to the awarding authority by mail, first class postage prepaid, or by electronic mail, certified payroll records that shall consist of a complete copy of those records accompanied by a statement signed by the employer that indicates (1) the records are correct; and (2) the rate of wages paid to each performing the work of mechanic, apprentice, teamsters, chauffeurs, and laborers, and shall promptly furnish to the attorney general or his representative, upon his request, a copy of said record, signed by the employer or his authorized agent under the penalties of perjury. For every week in which an apprentice is employed by a contractor, subcontractor or public body subject to this section, a photocopy of the apprentice's apprentice identification card, issued pursuant to section 11W of chapter 23, shall be attached to the records submitted under this section. Such records shall be open to inspection by any authorized representative of the department at any reasonable time, and as often as may be necessary. Every contractor and subcontractor required to keep such a record shall submit a copy of said record to the awarding authority directly on a weekly basis.

Each such contractor, subcontractor or public body shall preserve its payroll records for a period of three years from the date of completion of the contract.

Each such contractor, subcontractor or public body shall furnish to the awarding authority directly within fifteen days after completion of its portion of the work a statement, executed by the

contractor, subcontractor or public body or by any authorized officer or employee of the contractor, subcontractor or public body who supervises the payment of wages, in the following form:

statement of compliance

,
(insert year)
I,,
(Name of signatory party)(Title)
do hereby state:
That I pay or supervise the payment of the persons employed by
on the
(Contractor, subcontractor or public body)(Building or project)
and that all mechanics and apprentices, teamsters, chauffeurs and laborers employed on said project have been paid in accordance with wages determined under the provisions of sections twenty-six and twenty-seven of chapter one hundred and forty-nine of the General Laws.
Signature
Title

The above-mentioned copies of payroll records and statements of compliance shall be available for inspection by any interested party filing a written request to the awarding authority for such inspection and copying.

Section 27C – Penalties for violations of certain sections by employers, contractors, subcontractors of their employees: ((a)(1) Any employer, contractor or subcontractor, or any officer, agent, superintendent, foreman, or employee thereof, or staffing agency or work site employer who willfully violates any provision of section 26, 27, 27A, 27B, 27F, 27G, 27H, 148, 148A, 148B or 159C or section 1A, 1B or 19 of chapter 151, shall be punished by a fine of not more than $25,000 or by imprisonment for not more than one year for a first offense, or by both such fine and imprisonment and for a subsequent willful offense a fine of not more than $50,000, or by imprisonment for not more than two years, or by both such fine and such imprisonment.

(2) Any employer, contractor or subcontractor, or any officer, agent, superintendent, foreman or employee thereof, or staffing agency or work site employer who without a willful intent to do so, violates any provision of section 26, 27, 27A, 27B, 27F, 27G, 27H, 148, 148A, 148B or 159C or section 1A, 1B or 19 of chapter 151, shall be punished by a fine of not more than $10,000, or by imprisonment for not more than six months for a first offense, and for a subsequent offense by a fine of not more than $25,000 or by imprisonment for not more than one year, or by both such fine and such imprisonment. A complaint or indictment hereunder or under the provisions of the first paragraph may be sought either in the county where the work was performed or in the county where the employer, contractor, or subcontractor has a principal place of business. In the case of an employer, contractor, or subcontractor who has his principal place of business outside the commonwealth, a complaint or indictment may be sought either in the county where the work was performed or in Suffolk county.

(3) Any contractor or subcontractor convicted of willfully violating any provision of section 26, 27, 27A, 27B, 27F, 27G, 27H or 148B shall, in addition to any criminal penalty imposed, be prohibited from contracting, directly or indirectly, with the commonwealth or any of its agencies or political subdivisions for the construction of any public building or other public works, or from performing any work on the same as a contractor or subcontractor, for a period of five years from the date of

such conviction. Any contractor or subcontractor convicted of violating any provision of section 26, 27, 27A, 27B, 27F, 27G, 27H or 148B shall, in addition to any criminal penalty imposed, be prohibited from contracting, directly or indirectly, with the commonwealth or any of its agencies, authorities or political subdivisions for the construction of any public building or other public works or from performing any work on the same as a contractor or subcontractor, for a period not to exceed six months from the date of such conviction for a first offense and up to three years from the date of conviction for subsequent offense. After final conviction and disposition of a violation pursuant to this paragraph in any court, the clerk of said court shall send a notice of such conviction to the attorney general, who shall publish written notice to all departments and agencies of the commonwealth which contract for public construction and to the appropriate authorities of counties, authorities, cities and towns that such person is prohibited from contracting, directly or indirectly, with the commonwealth or any of its authorities or political subdivisions for the period of time required under this paragraph. The attorney general may take such action as may be necessary to enforce the provisions of this paragraph, and the superior court shall have jurisdiction to enjoin or invalidate any contract award made in violation of this paragraph.

(b)(1) As an alternative to initiating criminal proceedings pursuant to subsection (a), the attorney general may issue a written warning or a civil citation. For each violation, a separate citation may be issued requiring any or all of the following: that the infraction be rectified, that restitution be made to the aggrieved party, or that a civil penalty of not more than $25,000 for each violation be paid to the commonwealth, within 21 days of the date of issuance of such citation. For the purposes of this paragraph, each failure to pay an employee the appropriate rate or prevailing rate of pay for any pay period may be deemed a separate violation, and the pay period shall be a minimum of 40 hours unless such employee has worked fewer than 40 hours during that week.

(2) Notwithstanding the foregoing, the maximum civil penalty that may be imposed upon any employer, contractor or subcontractor, who has not previously been either criminally convicted of a violation of the provisions of this chapter or chapter 151 or issued a citation hereunder, shall be no more than $15,000, except that in instances in which the attorney general determines that the employer, contractor or subcontractor lacked specific intent to violate the provisions of this chapter or said chapter 151, the maximum civil penalty for such an employer, contractor or subcontractor who has not previously been either criminally convicted of a violation of the provisions of this chapter or said chapter 151 or issued a citation hereunder shall be not more than $7,500. In determining the amount of any civil penalty to be assessed hereunder, said attorney general shall take into consideration previous violations of this chapter or said chapter 151 by the employer, the intent by such employer to violate the provisions of this chapter or said chapter 151, the number of employees affected by the present violation or violations, the monetary extent of the alleged violations, and the total monetary amount of the public contract or payroll involved.

(3) In the case of a citation for violating any provision of section 26, 27, 27A, 27B, 27F, 27G, 27H or 148B, the attorney general may also order that a bond in an amount necessary to rectify the infraction and to ensure compliance with sections 26 to 27H, inclusive, and with other provisions of law, be filed with said attorney general, conditioned upon payment of said rate or rates of wages, including payments to health and welfare funds and pension funds, or the equivalent payment in wages, on said public works to any person performing work within classifications as determined by the commissioner. Upon any failure to comply with the requirements set forth in a citation, said attorney general may order the cessation of all or the relevant portion of the work on the project site. In addition, any contractor or subcontractor failing to comply with the requirements set forth in a

citation or order, shall be prohibited from contracting, directly or indirectly, with the commonwealth or any of its agencies or political subdivisions for the construction of any public building or other public works, or from performing any work on the same as a contractor or subcontractor, for a period of one year from the date of issuance of such citation or order. Any contractor or subcontractor who receives three citations or orders occurring on three different occasions, each of which includes a finding of intent, within a three year period shall automatically be debarred for a period of two years from the date of issuance of the third such citation or order or a final court order, whichever is later. Any debarment hereunder shall also apply to all affiliates of the contractor or subcontractor, as well as any successor company or corporation that said attorney general, upon investigation, determines to not have a true independent existence apart from that of the violating contractor or subcontractor.

(4) Any person aggrieved by any citation or order issued pursuant to this subsection may appeal said citation or order by filing a notice of appeal with the attorney general and the division of administrative law appeals within ten days of the receipt of the citation or order. Any such appellant shall be granted a hearing before the division of administrative law appeals in accordance with chapter 30A. The hearing officer may affirm or if the aggrieved person demonstrates by a preponderance of evidence that the citation or order was erroneously issued, vacate, or modify the citation or order. Any person aggrieved by a decision of the hearing officer may file an appeal in the superior court pursuant to the provisions of said chapter 30A.

(5) In cases when the decision of the hearing officer of the division of administrative law appeals is to debar or suspend the employer, said suspension or debarment shall not take effect until 30 days after the issuance of such order; provided, however, that the employer shall not bid on the construction of any public work or building during the aforementioned 30 day period unless the superior court temporarily enjoins the order of debarment or suspension.

(6) If any person shall fail to comply with the requirements set forth in any order or citation issued by the attorney general hereunder, or shall fail to pay any civil penalty or restitution imposed thereby within 21 days of the date of issuance of such citation or order or within 30 days following the decision of the hearing officer if such citation or order has been appealed, excluding any time during which judicial review of the hearing officer's decision remains pending, said attorney general may apply for a criminal complaint or seek indictment for the violation of the appropriate section of this chapter.

(7) Notwithstanding the provisions of paragraph (6), if any civil penalty imposed by a citation or order issued by the attorney general remains unpaid beyond the time period specified for payment in said paragraph (6), such penalty amount and any restitution order, together with interest thereon at the rate of 18 per cent per annum, shall be a lien upon the real estate and personal property of the person who has failed to pay such penalty. Such lien shall take effect by operation of law on the day immediately following the due date for payment of such fine, and, unless dissolved by payment, shall as of said date be considered a tax due and owing to the commonwealth, which may be collected through the procedures provided for by chapter 62C. In addition to the foregoing, no officer of any corporation which has failed to pay any such penalty may incorporate or serve as an officer in any corporation which did not have a legal existence as of the date said fine became due and owing to the commonwealth.

(c) Civil and criminal penalties pursuant to this section shall apply to employers solely with respect to their wage and benefit obligations to their own employees.

Section 27D - "Construction" and "constructed" defined: Wherever used in sections twenty-six to twenty-seven C, inclusive, the words "construction" and "constructed" as applied to public buildings and public works shall include additions to and alterations of public works, the installation of resilient flooring in, and the painting of, public buildings and public works; certain work done preliminary to the construction of public works, namely, soil explorations, test borings and demolition of structures incidental to site clearance and right of way clearance; and the demolition of any building or other structure ordered by a public authority for the preservation of public health or public safety.

Section 27E – Employment of residents in highway districts: At least seventy-five per cent of the persons employed by the department of highways to work in connection with the construction, reconstruction, alteration or repair of any public works, in positions other than those subject to the civil service laws and rules and regulations, shall be residents in the highway district, as then established by said department or its successor in office, in which the work is being done.

Section 27F – Wages of operators of rented equipment; agreements; penalty; civil action: No agreement of lease, rental or other arrangement, and no order or requisition under which a truck or any automotive or other vehicle or equipment is to be engaged in public works by the commonwealth or by a county, city, town or district, shall be entered into or given by any public official or public body unless said agreement, order or requisition contains a stipulation requiring prescribed rates of wages, as determined by the commissioner, to be paid to the operators of said trucks, vehicles or equipment. Any such agreement, order or requisition which does not contain said stipulation shall be invalid, and no payment shall be made thereunder. Said rates of wages shall be requested of said commissioner by said public official or public body, and shall be furnished by the commissioner in a schedule containing the classifications of jobs, and the rate of wages to be paid for each job. Said rates of wages shall include payments to health and welfare plans, or, if no such plan is in effect between employers and employees, the amount of such payments shall be paid directly to said operators.

Whoever pays less than said rates of wages, including payments to health and welfare funds, or the equivalent in wages, on said works, and whoever accepts for his own use, or for the use of any other person, as a rebate, gratuity or in any other guise, any part or portion of said wages or health and welfare funds, shall have violated this section and shall be punished or shall be subject to a civil citation or order as provided in section 27C.

An employee claiming to be aggrieved by a violation of this section may, 90 days after the filing of a complaint with the attorney general, or sooner if the attorney general assents in writing, and within 3 years after the violation, institute and prosecute in his own name and on his own behalf, or for himself and for others similarly situated, a civil action for injunctive relief, for any damages incurred, and for any lost wages and other benefits. An employee so aggrieved who prevails in such an action shall be awarded treble damages, as liquidated damages, for any lost wages and other benefits and shall also be awarded the costs of the litigation and reasonable attorneys' fees.

Section 27G – Wage of employees of moving contractors; contracts; injunction relief; damages: No contract for the moving of office furniture and fixtures shall be entered into or given by the commonwealth or by a county, city, town or district unless said contract contains a stipulation requiring prescribed rates of wages, as determined by the commissioner, to be paid to the employees of a moving contractor. Any such contract which does not contain said stipulation shall be invalid, and no payment shall be made thereunder. Said rates of wages shall be requested of the

commissioner by the commonwealth or by a county, city, town or district, and shall be furnished by the commissioner in a schedule containing the classifications of jobs and the rate of wages to be paid for each job. Said rates of wages shall include payments to health and welfare plans, or, if no such plan is in effect between employers and employees, the amount of such payments shall be paid directly to said employees.

An employee claiming to be aggrieved by a violation of this section may, 90 days after the filing of a complaint with the attorney general, or sooner if the attorney general assents in writing, and within 3 years after the violation, institute and prosecute in his own name and on his own behalf, or for himself and for others similarly situated, a civil action for injunctive relief, for any damages incurred, and for any lost wages and other benefits. An employee so aggrieved who prevails in such an action shall be awarded treble damages, as liquidated damages, for any lost wages and other benefits and shall also be awarded the costs of the litigation and reasonable attorneys' fees.

Section 27H – Wages of employment of maintenance of cleaning contractors; contracts; civil action: No agreement or contract providing for the cleaning and maintenance of public buildings or space rented by the commonwealth, shall be entered into or given by the commonwealth unless said contract or agreement contains a stipulation requiring prescribed rates of wages, as determined by the commissioners, to be paid to the employees of the maintenance or cleaning contractor. Any such contract which does not contain said stipulation shall be invalid, and no payment shall be made thereunder. Said rates of wages shall be requested of the commissioner, and shall be furnished by the commissioner in a schedule containing the classifications of jobs and rate of wages to be paid for each job. Said rates of wages shall include payments to health and welfare plans and pension plans, or, if no such plan is in effect between employers and employees, the amount of such payments shall be paid directly to said employees. Whoever pays less than said rates of wages, including payments to health and welfare funds and pension funds, or the equivalent in wages, on said works, and whoever accepts for his own use, or for the use of any other person as a rebate, gratuity or in any other guise, any part or portion of said wages, health and welfare funds or pension funds, shall have violated this section and shall be punished or shall be subject to a civil citation or order as provided in section 27C.

An employee claiming to be aggrieved by a violation of this section may, 90 days after the filing of a complaint with the attorney general, or sooner if the attorney general assents in writing, and within 3 years after the violation, institute and prosecute in his own name and on his own behalf, or for himself and for others similarly situated, a civil action for injunctive relief, for any damages incurred, and for any lost wages and other benefits. Any employee so aggrieved who prevails in such an action shall be awarded treble damages, as liquidated damages, for any lost wages and other benefits and shall also be awarded the costs of the litigation and reasonable attorneys' fees.

Item 17. Public contracts; stipulation as to hours and days of work; void contracts

(General Laws, Chapter 149, Section 34 - “Online edition including all amendments to the General Laws passed through July 31, 2019”)

Every contract, except for the purchase of material or supplies, involving the employment of laborers, workmen, mechanics, foremen or inspectors, to which the commonwealth or any county or any town, subject to section thirty, is a party, shall contain a stipulation that no laborer, workman, mechanic, foreman or inspector working within the commonwealth, in the employ of the contractor, sub-contractor or other person doing or contracting to do the whole or a part of the work

contemplated by the contract, shall be required or permitted to work more than eight hours in any one day or more than forty-eight hours in any one week, or more than six days in any one week, except in cases of emergency, or, in case any town subject to section thirty-one is a party to such a contract, more than eight hours in any one day, except as aforesaid; provided, that in contracts entered into by the department of highways for the construction or reconstruction of highways there may be inserted in said stipulation a provision that said department, or any contractor or sub-contractor for said department, may employ laborers, workmen, mechanics, foremen and inspectors for more than eight hours in any one day in such construction or reconstruction when, in the opinion of the commissioner, public necessity so requires. Every such contract not containing the aforesaid stipulation shall be null and void.

Item 18. Definitions applicable to Secs 44A to 44H; competitive bids on construction, etc., of public works; award; bonds; extreme emergency situations; records contracts no subject to competitive bid process

(General Laws, Chapter 149, Section 44A - "Online edition including all amendments to the General Laws passed through July 31, 2019")

(1) The words defined in this section shall have the meaning set forth below whenever they appear in sections forty-four A through forty-four H, inclusive, of this chapter unless indicated otherwise or unless the context in which they are used clearly requires a different meaning.

"Commissioner", means the commissioner of the division of capital asset management and maintenance or his designee.

"Public Agency" means a department, agency, board, commission, authority, or other instrumentality of the commonwealth or political subdivision of the commonwealth, or two or more subdivisions thereof but not including the Massachusetts Bay Transportation Authority;

"Responsible" means demonstrably possessing the skill, ability and integrity necessary to faithfully perform the work called for by a particular contract, based upon a determination of competent workmanship and financial soundness in accordance with the provisions of section forty-four D of this chapter;

"Eligible" means able to meet all requirements for bidders or offerors set forth in sections forty-four A through forty-four H of this chapter and not debarred from bidding under section forty-four C of this chapter or any other applicable law, and who shall certify that he is able to furnish labor that can work in harmony with all other elements of labor employed or to be employed on the work.

"Modular Building", a pre-designed building or units of a pre-designed building assembled and equipped with internal plumbing, electrical or similar systems prior to movement to the site where such units are attached to each other and such building is affixed to a foundation and connected to external utilities; or any portable structure with walls, a floor, and a roof, designed or used for the shelter of persons or property, transportable in one or more sections and affixed to a foundation and connected to external utilities.

"Procurement", buying, purchasing, or otherwise acquiring and installing a modular building, and all functions that pertain to the acquisition and installation of a modular building, including description of requirements, selection and solicitation of sources, preparation and award of contract, and all phases of contract administration.

"Proprietary environmental technology systems", systems, in the town of Nantucket, including solid waste related equipment, supporting structures, and buildings, designed, manufactured, and produced under exclusive individual right to sell such product, pertaining to solid waste related environmental protection or remediation. Such systems shall include, but not be limited to, sequential, turnkey, construction management, design/build procurement, and the phasing of such procurement, including approval of design and construction stages as separate or combined phases.

(A) Every contract or procurement for the construction, reconstruction, installation, demolition, maintenance or repair of a building by a public agency estimated to cost less than $10,000 shall be obtained through the exercise of sound business practices as defined in section 2 of chapter 30B. The public agency shall make and keep a record of each procurement that, at a minimum, shall include the name and address of the person from whom the services were procured. A public agency that utilizes a vendor on a statewide contract procured through the operational services division of the commonwealth, or a blanket contract procured by the public agency pursuant to this subsection, shall be deemed to have obtained the contract through sound business practices.

(B) Every contract for the construction, reconstruction, installation, demolition, maintenance or repair of any building estimated to cost not less than $10,000 but not more than $50,000 shall be awarded to the responsible person offering to perform the contract at the lowest price. The public agency shall make public notification of the contract and shall seek written responses from no fewer than 3 persons who customarily perform such work. The solicitation shall include a scope-of-work statement that defines the work to be performed and provides potential responders with sufficient information regarding the objectives and requirements of the public agency and the time period within which the work shall be completed. The public agency shall record the names and addresses of all persons from whom written responses were sought, the names of the persons submitting written responses and the date and amount of each written response. A public agency may utilize a vendor list established through a statewide contract procured through the operational services division to identify 1 or more of the persons from whom it will seek written responses for purposes of this paragraph. A public agency may also procure a blanket contract to establish a listing of vendors in certain defined categories of work that are under contract to provide services for multiple individual tasks of not more than $50,000 each, and from whom written responses will be sought. Any such blanket contract procured by the awarding authority shall be procured pursuant to either section 39M of chapter 30 or sections 44A to 44J, inclusive, of chapter 149 which are applicable to projects over $50,000. For purposes of this paragraph, the term "public notification" shall include, but not be limited to, posting at least 2 weeks before the time specified in the notification for the receipt of responses, the contract and scope-of-work statement: (1) on the website of the public agency, (2) on the COMMBUYS system administered by the operational services division, (3) in the central register published pursuant to section 20A of chapter 9 and (4) in a conspicuous place in or near the primary office of the public agency; provided, however, that if the public agency obtains a minimum of 2 written responses from a vendor list established through a blanket contract or a statewide contract procured through the operational services division, and the lowest of those written responses is deemed acceptable to the public agency, public notification is not required.

(C) Every contract for the construction, reconstruction, installation, demolition, maintenance or repair of any building by a public agency estimated to cost more than $50,000 but not more than $150,000, except for a pumping station to be constructed as an integral part of a sewer construction or water construction project bid under the provisions of section 39M of chapter 30, shall be awarded to the lowest responsible and eligible bidder on the basis of competitive bids publicly opened and

read in accordance with the procedure set forth in said section 39M of said chapter 30. The term "pumping station" as used in this section shall mean a building or other structure which houses solely pumps and appurtenant electrical and plumbing fixtures.

(D) Every contract for the construction, reconstruction, installation, demolition, maintenance or repair of any building by a public agency estimated to cost more than $150,000, except for a pumping station to be constructed as an integral part of a sewer construction or water construction project bid under the provisions of section 39M of chapter 30, shall be awarded to the lowest responsible and eligible general bidder on the basis of competitive bids in accordance with the procedure set forth in section 44A to 44H, inclusive.

(E) When the general court has approved the use of an alternative mode of procurement of construction for a project pursuant to section 7E of chapter 29, the awarding authority responsible for procuring construction services for the project shall follow the policies and procedures of this section and of section 44B to 44H, inclusive, to the extent compatible with the mode of construction procurement selected.

(F) Notwithstanding paragraph (E), a public agency may undertake the procurement of modular buildings, in accordance with section 44E. A public agency may procure site work for modular buildings, including but not limited to, construction of foundations, installations, and attachment to external utilities, or any portion of site work, either in combination with the procurement of modular buildings pursuant to section 44E or on the basis of competitive bids pursuant to the paragraph (E). Notwithstanding the paragraph (E), a public agency may procure energy management services in accordance with section 11C of chapter 25A and regulations promulgated thereunder.

(G) Every contract by a state agency or state assisted contract for design, construction, reconstruction, installation, demolition, maintenance or repair shall set forth the participation goals of minority and women workers to be employed on each such contract and the processes and procedures to ensure compliance with those workforce participation goals, including reporting and enforcement provisions.

(3) The award of every such contract in connection with which approval by an officer, board or agency of the federal government is required shall be made within thirty days, Saturdays, Sundays and legal holidays excluded, after such approval; and the award of every contract subject to this section in connection with which approval by an officer, board or agency of the federal government is not required shall be made within thirty days, Saturdays, Sundays and legal holidays excluded, after the opening of the bids therefor. If the bidder selected as the general contractor fails to perform his agreement to execute a contract in accordance with the terms of his bid and furnish a performance bond and also a labor and materials or payment bond as stated in his bid in accordance with section forty-four E, an award shall be made to the next lowest responsible and eligible bidder, subject to the provisions of sections forty-four A to forty-four H, inclusive, of this chapter. The thirty-day time limit shall not be applicable to a second or subsequent award made after expiration of the time limit with the consent of said next lowest responsible and eligible bidder, and made because the original award made within the time limit was invalid, or because the bidder failed to execute the contract or to provide a performance bond and labor and materials or payment bond.

(4) In cases of extreme emergency, the awarding authority may, with the prior approval of the commissioner, award a contract for that portion of the work necessary to preserve the health or safety of persons or property or to alleviate an imminent security threat on the basis of such competitive

bids or proposals as it can obtain in time to care for the extreme emergency and without public opening of the bids or proposals.

Where the nature of the emergency prevents the awarding authority from obtaining the prior approval of the commissioner, the awarding authority may contract for the necessary work without said prior approval; provided, however, that the approval of the commissioner shall still be sought at the earliest possible time; and provided, further, that if the commissioner at that time fails to approve the emergency determination the awarding authority shall promptly cease all work for which the emergency determination was denied. In such cases, the contractor shall be entitled to payment for the fair value of the labor and materials furnished prior to cessation of the work.

The commissioner shall maintain a record of all contracts awarded pursuant to this subsection, containing a description of the circumstances and the reasons for the commissioner's determination.

(5) (a) Notwithstanding the provisions of this section or any other general or special law to the contrary, a municipality may enter into a contract for proprietary environmental technology systems as defined in subsection (1) of this section without said contract being subject to the competitive bid process as set forth in sections thirty-eight A 1/2 to thirty-eight *O*, inclusive, of chapter seven; this section and sections forty-four B to forty-four H, inclusive, of this chapter, and section thirty-nine M of chapter thirty; provided that the awarding authority meets the conditions set forth and receives the approvals required in paragraph (b) of this subsection.

(b) Prior to the issuance of any request for proposal with respect to the awarding of any contract pursuant to the provisions of paragraph (a) of this subsection, the awarding authority shall meet or obtain each of the following conditions or required approvals: (1) the municipality shall appoint qualified persons to conduct a thorough review of all available environmental technology, including both proprietary and non-proprietary environmental technology, and if the conclusion of this review is that a contract for proprietary environmental technology systems is in the public interest, such conclusion shall be supported by sound documented reasons in writing available for public inspection; (2) the city council, the board of selectmen, or the town meeting shall take a majority vote finding that it is in the public interest to enter into a contract for proprietary environmental technology systems, as defined in subsection (1) of this section, providing such vote is supported by the conclusion of the review conducted pursuant to condition (1); (3) both the attorney general and the commissioner of the department of environmental protection shall grant written approval; (4) said contract shall be subject to any limitation in the waiver of sections thirty-eight A 1/2 to thirty-eight *O*, inclusive, of chapter seven, sections forty-four A to forty-four H of chapter one hundred and forty-nine, and section thirty-nine M of chapter thirty imposed by either the attorney general or the commissioner of the department of environmental protection as a condition for a grant of approval by said officers; and (5) every proprietary environmental technology systems contract shall be as compatible with sections thirty-eight A to thirty-eight *O*, inclusive, of chapter seven, sections forty-four A to forty-four H of chapter one hundred and forty-nine, and section thirty-nine M of chapter thirty as is feasible for the procurement of the proprietary environmental technology systems chosen.

Item 19 Allowances; alternates; weather protection devices

(General Laws, Chapter 149, Section 44G - “Online edition including all amendments to the General Laws passed through July 31, 2019”)

(A) "Allowance" as used herein means a sum of money covering one or more items of labor or labor and materials which is designated in bid documents and which general bidders are required to use in computing their bids. The use of such allowances shall be prohibited in the award of any contract subject to the provisions of section forty-four A. Whenever the designer is unable to supply specifications for any item prior to the solicitation of bids, such item shall not be included in any contract subject to the provisions of section forty-four A. The awarding authority shall solicit bids for every such item separately pursuant to the provisions of section forty-four A after specifications for that item are prepared.

(B) Every alternate contained in the form for general bids shall be listed in a numerical sequence in order of priority. When the awarding authority decides to consider alternates in determining the lowest eligible and responsible bidder, the awarding authority shall consider the alternates in descending numerical sequence, such that no single alternate shall be considered unless every alternate preceding it on the list has been added to or subtracted from the base bid price.

(C) The use of options other than alternates in bid documents or bid forms subject to section forty-four A shall be prohibited under all circumstances.

(D) Every contract subject to section forty-four A shall include specifications for the installation of weather protection and shall require that the contractor shall install the same and that he shall furnish adequate heat in the area so protected during the months of November through March. Standards for such specifications shall be established by the commissioner or his designee.

Item 20. Invitations to bid; notice; contents; violations; penalty

(General Laws, Chapter 149, Section 44J "Online edition including all amendments to the General Laws passed through July 31, 2019")

(1) No public agency or authority of the commonwealth or any political subdivision thereof shall award any contract for which competitive bids are required pursuant to section forty-four A of this chapter or section thirty-nine M of chapter thirty, or for which competitive proposals are required pursuant to subsection (4) of section forty-four E of this chapter or section eleven C of chapter twenty-five A, unless a notice inviting bids or proposals therefor shall have been posted no less than one week prior to the time specified in such notice for the receipt of said bids or proposals in a conspicuous place in or near the offices of the awarding authority, and shall have remained posted until the time so specified, and unless such notice shall also have been published at least once not less than two weeks prior to the time so specified in the central register published by the secretary of state pursuant to section twenty A of chapter nine and in a newspaper of general circulation in the locality of the proposed project, and on the COMMBUYS system administered by the operational services division. Said notice shall also be published at such other times and in such other newspapers or trade periodicals as the commissioner of capital asset management and maintenance may require, having regard to the locality of the work involved.

(2) Said notice shall specify the time and place where plans and specifications of the proposed work may be had; the time and place of submission of general bids; and the time and place for opening of the general bids. For contracts subject to the provisions of sections forty-four A to H, inclusive, of this chapter, said notice shall also specify the time and place for submission of filed sub-bids, where required pursuant to section forty-four F; and the time and place for opening of said filed sub-bids.

Said notice shall also provide sufficient facts concerning the nature and scope of such project, the type and elements of construction, and such other information as will assist applicants in deciding to bid on such contract.

(3) No contract or preliminary plans and specifications shall be split or divided for the purpose of evading the provisions of this section.

(4) General bids and filed sub-bids for any contract subject to this section shall be in writing and shall be opened in public at the time and place specified in the posted or published notice, and after being so opened shall be open to public inspection.

(5) The provisions of this section shall not apply to any transaction between the commonwealth and any public service corporation.

(6) The provisions of this section may be waived in cases of extreme emergency involving the health and safety of the people and their property, upon the written approval of said commissioner. The written approval shall contain a description of the circumstances and the reasons for the commissioner's determination.

(7) Whoever violates any provision of this section shall be punished by a fine of not more than ten thousand dollars or by imprisonment in the state prison for not more than three years or in a jail or house of correction for not more than two and one-half years, or by both said fine and imprisonment; and in the event of final conviction, said person shall be incapable of holding any office of honor, trust or profit under the commonwealth or under any county, district of municipal agency.

Each and every person who shall cause or conspire to cause any contract or preliminary plans and specifications to be split or divided for the purpose of evading the provisions of this section shall forfeit and pay to the commonwealth, a political subdivision thereof or other awarding authority subject to this section, the sum of not more than five thousand dollars and, in addition, such person or persons shall pay, apportioned among them, double the amount of damages which the commonwealth or political subdivision thereof or other awarding authority may have sustained by reason of the doing of such act, together with the costs of the action.

(8) If an awarding authority rejects all general bids or does not receive any general bids, and advertises for a second opening of general bids with the original filed sub-bids as set forth in subsection (1) of section forty-four E the notice for receipt of such general bids may be published in the central register and elsewhere as required not less than one week prior to the time specified for such second opening of general bids.

(9) No request for proposals or invitation for bids issued under sections 38A 1/2 to 38*O*, inclusive, of chapter 7, section 11C of chapter 25A, section 39M of chapter 30, this section and sections 44A to 44H, inclusive, shall be advertised if the awarding authority's cost estimate is greater than 1 year old.

- END OF SECTION -

SECTION 00824

SPECIAL CONDITIONS - DEP POLICY MEMORANDA

Index

Policy Memorandum No. CG-1	Easements and Rights-of-Way
Policy Memorandum No. CG-2	Permits
Policy Memorandum No. CG-3	Field Controls
Policy Memorandum No. CG-4	Record Drawings
Policy Memorandum No. CG-5	Plan Scale
Policy Memorandum No. CG-6	Borings Logs
Policy Memorandum No. CG-7	Breakdown of Bid Items
Policy Memorandum No. CG-8	Pavement
Policy Memorandum No. CG-9	Pipe Testing
Policy Memorandum No. CG-10	Change Orders
Policy Memorandum No. CG-11	Utility Relocation
Policy Memorandum No. CG-12	Refundable Deposits for Plans and Specifications
Policy Memorandum No. CG-13	Bid Opening Procedures
Policy Memorandum No. CG-14	Payment for Rock Excavation
Policy Memorandum No. CG-15	Traffic Police
Policy Memorandum No. CG-16	Documentation Required to Substantiate Contract Quantities
Policy 88-02	Policy for Review of Sewer Line/ Water Supply Protection

Exceptions:

DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF WATER RESOURCES
DIVISION OF MUNICIPAL SERVICES POLICIES

The Division of Municipal Services (DMS) has established the following policies for all Division financially-assisted projects.

POLICY MEMORANDUM NO. CG-1 EASEMENTS AND RIGHTS OF WAY

Prior to the approval of financial assistance for construction, the owner shall obtain and shall thereafter retain, a fee simple or such estate or interest in the site of construction and rights of access as will assure undisturbed use and possession for the purpose of construction and operation for the estimated life of the project. The Division may refuse to approve financial assistance until it has received from the owner sufficient assurances that such interests have been obtained. Unless the Division otherwise notifies the owner, the certificate (under pains and penalties of perjury) of the owner's legal representative shall constitute such sufficient assurance.

Additional cost which result from interruptions of construction or extensions of contract time caused by the owner's failure to obtain the necessary interests in land shall be ineligible for financial assistance, and all such additional costs shall be borne by the owner.

POLICY MEMORANDUM NO. CG-2 PERMITS

The owner shall be responsible for identifying and obtaining all federal, state, local and railroad permits required by the nature and location of construction, including but not limited to building construction permits and permits for street and highway cuts and openings, and all such permits shall be listed in a separate permits section of the contract documents. To the extent possible, such permits shall be obtained by the owner prior to the solicitation of bids for construction, and copies of all permits so obtained shall be included in the said permits section. The status of the application for each permit, including the permit conditions, and costs, not obtained prior to the solicitation of bids shall also be indicated in the contract documents permits section. The Division may refuse to approve financial assistance for construction unless and until it has received from the owner sufficient assurances that all necessary permits have been or will be obtained prior to the commencement of construction.

The contractor shall be responsible for obtaining all permits required of his equipment, work force, or particular operations (such as blasting) in the performance of the contract and not otherwise specified in the two preceding paragraphs as to be obtained by the owner. These permit fees shall be paid by the contractor.

The owner shall be responsible for the payment of all other permit fees required by the construction.

The following permits shall not be eligible for financial participation by the Department of Environmental Protection (DEP).

- Permits and insurance for construction in railroads' rights of way;
- Building permits;
- Permits for opening public streets and other public or municipal rights of way;
- Permits for the use of explosives;
- Permits for the disposal of waste materials;
- Permits and fees for connecting to municipal utilities.

Permits required by extraordinary circumstances and not specifically excluded from eligibility above may be eligible for DEP participation. For such permits to be so eligible, the owner or his representative must notify the DEP project engineer in advance of obtaining such permit and receive from the engineer specific agreement that such permit will be eligible for DEP participation. Eligibility for such participation will not be made retroactively.

Additional costs which result from interruptions of construction or extensions of contract time resulting from the owner's or the contractor's failure to obtain the necessary permits may be ineligible for participation.

POLICY MEMORANDUM NO. CG-3 **FIELD CONTROLS**

The Owner shall be responsible for indicating on the contract drawings all easement limits and all property and other control lines for locating the principal component parts of the work together with those elevations and bench marks used in the design of the work, all hereinafter referred to as "field controls". Where easement and property limits have not previously been established in the field, the owner shall be responsible for establishment of such limits. From the information provided by the Owner, unless otherwise specified, the Contractor shall develop and make all layouts required for construction, such as slope stakes, batter boards, stakes for pipe locations and other working points, lines, elevations and cut sheets.

Whenever he has reason to believe that an error exists or whenever he is otherwise unable to locate the field controls, the contractor shall promptly notify the owner and the owner's engineer of such error with appropriate documentation.
DEP-DMS-CG-2

POLICY MEMORANDUM NO. CG-4 **RECORD DRAWINGS**

The Owner shall be responsible for the preparation of all record drawings required by this contract. This responsibility may be delegated to the Owner's representative. The responsibility for preparation of record drawings shall not be delegated or transferred to the contractor. They may use the contractor's and sub-contractor's certified AS BUILT drawings along with their own marked up set in the preparation of the Record Drawings.

Division approved contract drawings shall be revised upon completion of the contract to reflect any changes made and/or final quantities, as appropriate.

POLICY MEMORANDUM NO. CG-5 **PLAN SCALE**

Unless otherwise approved in advance by the Division, the horizontal scale for construction plans for non-structural facilities shall be 1" = 40'. A larger horizontal scale shall be used where appropriate to show sufficient detail to construct the project. The vertical scale for construction plans for non-structural facilities shall be 1" = 4'. Based on the best information available at the time of their preparation, the location of underground utilities and support structures for overhead utilities shall be shown on the plans.

Unless otherwise exempted in advance by the Division, construction plans shall be updated whenever the date of the advertisement for bids for the construction of such facilities is more than one year after the date of approval by the Division or EPA; and in the case of approval by both such agencies, the later approval date shall be used in determining the need for update.

The consulting engineer shall receive adequate compensation for updating plans and specifications, and such additional cost shall be eligible for assistance to the extent not otherwise prohibited by USEPA and Division regulations and program guidance.

All revision, or review without need for revision, shall be noted and dated on the plans prior to advertisement of the project for bid.

POLICY MEMORANDUM NO. CG-6 **BORINGS LOGS**

All soil borings shall be taken as close as practicable to the construction line, and the location of all such borings shall be clearly indicated on the contract drawings. The plan view shall show the location and boring number of each boring. The profile view shall show the location, elevation, and depth of each soil boring, the location of each change in soil stratum, the groundwater level, and the average of blow counts at each five foot interval. As a minimum, boring logs to be submitted with the plans and specifications shall show the name of the company taking the borings, the soil classification, the number of blows per foot of penetration, the groundwater elevation, and the date on which the borings were taken.

As part of the submission of plans and specification for approval, the owner's representative shall include written justification for the lesser frequency and depth of borings where their interval is more than approximately 300' or their depth is less than 50% below depth of pipe invert.

DEP-DMS-CG-3

POLICY MEMORANDUM NO. CG-7 **BREAKDOWN OF BID ITEMS**

The following items shall, where applicable, be listed separately in the bid documents.

1. Mobilization

2. Pavement
   a. Municipal
      i. temporary
      ii. permanent
   b. State
      i. temporary
      ii. permanent

3. Concrete cradle or encasement (to be identified where applicable)

4. Rock-Excavation

5. Wood or steel sheeting left in place

6. Excavation of unsuitable materials below grade.

7. Select and/or borrow material

8. Dewatering

9. Special Dewatering (coffer dam)

Mobilization costs are the costs of initiating the contract, exclusive of the cost of materials. Payment for mobilization shall be a lump sum at the price bid for this item in the proposal and shall be payable when the contractor is operational on the site. For purposes of this policy, "operational" shall mean the substantial commencement of work on site.

The lump sum price bid for mobilization shall not exceed five per centum (5%) of the total amount of the bid.

POLICY MEMORANDUM NO. CG-8 **PAVEMENT**

All roads and trenches therein shall be refilled and repaved in accordance with specifications provided by the owner in the contract documents. Please note that this policy may be excludable on federally assisted projects where bid alternative items may be required (i.e. trench width vs. full width pavement). You are advised to seek project specific clarification.

Loan eligibility shall be limited to the following:

A. Where the depth of the pipe invert is 0 to 8', the maximum pavement widths which shall be eligible for financial assistance are as follows:

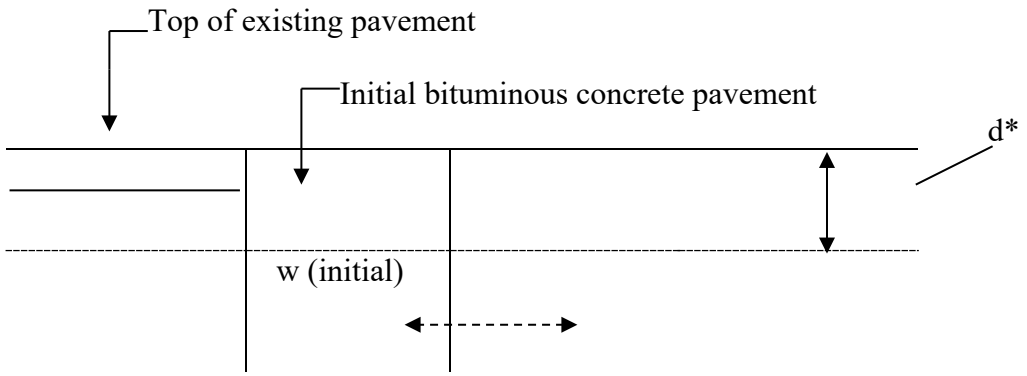
Nominal Pipe Diameter	Maximum Eligible Widths	
	Initial Pavement	Permanent Trench
0-24"	6'-6"	8'-6"

Where the nominal pipe diameter is greater than 24" the maximum eligible width for initial re-paving shall be the nominal diameter of the pipe plus four (4) feet, and for permanent trench re-paving the maximum eligible width shall be the nominal pipe diameter plus six (6) feet.

B. For each additional four (4) feet (or fraction thereof) of pipe invert depth, add three feet to the eligible width limits stated in paragraph A. DEP-DMS-CG-4

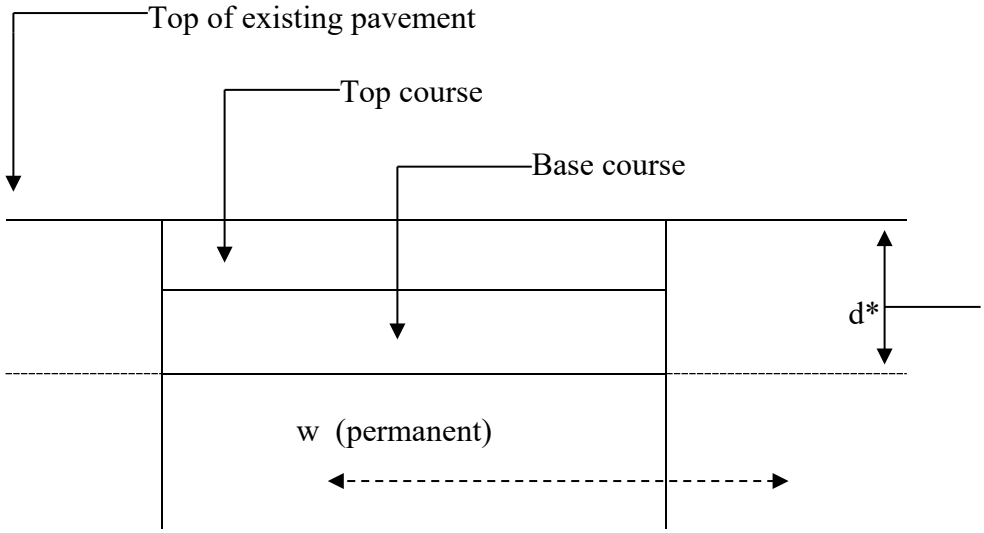
At the design phase of a project the owner has the option to elect either Initial Pavement with Option I (Permanent Trench replacement) or Initial with Option II (curb to curb over initial)

Initial Pavement



d*= depth of existing pavement to a maximum of 3 inches (see general notes #3)
w = maximum eligible Initial pavement width as described in paragraphs "A" & "B" on page DEP-DMS-CG's-P4.

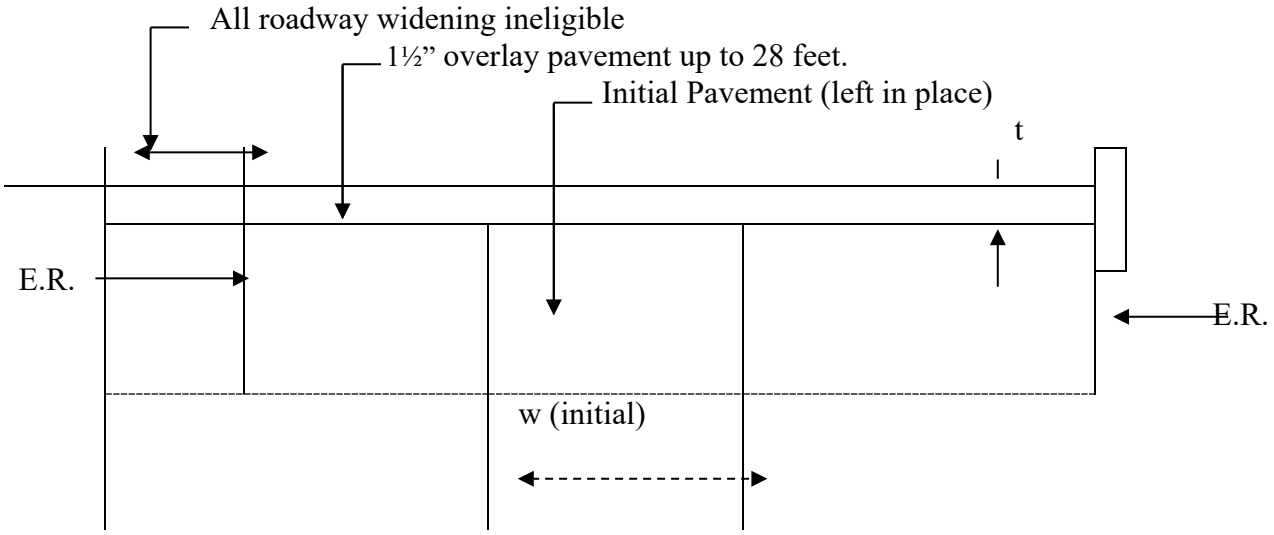
OPTION I Permanent Trench Pavement



d*= depth of existing pavement trench to a maximum of 3 inches (see general notes #3)
w = maximum eligible permanent pavement width as described in paragraphs "A" & "B". equals initial width plus 2 feet and includes:

- Cutting edges for the permanent trench
- Removal of initial patch plus two feet of existing pavement
- Fine grading/compacting gravel
- Placement of Permanent Trench pavement in two courses.

OPTION II Curb to Curb Pavement (overlay pavement for roadways up to 28 feet)



E.R.= edge of existing paved roadway
t = one and one half inch (1½") overlay of bituminous concrete pavement

GENERAL NOTES:

1. Repavement of settled areas and crown restoration within the trench limits shall be the responsibility of the contractor.
2. Leveling outside the trench limits shall be the responsibility of the owner.
3. Sewer trench re-fill and pavement re-paving on public ways under the jurisdiction of the Massachusetts Department of Public Works, the Metropolitan District Commission, or other such agency shall be in accordance with permit(s) issued therefore by that Department or Commission, as the case may be.
4. The Division will consider requests for increase in the participating pay limits defined in paragraphs A and B, when such increases are, in the Division's opinion, reasonable. Such requests should be documented in writing and submitted to the Division in a timely manner.
5. Projects which deviate from the above options are required to seek Division review and approval.

POLICY MEMORANDUM NO. CG-9 **PIPE TESTING**

Monthly payment estimates shall be prepared in accordance with contract documents. All pipe shall be tested in accordance with the contract documents and sound engineering practice. If, after 60 days following submission of a monthly payment estimate for pipe items, the pipe for which payment is requested has not been successfully tested, the owner may withhold up to 10% of the amount requested for such pipe items until the pipe has been so tested. However, in the case of a major (pipe diameter 24 inches or greater) interceptor pipe installation, sums retained by the owner pursuant to this policy memorandum shall not exceed two per centum (2%) of the costs of such pipe items.

POLICY MEMORANDUM NO. CG-10 **CHANGE ORDERS**

Executed change orders submitted to the Division for review and processing for financial assistance must be prepared on the attached Change Order Forms (CG-10, Attachment 1, pages A-1 & A-2) with a duplicate copy, calculation sheet(s) (CG-10, Attachment 2), and all other supporting documentation necessary for evaluation. Failure to comply with these instructions will result in delays in processing the change order and/or limited financial assistance.

M.G.L. c.44, s.31C requires that the auditor, accountant, or other municipal officer having similar duties must certify that adequate funding in an amount sufficient to cover the total cost of the change order has been made. Change orders will not be processed or approved until this certification is made on the face of the Change Order Form (CG-10 Attachment 1).

Payment of Change Orders:

Payment of all change orders shall be in accordance with the relevant provisions of Massachusetts General laws, Chapter 30, Section 39G for non-building construction and Section 39K for building construction.

Payment of change orders shall be made in accordance with one of the following three methods:

A. Existing unit prices as set forth in the contract; or
B. Agreed upon lump sum or unit prices; or
C. Time and materials

A. Payment for work for which there is a unit price in the contract:

Where the contract contains a unit price for work and the Engineer orders a change for work of the same kind as other work contained in the contract and is performed under similar physical conditions, the contractor may accept full and final payment at the contract unit price(s) for the acceptable quantities.

B. Payment for work or materials for which no price is contained in the contract:

If the Engineer directs, the contractor shall submit promptly in writing to the Engineer and offer to do the required work on a lump sum or unit price basis, as specified by the Engineer. The stated price, either lump sum or unit price, shall be divided so as to show that it is the sum of:

(1) The estimated cost of labor, plus
(2) Direct Labor Cost, plus
(3) Material and Freight Costs, plus
(4) Equipment Costs, plus
(5) An amount not to exceed 20% of the sum of items (1) through (4) for overhead and profit, plus (if applicable),
(6) In the case of work done by a subcontractor an amount not to exceed 7 ½ %, for the general contractor of the sum of items (1) through (4) for his overhead and profit, less, if applicable,
(7) Credits for work deleted from the contract.

C. Payment for work on a time and materials basis:

Unless an agreed lump sum and/or unit price is obtained from above and is so stated in the change price, the contractor shall accept as full payment for which no other agreement is contained in contract, and amount equal to:

(1) The estimated cost of Labor, plus
(2) Direct Labor Cost, plus
(3) Material and Freight Costs, plus
(4) Equipment Costs, plus
(5) An amount not to exceed 20% of the sum of items (1) through (4) for overhead and profit, plus (if applicable),
(6) In the case of work done by a subcontractor an amount not to exceed 7 ½ %, for the general contractor of the sum of items (1) through (4) for his overhead and profit, less, if applicable,
(7) Credits for work deleted from the contract.

Explanation of items (1) through (7) as outlined in "B" and "C":

(1) Labor – Only those workers employed on the project who are doing the extra work, including the foreman in charge, are allowable. General foremen, superintendents, or other supervisory personnel are considered to be included in the overhead markup as provided in items (5) and/or (6). Hourly labor rates in excess of those as listed in the contract wage rates (Federal or State, whichever applies) require documentation. As a minimum, an explanation and the appropriate copy of the certified payroll are required.

(2) Direct Labor Costs - These costs are limited to those which are required in the contract document. Coverage in excess of the contract provisions, secured by the contractor/subcontractor(s) at his option, are ineligible for financial assistance. The following list of typical direct labor charges is provided for your assistance and is in no way intended to be complete or all encompassing:

- Workman's Compensation
- Federal/State: Social Security Tax and Unemployment Tax;
- Health, Welfare and Pension Benefits; (this cost is included in the wage rates appearing in the Mass. Wage Rates of the contract specifications)
- Liability Insurance: Bodily Injury;
  Excess Umbrella;
  Property damage;
  Public Liability
- Blasters Insurance
- Builders Risk Insurance
- Experience Modification Insurance
- Surcharges

If applied to any required direct labor costs.

Following the Notice of Intent to Award, the Owner shall require the Low Bidder to submit the percentage to be used for the Direct Labor Cost markup, along with the breakdown of how it is calculated (this number shall be required and submitted to MassDEP before and Authorization to Award is issued by DMS). This documented direct labor cost may be adjusted upon the submission of new documentation which demonstrates both how and why it has changed.

(3) Material and Freight – Only those materials required as a result of the change order and reasonable freight charges for delivery of same are allowable.

(4) Equipment – Only the equipment required as a result of the change order is allowable. Equipment rental rates shall be governed by the current Nielson/Dataquest Rental Rate bluebook for Construction Equipment (the "Bluebook"). In determining the rental rate the following shall apply:

(a) For equipment already on the project – the monthly prorated rental rate by the hourly use shall be applicable;
(b) For equipment not on the project the daily rate, the weekly rate, or monthly rate will prevail, whichever will prove to be most cost effective. Small tools and manual equipment are examples of costs not allowable under this item. These costs are considered to be included in the overhead markup as provided in items (5) and/or (6) (1 month (normal use) = 176 hours)

(5) & (6) Overhead and Profit – All other costs not previously mentioned are considered to be included in this item, be it for the general contractor or subcontractor(s).

(7) Credits – Work deleted, material and equipment removed from the contractor, stored and/or returned shall be credited to the cost of the change order, less costs.

The Contractor shall furnish itemized statements of the cost of the work ordered and shall give the Engineer access to all accounts, bills and vouchers relating thereto; and unless the Contractor shall furnish such itemized statements, and access to all accounts, bills and vouchers, he shall not be entitled to payment for any items of extra work for which such information is sought by the Engineer. Devations from any of the above will be reviewed for financial assistance on a case-by-case basis.

The change order will be prepared in such manner as to clearly separate Eligible and Ineligible Costs.

CHANGE ORDER FORM

SRF Number _____

Public Entity _____

Contract Number _____

Change Order Number _____

Contract Amount (As Bid) $ _____

Net Change in Contract Price (this change order) $ _____

Total Adjusted Contract Price (including this and all other change orders) $ _____

This change order extends the time to complete the work by _____ calendar days.

The extended completion date is _____

This change order checked by _____ _____

(Chief) Resident Engineer Date

This change order is requested by: _____

This change order is recommended by: _____

_____ _____ _____

Consultant Engineer P.E. Number Date

The undersigned agree to the terms of the change order.

_____ _____

Contractor Date

_____ _____

Owner Date

Certification of Appropriation under M.G.L. c.44, §31C: Adequate funding in an amount sufficient to cover the total cost of this change order is available.

By: _____ _____

Certification Officer (Auditor, accountant, treasurer) Date

Do not write below: this space reserved for STATE AGENCY APPROVAL

DEP/DMS

CHANGE ORDER FORM (Continued)

Public Entity _____

SRF No: _____ Contract No. _____ Change Order No. _____

Contract Title: _____

Owner's Name: _____

Owner's Address: _____

Contractor's Name: _____

Contractor's Address: _____

Description of Change

Reason for Change

CALCULATION SHEET

(1) Labor

Foreman	10 hrs @ $10.00/hr.	$ 100.00	
Engineer	10 hrs @ 8.50/hr	85.00	
Operator	10 hrs @ 9.50/hr	95.00	
Laborers	24 hrs @ 7.00/hr	168.00	
			$448.00

(2) Direct Labor Cost (use the agreed upon Direct Labor Cost)

*	(30)% of $448	
*	(Used for example purposes only)	134.00

(3) Materials & Freight

150 l.f. of 12" pipe @ $2.00/l.f.	$ 300.00	
15 v.f. precast SMH	1,700.00	
Freight (slip # _____ Enclosed)	25.00	
		2,025.00

(4) Equipment

1 Backhoe 10 hrs @ $80.00/hr	$ 800.00	
1 Truck-crane 10 hrs @ $100.00/hr	1,000.00	
		1,800.00
	Total (Items 1 through 4)	4,407.00

(5) 20% markup for Overhead, Profit

20% of $4,407 881.00

(6) 7 ½% markup for general contractor (if subcontractor is involved)

7 ½% of $4,407 331.00

(7) Credits (deductibles) - 323.00

Total Cost $ 5,296.00

Reminder: Provide support documentation as necessary i.e. vouchers, correspondence, Calculation, photographs, reports …….

EXAMPLE

POLICY MEMORANDUM NO. CG-11 **UTILITY RELOCATION**

The construction of treatment facilities, sewers, pumping stations, force mains and appurtenant work can cause the relocation of utilities. Costly relocation can sometimes be minimized by early communication and cooperation of the representatives of the municipality (owner) and the utilities.

Every possible effort should be made by the owner and each utility to establish the location of existing utilities in the vicinity of the proposed construction. The owner or its consulting engineer should make every reasonable effort to design the proposed construction so that relocation of existing utilities is minimized whenever possible. If the proposed construction is in an area of many existing utilities or in an otherwise critical area, the utilities are encouraged to mark the location of their existing utilities at the site during the design phase of the project.

During the design phase of the project, the municipality should provide timely notice to all utilities known or thought to have facilities in or proximate to the site of such future construction.

POLICY MEMORANDUM NO. CG-12 **REFUNDABLE DEPOSITS FOR PLANS AND SPECIFICATIONS**

For each set of project plans and specifications provided, the owner may require a deposit in form of cash or other appropriate security, in an amount sufficient to cover the costs of production of such plans and specifications.

Upon return of the plans and specifications to the owner within a reasonable time and in good condition, such deposit shall be refunded.

Actual mailing costs, if any, shall be borne by the party requesting such plans and specifications.

POLICY MEMORANDUM NO. CG-13 **BID OPENING PROCEDURES**

As a minimum, bid documents shall be reviewed/inspected for conformance to the following bid opening procedure in the order presented below. Failure to comply with any of these steps shall render the bid non-responsive and upon determination of such non-responsiveness, such bid shall be rejected immediately, set aside, and shall receive no further consideration.

Bid Opening Procedure

Step #1. Timeliness – The bid must be filed at the place and within the time specified therefore in the invitation to bid, and no bid shall be accepted after such time. The time at which a bid is filed should be time/date stamped or otherwise prominently noted on the bid;

Step #2. Bid Security – Properly executed bid security, in the amount and terms specified in the invitation to bid (equal to 5% of Base Bid or Highest Possible Amount considering all alternatives) shall be placed in a seal envelope and attached to the outside of the envelope containing the bid at the time of its submission;

A. Bid Bond

The Bid bond must be dated On or Before the Bid Date;
Issued by a Bonding Company Licensed in Massachusetts;
Accompanied by a Current Power of Attorney;
Signed by Surety;

B. Check

The Check must be a Certified, Cashiers or Bank Treasurer's;
Dated On or Before the Bid Date;

Step #3. Bid Signature – The bid and all accompanying documents so required shall be signed by the bidder or its authorized representative before submission;

Step #4. Addenda – All addenda shall be sent certified mail, return receipt requested, by the owner to all individuals and organizations which have received plans and specifications and shall be mailed not later than five days prior to the date established for submission of bids. All bidders shall include with their bids written acknowledgement of receipt of all addenda, which acknowledgement may be on a form provided therefore by the owner.

Alternates – Any Alternates shall be acknowledged.

Step #5. Written Dollar Amounts – The total dollar amount of each bid shall be read, and the three lowest bids shall be selected for further consideration. The remaining bids shall then be set aside. The three apparent low bids shall be read to determine whether the unit price for each line item of each bid has been written therein in words. If it has not, such bid shall be rejected and shall receive no further consideration. ***Bid amounts shall be consistent (words vs. numbers) and if words and numbers differ, the words govern.*** This procedure shall then be repeated with the next apparent low bid until three are acceptable which have all the unit prices written in words, at which time the lowest bid shall be announced as the apparent low bidder, and the bid opening procedure shall be closed.

The Division recommends that this policy memorandum be included in all contract specifications and that the owner's evaluator(s) use the attached form (CG-13 Attachment #1) for bid opening procedures.

The Contractor's Bid Opening Checklist also attached hereto, is for use by each contractor to assure that his bid conforms with this policy memorandum. It is recommended that the checklist (CG-13 Attachment #2) be included in information for bidders, or at the end of the bid proposal, or in some other prominent part of the bid specifications

FORM FOR BID OPENING PROCEDURES

(to be completed by the owner's evaluator(s))

CONTRACT NO.: _____ DATE: _____

CONTRACT NAME: _____ BID OPENING TIME: _____

All non-responsive bids shall be rejected forthwith by the awarding authority upon determination of such bids' non-responsiveness at the time bids are opened and read. Failure to comply with any one of the requirements shall render the bid non-responsive, and upon determination of such non-responsiveness such bid shall be rejected and receive no further consideration.

A = Acceptable N-R = Non-Responsive (explain reasons on supplemental sheet & attach)

BIDDER		1. TIMELINESS	2. BID SECURITY	3. SIGNATURE	4. ADDENDA ALTERNATIVES	5. WRITTEN DOLLAR AMOUNTS	COMPLIANCE (CIRCLE ONE)	
1							YES	NO
2							YES	NO
3							YES	NO
4							YES	NO
5							YES	NO
6							YES	NO
7							YES	NO
8							YES	NO
9							YES	NO
10							YES	NO
11							YES	NO
12							YES	NO

DEP/DMS

Evaluator(s) _____

_____

_____

CG-13 Attachment #1

DEP-DMS-CG-16

BID OPENING PROCEDURES
CONTRACTORS CHECKLIST

CONTRACT NO.: _____ BIDDER: _____ DATE: _____

All non-responsive bids shall be rejected forthwith by the awarding authority upon determination of such bids' non-responsiveness at the time bids are opened and read. Failure to comply with one or more of the following requirements shall render the bid non-responsive, and upon determination of such non-responsiveness such bid shall be rejected and receive no further consideration.

ITEM	REQUIREMENTS	COMPLIANCE (CIRCLE 1)		REASONS FOR REJECTION
1. Timeliness	Bid filed w/in time specified	Yes	No; Rejected	
2. Bid Security	Appropriate and properly Executed security w/bid.	Yes	No; Rejected	
3. Signature	Bid signed by authorized Representative	Yes	No; Rejected	
4. Addenda	All addenda acknowledge Any alternative	Yes	No; Rejected	
5. Dollar Amount	Dollar amount in words Specified for each line item in bid	Yes	No; Rejected	

DEP/DMS Attachment #2 Policy Memo No. CG-13

POLICY MEMORANDUM NO. CG-14 **PAYMENT FOR ROCK EXCAVATION**

There shall be in the contract documents a separate pay item for rock excavation. For such purposes, "rock" shall mean igneous, sedimentary, metamorphic, and conglomerate rock, which for excavation must be drilled, blasted, broken, or ripped by power tools. Boulders and concrete structures one cubic yard or greater, however removed, are included within this definition of rock for payment purposes. At the option of the owner or his representative a separate pay item for boulders, concrete structures, or concrete road base may be used.

Depth From Ground Surface To Invert Pipe	Pay Width (Nominal Pipe Diameter)	
	0-24"	Over 24"
* 0 – 12'	5'0"	D+3'0"
* Over 12' – 20'	7'0"	D+5'

Engineer's plans and specifications shall establish pay limits below pipe and structures.

- See CG-14 Attachment #1 (typical cross section)

Payment width for depths over twenty feet (20') shall be determined on a case-by-case basis consistent with the foregoing chart.

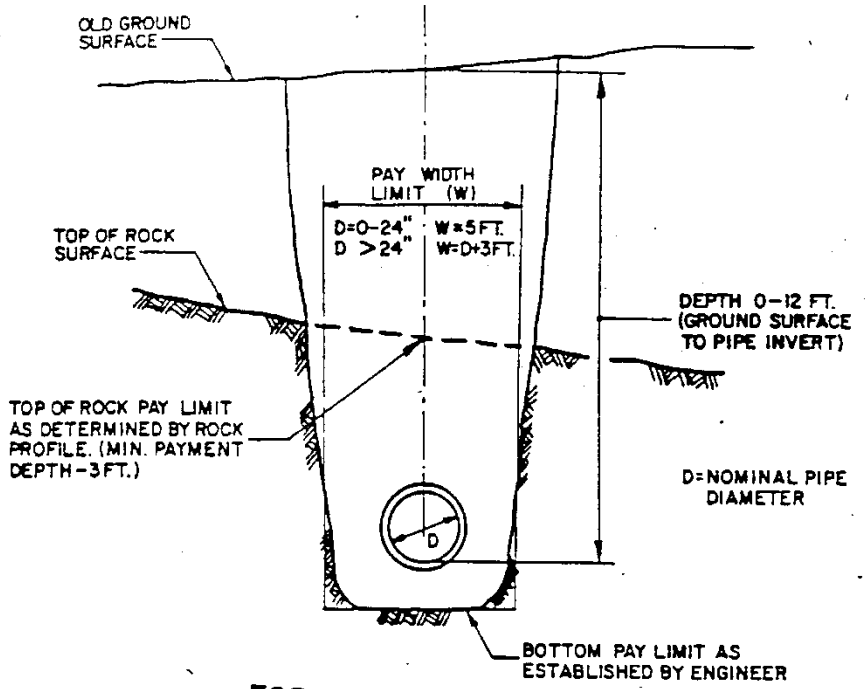
The pay limit for rock removal outside proposed manholes shall commence one foot (1') outside the widest dimension of the structure of shall be the maximum connecting trench width, whichever is greater.

Payment depth for rock which is encountered in a trench shall be no less than three feet (3') when removal can be accomplished only by drilling and blasting or by use of jack (air or hydraulic) hammers.

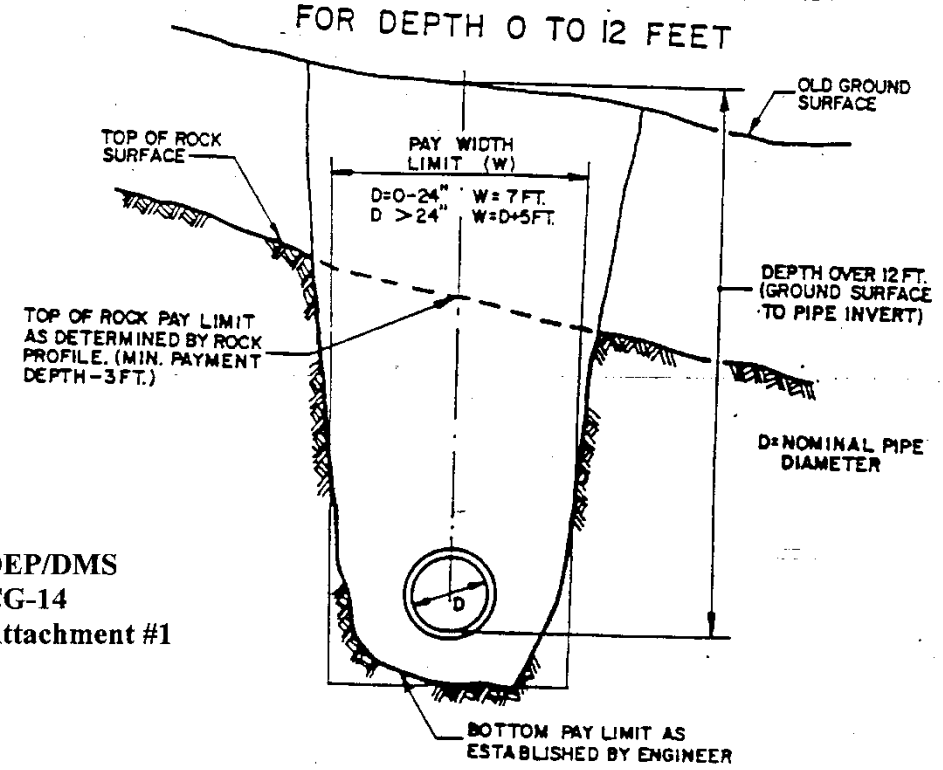
Payment for rock removed, using the same or equal equipment as utilized for normal trench excavation, shall be limited to the actual depth removed within the limits established by the contract documents.

Boulders encountered within the pay limits of excavation, whose volume is one cubic yard or greater, part of which extends outside said limits shall be paid in accordance with the actual volume excavated.

CG-14 ROCK EXCAVATION



FOR DEPTH 0 TO 12 FEET



FOR DEPTH OVER 12 FEET AND UP TO 20 FEET

DEP/DMS
CG-14
Attachment #1

POLICY MEMORANDUM NO. CG-15 **TRAFFIC POLICE**

The reasonable costs for police details required for traffic control on a construction project which receives financial assistance shall be considered as an eligible administrative cost. A police detail item shall not be included as a bid item in the contract documents.

"Police" as used in this memorandum includes local, county, capital, state, regular and auxiliary police.

Owner's Responsibility

It shall be the owner's responsibility to submit in writing the hourly rate of pay to be established for detailed traffic police and each change in rate during the course of the project. It is the owner's responsibility to arrange, document and pay for such police details. The owner or its representative shall meet with the police chief or other officer in charge of police detail duty to review contract needs. The owner shall maintain a daily record of the following:

a. Officer's name
b. Hours worked
c. Location of assignment
d. Hourly rate

POLICY MEMORANDUM NO. CG-16 **DOCUMENTATION REQUIRED TO SUBSTANTIATE CONTRACT QUANITITES**

Unit	Documentation required
Acres (A)	Location, station, offset and calculations. Location = Street right-of-way, etc; Station = Point on Baseline; Offset = Distance left or right of Baseline
Cubic Yard (C.Y.)	Location, stations, widths, depths, calculations and Cross sections as necessary
Each (Ea.)	Location, station, and offset.
Gallon (Gal.)	Location, stations, calculations (if appropriate) and delivery slips.
Hour (Hr.)	Hours and location.
Linear Feet (L.F.)	Location, stations, and offsets.
Month (Mo.)	Location, period of time and calculations if applicable.

1000 Foot Board Measure (MFBM)	Location, stations, offset, elevations, grade, and calculations. Attach invoices where applicable.
Pound (Lb.)	Locations, stations, and calculations (if applicable). Attach Delivery weight slips.
Square Feet (S.F.)	Locations, stations and calculations
Square Yard (S.Y.)	Locations, stations and calculations
Ton	Locations, stations and calculations (if applicable). Attach Delivery weight slips.
Vertical Feet (V.F.)	Locations, stations, elevations, and offsets.

Note:

1. All of the above, that apply must be submitted with a final payment request or change order as applicable.
2. Where in place measurement is not possible or practical, delivery slips may be used to substantiate quantities.
3. Change orders – See CG-10 in which some of the above may be applicable in justifying materials, equipment and labor.
4. When necessary, itemized quantities must be separated into eligible and non-eligible units with separate calculations to justify eligible costs.
5. Overruns and underruns of any specific item shall be explained with an appropriate sentence or paragraph.
6. On all quantities, units of payment shall be maintained at the project site and shall be updated daily so that upon field inspection by the C.O.E., EPA or DMS, the quantities paid to date can be substantiated.
7. In the case of unforeseen conditions, photos should be submitted with the applicable item in addition to the recommended documentation.
8. Documentation of units of payment shall be clearly legible and cross referenced to the applicable sheets of the record drawings.
9. For record drawings policy, please see CG-4.

DMS Policies 1 through 16 Approved By:

Steven J. McCurdy
Division of Municipal Services

DWS POLICY 88-02
DEPARTMENT OF ENVIRONMENTAL PROTECTION
POLICY FOR REVIEW OF SEWER LINE/WATER SUPPLY PROTECTION

The Department of Environmental Protection seeks to protect existing and potential water supplies from the potentially negative effects of leaking sewer lines through the adoption of a Department policy on this subject.

The following restrictions will apply to new sewer construction statewide:

Gravel Packed Wells

~ Within the 400 foot radius protective distance around gravel packed wells, all sewer lines and appurtenances are prohibited, unless they are necessary to eliminate existing and/or potential sources of pollution to the well.

Tubular Wells

~ Within the 250 foot radius protective distance around tubular wells, all sewer lines and appurtenances are prohibited, unless they are necessary to eliminate existing and/or potential sources of pollution to the well.

Gravel Packed and Tubular Wells

~ Within a minimum radius of 2,640 feet or unless otherwise documented by an appropriate study specifically defining the area of influence and approved by the Division of Water Supply, all sewer lines and appurtenances will be designed and constructed for maximum water tightness.

○ Force Mains or Pressure Sewers: shall be tested at 150% above maximum operating pressure or 150 p.s.i. whichever is greater. Testing shall conform to the requirements of the American Water works Association (AWWA) standard c 600.

○ Gravity Sewers: shall be tested by approved methods which will achieve test results for infiltration or exfiltration of less than 100 gallons/inch diameter/mile/24 hours.

○ Manholes: shall be installed with watertight covers with locking or bolted and gasketed assembles. Testing for infiltration/exfiltration shall conform to the same standards as the maximum allowed for pipes in the manhole as required for gravity sewers, indicated above.

○ Satisfactory test results for Force Mains, Manholes and Gravity Sewers shall be performed prior to the expiration of the contractor's one year guarantee period.

○ All pumping stations within this zone shall have standby power high water alarms telemetered to an appropriated location that is manned at all times. An emergency contingency plan must be developed by the owner and approved by the BWR.

○ A minimum of Class B bedding as defined by WPCF-MOP9 must be used for all piping.

○ Service connections (laterals and house connections) shall be rigidly inspected by the appropriate municipal official. Certified inspection reports shall be submitted to the BWR.

Bedrock Wells

The above requirements are the same for bedrock wells, with the Department reserving the right to require more stringent controls on a case-by-case basis.

Surface Water Supplies

~ Within 100 feet of all surface water supplies and tributaries all sewer lines and appurtenances are prohibited except as required to cross tributaries or to eliminate existing or potential pollution to the water supply. In the latter case, watertight construction methods shall be use.

~ Tributary stream crossings shall employ watertight construction methods of sewer lines and manholes. Watertight construction must extend 100 feet to either side of the stream.

~ Within 1,000 feet of surface water supplies and tributaries, all pumping stations shall have standby power and high water alarms telemetered to an appropriate location that is manned at all times. An emergency contingency plan must be developed by the owner of the wastewater treatment facility and submitted to the BWR for approval.

~ Beyond 1,000 feet and within the watershed of surface water supplies the Department may in specific circumstances after review, require additional controls.

Potential Public Water Supplies

The above requirements also apply to potential public water supplies.

Baseline Date Requirements

Two (2) copies of an appropriately scaled map(s) shall be submitted to the Department which details the proposed sewers and/or appurtenances and also includes the following:

(1) the location of all nearby existing or potential surface water supplies, tributaries thereto, and watershed boundaries;

(2) the location of existing and potential public and municipal potable groundwater supply wells.

The Department reserves the right to impose more restrictive measures than those contained in this policy as deemed appropriate.

Definitions

- Appurtenances – all attachments to sewer lines necessary for the transport and operation and maintenance of sewer lines, including manholes, pumping station, siphons, etc.

- Area of influence – that area of an aquifer which contributes water to a well under the most severe recharge and pumping condition that can be realistically anticipated (i.e. pumping at the safe yield of the well for 180 days without any natural recharge occurring). It is bounded by the groundwater divides which result from pumping the well and by the contact of the edge of the aquifer with less permeable materials such as till and bedrock. At some locations, streams and lakes may form recharge boundaries.

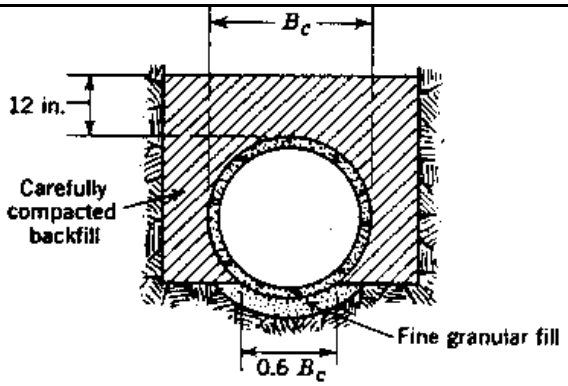
- Potential public water supply – areas designated by communities for water supply purposes where land has been set aside and Department approved pump tests conducted and surface water supplies as defined below.

- Surface Water Supply – Waters classified as Class A by the DWPC.

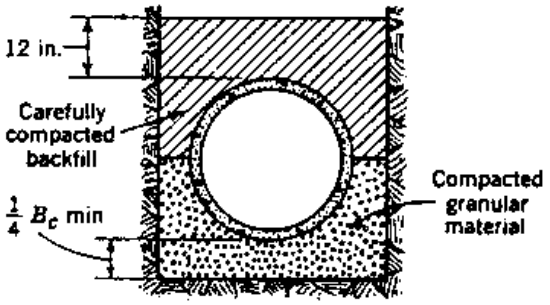
- Public Water Supply Systems – as defined in 310 CMR 22.02 (DEP Drinking Water Regulations).

- Class B Bedding – as defined in WPCF Manual of Practice No. 9.

APPROVED: (Signature on File)



Shaped bottom with tamped backfill, load factor 1.9



Compacted granular bedding, load factor 1.9

Class B---First-Class Bedding – Class B bedding may be achieved by either of two construction methods:

a. Shaped Bottom with Tamped Backfill. The bottom of the trench excavation shall be shaped to conform to a cylindrical surface with a radius at least 2 in. (5 cm) greater than the radius to the outside of the pipe and with a width sufficient to allow six-tenths of the width of the pipe barrel to be bedded in fine granular fill placed in the shaped excavation. Carefully compacted backfill shall be placed at the sides of the pipe to a thickness of at least 12 in. (30 cm) above the top of the pipe. Shaped trench bottoms are difficult to achieve under current construction conditions.

b. Compacted Granular Bedding with Tamped Backfill. The pipe shall be bedded in compacted granular material placed on a flat trench bottom. The granular bedding shall have a minimum thickness of one-fourth the outside pipe diameter and shall extend halfway up the pipe barrel at the sides. The remainder of the side fills and a minimum depth of 12 in. (30 cm) over the top of the pipe shall be filled with carefully compacted material.

SECTION 00825

SPECIAL CONDITIONS – MASSACHUSETTS SUPPLEMENTAL EQUAL EMPLOYMENT OPPORTUNITY, NON-DISCRIMINATION AND AFFIRMATIVE ACTION PROGRAM

ATTACHMENT

I. Definitions

For purposes of this contract,

"Minority" means a person who meets one or more of the following definitions:

(a) American Indian or Native American means: all persons having origins in any of the original peoples of North America and who are recognized as an Indian by a tribe or tribal organization.
(b) Asian means: All persons having origins in any of the original peoples of the Far East, Southeast Asia, the Indian sub-continent, or the Pacific Islands, including, but not limited to China, Japan, Korea, Samoa, India, and the Philippine Islands.
(c) Black means: All persons having origins in any of the Black racial groups of Africa, including, but not limited to, African-Americans, and all persons having origins in any of the original peoples of the Cape Verdean Islands.
(d) Eskimo or Aleut means: All persons having origins in any of the peoples of Northern Canada, Greenland, Alaska, and Eastern Siberia.
(e) Hispanic means: All persons having their origins in any of the Spanish-speaking peoples of Mexico, Puerto Rico, Cuba, Central or South America, or the Caribbean Islands.

"State construction contract" means a contract for the construction, reconstruction, installation, demolition, maintenance or repair of a building or capital facility, or a contract for the construction, reconstruction, alteration, remodeling or repair of a public work undertaken by a department, agency, board, or commission of the commonwealth.

"State assisted construction contract" means a contract for the construction, reconstruction, installation, demolition, maintenance or repair of a building or capital facility undertaken by a political subdivision of the commonwealth, or two or more political subdivisions thereof, an authority, or other instrumentality and whose costs of the contract are paid for, reimbursed, grant funded, or otherwise supported, in whole or in part, by the commonwealth.

II. Equal Opportunity, Non-Discrimination and Affirmative Action

During the performance of this Contract, the Contractor and all subcontractors (hereinafter collectively referred to as "the Contractor") for a state construction contract or a state assisted construction contract, for him/herself, his/her assignees and successors in interest, agree to comply with all applicable equal employment opportunity, non-discrimination and affirmative action requirements, including but not limited to the following:

In connection with the performance of work under this contract, the Contractor shall not discriminate against any employee or applicant for employment because of race, color, religious creed, national origin, sex, sexual orientation, genetic information, military service, age, ancestry or disability, shall not discriminate in the selection or retention of subcontractors, and shall not discriminate in the procurement of materials and rentals of equipment.

The aforesaid provision shall include, but not be limited to, the following: employment upgrading, demotion, or transfer; recruitment advertising, layoff or termination; rates of pay or other forms of compensation; conditions or privileges of employment; and selection for apprenticeship or on-the-job training opportunity. The Contractor shall comply with the provisions of chapter 151B of the Massachusetts General Laws, as amended, and all other applicable anti-discrimination and equal opportunity laws, all of which are herein incorporated by reference and made a part of this Contract.

The Contractor shall post hereafter in conspicuous places, available for employees and applicants for employment, notices to be provided by the Massachusetts Commission Against Discrimination setting forth the provisions of the Fair Employment Practices Law of the Commonwealth (Massachusetts General Laws Chapter 151B).

In connection with the performance of work under this contract, the Contractor shall undertake, in good faith, affirmative action measures to eliminate any discriminatory barriers in the terms and conditions of employment on the grounds of race, color, religious creed, national origin, sex, sexual orientation, genetic information, military service, age, ancestry or disability. Such affirmative action measures shall entail positive and aggressive measures to ensure non-discrimination and to promote equal opportunity in the areas of hiring, upgrading, demotion or transfer, recruitment, layoff or termination, rate of compensation, apprenticeship and on-the-job training programs. A list of positive and aggressive measures shall include, but not be limited to, advertising employment opportunities in minority and other community news media; notifying minority, women and other community-based organizations of employment opportunities; validating all job specifications, selection requirements, and tests; maintaining a file of names and addresses of each worker referred to the Contractor and what action was taken concerning such worker; and notifying the administering agency in writing when a union with whom the Contractor has a collective bargaining agreement has failed to refer a minority or woman worker. These and other affirmative action measures shall include all actions required to guarantee equal employment opportunity for all persons, regardless of race, color, religious creed, national origin, sex, sexual orientation, genetic information, military service, age, ancestry or disability. One purpose of this provision is to ensure to the fullest extent possible an adequate supply of skilled tradesmen for this and future Commonwealth public construction projects.

III. Minority and Women Workforce Participation

Pursuant to his/her obligations under the preceding section, the Contractor shall strive to achieve on this project the labor participation goals contained herein. Said participation goals shall apply in each job category on this project including but not limited to bricklayers, carpenters, cement masons, electricians, ironworkers, operating engineers and those classes of work enumerated in Section 44F of Chapter 149 of the Massachusetts General Laws. The participation goals for this project shall be 15.3% for minorities and 6.9% for women. The participation goals, as set forth herein, shall not be construed as quotas or set-asides; rather, such participation goals will be used to measure the progress of the Commonwealth's equal opportunity, non-discrimination and affirmative action program. Additionally, the participation goals contained herein should not be seen or treated as a floor or as a ceiling for the employment of particular individuals or group of individuals.

IV. Liaison Committee

At the discretion of the agency that administers the contract for the construction project there may be established for the life of the contract a body to be known as the Liaison Committee. The Liaison Committee shall be composed of one representative each from the agency or agencies administering the contract for the construction project, hereinafter called the administering agency, a representative from the Office of Affirmative action, and such other representatives as may be designated by the administering agency.

The Contractor (or his/her agent, if any, designated by him/her as the on-site equal employment opportunity officer) shall recognize the Liaison Committee as an affirmative action body, and shall establish a continuing working relationship with the Liaison Committee, consulting with the Liaison Committee on all matters related to minority recruitment, referral, employment and training.

V. Reports and Records

The Contractor shall prepare projected workforce tables on a quarterly basis when required by the administering agency. These shall be broken down into projections, by week, of workers required in each trade. Copies shall be furnished one week in advance of the commencement of the period covered, and also, when updated, to the administering agency and the Liaison Committee when required.

The Contractor shall prepare weekly reports in a form approved by the administering agency, unless information required is required to be reported electronically by the administering agency, the number of hours worked in each trade by each employee, identified as woman, minority, or non-minority. Copies of these shall be provided at the end of each such week to the administering agency and the Liaison Committee.

Records of employment referral orders, prepared by the Contractor, shall be made available to the administering agency on request.

The Contractor will provide all information and reports required by the administering agency on instructions issued by the administering agency and will permit access to its facilities and any books, records, accounts and other sources of information which may be determined by the administering agency to effect the employment of personnel. This provision shall apply only to information pertinent to the Commonwealth's supplementary non-discrimination, equal opportunity and access and opportunity contract requirements. Where information required is in the exclusive possession of another who fails or refuses to furnish this information, the Contractor shall so certify to the administering agency and shall set forth what efforts he has made to obtain the information.

VI. Access to Work Site

A designee of the administering agency and a designee of the Liaison Committee shall each have a right to access the work site.

VII. Solicitations for Subcontracts, and for the Procurement of Materials and Equipment

In all solicitations either by competitive bidding or negotiation made by the Contractor either for work to be performed under a subcontract or for the procurement of materials or equipment, each potential subcontractor or supplier shall be notified in writing by the Contractor of the Contractor's obligations under this contract relative to non-discrimination and equal opportunity.

VIII. Sanctions

Whenever the administering agency believes the General or Prime Contractor or any subcontractor may not be operating in compliance with the provisions of the Fair Employment Practices Law of the Commonwealth (Massachusetts General Laws Chapter 151B), the administering agency may refer the matter to the Massachusetts Commission Against Discrimination ("Commission") for investigation.

Following the referral of a matter by the administering agency to the Massachusetts Commission Against Discrimination, and while the matter is pending before the MCAD, the administering agency may withhold payments from contractors and subcontractors when it has documentation that the contractor or subcontractor has violated the Fair Employment Practices Law with respect to its activities on the Project, or if the administering agency determines that the contractor has materially failed to comply with its obligations and the requirements of this Section. The amount withheld shall not exceed a withhold of payment to the General or Prime Contractor of 1/100 or 1% of the contract award price or $5,000, whichever sum is greater, or, if a subcontractor is in non-compliance, a withhold by the administering agency from the General Contractor, to be assessed by the General Contractor as a charge against the subcontractor, of 1/100 or 1% of the subcontractor price, or $1,000 whichever sum is greater, for each violation of the applicable law or contract requirements. The total withheld from any one General or Prime Contractor or subcontractor on a Project shall not exceed $20,000 overall. No withhold of payments or investigation by the Commission or its agent shall be initiated without the administering agency providing prior notice to the Contractor.

If, after investigation, the Massachusetts Commission Against Discrimination finds that a General or Prime Contractor or subcontractor, in commission of a state construction contract or state-assisted construction contract, violated the provisions of the Fair Employment Practices Law, the administering agency may convert the amount withheld as set forth above into a permanent sanction,

as a permanent deduct from payments to the General or Prime Contractor or subcontractor, which sanction will be in addition to any such sanctions, fines or penalties imposed by the Massachusetts Commission Against Discrimination:

No sanction enumerated under this Section shall be imposed by the administering agency except after notice to the General or Prime Contractor or subcontractor and an adjudicatory proceeding, as that term is used, under Massachusetts General Laws Chapter 30A, has been conducted.

IX. Severability

The provisions of this section are severable, and if any of these provisions shall be held unconstitutional by any court of competent jurisdiction, the decision of such court shall not affect or impair any of the remaining provisions.

X. Contractor's Certification

A bidder for a state construction contract or state assisted construction contract will not be eligible for award of the contract unless such bidder has submitted to the administering agency the following certification, which will be incorporated into the resulting contract:

CONTRACTOR'S CERTIFICATION

_____certifies that they:
(Contractor Name)

1. Will not discriminate in their employment practices;

2. Intend to use the following listed construction trades in the work under the contract

   _____

   _____; and

3. Will make good faith efforts to comply with the minority employee and women employee workforce participation ratio goals and specific affirmative action steps contained herein; and

4. Are in compliance with all applicable federal and state laws, rules, and regulations governing fair labor and employment practices; and

5. Will provide the provisions of the "Supplemental Equal Employment Opportunity, Non-Discrimination and Affirmative Action Program" to each and every subcontractor employed on the Project and will incorporate the terms of this Section into all subcontracts and work orders entered into on the Project.

6. Agree to comply with all provisions contained herein.

_____
(Signature of authorized representative of Contractor) Date

_____
(Printed name of authorized representative of Contractor)

XI. Subcontractor Requirements

Prior to the award of any subcontract for a state construction contract or a state assisted construction contract, regardless of tier, the Prime or General Contractor shall provide all prospective subcontractors with a complete copy of this Section entitled "Supplemental Equal Employment Opportunity, Non-Discrimination and Affirmative Action Program" and will incorporate the provisions of this Section by reference into any and all contracts or work orders for all subcontractors providing work on the Project. In order to ensure that the said subcontractor's certification becomes a part of all subcontracts under the prime contract, the Prime or General Contractor shall certify in writing to the administering agency that it has complied with the requirements as set forth in the proceeding paragraph.

- END OF SECTION –

SECTION 00826

SPECIAL CONDITIONS –
AMERICAN IRON AND STEEL PROVISIONS

1.01 AMERICAN IRON AND STEEL REQUIREMENTS

01.1 This project is subject to the American Iron and Steel (AIS) requirements of P.L. 113-76, the Consolidated Appropriations Act of 2014.

01.2 The AIS provisions follow at the end of this section.

MASSACHUSETTS DEPARTMENT OF ENVIRONMENTAL PROTECTION
STATE REVOLVING FUND LOAN PROGRAM
AMERICAN IRON AND STEEL
BEST PRACTICES GUIDE

Based on MassDEP's experience with the Buy American provisions of the American Recovery and Reinvestment Act (ARRA), this best practices guide has been developed to assist borrowers in the implementation of the American Iron and Steel (AIS) requirements.

American Iron and Steel is required for the vast majority of SRF construction projects from the 2014 Intended Use Plan going forward. The US Environmental Protection Agency (EPA) has issued program guidance, which has been incorporated in its entirety into Appendix I of the MassDEP Plans and Specifications package (http://www.mass.gov/eea/docs/dep/water/approvals/year-thru-alpha/m-thru-s/pspkg.pdf). This guidance provides detailed questions and answers with respect to the AIS program.

OVERALL AIS COMPLIANCE

It is the responsibility of the Owner to ensure that the project complies with the AIS requirements. This means that it will be a joint effort between the Owner, the Consultants and the project Contractors. MassDEP's role is to ensure that these provisions are consistently being met across the SRF program. MassDEP is not mandating an exact method for compliance to take into account the many types of projects the SRF undertakes. We don't believe there is a one size fits all approach to compliance. However, MassDEP may not be the only entity reviewing AIS compliance. The EPA is planning to conduct site visits in all 50 states in 2015 and the EPA's Office of Inspector General could be looking into AIS compliance as well. Therefore, it is in every project's interest to develop a simple, transparent, well-documented program to ensure compliance with the AIS requirements that can be understood by engineers as well as non-technical personnel.

PRIOR TO BIDDING AND CONSTRUCTION

The Consultant should be identifying those materials that will need to comply with AIS. They should also be identifying those items that are exempt from AIS. Developing a materials list that shows which items need to comply and which don't need to comply will help assist contractors in the bidding phase.

The Consultant should be identifying, to the extent possible, those materials that may need a project specific waiver from the AIS requirements. If particular materials can be identified before the start of bidding or construction, waiver requests can be submitted early in the process to prevent delays after contract award. The EPA AIS guidance outlines the process for submitting a waiver requests.

The Consultant should develop a system to ensure that AIS compliance is maintained throughout the project. During ARRA, MassDEP found that obtaining the necessary manufacturers certifications during the shop drawing submittal and review process simplified the process significantly. Specifically, shop drawings for items requiring AIS compliance would not be approved until the certification was submitted.

DURING BIDDING

The Consultant should identify that the project is required to comply with the AIS provisions in the Invitation to Bid. This will let the prospective contractors know up front what they will need to deal with when the project gets underway. The bid documents must include the required AIS language that is included in the Plan and Specifications package.

If a pre-bid conference is held, time should be set aside to discuss the AIS provisions and in general, what will be expected of the contractor. MassDEP staff can attend this meeting if requested to assist in explaining the AIS requirements and answering questions.

AFTER AWARD

Time should be set-aside during the pre-construction meeting to discuss AIS and how the Consultant and the Contractor will work together to ensure compliance. MassDEP will make every effort to attend the pre-construction meeting to discuss how we will review AIS compliance and what the ramifications are if AIS compliance is not maintained.

DURING CONSTRUCTION

MassDEP recommends that a copy of all records pertaining to AIS compliance be maintained on the project site. It is MassDEP's responsibility to ensure that each project is maintaining compliance with AIS and this will be done during the routine construction monitoring that is conducted throughout the project. Therefore, having appropriate records on-site will expedite these reviews.

AIS CERTIFICATIONS

Manufacturer certifications must be provided for all covered iron and steel products. These must certify that the product meets the AIS requirements and should, at a minimum, include the name of the item and the location the product is being manufactured. Buy American certification under ARRA is not acceptable for AIS.

DE MINIMIS WAIVER

The DeMinimis waiver allows small, incidental items that do not comply with AIS to be used on the project as long as the total value of these items is less than 5% of the total cost of all materials on the project with no one item being more than 1% of the total material cost. Examples of incidental items could include small washers, screws, fasteners (nuts and bolts), miscellaneous wire, corner bead, ancillary tube, etc. These items are typically low cost and procured in bulk. It is expected that most projects will need to utilize the DeMinimis waiver to account for these incidental items.

In order to comply with the waiver, a baseline cost of project materials needs to be developed so that 5% of that cost can be readily determined. This materials cost can include approximate costs for those items that have not yet been procured. This cost is best developed by the Contractor since they have direct knowledge of the actual material costs, although it could be developed by the Consultant in conjunction with the Contractor.

A list of all of the items on the project that are being included in the DeMinimis waiver must be tracked. MassDEP recommends the use of a simple spreadsheet or ledger that identifies the name of the item, the amount of the item to be used on the project, the unit cost of the item and the total cost of the item. As with the material estimate, some level of estimation can be used in developing this DeMinimis list. If the project is approaching the 5% limit, MassDEP recommends that the earlier estimates be fine tuned based on actual material purchases to ensure that the 5% is not exceeded.

MassDEP Division of Municipal Services
State Revolving Fund (SRF) Loan Program

Internal Staff Guidance #15-03

CATEGORY: American Iron and Steel

PURPOSE: To establish a formal procedure for the review of compliance with the American Iron and Steel requirements.

APPLICABILITY: This procedure is applicable to all SRF construction projects for treatment works and public water systems from the 2014 IUP going forward.

TEXT:

The American Iron and Steel (AIS) provisions were originally put in place on January 17, 2014. In general, SRF projects on the 2013 IUPs were exempt (with a couple of exceptions). For the most part, AIS is applicable to all 2014 IUP construction projects for treatment works and public water systems. The AIS provisions were made permanent for the Clean Water SRF and currently are instituted on a year-to-year basis for the Drinking Water SRF. Non-point source projects are exempt from AIS.

If there are any questions regarding the applicability of AIS to a specific project, the Project Engineer should discuss the issue with their Program Manager and/or Deputy Director as necessary.

MassDEP is not dictating to the sites exactly how to ensure compliance with the AIS requirements. It is up to each LGU in conjunction with their Consultants and Contractors to develop a system that adequately documents the procurement and installation of AIS compliant materials. However, it is MassDEP's responsibility to review the system put in place, to ensure that the system is functioning as designed and would, in our estimation, pass muster if an independent third party came in to review compliance. This is not expected to be an exhaustive review of every AIS component in the project, but a review of a sampling of components to verify that the project's approach to AIS compliance is valid.

In order to ensure compliance with the AIS provisions, the Project Engineer should consider the following steps:

1. The Project Engineer should review the AIS final guidance issued by the EPA on March 20, 2014 (reprinted in its entirety in the Plans & Specification package) to familiarize themselves with the provisions of AIS

2. During the review phase of the project, the Project Engineer should review the materials to be used on the project to develop a general idea of AIS applicability.

3. The Project Engineer should review the plans and specifications to ensure that the appropriate references to AIS are included in the contract documents.

4. The Project Engineer should make every effort to attend the pre-construction meeting to discuss the AIS provisions with the Consultant and Contractor. See the attached talking points and best practices handout for additional guidance.

5. At the first inspection after the pre-construction meeting, the Project Engineer should discuss the approach that the Resident Engineer and Contractor will be using to ensure AIS compliance. This review should try to evaluate whether there are situations where AIS materials could be brought on-site and installed in the project without the proper certifications.

6. Once AIS materials start arriving on-site, the Project Engineer should review a sampling of AIS materials. The goal of this effort is to ensure that the proper AIS documentation is being maintained and that the certified materials are actually being used on the site. The number of items to look at will vary depending on the complexity of the site and how well the site appears to be complying with the AIS provisions. For a simple project it may be possible to review all of the AIS certifications, while at a complex treatment plant project, a smaller sampling will need to be done. It is recommended to look at several items early in the project to establish a baseline of compliance and then a reduced number can usually be looked at later in the project once a level of comfort is achieved with the process being used at the site.

7. AIS certifications must be provided by the manufacturer. These certifications should identify the specific product, the location of manufacture (preferably city and state, not just United States), that the product is in compliance with the AIS requirements and signed by a responsible company representative. These must be signed by the manufacturer, not a distributor or salesperson. They also must reference AIS – not Buy American. These two provisions are very different and compliance with Buy American does not necessarily equate to AIS.

8. The Project Engineer should also review the use of the DeMinimis waiver. It is expected that most sites will need to use the DeMinimis waiver to account for those small, low cost items where the country of origin is not readily available. In order to verify compliance with the waiver, a schedule of material values should be prepared by the site to establish the value of the waiver (5% of the total material cost, no one item more than 1%). A list of the items to be included under the waiver must then be maintained by the site. This list should identify the item, the cost of the item, the amount of the item to be used on the project and the total value of the items on the project. MassDEP does not dictate how this list must be kept, but a simple spreadsheet or other neatly organized listing should suffice.

   If a site indicates that they will not be using the DeMinimis waiver, they will need to maintain appropriate documentation for **ALL** items that require compliance with AIS. This will likely require a larger effort on behalf of the Project Engineer to verify compliance.

9. The Project Engineer should review with the site whether or not any project specific waivers have been requested. These need to be coordinated with MassDEP and reviewed and approved by the EPA.

10. The Project Engineers should familiarize themselves with national waivers issued by the EPA. The Deputy Directory and Program Managers will disseminate data to the Project Engineers

when national waivers are approved by EPA. The Project Engineers should share these with the Resident Engineers and Contractors at the project site.

11. The Project Engineer must document the AIS review in the Inspection Report. If any discrepancies are found with AIS compliance, they should be noted in the Inspection Report with an identified corrective action and/or follow-up requirement.

12. If any problems are identified with AIS compliance, the Project Engineer should immediately raise this issue with their Program Manager. If issues are not resolved by the next project inspection, the Program Manager should raise this issue up to the Deputy Director and/or Director to be addressed as appropriate.

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

MAR 20 2014

OFFICE OF WATER

MEMORANDUM

SUBJECT: Implementation of American Iron and Steel provisions of P.L. 113-76, Consolidated Appropriations Act, 2014

FROM: For 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:

Reasonably Available Quantity: 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.

Satisfactory Quality: The quality of iron or steel products, as specified in the project plans and designs.

Assistance Recipient: 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

The following information is provided as a sample letter of **step** certification for AIS 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 (XXXXXXXXXX)

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 sample letter of certification for AIS compliance. Documentation must be provided on company letterhead.

Date

Company Name

Company Address

City, State Zip

Subject: American Iron and Steel Certification for Project (XXXXXXXXXX)

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

American Iron and Steel Site Visit Checklist

SECTION A - PRE-SITE VISIT

Complete prior to site visit.

1. General Project Information

a. Assistance recipient name: _____

b. Population served: _____

c. General project description:

_____
_____
_____

d. Project location: _____

e. Project or loan number:_____

f. Total project cost: _____ g. Total SRF funding amount: _____

h. Notes:

SECTION B - ONSITE REVIEW

Complete during site visit of project. Sub-sections include a review of documentation kept by the assistance recipient, engineering consultants, or construction contractor, and/or an onsite review of the project and construction site.

2. Site Visit Information

All site visits should include visits to the assistance recipient's office (if construction has not yet begun) or the project or construction site (once construction begins). Site visits may also include visits to the engineering consultant or construction contractor's office, as necessary.

a. Site visit number: _____

b. Locations and dates of review:

- ☐ Assistance recipient offices; on: _____
- ☐ Project or construction site; on: _____
- ☐ Engineering consultant offices; on: _____
- ☐ Construction contractor offices; on: _____
- ☐ Other site: _____; on: _____

c. State SRF staff reviewer(s): _____

_____

d. Assistance recipient staff present at review: _____

_____

e. Engineering consultation staff present at review: _____

_____

f. Construction contractor staff present at review: _____

_____

g. EPA/EPA contractor staff present at review: _____

_____

h. Other individuals present at review: _____

_____

i. Notes:

j. Is the project exempt from AIS requirements under the Plans and Specifications Waiver or exemption included in the CAA?

Y	N
☐	☐

If the project is exempt, the remaining sections do not apply.

3. Confirm that items covered by a project-specific waiver are in compliance

Section B-3 may not be applicable to this project or this site visit. If so, please check the box below:

☐ N/A - project has not received a project-specific American Iron and Steel waiver

If the project has received a project-specific waiver from the American Iron and Steel requirements, this waiver will be posted on EPA's website.

a. Date project-specific waiver posted on EPA's website: ☐

b. Description of component(s) for which waiver was approved:

_____

c. Component is the same character and type as described in the project-specific waiver. Y☐ N☐

d. Notes:

4. Confirm that the *de minimis* waiver is applied correctly

☐ N/A - No incidental components have been ordered for this project to date

☐ N/A - Project does not require any incidental components

☐ N/A - Incidental components purchased, but unknown if *de minmis* will be used

Documentation Review			*Onsite Review*		
a. Assistance recipient and/or contractor maintains an itemized list of incidental components	Y ☐	N ☐	c. The *de minimis* waiver is only applied to miscellaneous, generally low-cost iron and steel components that are essential for, but incidental to construction and are incorporated into the physical structure of the project	Y ☐	N ☐
b. Assistance recipient and/or contractor maintains receipts or invoices showing total value of exempted items	Y ☐	N ☐			

Compare the value of incidental components subject to AIS requirements and designated as being exempted under de minimis to estimated or, if available, actual total materials costs. The total value of exempted items cannot exceed 5% of total materials costs and no single item can exceed 1% of total materials costs.

Value of incidental components exempted under the American Iron and Steel requirement: _____

Estimate/final cost of materials (to be) procured for project: _____

Percentage of material costs exempted: _____

d. Items exempted under the *de minimis* waiver make up 5% or less of total materials cost Y ☐ N ☐

e. Does an individual item under *de minimis* waiver exceed 1% of total materials cost? Y ☐ N ☐

5. Confirm that procured items are in compliance with American Iron and Steel requirements

State SRF program managers and staff assigned to the project should decide how many components should be reviewed for each project. ***Additional copies of this page should be made and completed for each component reviewed.***

a. Description of component reviewed:

Onsite review may not be possible to complete if a component has been ordered and not yet delivered, or if a component has been installed or incorporated into construction. Please indicate the status of the component that is being reviewed:

☐ Component ordered but not yet delivered

☐ Component delivered, but not yet installed (stored material)

☐ Component installed or incorporated into construction

Documentation Review

b. *Indicate the location and type of documentation indicating country-of-manufacture available by writing a location code on the line next to the appropriate documentation type. See box below right for location codes.*

_____ Step certification

_____ Certification from manufacturer

_____ Verification of manufacturing location from manufacturer

_____ Print-outs from manufacturer's website

_____ Shipping manifest or bill of lading

_____ Cut sheets or invoice(s)

_____ Other: _____

☐ N/A: documentation not available at time of site visit

Onsite Review

c. Component is the same general character and type as described in the documentation — Y ☐ N ☐

d. Country-of-origin labeling is consistent with the documentation (ie., labeling does not indicate foreign origin) — Y ☐ N ☐

e. Notes:

Location codes:

A - On-file with assistance recipient
C - On-file with construction contractor
E - On-file with engineering consultant
P - At the project site

5. Confirm that procured items are in compliance with American Iron and Steel requirements

State SRF program managers and staff assigned to the project should decide how many components should be reviewed for each project. ***Additional copies of this page should be made and completed for each component reviewed.***

a. Description of component reviewed:

Onsite review may not be possible to complete if a component has been ordered and not yet delivered, or if a component has been installed or incorporated into construction. Please indicate the status of the component that is being reviewed:

☐ Component ordered but not yet delivered

☐ Component delivered, but not yet installed (stored material)

☐ Component installed or incorporated into construction

Documentation Review

b. *Indicate the location and type of documentation indicating country-of-manufacture available by writing a location code on the line next to the appropriate documentation type. See box below right for location codes.*

_____ Step certification

_____ Certification from manufacturer

_____ Verification of manufacturing location from manufacturer

_____ Print-outs from manufacturer's website

_____ Shipping manifest or bill of lading

_____ Cut sheets or invoice(s)

_____ Other: _____

☐ N/A: documentation not available at time of site visit

Onsite Review

c. Component is the same general character and type as described in the documentation — Y ☐ N ☐

d. Country-of-origin labeling is consistent with the documentation (ie., labeling does not indicate foreign origin) — Y ☐ N ☐

e. Notes:

Location codes:

A - On-file with assistance recipient
C - On-file with construction contractor
E - On-file with engineering consultant
P - At the project site

5. Confirm that procured items are in compliance with American Iron and Steel requirements

State SRF program managers and staff assigned to the project should decide how many components should be reviewed for each project. ***Additional copies of this page should be made and completed for each component reviewed.***

a. Description of component reviewed:

Onsite review may not be possible to complete if a component has been ordered and not yet delivered, or if a component has been installed or incorporated into construction. Please indicate the status of the component that is being reviewed:

☐ Component ordered but not yet delivered

☐ Component delivered, but not yet installed (stored material)

☐ Component installed or incorporated into construction

Documentation Review

b. *Indicate the location and type of documentation indicating country-of-manufacture available by writing a location code on the line next to the appropriate documentation type. See box below right for location codes.*

_____ Step certification

_____ Certification from manufacturer

_____ Verification of manufacturing location from manufacturer

_____ Print-outs from manufacturer's website

_____ Shipping manifest or bill of lading

_____ Cut sheets or invoice(s)

_____ Other: _____

☐ N/A: documentation not available at time of site visit

Onsite Review

	Y	N
c. Component is the same general character and type as described in the documentation	☐	☐
d. Country-of-origin labeling is consistent with the documentation (ie., labeling does not indicate foreign origin)	☐	☐

e. Notes:

Location codes:

A - On-file with assistance recipient
C - On-file with construction contractor
E - On-file with engineering consultant
P - At the project site

5. Confirm that procured items are in compliance with American Iron and Steel requirements

State SRF program managers and staff assigned to the project should decide how many components should be reviewed for each project. ***Additional copies of this page should be made and completed for each component reviewed.***

a. Description of component reviewed:

Onsite review may not be possible to complete if a component has been ordered and not yet delivered, or if a component has been installed or incorporated into construction. Please indicate the status of the component that is being reviewed:

☐ Component ordered but not yet delivered

☐ Component delivered, but not yet installed (stored material)

☐ Component installed or incorporated into construction

Documentation Review

b. *Indicate the location and type of documentation indicating country-of-manufacture available by writing a location code on the line next to the appropriate documentation type. See box below right for location codes.*

_____ Step certification

_____ Certification from manufacturer

_____ Verification of manufacturing location from manufacturer

_____ Print-outs from manufacturer's website

_____ Shipping manifest or bill of lading

_____ Cut sheets or invoice(s)

_____ Other: _____

☐ N/A: documentation not available at time of site visit

Onsite Review

	Y	N
c. Component is the same general character and type as described in the documentation	☐	☐
d. Country-of-origin labeling is consistent with the documentation (ie., labeling does not indicate foreign origin)	☐	☐

e. Notes:

Location codes:

A - On-file with assistance recipient
C - On-file with construction contractor
E - On-file with engineering consultant
P - At the project site

5. Confirm that procured items are in compliance with American Iron and Steel requirements

State SRF program managers and staff assigned to the project should decide how many components should be reviewed for each project. ***Additional copies of this page should be made and completed for each component reviewed.***

a. Description of component reviewed:

Onsite review may not be possible to complete if a component has been ordered and not yet delivered, or if a component has been installed or incorporated into construction. Please indicate the status of the component that is being reviewed:

☐ Component ordered but not yet delivered

☐ Component delivered, but not yet installed (stored material)

☐ Component installed or incorporated into construction

Documentation Review

b. *Indicate the location and type of documentation indicating country-of-manufacture available by writing a location code on the line next to the appropriate documentation type. See box below right for location codes.*

_____ Step certification

_____ Certification from manufacturer

_____ Verification of manufacturing location from manufacturer

_____ Print-outs from manufacturer's website

_____ Shipping manifest or bill of lading

_____ Cut sheets or invoice(s)

_____ Other: _____

☐ N/A: documentation not available at time of site visit

Onsite Review

	Y	N
c. Component is the same general character and type as described in the documentation	☐	☐
d. Country-of-origin labeling is consistent with the documentation (ie., labeling does not indicate foreign origin)	☐	☐

e. Notes:

Location codes:

A - On-file with assistance recipient
C - On-file with construction contractor
E - On-file with engineering consultant
P - At the project site

5. Confirm that procured items are in compliance with American Iron and Steel requirements

State SRF program managers and staff assigned to the project should decide how many components should be reviewed for each project. ***Additional copies of this page should be made and completed for each component reviewed.***

a. Description of component reviewed:

Onsite review may not be possible to complete if a component has been ordered and not yet delivered, or if a component has been installed or incorporated into construction. Please indicate the status of the component that is being reviewed:

☐ Component ordered but not yet delivered

☐ Component delivered, but not yet installed (stored material)

☐ Component installed or incorporated into construction

Documentation Review

b. *Indicate the location and type of documentation indicating country-of-manufacture available by writing a location code on the line next to the appropriate documentation type. See box below right for location codes.*

_____ Step certification

_____ Certification from manufacturer

_____ Verification of manufacturing location from manufacturer

_____ Print-outs from manufacturer's website

_____ Shipping manifest or bill of lading

_____ Cut sheets or invoice(s)

_____ Other: _____

☐ N/A: documentation not available at time of site visit

Onsite Review

c. Component is the same general character and type as described in the documentation — Y ☐ N ☐

d. Country-of-origin labeling is consistent with the documentation (ie., labeling does not indicate foreign origin) — Y ☐ N ☐

e. Notes:

Location codes:

A - On-file with assistance recipient
C - On-file with construction contractor
E - On-file with engineering consultant
P - At the project site

5. Confirm that procured items are in compliance with American Iron and Steel requirements

State SRF program managers and staff assigned to the project should decide how many components should be reviewed for each project. ***Additional copies of this page should be made and completed for each component reviewed.***

a. Description of component reviewed:

Onsite review may not be possible to complete if a component has been ordered and not yet delivered, or if a component has been installed or incorporated into construction. Please indicate the status of the component that is being reviewed:

☐ Component ordered but not yet delivered

☐ Component delivered, but not yet installed (stored material)

☐ Component installed or incorporated into construction

Documentation Review

b. *Indicate the location and type of documentation indicating country-of-manufacture available by writing a location code on the line next to the appropriate documentation type. See box below right for location codes.*

_____ Step certification

_____ Certification from manufacturer

_____ Verification of manufacturing location from manufacturer

_____ Print-outs from manufacturer's website

_____ Shipping manifest or bill of lading

_____ Cut sheets or invoice(s)

_____ Other: _____

☐ N/A: documentation not available at time of site visit

Onsite Review

	Y	N
c. Component is the same general character and type as described in the documentation	☐	☐
d. Country-of-origin labeling is consistent with the documentation (ie., labeling does not indicate foreign origin)	☐	☐

e. Notes:

Location codes:

A - On-file with assistance recipient
C - On-file with construction contractor
E - On-file with engineering consultant
P - At the project site

5. Confirm that procured items are in compliance with American Iron and Steel requirements

State SRF program managers and staff assigned to the project should decide how many components should be reviewed for each project. ***Additional copies of this page should be made and completed for each component reviewed.***

a. Description of component reviewed:

Onsite review may not be possible to complete if a component has been ordered and not yet delivered, or if a component has been installed or incorporated into construction. Please indicate the status of the component that is being reviewed:

☐ Component ordered but not yet delivered

☐ Component delivered, but not yet installed (stored material)

☐ Component installed or incorporated into construction

Documentation Review

b. *Indicate the location and type of documentation indicating country-of-manufacture available by writing a location code on the line next to the appropriate documentation type. See box below right for location codes.*

_____ Step certification

_____ Certification from manufacturer

_____ Verification of manufacturing location from manufacturer

_____ Print-outs from manufacturer's website

_____ Shipping manifest or bill of lading

_____ Cut sheets or invoice(s)

_____ Other: _____

☐ N/A: documentation not available at time of site visit

Onsite Review

c. Component is the same general character and type as described in the documentation — Y ☐ N ☐

d. Country-of-origin labeling is consistent with the documentation (ie., labeling does not indicate foreign origin) — Y ☐ N ☐

e. Notes:

Location codes:

A - On-file with assistance recipient
C - On-file with construction contractor
E - On-file with engineering consultant
P - At the project site

5. Confirm that procured items are in compliance with American Iron and Steel requirements

State SRF program managers and staff assigned to the project should decide how many components should be reviewed for each project. ***Additional copies of this page should be made and completed for each component reviewed.***

a. Description of component reviewed:

N/A: documentation not available at time of site visit

Onsite review may not be possible to complete if a component has been ordered and not yet delivered, or if a component has been installed or incorporated into construction. Please indicate the status of the component that is being reviewed:

☐ Component ordered but not yet delivered

☐ Component delivered, but not yet installed (stored material)

☐ Component installed or incorporated into construction

Documentation Review

b. *Indicate the location and type of documentation indicating country-of-manufacture available by writing a location code on the line next to the appropriate documentation type. See box below right for location codes.*

_____ Step certification

_____ Certification from manufacturer

_____ Verification of manufacturing location from manufacturer

_____ Print-outs from manufacturer's website

_____ Shipping manifest or bill of lading

_____ Cut sheets or invoice(s)

_____ Other: _____

☐ N/A: documentation not available at time of site visit

Onsite Review

c. Component is the same general character and type as described in the documentation — Y ☐ N ☐

d. Country-of-origin labeling is consistent with the documentation (ie., labeling does not indicate foreign origin) — Y ☐ N ☐

e. Notes:

Location codes:

A - On-file with assistance recipient
C - On-file with construction contractor
E - On-file with engineering consultant
P - At the project site

5. Confirm that procured items are in compliance with American Iron and Steel requirements

State SRF program managers and staff assigned to the project should decide how many components should be reviewed for each project. ***Additional copies of this page should be made and completed for each component reviewed.***

a. Description of component reviewed:

Onsite review may not be possible to complete if a component has been ordered and not yet delivered, or if a component has been installed or incorporated into construction. Please indicate the status of the component that is being reviewed:

☐ Component ordered but not yet delivered

☐ Component delivered, but not yet installed (stored material)

☐ Component installed or incorporated into construction

Documentation Review

b. *Indicate the location and type of documentation indicating country-of-manufacture available by writing a location code on the line next to the appropriate documentation type. See box below right for location codes.*

_____ Step certification

_____ Certification from manufacturer

_____ Verification of manufacturing location from manufacturer

_____ Print-outs from manufacturer's website

_____ Shipping manifest or bill of lading

_____ Cut sheets or invoice(s)

_____ Other: _____

☐ N/A: documentation not available at time of site visit

Onsite Review

	Y	N
c. Component is the same general character and type as described in the documentation	☐	☐
d. Country-of-origin labeling is consistent with the documentation (ie., labeling does not indicate foreign origin)	☐	☐

e. Notes:

Location codes:

A - On-file with assistance recipient
C - On-file with construction contractor
E - On-file with engineering consultant
P - At the project site

CERTIFICATE OF SUBSTANTIAL COMPLETION

SRF Project No.: CWSRF 6722 ENGINEER's Project No.: 360-2001

Project: Sea Street Pump Station Force Main No.3

CONTRACTOR: _____

Contract For: Sea Street Pump Station Force Main No.3 Contract Date: _____

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

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

To: Town of Nantucket, Massachusetts
(Owner)

And
To: _____
(Contractor)

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

_____
(Date of Substantial Completion)

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

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

RESPONSIBILITIES:

OWNER: Town of Nantucket, Massachusetts

CONTRACTOR: _____

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

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

Executed by ENGINEER on:

_____, 20____

Environmental Partners Group, Inc.
(Engineer)

By: _____

CONTRACTOR accepts this Certificate of Substantial Completion on:

_____, 20____

_____
(Contractor)

By: _____

OWNER accepts the Certificate of Substantial Completion on:

_____, 20____

Town of Nantucket, Massachusetts
(Owner)

By: _____

CERTIFICATE OF FINAL COMPLETION

SRF Project No. CWSRF 6722 Engineer's Project No. 360-2001
Project Sea Street Pump Station Force Main No.3
OWNER: Town of Nantucket, Massachusetts
CONTRACTOR: _____
Engineer: Environmental Partners Group. Inc.

Agreement Date: _____

Notice to Proceed Date: _____

Contractual Substantial Completion Date as modified by Change Orders: _____

Actual Substantial Completion Date: _____

Contractual Final Completion Date as modified by Change Orders: _____

The Work to which this Certificate applies has been inspected by authorized representatives of OWNER, CONTRACTOR, Engineer and DEP, the punch list has been completed and the Work of the Contract is hereby declared to be Finally Complete in accordance with the Contract Documents on:

_____
Date of Final Completion

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

Executed by Engineer on: _____, 20____

By:_____

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

By:_____

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

By:_____

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

By:_____

CONTRACTOR'S AFFIDAVIT

STATE OF: _____

COUNTY OF: _____

Before me, the undersigned, a _____
(Notary Public)

in and for said County and State personally appeared, _____
(Individual, Partner or duly

_____ who being duly sworn according to law
authorized representative of Contractor)

deposes and says that the cost of all the Work, and outstanding claims and indebtedness of whatever nature arising out of the performance of the contract between

Town of Nantucket, Massachusetts
(Owner)

and _____ of _____
(Contractor) (Address)

dated _____ for the construction of the Sea Street Pump Station Force Main No.3
(Project Name)

and necessary appurtenant installations have been paid in full.

_____
(Individual, Partner, or Duly Authorized Representative of Contractor)

_____
(Title)

Sworn to and subscribed before me

this _____ day of _____ , 20 ____

_____

_____
Notary Public

CONTRACTOR'S FINAL RELEASE AND WAIVER OF LIEN

Project/Owner		Contractor	
Project:	Sea Street Pump Station Force Main No.3	Name:	_____
Address:	1 Sea Street	Address:	_____
	Nantucket, MA 02554 City State Zip		_____ City State Zip
Owner:	Town of Nantucket	Contractor License:	_____
	16 Broad St, Nantucket, MA 02554	Contract Date:	_____

TO ALL WHOM IT MAY CONCERN:

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

The undersigned further hereby acknowledges that the sum of

_____

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

Dated this _____ day of _____20___

_____
Contractor

Witness to Signature

By: _____ By: _____

Title: _____ Title: _____

DIVISION 1

GENERAL REQUIREMENTS

INDEX

Section	Title	Page
01010	Summary of Work	01010-1
01020	Allowances	01020-1
01024	Measurement and Payment	01024-1
01040	Project Coordination	01040-1
01046	Control of Work	01046-1
01050	Field Engineering	01050-1
01063	Miscellaneous Requirements	01063-1
01080	Abbreviations and Definitions	01080-1
01095	Reference Standards	01090-1
01110	Environmental Protection Measures	01110-1
01170	Special Provisions	01170-1
01170A	Special Provisions - Price Adjustments	01170A-1
01200	Project Meetings	01200-1
01300	Submittals	01300-1
01311	Construction Progress Schedules	01311-1
01350	Health and Safety Plan	01350-1
01370	Schedule of Values	01370-1
01380	Construction Photographs	01380-1
01400	Quality Assurance	01400-1
01500	Temporary Facilities and Controls	01500-1
01610	Delivery, Storage and Handling	01610-1
01700	Contract Closeout	01700-1
01710	Cleaning Up	01710-1
01740	Warranties and Bonds	01740-1
01850	Traffic Management	01850-1

SECTION 01010

SUMMARY OF WORK

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplemental Conditions, Division 0 and Division 1 Specification Sections, apply to this section.

1.2 LOCATION OF WORK

A. The Work to be performed under this Contract shall be conducted between the Sea Street Pump Station and the Surfside Wastewater Treatment Facility along Sea Street, Step Lane, Centre Street, Lily Street, Liberty Street, Winter Street, Pine Street, Silver Street, Pleasant Street, Atlantic Avenue, Surfside Road and South Shore Road in the Town of Nantucket, Massachusetts.

1.3 SUMMARY OF WORK

A. The Work under this Contract includes, but is not necessarily limited to the following major items:

1. Furnishing all labor, services, equipment, and materials for the installation, testing, and commissioning of approximately 18,200 linear feet of new 20-inch and 24-inch SDR18 C900 PVC/ductile iron sewer force main including all connections and appurtenances (plug valves, check valves, intermediate access point manholes and fittings, air valve manholes and fittings, blow-off/clean out manholes and fittings).

2. Furnishing all labor, services, equipment and materials for removal and legal disposal of existing water mains and installation, testing and chlorination of approximately 5,400 linear feet of new 6-inch, 8-inch, and 12-inch ductile iron water mains including all connections, services, and appurtenances (gate valves, hydrant assemblies, gate boxes, water services, curb boxes, fittings, etc.). Confirm all existing water services have been reconnected.

3. Furnish all labor, services, equipment, and materials for removal and legal disposal of existing water services and installation of new curb boxes and PE tubing water services up to the property line.

4. Furnishing, installation, testing, chlorination, operation, and maintenance of water bypass system and appurtenances to maintain uninterrupted water service to abutting properties throughout the duration of construction.

5. Furnishing all labor, services, equipment and materials for removal and legal disposal of existing gravity sewer mains and installation and testing of approximately 4,400 linear feet of new 8-inch, 10-inch, and 12-inch SDR35 PVC gravity sewer mains.

6. Furnishing all labor, services, equipment, and materials for the installation, testing, and commissioning of approximately 325 linear feet of new 8-inch and 12-inch C909 PVC gravity sewer including all connections and appurtenances (plug valves, check valves, intermediate access point manholes and fittings, air valve manholes and fittings, blow-off/clean out manholes and fittings).

7. Furnishing all labor, services, equipment, and materials for removal and legal disposal of existing precast concrete sewer manholes and appurtenances and installation of new precast concrete sewer manholes including frames and covers.

8. Furnishing all labor, services, equipment, and materials for the removal and legal disposal of existing gravity sewer services and installation of new PVC gravity sewer services and cleanouts up to the property line. Confirm all existing non-capped sewer services have been reconnected or stubbed at the property line.

9. Furnishing all labor, services, equipment, and materials for upgrades to the existing stormwater system, including installation of piping, catch basins, leaching catch basins, gutter inlets, and drain manholes.

10. Installation of environmental protection systems at the site for erosion and sediment control within the limits of work.

11. Furnishing all materials, labor and equipment for the relocation, protection, or temporary disturbance of existing utilities (i.e. telecommunications, electric) to permit construction activities.

12. Furnishing, installation and maintenance of all traffic control and site safety measures during the construction period, including signs, barricades, detours, variable message boards, maintenance of safe vehicular and pedestrian access to abutting properties, and assuring an uninterrupted supply of utility services to all abutters within the project area, at all times.

13. Furnishing, installation, testing, operation, and maintenance of sewer bypass pumping system and appurtenances to maintain uninterrupted sewer service throughout the duration of construction.

14. Furnishing, permitting, installation, operation and maintenance of construction dewatering system and appurtenances in accordance with various regulatory approvals.

15. Restoration of public and private property including, but not limited to, granite curbing, bituminous concrete cape cod berms, cobblestone roadways, private asphalt driveways, brick driveways, brick/stone paths and sidewalks, lawns, plantings, stone walls, and other surficial features.

16. Furnishing all labor, services, materials, and equipment required for pre-construction videos and photographs.

17. Furnishing all labor, services, materials, and equipment required for asbestos cement contaminated material management and legal disposal.

18. Furnishing all labor, services, materials, and equipment required for geotechnical instrumentation and monitoring.

19. Furnishing all materials and performing all excavations, backfilling and compaction of excavated areas, restoration of pavement sub-base and installation of temporary and permanent pavement as specified herein and indicated on the Drawings.

20. Performing test pits as shown on the Contract Drawings and reporting all results to the Engineer.

B. A general description of the Work to be performed under this Contract shall include, but will not be limited to, the following construction operations:

1. Coordination of all construction activities with the appropriate local and State authorities and utilities.

2. Attending the pre-construction conference and required job progress meetings.

3. Submission of a construction schedule, list of subcontractors and submission of all required Shop Drawings, in a timely manner, to the Engineer for review.

4. Perform all field engineering associated with the project work including, but not limited to: construction layout and elevations; preparation of as-built plans at the completion of the project.

5. Pre-construction and post-construction video and photographs of the site. Monthly construction photos shall be submitted to the Engineer of all installation activities.

6. Mobilization and Demobilization from the Site.

7. Provide site security, temporary fencing, and other construction site control measures, as needed.

8. On-site and laboratory testing, as specified.

9. Coordination of environmental protection procedures in accordance with local, state, and federal regulatory approvals.

10. Protection of existing structures, facilities and equipment and installation of protection systems to mitigate potential interferences.

11. Restoration of disturbed areas, landscaping, hardscapes, and appurtenances on residential properties to pre-construction conditions and elevations within the limits of work.

12. Coordination with other entities owning infrastructure within the limits of work, in particular potable water, telecommunications, and electrical and appurtenances.

13. Obtaining necessary permits and licenses, maintaining all items required by applicable permits, compliance with existing permits, and payment of fees.

C. The Work shall also conform to such additional Drawings and addenda to these Specifications and Drawings as may be published or exhibited prior to the opening of bid proposals and to such Drawings in explanation of details, or as may be furnished by the Engineer from time to time during the construction.

D. Work, materials, equipment, and storage areas, which are necessary for construction, but which are not specifically referred to in the Specifications or shown on the Drawings, but implied by the Contract, shall be furnished by the Contractor at his/her own cost and expense, and shall be such as will correspond with the general character of the Work, as may be determined by the Engineer, whose decisions as to the necessity for and character of such work and materials shall be final and conclusive. It is the intent of these Specifications to produce a complete, finished job, whether shown in every detail or not.

1.4 CONTRACTOR'S USE OF PREMISES

A. Contractor shall limit the use of the premises for his/her Work and for storage to allow for:

1. Property Owner occupancy and access.

2. Public use.

3. Site safety.

B. Coordinate use of premises with Town of Nantucket Public Works, Water, and Sewer Departments

C. Contractor shall assume full responsibility for security of all his/her and his/her

subcontractors' materials and equipment stored on the Site.

D. If directed by the Owner or Engineer, move any stored items which interfere with operations of Owner, other contractors, or property owners.

E. Obtain and pay for use of additional storage areas or Work areas as necessary and required to perform the Work.

F. Contractor will have access to Town water for construction purposes and operation of hydrants shall be authorized by and coordinated with the Town of Nantucket.

1.5 PROPERTY OWNER OCCUPANCY

A. Property Owners will occupy premises during performance of the Work for the conduct of his/her normal operations. Coordinate all construction operations with Engineer and Owner to minimize conflict and to facilitate Property Owner usage.

1.6 UTILITIES

A. The utilities shown on the plans have been located primarily from information furnished by others and are considered approximate both as to size and location. It shall be the Contractor's responsibility to locate all existing utilities and to protect the same from damage or harm. All utilities interfered with or damaged shall be properly restored, at the expense of the Contractor, to the satisfaction of its Owner.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION 01010

SECTION 01020

ALLOWANCES

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplemental Conditions, Division 0 and Division 1 Specification Sections, apply to this section.

1.2 SUMMARY

A. Include all costs related to the scheduled allowances in the applicable request as stated in the Bid Form. Allowance amounts listed herein have been estimated. Actual paid invoice amounts shall be used for reimbursement purposes.

B. Attention is directed to the Contract and all sections within Division 1 – General Requirements, which are hereby made a part of this section of the Specifications.

1.3 MEASUREMENT AND PAYMENT

A. Measurement and payment for work described in this section will be made in accordance with the provisions of Section 01024 – Measurement and Payment.

B. Include in the Contract Price, scheduled allowances included under the applicable Item of the Bid Form specified in the respective specification sections and listed below:

1.4 DEFINITIONS

A. As used in this section, the following terms are understood to have the following meanings:

1. "Furnish" shall mean purchase and deliver to the Project Site, complete with every necessary appurtenance and support.

2. "Install" shall mean unload at the delivery point at the Project Site and perform all Work necessary to establish proper location, secure mounting and operation in the Project.

3. "Provide" shall mean furnish and install.

4. “Work” shall mean all labor, materials, equipment, apparatus, controls, accessories, and all other items required for a proper and complete installation.

5. "Piping" shall mean, in addition to pipe or tubing, all fittings, flanges, unions, valves, strainers, specialties, drains, hangers and supports, and all other accessories relative to such pipe or tubing.

6. "Concealed" shall mean hidden from sight in chases, furred spaces, shafts, crawl spaces, embedded in construction, buried, and/or similar conditions.

7. "Exposed" shall mean not concealed as defined above.

8. “Furnished by others” shall mean materials or equipment purchased and set in place under other sections of the Contract and connected to the systems covered by this section of the Specifications by this trade Contractor.

9. "Coordinate" shall mean all Work provided under this section shall be correlated with the Work of other trades.

1.5 ALLOWANCES FOR PRODUCTS

A. The amount of each allowance includes:

1. The cost for the management, removal and proper disposal of any unforeseen asbestos cement piping encountered during construction activities. Payment shall be in accordance with Section 01024 as approved by the Engineer.

2. The cost for the support and coordination to maintain continuity of gas, telephone, electric, telecommunications, cable TV, and all privately owned utilities during construction activities. Payment shall be in accordance with Section 01024 as approved by the Engineer.

B. The schedule allowances are as follows:

Bid Item Number	Description	Amount
21c	Removal and Legal Disposal of Unforeseen Asbestos	$250,000.00
21d	Removal and Disposal of Other Hazardous Materials	$100,000.00
27	Utility Support and Coordination	$100,000.00

1.6 ADJUSTMENT OF COSTS

A. Should the net cost be more or less than the specified amount of the allowance, the Contract Price shall be adjusted accordingly by Change Order.

1. The amount of the Change Order will recognize any changes in handling costs at the Project Site, labor, installation costs, overhead, profit and other expenses caused by the selection under the allowance.

B. Submit any claims for anticipated additional costs at the Project Site, or other expenses caused by the selection under the allowance, prior to execution of the Work.

C. Submit documentation for actual additional costs at the Project Site, or other expenses caused by the selection under the allowance, within 60 days after completion of execution of the Work.

D. Failure to submit claims within the designated time will constitute a waiver of claims for additional costs.

E. At Contract closeout, reflect all approved changes in Contract Price in the final statement of accounting.

PART 2 –PRODUCTS – NOT USED

PART 3 – EXECUTION – NOT USED

END OF SECTION 01020

SECTION 01024

MEASUREMENT AND PAYMENT

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplemental Conditions, Division 0 and Division 1 Specification Sections, apply to this section.

1.2 SUMMARY OF WORK

A. Under the price specified to be paid for each item, the Contractor shall furnish all materials and equipment, furnish all labor and plant, and perform all operations to complete all work as indicated and specified. Provide all supervision, overhead items, insurance, bonds and permit costs, protection and precautions and all other costs, incidental to the construction work, complete, and as specified, are also included. Prevailing Massachusetts State wages and Davis-Bacon wages apply.

B. A complete, finished, working job, as intended by the general nature of these Specifications, shall be produced whether or not any particular wording or direction is omitted or inadvertently not clearly stated.

C. Measurement for payment shall be by the Engineer, except where noted elsewhere in this Specification. Measurement for payment for lump sum items shall be on the basis of percentage of work complete and in place.

D. Each unit or lump sum price stated in the Bid shall constitute full compensation as herein specified for each item of work completed in accordance with the Drawings and Specifications.

E. The prices for those items which involve excavation shall include compensation for handling, transportation, and disposal of surplus excavated material (except soils covered under Item 21b and 21c), handling of water, and any required earth support, shoring, or bracing for compliance with OSHA regulations.

F. The prices for all pipe and structure items shall constitute full compensation for pipe bedding, furnishing, laying, jointing, cleaning, backfilling, compaction and testing of pipe and structures; excavation and backfill; and clean up.

G. In all items involving excavation, the price shall be based on doing the entire excavation in earth. Where rock is excavated, the price thereof shall be in addition to the cost of excavating earth, and no deduction will be made in the amount for earth excavation.

H. Unit prices submitted for various items of work will be utilized for determining prices of any additional work necessary during construction.

I. Final payment shall not be issued until the Contractor submits record drawings and the Engineer approves these drawings.

J. In accordance with Chapter 150 of the Acts of 2013 (An Act Relative to Price Adjustments for Certain Materials in Construction Projects), specifically Section 38A, of Massachusetts General Laws Chapter 30, the following materials will be eligible for price adjustments in accordance with the Appendices and applicable Specifications Sections: fuel (both diesel and gasoline); liquid asphalt; and Portland cement (contained in cast-in-place concrete). The noted material price adjustments are applicable on a monthly basis only when the monthly cost change in base prices exceeds +/- 5% (Refer to Section 01170 - Special Provisions).

1.3 ITEM DESCRIPTIONS

A. Item 1: Mobilization and Demobilization

1. Under the lump sum for Item 1, the Contractor shall mobilize and demobilize to and from the site all labor, materials and equipment to complete all work associated with the SSPS Force Main No.3 utility work and appurtenances. Demobilization from the Site includes, but is not limited to, removal of all equipment and final cleanup to the satisfaction of the Owner and Engineer. Transportation of materials and equipment by ferry for mobilization and demobilization shall include a total of six (6) ferry trips. The Site is defined as the roads including Sea Street, Step Lane, Centre Street, Lily Street, Liberty Street, Winter Street, Pine Street, Silver Street, Pleasant Street, Atlantic Avenue, Surfside Road and South Shore Road. The lump sum price for Item 1 shall cover mobilization and demobilization across three (3) construction seasons.

2. Payment for Mobilization and Demobilization shall be by lump sum. Fifty percent of the lump sum price shall be paid to the Contractor upon completing mobilization activities in three (3) equal payments (one payment per season over three construction seasons, approx. 16.67%), and the remaining fifty percent shall be paid upon demobilization from the site in three (3) equal payments (one payment per season over three construction seasons, approx. 16.67%).

3. The total lump sum for mobilization/demobilization shall not exceed 5 percent of the total of all bid items excluding this item.

B. Item 2: Video and Photographs (Items 2a and 2b)

<u>Item 2a – Preconstruction Video and Photographs</u>

1. Under the lump sum for Item 2a, the Contractor shall furnish all labor, materials, tools, equipment, and incidentals required to complete the preconstruction video of the entire project area (including any staging areas and abutting residences) and construction photos as directed by the Engineer. The work includes but is not limited to preparation of electronic photograph files and video saved on USB

devices; additional inspections and site visits as required; coordination with property owners; support for the closeout of all outstanding Personal Property Damage Claims; and all incidental work.

2. Payment for the Preconstruction Video and Photographs shall be by lump sum. Ten percent of the lump sum price shall be paid to the Contractor upon the submittal and acceptance by the Engineer of all Preconstruction photos and videos. The balance of the lump sum will be paid upon receipt of all closeout of all Personal Property Damage Claims.

Item 2b – Monthly Construction Progress Photographs

1. Under the lump sum for Item 2b, the Contractor shall furnish all labor, materials, tools, equipment, and incidentals required to complete monthly construction progress photographs of the active work areas (and abutting residences) as describe in Section 01380. The work includes but is not limited to preparation of electronic photograph files saved on USB devices; additional inspections and site visits as required; coordination with property owners; and all incidental work.

2. Payment for the Monthly Construction Progress Photographs shall be by lump sum. Measurement for payment for Monthly Construction Progress Photos will be on a percent of the Lump Sum bid calculated by dividing the elapsed time to date by the original Contractual construction time limit as approved by the Engineer.

C. Item 3: Furnish and Install Sewer Force Main Pipe (Items 3a through 3f)

Item 3a – Furnish and Install 24" SDR18 C900 PVC Pipe and Fittings via Open Cut
Item 3b – Furnish and Install 20" SDR18 C900 PVC Pipe and Fittings via Open Cut
Item 3c – Furnish and Install 24" Protecto 401 Epoxy Lined DI Pipe and Fittings via Open Cut
Item 3d – Furnish and Install 20" Protecto 401 Epoxy Lined DI Pipe and Fittings via Open Cut
Item 3e – Furnish and Install 16" Protecto 401 Epoxy Lined DI Pipe and Fittings via Open Cut
Item 3f – Furnish and Install 8" Protecto 401 Epoxy Lined DI Pipe and Fittings via Open Cut

1. 24-inch and 20-inch SDR 18 C900 PVC sewer force main pipe under Items 3a and 3b, will be measured in place on a linear foot basis. Measurement for payment does not signify that the pipe is accepted.

2. 24-inch, 20-inch, 16-inch, and 8-inch Protecto 401 Epoxy Lined ductile iron sewer force main pipe under Items 3c, 3d, 3e, and 3f will be measured in place on a linear foot basis. Measurement for payment does not signify that the pipe is accepted.

3. Measurement of all subdivisions of Item 3 for length will be along the horizontal centerline of the pipe with no deduction for fittings and valves, and will be to the center of manholes. Measurement for depth will be from the original ground surface, as determined by the Engineer, to the invert of the pipe. Measurement will be to the nearest tenth of a foot.

4. Payment under Item 3 will be made at the Contract unit price stated in the Bid Form for the quantities as measured in place on a linear foot basis. The Contractor shall provide all labor, materials, tools, equipment, and incidentals required for construction of PVC/DI pipe and required fittings complete in place as indicated on the Drawings and as specified. Payment shall be considered full compensation for cutting and removing existing pavement; trench excavation; support of excavation, sheeting, shoring, bedding with crushed stone for pipe; backfilling with suitable excavated material, compaction as shown on the trench detail; compaction testing; filter fabric; restoring the trench surface to grade needed for trench pavement and subbase; protection or temporary removal and replacement of existing utilities and structures; laying, jointing, cleaning, and pressure testing the sewer force main pipe, water for construction; temporarily plugging open ends or providing a permanent plug on future service connections; bypass as required for future connections; draining of existing force mains as required for future connections; bracing the plug; insulation; underground warning tape with metal core; fittings and restrained joints; including restraints upstream and downstream from fittings as indicated on the Drawings, connections to existing sewer force mains including couplings; installing concrete thrust blocks, concrete encasement, and impervious clay dam; access to compacted backfill for compaction testing; and all incidental work, including driving and removing sheeting and bracing; removal and disposal of excess excavated material from the jobsite; and all else incidental thereto, for which separate payment is not provided under other items in the Bid Form.

5. For Item 3, payment will be made for pipe only when it is installed in the ground, tested, and accepted by the Engineer, and no proportional payment shall be made for pipe on the site but not yet installed. Sewer force main pipe installed but not successfully tested will be paid for at a maximum of 90 percent of the unit prices bid under Item 3 of the form. The remaining 10 percent will be paid upon receipt of successful test results by the Engineer. All reductions in payment due to unsuccessful testing will be made prior to normal retainage.

D. Item 4: Furnish and Install Sewer Force Main Valves (Items 4a through 4e)

Item 4a – Furnish and Install 24" Sewer Force Main Plug Valves
Item 4b – Furnish and Install 20" Sewer Force Main Plug Valves
Item 4c – Furnish and Install 16" Sewer Force Main Plug Valves
Item 4d – Furnish and Install 8" Sewer Force Main Plug Valves
Item 4e – Furnish and Install 8" Sewer Force Main Check Valves and Structures

1. The unit price for Items 4a through 4d shall include furnishing and installing epoxy coated sewer force main plug valves, valve box and cover, and all labor, materials, and equipment required to install sewer force main valves and fittings.

2. The unit price for Item 4e shall include furnishing and installing epoxy coated sewer force main check valves and precast concrete structures as shown on the Drawings, and all labor, materials, and equipment required to install sewer force main valves and fittings.

3. Payment for sewer force main valves shall be measured per each (EA) complete valve furnished and installed and accepted by the Engineer.

4. Payment shall also include the furnishing and installation of a stem extension (where required) that is terminated no more than one (1) foot below existing grade.

E. Item 5: Furnish and Install Intermediate Access Point Manholes and Associated Fittings (Items 5a and 5b)

Item 5a – Furnish and Install 8' Diameter Intermediate Access Point Manholes and Associated Fittings
Item 5b – Furnish and Install 5' x 8' Intermediate Access Point Manholes and Associated Fittings

1. The unit price for Items 5a and 5b shall include excavation (except rock excavation covered under Item 22b), support of excavation, sheeting, shoring, backfill, dampproofing; furnishing and installing a new 8’ diameter or 5’ x 8’ precast concrete manhole structure, respectively, manhole frame and covers, bedding material for the manhole, epoxy lined ductile iron manhole tee, 4” gate valve with a 4” camlock connection, all required fittings, pipe supports within the manhole, concrete encasement/support blocks as required, restrained PVC/DI flange adapters, HDPE grade rings, associated fittings and hardware as shown on the Drawings, and all else incidental thereto, for which separate payment is not provided under other items in the Bid Form.

2. Precast concrete Intermediate Access Point Manholes under Item 5 will be measured by each manhole furnished, installed, completed, tested, and accepted in place. Measurement shall be by actual amount of manholes installed and accepted by the Engineer.

F. Item 6: Furnish and Install Air Release/Vacuum Relief Manholes and Associated Fittings (Items 6a and 6b)

Item 6a – Furnish and Install 8' Diameter Air Release/Vacuum Relief Manholes and Associated Fittings
Item 6b – Furnish and Install 5' x 8' Air Release/Vacuum Relief Manholes and Associated Fittings

1. The unit price for Items 6a and 6b shall include excavation (except rock excavation covered under Item 22b), support of excavation, sheeting, shoring, backfill, dampproofing; furnishing and installing a new 8’ diameter or 5’ x 8’ precast concrete manhole structure, respectively, manhole frame and covers, bedding material for the manhole, epoxy lined ductile iron manhole tee, pipe

supports within the manhole, concrete encasement/support blocks as required, restrained PVC/DI flange adapters, a 4" gate valve with hand wheel, a 4" dual body combination air/vacuum relief valve, 4" Schedule 80 PVC for vent connection including coring and connection to existing gravity sewer manholes, HDPE grade rings, associated fittings and hardware as shown on the Drawings, and all else incidental thereto, for which separate payment is not provided under other items in the Bid Form.

2. Precast concrete Air Valve Manholes under Item 6 will be measured by each manhole furnished, installed, completed, tested, and accepted in place. Measurement shall be by actual amount of manholes installed and accepted by the Engineer.

G. Item 7: Furnish and Install Blow-off/Clean Out Manholes and Associated Fittings (Items 7a and 7b)

Item 7a – Furnish and Install 8' Diameter Blow-off/Clean Out Manholes and Associated Fittings
Item 7b – Furnish and Install 6' x 8' Blow-off/Clean Out Manholes and Associated Fittings

1. The unit price for Items 7a and 7b shall include excavation (except rock excavation covered under Item 22b), support of excavation, sheeting, shoring, backfill, dampproofing; furnishing and installing a new 8' diameter or 6' x 8' precast concrete manhole structure, respectively, manhole frame and covers, bedding material for the manhole, epoxy lined ductile iron manhole tee, pipe supports within the manhole, concrete encasement/support blocks as required, restrained PVC/DI flange adapters, an 8" gate valve, HDPE grade rings, associated fittings and hardware as shown on the Drawings, and all else incidental thereto, for which separate payment is not provided under other items in the Bid Form.

2. Precast concrete Blow-off/Clean Out Manholes under Item 7 will be measured by each manhole furnished, installed, completed, tested, and accepted in place. Measurement shall be by actual amount of manholes installed and accepted by the Engineer.

H. Item 8: Furnish and Install Ductile Iron Water Mains (Items 8a through 8c)

Item 8a – Furnish and Install 12" DI Water Main
Item 8b – Furnish and Install 8" DI Water Main
Item 8c – Furnish and Install 6" DI Water Main

1. Ductile iron water main pipe, fittings, tees, restrained joints, solid sleeves and couplings under Items 8a, 8b, and 8c will be measured for payment by the linear foot (LF) of water main furnished, installed, complete, tested, and accepted in place by the Engineer. Measurement will be along the water main centerline without deduction for valves and fittings. Hydrant branch lines will be measured

from the center of the main line tee to the centerline of the hydrant or mechanical joint cap.

2. Under Items 8a, 8b, and 8c, payment for 12-inch, 8-inch, and 6-inch ductile iron water main pipe as specified will be made at the Contract Unit Price stated in the Bid Form for the quantities as measured in place on a linear foot (LF) basis. Payment shall be considered as full compensation for furnishing all labor, equipment, materials, and services for saw cutting of existing pavement; all pipe, fittings, restrained joints, caps and plugs and any polyethylene encasement; underground warning tape with metal core; insulation as required; connections to existing mains and hydrants where required; couplings not included for payment elsewhere; trench excavation (except rock excavation covered under Item 22b); trench bedding and backfill materials including subbase, compaction, as shown on the trench detail; compaction testing; support of excavation; furnish, put in place, maintain and remove bracing including trench boxes and trench shields; protection of existing utilities; cutting or excavation of existing sheeting; opening and closing gate valves; backfilling and compaction; restoring the trench surface to grade; restoring disturbed areas to their pre-existing condition; disposal of excavated materials not covered elsewhere herein; removal and legal disposal of existing water main pipe as indicated (except removal and disposal of Asbestos Cement materials); permit compliances and associated fees; installation of temporary blow-offs and chlorination injection points for water main testing; pressure testing and disinfection; dechlorination; flushing; bacteriological sampling; laboratory analyses; clean up; and all else incidental thereto, for which separate payment is not provided under other items in the Bid Form.

3. For Item 8, payment will be made for pipe only where it is installed in the ground, tested, and accepted by the Engineer, and no proportional payment shall be made for pipe on the site but yet installed. Water pipe installed but not successfully tested and/or chlorinated will be paid for at a maximum of 90 percent of the unit prices bid under Item 8 of the form. The remaining 10 percent will be paid upon receipt of successful test results by the Engineer. All reductions in payment due to unsuccessful testing will be made prior to normal retainage.

I. Item 9: Furnish and Install Water Main Gate Valves and Boxes (Items 9a through 9e)

<u>Item 9a – Furnish and Install 12” Gate Valves and Boxes</u>
<u>Item 9b – Furnish and Install 8” Gate Valves and Boxes</u>
<u>Item 9c – Furnish and Install 6” Gate Valves and Boxes</u>
<u>Item 9d – Furnish and Install 4” Gate Valves and Boxes</u>
<u>Item 9e – Furnish and Install Additional Gate Valves and Boxes</u>

1. The number of resilient wedge gate valves with boxes to be paid for under Item 9 will be measured as the number of different sizes each (EA) actually furnished and installed in the completed project and accepted by the Engineer.

2. Payment for furnishing and installing valves with boxes will be made for each (EA) installed under Items 9a, 9b, 9c, 9d, and 9e, 12-inch, 8-inch, 6-inch, 4-inch,

and additional resilient wedge gate valves, respectively. Payment will also be considered full compensation for furnishing all labor, equipment, materials, industry restrained joints and services required or incidental for the satisfactory completion of the Work. Payment shall include removal of existing valves, valve boxes, and frames and covers. Payment shall include delivery of removed valves to the Nantucket Water Department and legal disposal of removed valve boxes and frames and covers. Bid prices for Item 9e shall be prepared under the assumption that additional gate valves will be sized in accordance with the largest main within the limit of work (12-inches).

J. Item 10: Furnish and Install Hydrant Assemblies (Items 10a and 10b)

Item 10a – Furnish and Install Hydrant Assemblies
Item 10b – Furnish and Install Additional Hydrant Assemblies

1. Payment for furnishing and installing hydrants will be made for each (EA) kit installed complete and accepted by the Engineer under Item 10. Payment will also be considered full compensation for furnishing all labor, equipment, and materials required for excavation and backfill, compaction, compaction testing, installation of tie rods and concrete thrust blocks, furnishing and placing crushed stone; pressure testing, disinfection, removal of excess excavated material, clean up and all else incidental thereto for the satisfactory completion of the Work. Payment for 6" hydrant lateral and 6" valve and appurtenances shall be paid for under bid Items 8c and 9c, respectively. Mechanical joint restraints will be included for payment under water mains, Item 8. Payment shall include removal of existing hydrants and delivery to the Nantucket Water Department.

2. Payment for furnishing and installing hydrant extension kits shall also be included under Item 10. Payment shall include the cost of all labor and materials required to install the extension kit where directed by the Engineer.

K. Item 11: Furnish and Install Water Service Taps and Curb Boxes

1. The number of water service taps, including corporation stops, fittings, saddles, curb stops, and boxes, to be paid for under Item 11 will be measured as the number of different sizes each (EA) actually installed and connected to the new water main in the completed project as accepted by the Engineer. Each service tap shall be complete and include corporation stops, fittings, couplings, tapping sleeves, curb stops and boxes. Service piping will be paid for under Item 12.

2. Payment for furnishing and installing service taps with curb stops will be made for each (EA) installed under Item 11. Payment will be considered full compensation for furnishing all labor, equipment, materials, adaptors, services, excavation, support of excavation, bedding material and backfill, compaction, compaction testing, and all else incidental thereto for which separate payment is not provided. Payment shall include removal and legal disposal of existing water service taps and curb stops as directed by the Town or Engineer.

3. Payment for taps and curb stops for temporary blow-off and chlorine injection points are not included under this item and shall be included under Item 8.

L. Item 12: Furnish and Install Polyethylene Water Services

1. Water services to be paid for under Item 12 will be measured for payment by the actual number of linear feet (LF) of water service installed, as specified, measured in place along the centerline of the pipe from the proposed water main to the locations indicated on the design Drawings and details.

2. Payment for furnishing and installing water services will be made by the linear foot (LF) of water service installed under Item 12. Water services will be paid for at the unit prices bid under Item 12 of the Bid Form for the above determined quantities. This price and payment will be considered full compensation for all labor, equipment, materials, sand bedding material and backfill, compaction, compaction testing, and services necessary for installing the polyethylene water service tubing, warning tape, tracing wire, excavation, cutting or excavating existing sheeting, sheeting and shoring, connections to existing services, adapters, flushing, and all else incidental for the satisfactory completion of the Work, and disposal of any excess materials. Payment shall include removal and legal disposal of existing water services as directed by the Town or Engineer.

3. Payment for service pipe for temporary blow-off and chlorine injection points are not included under this item and shall be included under Item 8.

M. Item 13: Furnish and Install Temporary Bypass Piping and Appurtenances (Items 13a and 13b)

Item 13a – Furnish and Install 4" Temporary Bypass Piping and Appurtenances
Item 13b – Furnish and Install 2" Temporary Bypass Piping and Appurtenances

1. The lengths of bypass piping, valves, fittings, plugs, and caps to be paid for under the appropriate subdivisions of Item 13 shall be measured by the linear foot (LF) along the top of the piping laid. No reductions shall be made for valves or fittings. Reducers shall be classed as the larger size.

2. The unit price for Items 13a and 13b shall constitute full compensation for furnishing, laying, disinfecting, testing, maintaining, removing, restoring surrounding area disturbed by the Work, complete as indicated on the Drawings and as specified herein, including direct burial of bypass, processed gravel and hot mix asphalt for bypass trench patch, and all Work incidental thereto and not specifically included for payment under other items.

3. The unit price for Item 13 shall constitute full compensation for furnishing, installing, connecting to the sillcock, dig-down/excavated service connections, connections to existing backflow prevention devices, temporary hydrants, temporary valves, disinfecting, dechlorination, testing and removing the connection, and restoring the surrounding area disturbed by the Work, complete

as indicated on the Drawings and as specified herein, including all items incidental thereto not specifically included for payment under other items.

4. Work under Item 13 does not include transfer of Ownership of the temporary connections or material to the Owner. All temporary connections are the responsibility the Contractor.

N. Item 14: Furnish and Install Additional Water Main Fittings

1. The quantity of additional fittings to be measured for payment under Item 14 shall be the total weight of the fittings (including horizontal and vertical) in pounds (LB) actually installed as ordered by the Owner in addition to the fittings indicated on the Drawings. Additional fittings shall be approved for payment only upon specific approval of their use by the Owner.

2. The unit price for Item 14 shall constitute full compensation for furnishing, setting, jointing, testing and disinfecting the additional fittings, including restrained joints, concrete thrust blocks, excavation and backfill, and all other Work incidental thereto.

O. Item 15: Furnish and Install PVC Gravity Sewer Main Pipe (Items 15a through 15c)

Item 15a – Furnish and Install 12" SDR 35 PVC Gravity Sewer Pipe
Item 15b – Furnish and Install 10" SDR 35 PVC Gravity Sewer Pipe
Item 15c – Furnish and Install 8" SDR 35 PVC Gravity Sewer Pipe
Item 15d – Furnish and Install 12" C909 PVC Gravity Sewer Pipe
Item 15e – Furnish and Install 8" C909 PVC Gravity Sewer Pipe

1. 12-inch, 10-inch and 8-inch SDR 35 PVC gravity sewer pipe under Items 15a, 15b, and 15c, will be measured in place on a linear foot basis. Measurement for payment does not signify that the pipe is accepted.

2. 12-inch and 8-inch C909 PVC gravity sewer pipe under Items 15d and 15e, will be measured in place on a linear foot basis. Measurement for payment does not signify that the pipe is accepted.

3. Measurement of all subdivisions of Item 15 for length will be along the horizontal centerline of the pipe with no deduction for fittings and will be to the center of manholes. Measurement for depth will be from the original ground surface, as determined by the Engineer, to the invert of the pipe. Measurement will be to the nearest tenth of a foot. Gravity sewer depths range from 2.2' below ground surface to 14.4' below ground surface.

4. Payment under Item 15 will be made at the Contract unit price stated in the Bid Form for the quantities as measured in place on a linear foot basis. The Contractor shall provide all labor, materials, tools, equipment, and incidentals required for construction of PVC pipe and fittings complete in place as indicated on the Drawings and as specified. Payment shall be considered full compensation for cleaning and closed circuit television (CCTV) of existing gravity sewer mains

to locate sewer service laterals; cutting and removing existing pavement; trench excavation (except rock excavation covered in Item 22b); support of excavation, bedding with crushed stone for pipe; backfilling with suitable excavated material, compaction as shown on the trench detail; compaction testing; filter fabric; restoring the trench surface to grade needed for trench pavement and subbase; protection or temporary removal and replacement of existing utilities and structures; laying, jointing, cleaning, post-installation CCTV inspection, and testing the 12-inch, 10-inch and 8-inch gravity sewer pipe, including low pressure testing; water for construction; temporarily plugging open ends or providing a permanent plug on future service connections; bracing the plug; insulation; sewer flow bypass; temporary connections to existing gravity sewer mains, fittings; connections to existing sewers including couplings, access to compacted backfill for compaction testing; and all incidental work, including driving and removing sheeting and bracing; removal and disposal of excess excavated material from the jobsite; and all else incidental thereto, for which separate payment is not provided under other items in the Bid Form. Payment shall also include removal and legal disposal of existing gravity sewer main.

5. Payment will include the cleaning and CCTV inspection of completed sewers to be paid for under Items 15a, 15b, 15c, 15d, and 15e. The unit price for these items shall constitute full compensation for cleaning and closed circuit television inspection and furnishing color USBs complete as indicated and as specified including all work incidental thereto and not specifically included for payment under other items.

6. For Item 15, payment will be made for pipe only when it is installed in the ground, tested with low pressure, mandrel tested, cleaned, televised as specified, and accepted by the Engineer, and no proportional payment shall be made for pipe on the site but not yet installed. Low pressure testing is to be performed on the main gravity sewer line only, this does not include services. PVC pipe installed but not successfully tested will be paid for at a maximum of 90 percent of the unit prices bid under Item 15 of the form. The remaining 10 percent will be paid upon receipt of successful test results by the Engineer. All reductions in payment due to unsuccessful testing will be made prior to normal retainage.

P. Item 16: Furnish and Install 6” PVC Gravity Sewer Service and Cleanout

1. 6-inch SDR 35 PVC sewer services and cleanouts under Item 16 will be measured in on a linear foot basis. Measurement for payment does not signify that the pipe is accepted.

2. Measurement of 6-inch service connections will be made based on the number of gravity/chimney services installed from the connection to the gravity sewer main up to the property line, including cleanouts and cleanout covers as shown on the Drawings.

3. Payment under Item 16 will be made at the Contract unit price stated in the Bid Form for the quantities as measured in place on a linear foot basis. The Contractor shall provide all labor, materials, tools, equipment, and incidentals

required for construction of PVC pipe complete. Payment shall be considered full compensation for providing cutting and removing existing pavement; trench excavation (except rock excavation covered in Item 22b); support of excavation, bedding with crushed stone for pipe; backfilling with suitable excavated material, compaction as shown on the trench detail; compaction testing; filter fabric; restoring the trench surface to grade needed for trench pavement and subbase; protection or temporary removal and replacement of existing utilities and structures; laying, jointing, cleaning, and testing the gravity sewer service pipe, including low pressure testing; water for construction; temporarily plugging open ends or providing a permanent plug on future service connections; bracing the plug; wood markers at the end of service pipe; insulation; sewer flow bypass; fittings and restrained joints; connections to existing sewers services including couplings, installation of sewer service cleanouts and cleanout covers, access to compacted backfill for compaction testing; and all incidental work, including driving and removing sheeting and bracing; removal and disposal of excess excavated material from the jobsite; and all else incidental thereto, for which separate payment is not provided under other items in the Bid Form. Payment shall also include removal and legal disposal of existing gravity sewer services.

4. For Item 16, payment will be made for pipe only when it is installed in the ground, tested with low pressure testing, cleaned, and accepted by the Engineer, and no proportional payment shall be made for pipe on the site but not yet installed. PVC pipe installed but not successfully tested will be paid for at a maximum of 90 percent of the unit prices bid under Item 16 of the form. The remaining 10 percent will be paid upon receipt of successful test results by the Engineer. All reductions in payment due to unsuccessful testing will be made prior to normal retainage.

Q. Item 17: Furnish and Install Gravity Sewer Manhole (Items 17a through 17c)

Item 17a – Furnish and Install 4’ Diameter Gravity Sewer Manhole
Item 17b – Furnish and Install 5’ Diameter Gravity Sewer Manhole
Item 17c- Furnish and Install Gravity Sewer Manhole Frame and Cover

1. Precast concrete gravity sewer manholes under Item 17 will be measured by each manhole furnished, installed, completed, tested, and accepted in place. Measurement shall be by actual amount of manholes completed.

2. Payment for providing 4-ft diameter and 5-ft diameter precast concrete manholes complete in place will be made for the quantity as above determined at the price per each (EA) manhole for Item 17 in the Bid Form. This price and payment shall be full compensation for providing all excavation (except rock excavation covered under Item 22b), manhole bypassing, support of excavation, bedding, backfilling, precast sections and bases, subbase, all forms, reinforcing, concrete and masonry materials including brick inverts, dampproofing, drop connection piping as shown on plans, manhole steps, top slabs for shallow manholes if used, top cones, pipe boots, HDPE grade rings, vacuum testing, and all else incidental thereto, for which separate payment is not provided under other items in the Bid

Form. Payment shall also include removal and legal disposal of existing sewer manholes.

3. Sewer manholes installed but not successfully tested will be paid for at a maximum of 90 percent of the unit prices bid under Item 5 of the form. The remaining 10 percent will be paid upon receipt of successful test results by the Engineer. All reductions in payment due to unsuccessful testing will be made prior to normal retainage.

4. Gravity Sewer Manhole Frames and Covers under Item 17c will be measured by each frame and cover furnished, installed, completed, and accepted in place. Measurement shall be by actual amount of frame and covers completed.

5. Under Item 17c, the unit price for this item shall constitute compensation for each traffic rated frame and cover set as measured by actual amount of traffic rated frame and cover sets furnished, installed, and accepted in place. Unit price shall include all equipment, material and labor associated with grade rings, hardware, and grout to install frames and covers on new sewer manholes at the locations and grades indicated on the drawings.

R. Item 18: Furnish and Install Ductile Iron Drain Pipe and Fittings (Items 18a through 18d)

Item 18a – Furnish and Install 18" DI Drain Pipe and Fittings
Item 18b – Furnish and Install 15" DI Drain Pipe and Fittings
Item 18c – Furnish and Install 12" DI Drain Pipe and Fittings
Item 18d – Furnish and Install 8" DI Drain Pipe and Fittings

1. 18-inch, 15-inch, 12-inch, and 8-inch Ductile Iron Drain pipe under Items 18a, 18b, 18c, and 18d will be measured in place on a linear foot basis. Measurement for payment does not signify that the pipe is accepted.

2. Measurement of all subdivisions of Item 18 for length will be along the horizontal centerline of the pipe with no deduction for fittings and will be to the center of manholes/catch basins. Measurement for depth will be from the original ground surface, as determined by the Engineer, to the invert of the pipe. Measurement will be to the nearest tenth of a foot.

3. Payment under Item 18 will be made at the Contract unit price stated in the Bid Form for the quantities as measured in place on a linear foot basis. The Contractor shall provide all labor, materials, tools, equipment, and incidentals required for construction of ductile iron pipe complete in place as indicated on the Drawings and as specified. Payment shall be considered full compensation for providing cutting and removing existing pavement; trench excavation (except rock excavation covered in Item 21b); support of excavation, bedding with crushed stone for pipe; backfilling with suitable excavated material, compaction as shown on the trench detail; compaction testing; filter fabric; restoring the trench surface to grade needed for trench pavement and subbase; protection or

temporary removal and replacement of existing utilities and structures; laying, jointing, cleaning, water for construction; fittings and restrained joints; connections to existing drain pipes and structures including cutting and coring into existing structures, couplings, access to compacted backfill for compaction testing; and all incidental work, including driving and removing sheeting and bracing; removal and disposal of excess excavated material from the jobsite; and all else incidental thereto, for which separate payment is not provided under other items in the Bid Form.

S. Item 19: Removal and Replacement of Catch Basins, Drain Manholes, and Gutter Inlets (Items 19a through 19d)

Item 19a – Remove and Replace Catch Basin
Item 19b – Remove and Replace Leaching Catch Basin
Item 19c – Remove and Replace Drain Manhole
Item 19d – Remove and Replace Gutter Inlet

1. The removal and replacement of catch basins, leaching catch basins, and drain manholes, Items 19a, 19b, 19c, and 19d, respectively, will be measured as a complete unit in place and accepted.

2. Payment for providing catch basins, leaching catch basins, drain manholes and gutter inlets complete in place will be made for the quantity as determined above for Items 19a, 19b, 19c and 19d in the Bid Form. This price and payment shall be full compensation for providing all excavation (except rock and boulder excavation), bedding, backfilling, precast sections and bases, crushed stone backfill, preformed pipe openings, all forms, top slabs for shallow manholes and catch basins, reinforcing, concrete and masonry materials, damproofing, compaction, compaction testing, frames and grates/covers, HDPE grade rings, brick and mortar levelling as necessary to bring frame/covers to grade, and all else incidental thereto, for which separate payment is not provided under other items in the Bid Form.

T. Item 20: Installation of Concrete Cradles Over Force Main Pipe for Catch Basins and Drain Manholes

1. The unit price for Item 20 shall include furnishing and installing concrete cradles over force main pipes for catch basins and manholes. Payment under this item includes and all labor, materials, and equipment required to install each concrete cradle. This price and payment shall be full compensation for providing all excavation (except rock and boulder excavation), bedding, backfilling, precast sections and bases, crushed stone backfill, preformed pipe openings, all forms, reinforcing, concrete and masonry materials, damproofing, compaction, compaction testing, and all else incidental thereto, for which separate payment is not provided under other items in the Bid Form.

2. Payment for concrete cradles shall be measured per each (EA) cradle complete furnished and installed and accepted by the Engineer.

U. Item 21: Contaminated Material Management (Items 21a through 21e)

Item 21a – AC Pipe Removal and Disposal

1. Asbestos cement pipe removal and disposal, Item 21a, will be measured as it exists in place on a linear foot (LF) basis. Measurement of Item 21a for length will be along the horizontal centerline of the pipe with no deduction for fittings.

2. Payment for Item 21a, asbestos cement pipe removal and disposal, will be made at the Contract unit price stated in the Bid Form for the quantities as measured in place on a linear foot (LF) basis. The Contractor shall provide all labor, materials, tools, equipment, and incidentals required for handling, excavating, managing, temporary storage, and disposing of asbestos cement pipe indicated on the Drawings, as specified herein, or as discovered during construction. Handling and disposal shall be according to Section 02700. The linear foot cost for asbestos cement pipe removal and disposal shall include up to one cubic foot of underlying soil for every 12 linear feet of pipe. The work includes, but is not limited to: remove, handle, and dispose of asbestos cement pipe and soil; all controls necessary to maintain compliance with regulatory requirements relative to asbestos; procuring all health and safety equipment; protecting and securing the excavation and storage areas from accidental entry; air monitoring; controlling the spread of airborne contaminants; and, all notifications, fees, permits, and taxes. The Contractor will not be paid any additional costs under this item resulting from improper pipe removal activities that result in soil contamination. Asbestos cement pipe excavated and removed will be paid for at a maximum of 50 percent of the unit price bid under Item 21a after it is removed from the Town of Nantucket. The remaining 50 percent will be paid upon receipt of the return manifest or certified weight slip and accompanied by the appropriate MassDEP Waste Shipment Record. Payment shall not be made for soil excavation and disposal if the removal is necessitated by the Contractor's failure to properly protect underlying soil by placement of polyethylene sheeting. No additional payment shall be made under this item for improper pipe removal activities that result in soil contamination. All reductions in payment will be made prior to normal retainage.

3. Payment for Item 21a shall not include handling, excavating, managing and disposing of asbestos cement pipe exposed during excavation and found to have been broken or crushed in place or disposed of in the area of excavation prior to excavation by the Contractor.

Item 21b – Management and Disposal of Crushed AC Pipe and AC Impacted Soils

1. Measurement for Item 21b will be based on each cubic yard of asbestos contaminated materials and associated soil removed and disposed of as measured in place by the Engineer. Contractor will not be paid any additional costs under this item resulting from improper pipe removal activities that result in soil contamination. Asbestos Contaminated Materials excavated and removed will be paid for at a maximum of 50 percent of the unit price bid under Item 21b of

the form after it is removed from the Town of Nantucket. The remaining 50 percent will be paid upon receipt of the return fully executed manifest or certified weight slip and accompanied by the appropriate fully executed MassDEP Waste Shipment Record. All reductions in payment will be made prior to normal retainage.

2. Payment for Item 21b shall include furnishing all labor, materials, tools, equipment, and incidentals required for handling, excavating, managing and disposing of asbestos containing material and soil, including asbestos cement pipe exposed during excavation and found to have been broken or crushed in place or disposed of in the area of excavation prior to excavation by the Contractor. This item shall not include pipe broken by the Contractor in the course of removing piping under Item 21a. The work includes, but is not limited to: remove, handle, and dispose of all asbestos cement pipe and asbestos containing material including soil up to six inches below limits of asbestos containing material and/or asbestos pipe; all controls necessary to maintain compliance with regulatory requirements relative to asbestos in soils; procuring all health and safety equipment; protecting and securing the excavation and storage areas from accidental entry; the spread of airborne contaminants; and, all notifications, fees, permits, and taxes.

Item 21c – Removal and Disposal of Unforeseen Asbestos

1. Under Bid Item 21c, the Contractor shall be reimbursed for certain charges authorized by the Engineer for unforeseen asbestos abatement and removal and legal disposal of asbestos-impacted material required and authorized by the Engineer. The allowance (ALLOW) for this item established in the Bid is an estimated figure to facilitate comparison of bids only. Payment for this item shall be based on actual subcontractor invoices and/or Contractor accounting of actual costs for labor, equipment, soil testing, storage, transport, disposal, incidentals and other appurtenant items necessary for the legal disposal of unforeseen asbestos containing materials, including the timely and required notification of all encounters. Subcontractor invoices and Contractor expenses will be reimbursed at cost without markup (profit).

Item 21d – Removal and Disposal of Other Hazardous Materials

Under Bid Item 21d, the Contractor shall be reimbursed for certain charges authorized by the Engineer for unforeseen contaminated/hazardous materials discovered in the field. Payment under this item includes the removal and legal disposal of hazardous material required and authorized by the Engineer. The allowance (ALLOW) for this item established in the Bid is an estimated figure to facilitate comparison of bids only. Payment for this item shall be based on actual subcontractor invoices and/or Contractor accounting of actual costs for labor, equipment, soil testing, storage, transport, disposal, incidentals and other appurtenant items necessary for the legal disposal of asbestos containing materials, including the timely and required notification of all encounters. Subcontractor invoices and Contractor expenses will be reimbursed at cost without markup (profit).

Item 21e – Soil Management Plans

1. The preparation of soil management plans shall be covered under Item 21e. The lump sum price for preparing soil management plans shall constitute full compensation for furnishing all labor, equipment, materials and tools necessary for preparation of soil management plans by a Licensed Site Professional (LSP) hired by the Contractor, complete, as indicated on the Drawings and as specified, including daily site/soils management, status reports, completion reports, soil reuse/disposal shipping documentation and all work incidental thereto and not specifically included for payment under other items.

V. Item 22: Exploratory Excavation and Rock Excavation (Items 22a and 22b)

Item 22a – Exploratory Excavation

1. Under the unit price bid for Item 22a, the Contractor shall excavate and backfill, as directed and approved by the Engineer, such materials as are necessary to locate pipe, utilities, and possible obstructions. Included under the unit price is payment for recording existing field conditions, excavation, sheeting, shoring, backfill, compaction, surface restoration, landscaping, all labor, services and equipment necessary for exploratory excavations in the locations of this Contract. Also included under this item is provision of all test pit results to the Engineer.

2. Measurement for payment will be on the basis of cubic yards (CY) of exploratory excavation as measured and approved by the Engineer. Paving shall be included for payment as specified under the appropriate Item (Item 23).

Item 22b – Rock Excavation

1. Under the unit price bid for Item 22b, the Contractor shall excavate, remove, and dispose of ledge and rock from trenches and excavated areas via mechanical methods. Blasting will not be permitted. Included in the price bid per cubic yard (CY) shall be related costs such as hoe-ramming, expansive grout or similar materials, drilling, and replacement with suitable and compacted gravel borrow material, removal, and disposal of excavated material. Typical of materials classified as rock are boulders 1.0 cu. yd. or more in volume, solid rock, rock in ledges, and rock-hard cementitious aggregate deposits. Rock that is excavated by normal excavation methods will not be measured under this Item. Measurement for payment will be on the basis of cubic yards (CY) of ledge or rock excavated as measured by the Engineer. Rock in pipe trenches shall be measured from its surface to 6-inches below the outside of the pipe and with a width of two (2) feet greater than the inside diameter of the pipe but not less than 3 feet minimum trench width. Any rock excavated to a depth or width greater than the above shall be removed and backfilled with common fill at the Contractor's expense.

W. Item 23: Pavement (Items 23a through 23f)

Item 23a – 3" Temporary Trench Pavement

1. Under Item 23a, the quantity of 3" Thick Temporary Trench Paving, shall be measured by square yards placed in trenches as directed. Certified weight slips for all bituminous concrete delivered to the site(s) shall be submitted to the Engineer on a daily basis. Payment for furnishing and placing temporary bituminous concrete pavement shall be made at the unit price bid per square yard computed using one of the following methods:

    a) Method 1 (Measured in Place): The Engineer shall multiply the length by the width of the pavement area to obtain the square yardage of bituminous concrete. Tonnage shall be calculated from the square yardage using the factor of 0.056 tons per square yard per inch of thickness.
    b) Method 2 (Delivered): Certified weight slips shall be used. Any bituminous concrete placed outside the payment limits, unless approved by the Engineer, shall be deducted (using Method 1) from the total tonnage obtained from the certified weight slips.
    c) Payment for furnishing and placing temporary and permanent bituminous concrete will be made based on the square yardage obtained using either Method 1 or Method 2, whichever is less.

2. The unit price for Item 23a shall constitute full compensation for installing, constructing and maintaining temporary trench pavement, complete, including tack coats as indicated on the Drawings and as specified. Measurement of temporary pavement over existing trenches shall be in accordance with the pay limits indicated on the Details. Temporary trench pavement shall be placed atop processed gravel subbase as indicated in the Drawings to be paid for under Item 23c. The Contractor shall maintain temporary pavement in good repair and flush with the existing pavement at all times during the duration of the Contract. If defects occur in surfacing constructed by the Contractor, remove Temporary Pavement as necessary to properly correct defect.

3. No additional payment will be made beyond the payment limits noted or for maintenance or repair of trenches.

4. Also included for payment under Item 23a are the services, labor, equipment, and materials required to replace pavement markings and/or adjust existing valve, gas and service boxes, castings and structures, not included for payment elsewhere, where required.

Item 23b – Full-Width Full-Depth Reclamation and Pavement

1. The quantity of Full-Width Full-Depth Reclamation and Pavement to be measured for payment under Item 23b shall be measured by the square yards placed in streets and parking lots as directed. The thickness of permanent pavement shall be 5.5-inches as shown on the Drawings and as directed by the

Engineer. Payment for furnishing and placing temporary bituminous concrete pavement shall be made at the unit price bid per square yard computed using one of the following method:

a) The Engineer shall multiply the length by the width of the pavement area to obtain the square yardage of bituminous concrete. Tonnage shall be calculated from the square yardage using the factor of 0.056 tons per square yard per inch of thickness.

2. The unit price for Item 23b shall constitute full compensation for full depth reclamation of hot mix asphalt pavement and for all work necessary to complete the Item, including cutting, pulverizing the existing asphalt mat and bituminous concrete trench pavement, mixing the pulverized mat into existing subgrade base course, wetting and compacting the mixed pulverized asphalt mat and subgrade and/or base course, blading, shaping, rough grading, fine grading, sweeping, watering and providing dust control, and hauling and disposal of excess material off site. The unit price shall include materials, tools, equipment, labor, and work necessary or incidental to the satisfactory completion of all Items shown on the details or specified.

3. Also included for payment under Item 23b are the services, labor, equipment, and materials required to replace pavement markings and/or adjust existing valve, gas and service boxes, castings and structures, not included for payment elsewhere, where required.

Item 23c – 12" Processed Gravel Subbase

1. Measurement for payment under Item 23c will be on the basis of square yards of 12" processed gravel complete in place as measured and approved by the Engineer.

2. The quantity of processed gravel to be paid for under Item 23c shall be equal to the number of square yards of 12" processed gravel actually placed in roadways. The unit price shall also include full compensation for removal and legal disposal of temporary backfill materials installed during temporary trench paving and removal and legal disposal of existing soil in the pavement cut back areas as needed to create a level subgrade 12 inches below the existing pavement surface. Temporary backfill materials are 17.5 inches of Processed Gravel. The unit price shall constitute full compensation for furnishing, placing, and compacting Processed Gravel, complete, as indicated on the Drawings and as specified, including for surface restoration of exploratory test pits.

Item 23d – 7" Permanent Trench Pavement

1. Under Item 23d, the quantity of 7-inch Permanent Trench Pavement, shall be measured by square yards placed in streets as directed. Certified weight slips for all bituminous concrete delivered to the site(s) shall be submitted to the Engineer on a daily basis. Payment for furnishing and placing permanent bituminous

concrete trench pavement shall be made at the unit price bid per square yard computed using one of the following methods:

a) Method 1 (Measured in Place): The Engineer shall multiply the length by the width of the pavement area to obtain the square yardage of bituminous concrete. Tonnage shall be calculated from the square yardage using the factor of 0.056 tons per square yard per inch of thickness.
b) Method 2 (Delivered): Certified weight slips shall be used. Any bituminous concrete placed outside the payment limits, unless approved by the Engineer, shall be deducted (using Method 1) from the total tonnage obtained from the certified weight slips.
c) Payment for furnishing and placing temporary and permanent bituminous concrete will be made based on the square yardage obtained using either Method 1 or Method 2, whichever is less.

2. The unit price for Item 23d shall constitute full compensation for saw-cutting; removing and disposing temporary and existing bituminous material; grading and compacting remaining subbase furnishing and installing 7 inches of permanent bituminous concrete trench pavement, complete, including tack coats as indicated on the Drawings and as specified. Permanent trench pavement shall be placed atop 12" of processed gravel subbase to be paid for under Item 23c. The maximum width eligible for payment shall be in accordance with the pay limits indicated on the Details.

3. No additional payment will be made beyond the payment limits noted or for maintenance or repair of trenches.

4. Also included for payment under Item 23d are the services, labor, equipment, and materials required to replace pavement markings and/or adjust existing valve, gas and service boxes, castings and structures, not included for payment elsewhere, where required.

Item 23e – 2" Mill and Overlay

1. The quantity of 2-inch mill and overlay placed to be paid for under Bid Item 23e shall be equal to the actual amount of the pavement course, furnished and installed and measured by the square yard (SY) of surface area, as indicated on the Drawings or as otherwise approved by the Engineer. The unit price for this item shall constitute full compensation for installation of the 2-inch mill and overlay (surface course) as herein specified and approved by the Engineer. The unit price for this item shall also include all additional Work required for Work in roads and streets, including furnishing and applying required tack coats and emulsions; HMA joint sealant, sweeping; special compaction requirements; keying in driveways and side streets; safety precautions, and all other appurtenant Work not specifically paid for under other bid items.

Item 23f – 4" Permanent Bike Path Construction

1. The quantity of 4-Inch Permanent Bike Path Construction to be measured for payment under Item 23f shall be measured by the square yards (SY) placed in bike path as directed.

2. The unit price for Item 23f shall constitute full compensation for saw-cutting; removing and disposing temporary and existing bituminous material; grading and compacting remaining subbase; furnishing and installing 4 inches of bituminous concrete bike path in two (2) lifts, complete, as indicated on the Drawings and as specified. Bituminous concrete pavement shall be placed atop 8" of processed gravel subbase to be included for payment under this item.

3. Also included for payment under Item 23f are the services, labor, equipment, and materials required to replace pavement markings and/or adjust existing valve, gas and service boxes, castings and structures, not included for payment elsewhere, where required.

X. Item 24: Restoration (Items 24a through 24n)

Item 24a – Install New Brick Sidewalk

1. The measurement for installing new brick sidewalks to be paid for under Item 24a, respectively, shall constitute full compensation for installing new brick sidewalks, including removing existing brick, furnishing and placing brick as specified and as indicated on the Drawings. The unit price shall include clearing and grubbing, saw cut pavement, excavation and legal disposal of existing bituminous concrete sidewalks; excavation and disposal of surplus subgrade material, subgrade preparation including all bedding materials, adjust casting as necessary, procuring and installing approved brick pavers; brushing stone dust in the joints, compacting, grading of sidewalk for wheelchair ramps and install detectable warning panel, and all other incidental Work relative thereto and not specifically paid for under other items of Work.

2. Payment for brick sidewalks shall be based on the square yards (SY) of sidewalks installed and accepted by the Engineer.

Item 24b – Remove and Reset Brick Sidewalk

1. The measurement for removing and resetting brick sidewalks to be paid for under Item 24b, respectively, shall constitute full compensation for removing and resetting brick sidewalks, including furnishing and placing brick as specified and as indicated on the Drawings. The unit price shall include clearing and grubbing, saw cut pavement, excavation and disposal of existing bituminous concrete sidewalks. excavation and legal disposal of surplus subgrade material, subgrade preparation including all bedding materials, adjust castings as necessary, carefully remove, inventory, store, protect and install existing brick pavers, brush stone dust in the joints, compacting, grading of sidewalk for wheelchair ramps

and install detectable warning panel, and all other incidental Work relative thereto and not specifically paid for under other items of Work.

2. Payment for brick sidewalks shall be based on the square yards (SY) of sidewalks installed and accepted by the Engineer.

Item 24c – Furnish and Install Brick Wheelchair Ramps

1. The measurement for installing brick wheelchair ramps to be paid for under Item 24c shall be based on the square yard (SY) of brick wheelchair ramp installed. The unit price shall include all labor, materials, tools, equipment and transportation required to install brick wheelchair ramps complete and in place including clearing and grubbing, saw cut pavement, excavation and disposal of existing bituminous concrete sidewalks; excavation and disposal of surplus subgrade material, subgrade preparation including all bedding materials, adjust casting as necessary, procuring and installing approved brick pavers; brushing stone dust in the joints, compacting, the installation of the detectable warning strip, the installation of two granite transition curbs at each wheelchair ramp, furnishing and placing brick as specified and as indicated on the Drawings, and all other incidental Work relative thereto and not specifically paid for under other items of Work.

2. Payment for brick wheelchair ramps shall be based on the square yards (SY) of wheelchair ramps installed and accepted by the Engineer.

Item 24d – Remove and Replace Bituminous Concrete Sidewalk

1. The measurement for removing and replacing bituminous concrete sidewalks to be paid for under Item 24d, shall constitute full compensation for removing existing bituminous concrete sidewalks and installing new bituminous concrete sidewalks to the depth as indicted on the Drawings. The unit price shall include clearing and grubbing, saw cut pavement, excavation and disposal of existing bituminous concrete sidewalks, excavation and disposal of surplus subgrade material, subgrade preparation including all bedding materials, compacting, restoration, removal and replacement, adjusting or supporting of existing utility pipes and conduits, and all other incidental Work relative thereto and not specifically paid for under other items of Work.

2. Payment for bituminous concrete sidewalks shall be based on the square yards (SY) of sidewalks installed and accepted by the Engineer.

Item 24e – Remove and Reset Granite Curb

1. Measurement for payment under Item 24e shall be for the number of linear feet (LF) of granite curb removed and reset including straight, curved, and transition curb, curb wall, granite inlet curb, or the number of curb corners, all sizes furnished and installed, as measured and recorded by the Engineer. Prices bid under this item for curb shall be full compensation for all labor, equipment, tools, and materials necessary to complete the Work as specified, which shall include

clearing and grubbing, saw cut pavement, excavation and disposal of surplus subgrade material, concrete required for anchoring granite curbing, backfill to grade including all bedding materials, compacting, adjusting or supporting of existing utility pipes and conduits, carefully remove, inventory, store, protect, and install existing granite curb, and all other incidental Work relative thereto and not specifically paid for under other items of Work

2. Payment for the removal and resetting of granite curb shall be based on the number of linear feet (LF) of curb removed and reset as measured and recorded by the Engineer.

Item 24f – Install New Granite Curb

1. Measurement for payment under Item 24f shall be for the number of linear feet (LF) of new granite curb installed including straight, curved, and transition curb, curb wall, granite inlet curb, or the number of curb corners, all sizes furnished and installed, as measured and recorded by the Engineer. Prices bid under this item for curb shall be full compensation for all labor, equipment, tools, and materials necessary to complete the Work as specified, which shall include clearing and grubbing, saw cut pavement, excavation and disposal of surplus subgrade material, concrete required for anchoring granite curbing, backfill to grade including all bedding materials, compacting, adjusting or supporting of existing utility pipes and conduits, removal and legal disposal of existing concrete curbing, and all other incidental Work relative thereto and not specifically paid for under other items of Work.

2. Payment for the installation of new granite curb shall be based on the number of linear feet (LF) of new curb installed as measured and recorded by the Engineer.

Item 24g – Install Bituminous Concrete Cape Cod Berm

1. Measurement for payment under Item 24g shall be for the number of linear feet (LF) of bituminous concrete cape cod berm as measured and recorded by the Engineer. Prices bid under this item shall be full compensation for all labor, equipment, tools, and materials necessary to complete the Work as specified, which shall include clearing and grubbing, saw cut pavement, excavation and disposal of surplus subgrade material, backfill to grade including all bedding materials, compacting, placing bituminous berm, adjusting or supporting of existing utility pipes and conduits, and all other incidental Work relative thereto and not specifically paid for under other items of Work.

Item 24h – Restoration of Growth

1. Payment for restoration of growth shall be made at the unit price bid for Item 24r per square yard (SY) of area to be loam and seeded, sodded, or wood chipped. Measurement for payment shall be based on the square yards (SY) of material placed obtained by multiplying the length of area by the width of material placed to a maximum width indicated in the sewer force main, gravity sewer, water main, and drain trench Details. Payment will be made under this item for all

labor, materials and equipment required to perform the Work as specified. No payment will be made for loam and seed or sod until areas are properly fertilized, watered, lime applied, and growth occurs.

Item 24i – Furnish and Install Cobblestone/Belgian Block Road

1. The measurement for replacing cobblestone/Belgian block roads to be paid for under Item 24i, shall constitute full compensation for roadway restoration, including furnishing and placing cobblestone/Belgian blocks as specified and indicated on the Drawings. The unit price shall include excavation and disposal of surplus subgrade material, subgrade preparation including all bedding materials, compacting, adjust casting as necessary, carefully remove, inventory, store, protect, and install existing cobblestone and Belgian Block pavers; brush stone dust in the joints, adjusting or supporting of existing utility pipes and conduits, and all other incidental Work relative thereto and not specifically paid for under other items of Work.

2. Payment for this line item shall be based on the square yards (SY) of roadways installed and accepted by the Engineer.

Item 24j – Remove, Stockpile, and Deliver Existing Cobblestones to the DPW (From Winter Street and Pine Street)

1. The measurement for stockpiling existing cobblestones to be paid for under Item 24j, shall constitute full compensation for excavating, removing, transporting, and stockpiling existing cobblestones uncovered within the limits of Winter Street and Pine Street to the Nantucket DPW located at 188 Madaket Road, Nantucket, MA. The unit price shall include excavation and disposal of surplus subgrade material, carefully remove, protect, and transport existing cobblestones, and all other incidental Work relative thereto and not specifically paid for under other items of Work.

2. Payment for stockpiling existing cobblestones shall be based on the square yards (SY) of cobblestones removed, transported, and stockpiled as measured and accepted by the Engineer. Excavation depth shall not exceed one (1) foot.

Item 24k – Remove, Stockpile, and Deliver Additional Existing Cobblestones to the DPW

1. The measurement for stockpiling additional existing cobblestones to be paid for under Item 24k, shall constitute full compensation for excavating, removing, transporting, and stockpiling existing cobblestones uncovered within the project limits outside of Winter Street and Pine Street to the Nantucket DPW located at 188 Madaket Road, Nantucket, MA. The unit price shall include excavation and disposal of surplus subgrade material, carefully remove, protect, and transport existing cobblestones, and all other incidental Work relative thereto and not specifically paid for under other items of Work.

2. Payment for stockpiling additional existing cobblestones shall be based on the square yards (SY) of cobblestones removed, transported, and stockpiled as measured and accepted by the Engineer. Excavation depth shall not exceed one (1) foot.

24l – Furnish and Install New Cobblestone/Belgian Block

1. The measurement for installing new cobblestone/Belgian block roads to be paid for under Item 24l, shall constitute full compensation for roadway restoration, including furnishing and placing new cobblestone/Belgian blocks as specified and indicated on the Drawings. The unit price shall include excavation and disposal of surplus subgrade material, subgrade preparation including all bedding materials, compacting, adjust casting as necessary, brush stone dust in the joints, adjusting or supporting of existing utility pipes and conduits, and all other incidental Work relative thereto and not specifically paid for under other items of Work.

2. Payment for this line item shall be based on the square yards (SY) of roadways installed and accepted by the Engineer.

Item 24m – Driveway Apron Restoration

1. The measurement for driveway apron restoration to be paid for under Item 24m, shall constitute full compensation for removing existing bituminous concrete driveway aprons and installing new bituminous concrete driveway aprons to the depth as indicted on the Drawings. The unit price shall include clearing and grubbing, saw cut pavement, excavation and disposal of existing bituminous concrete driveway aprons. excavation and disposal of surplus subgrade material, subgrade preparation including all bedding materials, compacting, restoration, removal and replacement, adjusting or supporting of existing utility pipes and conduits, and all other incidental Work relative thereto and not specifically paid for under other items of Work. Payment for driveway apron restoration shall be based on the square yards (SY) of driveway aprons installed and accepted by the Engineer.

Item 24n – Remove and Reset Existing Fence

1. The measurement for removing and resetting existing fences to be paid for under Item 24n, shall constitute full compensation for furnishing all labor, materials, tools, equipment, and incidentals required for excavating, removing, and resetting existing fences as required for construction. The unit price shall include excavation and disposal of surplus subgrade material, restoration, and all incidental Work relative thereto and not specifically paid for under other items of Work. Payment for removing and resetting of existing fences shall be based on the linear feet (LF) of fence removed, stockpiled, and reset to pre-construction conditions, as measured by the Engineer.

Y. Item 25: Remove and Dispose of Existing Fire Protection Cistern

1. Fire protection cistern removal and disposal Item 25, will be measured as it exists in place on a lump sum (LS) basis. Payment shall be considered full compensation for providing cutting and removing existing pavement; trench excavation; support of excavation, sheeting, shoring, backfilling with suitable excavated material; compaction; protection or temporary removal and replacement of existing utilities and structures; removal and legal disposal of the concrete structure/cistern; and all incidental work, including driving and removing sheeting and bracing; removal and disposal of excess excavated material from the jobsite; and all else incidental thereto, for which separate payment is not provided under other items in the Bid Form.

2. Legal disposal of fire protection cistern shall be the responsibility of the Contractor under direction of the Engineer and approval by the Town of Nantucket.

Z. Item 26: Traffic Management

1. Measurement for payment for Traffic Management will be on a percent of the Lump Sum bid calculated by dividing the elapsed time to date by the original Contractual construction time limit as approved by the Engineer.

2. Under the lump sum price bid for this item, the Contractor shall furnish all labor, materials, tools, equipment, and incidentals required to provide, maintain, relocate, and remove Traffic Management and Control to areas directly or indirectly influenced by construction within the limits of work or outside the limits of work as delineated in the approved Traffic Management Plan, by the MUTCD, ADA, and MHD standards; and as further directed by the Owner and Engineer. The work further includes, but is not limited to; obtaining permits; coordination with the Town of Nantucket Department of Public Works, Police, and Fire Departments; coordination with private property owners within the limits of work; preparing notifications to private property owners within the limits of work; preparing, submitting, reviewing, implementing, and revising traffic management and control plans; furnishing, installing, relocating and removing construction signs; furnishing, installing, and maintaining traffic management devices based on approved traffic management and control plans including barriers, variable message boards, fencing, reflectorized drums, portable barricades, and cones; furnishing and installing temporary construction fencing; maintaining roadways and sidewalks inside or outside the limits of work; establishing and dismantling detours; covering existing traffic signs; obtaining, posting and maintaining “No Parking” signs; meeting with police details daily; coordinating police detail locations; and all incidental work, whether listed here or not, required to provide maintenance and protection of traffic and pedestrians.

AA. Item 27: Utility Support and Coordination

1. The allowance for this Item shall be considered full compensation for the Contractor to furnish all labor, materials, tools, equipment and incidentals required to maintain continuity of telephone, electric, telecommunications, cable TV, and all privately owned utilities. The Work includes all service, trunk, supply, transmission and main lines impacted by the Work. Under the unit price for this Item, the Contractor shall also furnish all labor, materials, tools, equipment and incidentals to coordinate and/or temporarily support all utilities exposed during the excavation for the installation of the Work; equipment and incidentals to coordinate and/or temporarily support all utilities poles required to facilitate the excavation and for the installation of the Work; submission of all utility coordination and support work plans and shop drawings; coordinate the protection of and protect all overhead utilities; and perform all coordination with the utility companies for the relocation, protection, support and other Work required to facilitate the completion of the project. This Item further includes utility location (Dig Safe); coordination of construction with existing utility owners and operators; providing access for utility owners and operators to their respective utilities; and communicating with affected homeowners and residents.

2. Payment for this item shall be based on invoices received from the utility owners for supporting, relocating or replacing utilities in the project area due to project construction. The Contractor will be reimbursed at cost without markup (profit). The allowance for this item established in the Bid is an estimated figure to facilitate comparison of bids only.

BB. Item 28: Environmental Protection Measures (Items 28a and 28b)

Item 28a – 12" Diameter Filter Sock

1. The unit price for Item 28a shall be considered full compensation for furnishing, placing, and maintaining filter sock sedimentation barriers for sedimentation/erosion control and protecting wetlands, catch basins, drains, etc. The unit price for this Item shall include all costs for labor, materials, and equipment required to furnish, install, maintain, replace, remove and dispose of barriers. Payment will be made at the unit price per linear foot of barrier furnished and installed as measured by the Engineer.

Item 28b – Silt Sacks

1. Measurement for payment under Item 28b will be made on the basis of each silt sack installed and complete in place at the locations specified in the Specifications and on the Drawings.

2. The unit price for Item 28b shall be considered full compensation for furnishing and placing silt sacks or approved equal in each catch basin or drop inlet for sedimentation/erosion control and protecting wetlands, catch basins, drains, etc., where shown on the Drawings. The unit price for this Item shall include all costs for labor, materials, and equipment required to furnish, install, maintain, replace,

remove and dispose of sacks. The unit price for this Item shall also include cleaning of each sack weekly throughout the duration of construction by removal and legal disposal of materials accumulated in each sack.

CC. Item 29: Dewatering and Discharge

1. The lump sum price for this Item shall include the removal of surface water and groundwater as necessary to perform the construction required by the Contract in accordance with the Drawings and Specifications. The Contractor shall furnish all labor, materials, equipment, and incidentals required to:

    a) Design, furnish, operate, maintain, and remove temporary dewatering systems to control groundwater and surface water to maintain stable, undisturbed subgrades, and allow work to be performed under dry and stable conditions, and comply with all applicable permit and other regulatory requirements.

    b) Work to be done as part of dewatering includes, but is not limited to:
        i. Lower the groundwater level within excavations to a minimum depth of 2 feet below the bottom of the excavation.
        ii. Lower hydrostatic pressure.
        iii. Prevent surface water from entering the excavation during construction.
        iv. Implement erosion and sedimentation control measures.
        v. Provide system to treat/settle all water removed from excavations, except water that is re-infiltrated into the ground on site in a manner that does not result in negative on- or off-site impacts.
        vi. Provide an Environmental Site Professional/ Dewatering Specialist/Field Representative who will be responsible for dewatering, reinfiltration, treatment and discharge of dewatering flows as specified and in compliance with all applicable permits and regulations.

2. Payment for dewatering and discharge shall be made based on the percentage of Work completed, as determined by the Engineer.

DD. Item 30: Geotechnical Instrumentation and Monitoring

1. Under the lump sum price for this Item, the Contractor shall furnish all labor, materials, instrumentation, tools, equipment, and incidentals required to install approximately 100 instruments and perform all geotechnical monitoring as specified in the Contract Specifications and also as directed by the Engineer. Payment under this Item includes, but is not limited to: furnishing and installing earth support settlement and deformation monitoring points as well as utility, ground surface and building and structure deformation monitoring points as shown on the Contract Documents and as specified; maintenance and monitoring of earth support settlement and deformation monitoring points and submission of all data to the Engineer; maintenance and monitoring of utility, ground surface

and building and structure deformation monitoring points and submission of all data to the Engineer; submission of shop Contract Documents and submittals as required.

2. Measurement for payment for Geotechnical Instrumentation and Monitoring shall be based on the actual number of points successfully installed as measured in the field by the Engineer. Payment will not be made until all required submittals have been approved by the Engineer. Further, payment will be contingent upon the Contractor meeting the requirements in the specifications for monitoring, maintenance, and submission of reports. Payment may be withheld, at the Engineer's discretion, for late submission of reporting requirements. Costs for additional monitoring points installed for the Contractor's convenience shall not be compensated for.

EE. Item 31: Miscellaneous Work and Cleanup

1. Under the lump sum price for this Item, the Contractor shall provide all general construction services, overhead items, labor, materials, supplies, consumables, and equipment necessary to complete all other work identified within this contract, which is not included in Bid Items 1 through 30. This shall include, but is not limited to, the following:

    a. Field engineering including site layout and control, the establishment of vertical and horizontal site control, construction line and grade, and layout.
    b. Securing of the staging area.
    c. Administrative duties (i.e. RFI and Change Order processing).
    d. Attending the construction kick-off meeting, pre-construction conference and all required job progress and community meetings, and coordination of all construction activities with the appropriate local authorities and utilities.
    e. Submission of all schedules, lists, laboratory test results, materials and sources, survey documentation, and shop drawings, as required, in a timely manner to the Engineer for review and approval.
    f. Coordination of all construction activities with the Engineer, Owner, Regulatory Agencies, local utilities, and police. Obtaining necessary permits and licenses, and payment of associated fees, as required.
    g. Maintenance and repair of all work for a one (1) year period after final payment is issued.
    h. Providing a Site-Specific Health and Safety Plan for the Contractor's employees in accordance with the minimum standards set forth in OSHA 29 CFR 1910.120 and 29 CFR 1926.
    i. Preparation of, monitoring and implementation of the Health and Safety Plan.
    j. Providing a Site-Specific Construction Period Stormwater Pollution Prevention Plan (SWPPP).
    k. Provide and maintain sanitary facilities during construction.
    l. Provide a set of record drawings at the completion of the project.

m. Construction, maintenance, and removal of equipment wash down area, as required.
n. Engineer's and Contractor's field offices including furnishing all labor, materials, and equipment associated with furnishing, installing, maintaining, and removing the Engineer's and Contractor's field offices at the location approved by the Engineer as specified in Section 01500, including but not limited to preparing the site as needed, mobilizing the trailers to the site, providing all necessary power, telephone, internet service, utilities, plumbing, sanitary facilities; insurance, maintenance, snow plowing, janitorial services, office furniture, equipment, and supplies; all monthly utility costs; and removing the trailers from the site as directed by the Engineer.
o. Overhead items, including performance and surety bonds, insurance, supervision, record keeping, administration, and permitting.
p. Tree protection and coordination with the Nantucket Tree Advisory Committee for the duration of construction.
q. Daily site management including soils management.
r. Contract closeout.
s. All other project related direct and indirect costs not described above.

2. Payment for this lump sum Item will be based on a percentage of the work completed, as determined by the Engineer.

FF. Item 32: Bid Alternates (Items 32a through 32e)

Item 32a – Bid Alternate No.1 – Liberty Street Drainage Improvements

1. Under the lump sum price for this Item, the Contractor shall provide all labor, equipment, tools and materials necessary to complete the Liberty Street Drainage Improvements as Specified and shown in the Drawings. The Work shall include the installation of four (4) Catch Basins (As Described under Item 19a), one (1) Drain Manhole (As Described under Item 19c) approximately 270 linear feet of 12" Ductile Iron Drain Pipe (As Described under Item 18c) on Liberty Street, approximately 5 linear feet of 18" Ductile Iron Drain Pipe (As Described under Item 18a) on Liberty Street, as well as daily and final site cleanup. The work shall also include restoration of all areas disturbed by the Contractor's operations that are not included for payment under another Bid Item, and all other incidental Work relative thereto.

2. Payment for this lump sum Item will be based on a percentage of the work completed, as determined by the Engineer.

Item 32b – Bid Alternate No.2 – Downtown Sidewalk and Crosswalk Improvements

1. Under the lump sum price for this Item, the Contractor shall provide all labor, equipment, tools and materials necessary to complete the Downtown Sidewalk and Crosswalk Improvements as Specified and shown in the Drawings. The Work shall include the installation of approximately 50 square yards of brick

sidewalk (As Described under Item 24a) and approximately 120 linear feet of vertical granite curbing (As Described under Item 24e) on Sea Street; the installation of approximately 40 square yards of brick sidewalk (As Described under Item 24a) and approximately 55 linear feet of vertical granite curbing (As Described under Item 24e) on Lily Street, including the installation of brick wheelchair ramps (As Described under Item 24c); and the installation of approximately 75 square yards of brick sidewalk (As Described under Item 24a) and approximately 145 linear feet of vertical granite curbing (As Described under Item 24e) on Liberty Street, including the installation of brick wheelchair ramps (As Described under Item 24c) and 12" Reflectorized Epoxy White Line crosswalks. The work shall also include restoration of all areas disturbed by the Contractor's operations that are not included for payment under another Bid Item, daily and final site cleanup, and all other incidental Work relative thereto.

2. Payment for this lump sum Item will be based on a percentage of the work completed, as determined by the Engineer.

Item 32c – Bid Alternate No.3 – Atlantic Avenue Drainage Improvements

1. Under the lump sum price for this Item, the Contractor shall provide all labor, equipment, tools and materials necessary to complete the Atlantic Avenue Drainage Improvements as Specified and shown in the Drawings. The Work shall include the installation of two (2) Catch Basins (As Described under Item 19a), three (3) Drain Manholes (As Described under Item 19c), two (2) Gutter Inlets (As Described under Item 19d), approximately 50 linear feet of 8" Ductile Iron Drain Pipe (As Described under Item 18d) and approximately 250 linear feet of 12" Ductile Iron Drain Pipe (As Described under Item 18c) on Atlantic Avenue. The work shall also include restoration of all areas disturbed by the Contractor's operations that are not included for payment under another Bid Item, daily and final site cleanup, and all other incidental Work relative thereto.

2. Payment for this lump sum Item will be based on a percentage of the work completed, as determined by the Engineer.

Item 32d – Bid Alternate No.4 – Silver Street Parking Lot Rehabilitation

1. Under the lump sum price for this Item, the Contractor shall provide all labor, equipment, tools and materials necessary to complete the Silver Street Parking Lot Rehabilitation as Specified and shown in the Drawings and Details. The Work shall include the cutting, removal, and legal disposal of existing pavement within the Parking Lot Area and placement 4 inches of bituminous concrete pavement over 12 inches of processed gravel subbase (Approximately 835 square yards). The Work shall include wetting and compacting the subgrade and/or base course, blading, shaping, rough grading, fine grading, sweeping, watering and providing dust control, and hauling and disposal of excess material off site. Also included for payment under Item 32d are the services, labor, equipment, and materials required to replace pavement markings

and/or adjust existing valve, gas and service boxes, castings and structures, not included for payment elsewhere, where required. The work shall also include restoration of all areas disturbed by the Contractor's operations that are not included for payment under another Bid Item, daily and final site cleanup, and all other incidental Work relative thereto.

2. Payment for this lump sum Item will be based on a percentage of the work completed, as determined by the Engineer.

Item 32e – Bid Alternate No.5 – Winter Street Cobblestone Restoration

1. Under the lump sum price for this Item, the Contractor shall provide all labor, equipment, tools and materials necessary to complete the Winter Street Cobblestone Restoration as Specified and shown in the Drawings. The Work shall include the installation of approximately 510 square yards of cobblestone roadway (As Described under Item 24i) on Winter Street. The work shall also include restoration of all areas disturbed by the Contractor's operations that are not included for payment under another Bid Item, daily and final site cleanup, and all other incidental Work relative thereto.

2. Payment for this lump sum Item will be based on a percentage of the work completed, as determined by the Engineer.

END OF SECTION 01024

SECTION 01040

PROJECT COORDINATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplemental Conditions, Division 0 and Division 1 Specification Sections, apply to this section.

1.2 SUMMARY OF WORK

A. This section specifies administrative and supervisory requirements necessary for Project Coordination including, but not necessarily limited to:

1. Coordination of all workers, subcontractors, utilities, and others with direct involvement in the Work.

2. Coordination of all administrative and supervisory personnel for proper control of the Work.

3. General installation provisions.

4. Cleaning and protection.

B. Progress meetings and preconstruction conferences are included in Section 01200 – Project Meetings.

C. Requirements for the Contractor's Construction Schedule are included in Section 01300 – Submittals and Section 01311 – Construction Progress Schedules.

D. Related Sections include the following:

1. Division 0 – Bidding and Contract Requirements

2. Division 1 – General Requirements

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 GENERAL INSTALLATION PROVISIONS

A. Inspection of Conditions: Inspect the conditions under which Work is to be performed. Do not proceed until unsatisfactory conditions have been corrected in an acceptable manner, and at no additional cost to the Owner.

B. Manufacturer's Written Instructions: Comply with manufacturer's written installation instructions and recommendations, to the extent that those instructions and recommendations are more explicit or stringent than requirements contained in the Contract Documents.

C. Inspect materials or equipment immediately upon delivery and again prior to installation. Reject damaged and defective items at no additional cost to the Owner.

D. Provide attachment and connection devices and methods for securing Work. Secure Work true to line and level. Allow for expansion and utility movement.

E. Re-check measurements and dimensions before starting installation or erection.

F. Install each component during weather conditions and Project status that will ensure the best possible results. Isolate each part of the completed construction from incompatible material to prevent deterioration.

G. Coordinate temporary enclosures with required inspections and tests, to minimize the necessity of uncovering completed construction for that purpose.

3.2 CLEANING AND PROTECTION

A. During handling and installation, clean and protect construction in progress and adjoining materials in place. Install protective covering to ensure protection from damage or deterioration.

B. Clean and maintain completed construction as frequently as necessary through the remainder of the construction period.

C. Contractor shall be required to sweep public and private roadways and sidewalks to remove all materials related to project activities. The frequency of sweeping shall be based on the condition of the affected roadway.

D. Limiting Exposures: Supervise construction activities to ensure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period. Where applicable, such exposures include, but are not limited to, the following:

3. Excessive static or dynamic loading.

4. Excessive internal or external pressures.

5. Excessively high or low temperatures.

6. Air contamination or pollution.

7. Water or ice.

8. Solvents.

9. Chemicals.

10. Heavy traffic.

9. Misalignment.

10. Unprotected storage.

11. Improper shipping or handling.

12. Theft.

13. Vandalism.

3.3 CONTRACT CLOSEOUT

A. Provide in accordance with Section 01700 – Contract Closeout

END OF SECTION 01040

SECTION 01046

CONTROL OF WORK

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplemental Conditions, Division 0 and Division 1 Specification Sections, apply to this section.

1.2 EQUIPMENT

A. Furnish equipment which will be efficient, appropriate and large enough to secure a satisfactory quality of work and a rate of progress which will ensure the completion of the Work within the Contract Time. If at any time such equipment appears to the Engineer to be inefficient, inappropriate or insufficient for securing the quality of work required or for producing the rate of progress aforesaid, he/she may order the Contractor to increase the efficiency, change the character or increase the plant equipment and the Contractor shall conform to such order. Failure of the Engineer to give such order shall in no way relieve the Contractor of his/her obligations to secure the quality of the work and rate of progress required.

1.3 PRIVATE LAND

A. The Contractor shall not (except after written consent from the proper parties) enter or occupy with men, tools, materials, or equipment any land outside the rights-of-way, legal easement, or property of the Owner.

1.4 HAULING, HANDLING, AND STORAGE OF MATERIALS

A. The Contractor shall, at his/her own expense, handle and haul all materials furnished by him and shall remove any and all of his surplus materials at the completion of the Work in accordance with Section 02080. The Contractor shall provide suitable and adequate storage for equipment and materials furnished by him/her that are liable to damage, and shall be responsible for any loss or damage to any equipment or materials by theft, breakage, or otherwise. The Contractor shall be responsible for all damages to the Work under construction during its progress and until final completion and acceptance, even though partial payments have been made under the Contract.

1.5 PROTECTION AND RELOCATION OF EXISTING STRUCTURES AND UTILITIES

A. The Contractor shall assume full responsibility for the protection of all buildings, structures, and utilities, public or private, including poles, fences, guardrails, signs, services to buildings, utilities in the street, gas pipes, water pipes, hydrants, sewers, drains, and electric and telephone cables, whether or not they are shown on the Drawings. The Contractor shall carefully support and protect all such structures and

utilities from damage of any kind. The Contractor is required to comply with all provisions of General Laws Chapter 353, entitled "Excavations-Public Ways-Notice Requirements", otherwise known as DIGSAFE. Any damage resulting from the Contractor's operations shall be repaired by him/her at no additional cost to the Owner.

B. Assistance will be given to the Contractor in determining the location of existing services. The Contractor, however, shall bear full responsibility for obtaining all locations of underground structures and utilities (including, but not limited to existing water services, drain lines, sewers, gas lines and duct banks). Services to buildings shall be maintained, and all costs or charges resulting from damage thereto shall be paid by the Contractor.

C. Protection and temporary removal and replacement of existing utilities and structures, as described in this Section, shall be a part of the work under the Contract, and all costs in connection therewith shall be included in the unit prices established in the Contract.

D. If, in the opinion of the Engineer, permanent relocation of a utility owned by the Owner is required, which is not shown on the Plans or the Specifications, he/she may direct the Contractor, in writing, to perform the work. Work so ordered will be paid for as extra work under Articles of the Standard General Conditions. If relocation of a privately-owned utility is required, the Owner will notify the utility to perform the work as expeditiously as possible. The Contractor shall fully cooperate with the Owner and utility, and shall have no claim for delay due to such relocation. The Contractor shall notify public utility companies, in writing, at least 72 hours (excluding Saturdays, Sundays, and legal holidays) before excavating in any public way.

1.6 SEWER SYSTEM AND SERVICE INTERRUPTION

A. It is essential to the operation of the existing sewerage system that there is no interruption in the flow of sewage. To this end, the Contractor shall at his own expense, provide, maintain, and operate all temporary facilities such as dams, pumping equipment, conduits, and all other labor and equipment necessary to intercept the sewage flow before it reaches the points where it would interfere with his work, carry it past his work, and return it to the existing sewer below his work. Refer to Section 02538.

1.7 PIPE LOCATIONS

A. Pipelines shall be located substantially as indicated on the Drawings, but the Engineer reserves the right to make such modifications in locations as may be found desirable to avoid interference with existing structures or for other reasons. Where fittings are noted on the Drawings, such notation is for the Contractor's convenience and does not relieve him/her from laying and joining different or additional items where required.

1.8 OPEN EXCAVATIONS

A. All open excavations shall be adequately safeguarded by providing temporary barricades, caution signs, lights and other means to prevent accidents to persons and

damage to property. The Contractor shall, at his/her own expense, provide suitable and safe bridges and other crossings for accommodating travel by pedestrians and workmen. Bridges provided for access during construction shall be removed when no longer required. The length or size of excavation will be controlled by the particular surrounding conditions, but shall always be confined to the limits prescribed by the Engineer. If the excavation becomes a hazard, or if it excessively restricts traffic at any point, the Engineer may require special construction procedures such as limiting the length of the open trench, prohibiting stacking excavated material in the street. Trenches shall not remain open overnight unless authorized by the Owner.

B. The Contractor shall take precautions to prevent damage to the public due to open trenches. All trenches, excavated material, equipment, or other obstacles which could be dangerous to the public shall be well lighted at night.

1.9 TEST PITS/EXPLORATORY EXCAVATION

A. Test pits for the purpose of locating underground pipeline or structures in advance of the construction shall be excavated and backfilled by the Contractor at the direction and approval of the Engineer. Test pits shall be backfilled and compacted immediately after their purpose has been satisfied and the surface restored and maintained in a manner satisfactory to the Engineer. Test pits as indicted on the Drawings are included in Table 1 below:

Table 1: Test Pit Locations

Test Pit No.	Test Pit Location Description	Test Pit Purpose
1	Outside of SSPS on Sea Street	Confirm location and elevation of existing 20”(DI)FM
2	Sea Street and N.Water Street	Confirm location and elevation of existing 20”(DI)FM
3	Near Step Lane and Centre Street	Confirm elevation of existing 6”(VC)S
4	Lily Street and Centre Street	Confirm presence of SMH
5	Lily Street and Lily Pond Road	Confirm depth and size of existing low pressure sewer and elevation of existing 12”(VC)S
6	#22 Lily Street	Confirm elevation of existing 12”(VC)S
7	Liberty Street and Brocks Court	Confirm location and elevation of existing 18”(VCP)D
8	#3/#7 Winter Street	Confirm location of existing 12”(PVC)D
9	Near Winter Street and Main Street	Confirm presence of electrical/telephone ducts
10	Near Pine Street and Main Street	Confirm roadway base and presence of cobblestones
11	#11 Pine Street	Confirm roadway base and presence of

Test Pit No.	Test Pit Location Description	Test Pit Purpose
		cobblestones
12	#25A Pine Street	Confirm depth and elevation of existing 6”(VCP)S
13	#31 Pine Street	Confirm roadway base and presence of cobblestones
14	Pine Street and Silver Street	Confirm roadway base and presence of cobblestones
15	Atlantic Street and Pleasant Street	Confirm depth of existing 6”S
16	#5 Atlantic Avenue	Confirm elevation of existing 6”(VCP)S
17	Atlantic Avenue and S. Prospect Street	Confirm elevation of existing 8”(PVC)S
18	Surfside Road and Vesper Lane	Confirm location of existing 20”(DI)FM
19	#19 Surfside Road	Confirm location of existing 20”(DI)FM
20	#23 Surfside Road	Confirm location of existing 20”(DI)FM
21	#33 Surfside Road	Confirm location of existing 20”(DI)FM
22	#35 Surfside Road	Confirm elevation of existing 8”(PVC)W
23	Surfside Road and Maclean Lane	Confirm location of existing 20”(DI)FM and elevation of existing 8”(PVC)W
24	Surfside Road and Bartlett Road	Confirm location of existing 20”(DI)FM and elevation of existing 8”(PVC)W
25	#36 Surfside Road	Confirm location of existing 20”(DI)FM
26	#44 Surfside Road	Confirm location of existing 20”(DI)FM
27	#48 Surfside Road	Confirm location of existing 20”(DI)FM
28	#52R Surfside Road	Confirm location of existing 20”(DI)FM
29	#65 Surfside Road	Confirm location of existing 20”(DI)FM
30	#70 Surfside Road	Confirm location and elevation of existing 20”(DI)FM
31	#76 Surfside Road	Confirm location and elevation of existing 20”(DI)FM
32	Surfside Road and Miacomet Road	Confirm elevation of existing 8”(PVC)W
33	#92 Surfside Road	Confirm location and elevation of existing 4”(PVC)S
34	#94 Surfside Road	Confirm location and elevation of existing 4”(PVC)S
35	#94 Surfside Road	Confirm end point of existing 4”(PVC)S
36	Surfside Road and Hooper Farm Road	Confirm location and elevation of existing 20”(DI)FM and 16”(PE)FM
37	Surfside Road and S. Shore Road	Confirm elevation of existing 12”(DI)W
38	S. Shore Road and Nanina Drive	Confirm location and elevation of existing 6”(PVC)FM
39	#6 S. Shore Road	Confirm location and elevation of existing 6”(PVC)FM and unknown size sewer
40	S. Shore Road and Wherowhero Lane	Confirm location and elevation of existing 6”(PVC)FM
41	S. Shore Road and Sherburne Commons	Confirm location and elevation of existing

Test Pit No.	Test Pit Location Description	Test Pit Purpose
		6”(PVC)FM
42	#29A S. Shore Road	Confirm elevation of existing 12”(DI)W
43	S. Shore Road and Zachary Way	Confirm elevation of existing 12”(DI)W
44	Near SSWWTF on S. Shore Road	Confirm location and elevation of existing 20”(DI)FM

1.10 MAINTENANCE OF TRAFFIC

A. Unless permission to close a street is received in writing from the proper authority, all excavated material shall be placed so that vehicular and pedestrian traffic may be maintained at all times. If the Contractor's operations cause traffic hazards, he/she shall repair the road surface, provide temporary ways, erect wheel guards or fences, or take other measures for safety satisfactory to the Engineer.

B. Detours around construction will be subject to the approval of the Owner and the Engineer. Where detours are permitted, the Contractor shall provide all necessary barricades and signs as required to divert the flow of traffic. While traffic is detoured, the Contractor shall expedite construction operations and periods when traffic is being detoured will be strictly controlled by the Owner.

C. The Contractor shall take precautions to prevent damage to the public due to open trenches. Night watchmen may be required where special hazards exist, or police protection provided for traffic while work is in progress. The Contractor shall be fully responsible for damage or injuries whether or not police protection has been provided.

D. When, in the opinion of the Police Department, public safety requires the services of police, the Safety Officer may direct the Contractor to provide manpower to direct traffic within the location of work under this Contract.

E. The intent is to ensure public safety by police direction of traffic. Police are not to serve as watchmen to protect the Contractor's equipment and materials, or to warn pedestrians of such hazards as open trenches.

F. Nothing contained herein shall be construed as relieving the Contractor of any of his/her responsibilities for protection of persons and property under the terms of the Contract.

G. It is the intent of this Contract that traffic be maintained at all times in the areas of construction. The Contractor may be required to halt operations and/or transport material to areas beyond immediate work locations in order to minimize traffic disruptions. Access to the Site by emergency vehicles, school buses and residents shall be maintained at all times.

H. The Contractor shall be responsible for providing the Owner with notifications regarding detours or road closures. The Owner will provide property owners with written notification of proposed construction which may require detours or road closures.

1.11 PROTECTION OF CONSTRUCTION AND EQUIPMENT

A. All newly-constructed Work shall be carefully protected from damage in any way. No placing of heavy loads on it shall be allowed, and all portions damaged shall be reconstructed by the Contractor at his/her own expense.

B. All structures shall be protected in a manner approved by the Engineer. All such damaged portions of the Work shall be completely repaired and made good by the Contractor, at his own expense, and to the satisfaction of the Engineer.

C. If, in the final inspection of the Work, any defects, faults, or omissions are found, the Contractor shall cause the same to be repaired or removed and replaced by proper materials and workmanship, without extra compensation for the materials and labor required. Further, the Contractor shall be fully responsible for the satisfactory maintenance and repair of the construction, and other Work undertaken herein, for at least the guarantee period described in the Contract Documents.

D. The Contractor shall take all necessary precautions to prevent damage to any Work during and after construction, and until such Work is accepted and taken over by the Owner.

1.12 CARE AND PROTECTION OF PROPERTY AND SURVEY MONUMENTS

A. The Contractor shall be responsible for the preservation of all public and private property, and shall use every precaution necessary to prevent damage thereto. If any direct or indirect damage is done to public or private property, by or on account of any act, omission, neglect, or misconduct in the execution of the Work on the part of the Contractor, such property shall be restored by the Contractor, at his/her expense, to a condition similar or equal to that existing before the damage was done, or he/she shall make good the damage in another manner acceptable to the Engineer.

B. Along the location of this Work, all fences, walks, bushes, trees, shrubbery, and other physical features shall be protected and restored in a thoroughly workmanlike manner. Fences and other features removed by the Contractor shall be replaced in the location indicated on the Drawings as soon as conditions permit. All grass areas beyond the limits of construction, which have been damaged by the Contractor, shall be graded and seeded at the Contractor's expense.

C. Trees close to the Work shall be protected against damage. The Contractor shall trim all branches that are liable to be damaged because of his operations, but in no case shall any trees be cut or removed without prior notification of the Owner or other person in charge. All injuries to bark, trunk, limbs, and roots of trees shall be repaired by dressing, cutting, and painting according to approved methods using only approved tools and materials. All tree trimming and removal must be approved by the Town of Nantucket Department of Public Works.

D. The protection, removal, and replacement of existing physical features along the line of Work shall be a part of the Work under the Contract, and all costs in connection therewith shall be included in the Bid Proposal. The Contractor is responsible for protecting and, if required, re-setting survey monuments (bounds). If a bound is in the way of required excavation, the Contractor will notify the Engineer/Inspector and/or the Town of Nantucket Department of Public Works with as much notice as possible prior to performing excavation near the bound.

1.13 REJECTED MATERIALS AND DEFECTIVE WORK

A. Materials furnished by the Contractor and condemned by the Engineer as unsuitable or not in conformity with the Specifications shall forthwith be removed from the Work by the Contractor, and shall not be made use of elsewhere in the Work. Any errors, defects, or omissions in the execution of the Work or in the materials furnished by the Contractor, even though they may have been passed or overlooked or have appeared after the completion of the Work, discovered at any time before the final payment is made hereunder, shall be forthwith rectified and made good by and at the expense of the Contractor, and in a manner satisfactory to the Engineer. The Contractor shall reimburse the Owner for any expenses, losses, or damages incurred in consequence of any defect, error, omission, or act of the Contractor or his employees, as determined by the Engineer, occurring previous to the final payment.

1.14 COORDINATION WITH LOCAL AGENCIES

A. The project is partially located within the Nantucket Historic District. Should a situation of historical concern arise, the Contractor shall immediately notify the Engineer. Questions or information regarding historic issues shall be directed to:

Holly Backus, Preservation Planner (Phone: (508) 325-7587 x 7026)

B. The Contractor shall attend a Pre-Construction Meeting to be held at a location to be decided by the Owner approximately one week prior to start of Work. The Contractor will provide the proposed schedule at that time (see Submittals, Section 01300).

C. The Contractor shall attend a Site Meeting with the Town of Nantucket Conservation Agent after installation of environmental protection measures (see Sections 01110 and 02020) to review the placement of the protection measures, proposed work within wetland resource areas, and the Order of Conditions (see Appendix C).

D. The Contractor will immediately notify the utility owner of any utility main breaks.

E. The Contractor will be required to reimburse the Owner for the actual cost of the services of Department Personnel required during other than regular working hours. This includes the cost of the Engineer / Site Inspectors when inspection is required outside the normal business hours. This cost shall be at the rate of time and one-half

of the Inspector's pay rate, to be paid to the Owner in the form of contract credit by the Contractor.

F. The Engineer will have the authority to reject any Work or materials that do not constitute approval by the Owner and shall not relieve the Contractor of his obligations to perform the Work in accordance with the Plans and Specifications.

G. The Contractor shall maintain pavement as specified in Section 02576 and shall provide the Owner with contact information at which he/she can be contacted when he/she is not at the Site. Upon notification by the Owner or the Engineer the Contractor shall promptly make repairs to the construction Site as may be necessary.

1.15 WATER FOR CONSTRUCTION PURPOSES

A. The Contractor shall furnish all water required for and in connection with Work to be done under this Contract including but not limited to: water for cleaning and testing all pipelines, manholes and structures; temporary potable water; sanitation and toilet facilities, and disinfection.

B. The Contractor shall coordinate with the Nantucket Department of Public Works before any public water is used for construction purposes. The Contractor will be responsible for all associated fees and charges for water use and compliance with conditions and/or restrictions associated with the use of public water from the Nantucket Department of Public Works.

C. No separate measurement and payment shall be made for temporary water and all costs shall be incidental to and included with each applicable item.

1.16 MAINTENANCE OF FLOW

A. The Contractor shall maintain the flow in sewers, drains and all watercourses, whether open channels or in pipes, in all other pipes interfered with in the line of Work and convey the flow to a suitable point of discharge so as not to flow upon the Work or create a nuisance. In the discharge of water removed from the excavations by pumping or by gravity similar precautions shall be observed.

1.17 COOPERATION WITHIN THIS CONTRACT

A. All firms or persons authorized to perform any Work under this Contract shall cooperate with Contractor and his/her subcontractors or trades and shall assist in incorporating the Work of other trades where necessary or required.

B. Cutting and patching, drilling and fitting shall be carried out where required by the trade or subcontractor having jurisdiction, unless otherwise indicated herein or directed by the Engineer.

1.18 CLEANUP AND DISPOSAL OF EXCESS MATERIAL

A. All material disposal is subject to Specification Section 02080.

B. During the course of the Work, the Contractor shall keep the Site of his/her operations in as clean and neat a condition as is possible. He/she shall dispose of all residues resulting from the construction Work and, at the conclusion of the Work; he/she shall remove and haul away any surplus excavation, broken pavement, lumber, equipment, temporary structures and any other refuse remaining from the construction operations and shall leave the entire Site of the Work in a neat and orderly condition.

C. In order to prevent environmental pollution arising from the construction activities related to the performance of this Contract, the Contractor and his/her subcontractors shall comply with all applicable Federal, State and local laws and regulations concerning waste material disposal, as well as the specific requirements stated in this Section and elsewhere in the Specifications.

D. The Contractor is advised that the disposal of excess excavated material in wetlands, stream corridors and plains is strictly prohibited even if the permission of the property owner is obtained. Any violation of this restriction by the Contractor or any person employed by him, will be brought to the immediate attention of the responsible regulatory agencies, with a request that appropriate action be taken against the offending parties. Therefore, the Contractor will be required to remove the fill at his/her own expense and restore the area impacted.

E. Outdoor burning of rubbish and waste material on the Site will not be permitted.

F. Disposal of volatile fluid wastes (such as mineral spirits, oil, gasoline, or paint thinner) in storm or sanitary sewer systems or into streams or waterways is not permitted.

G. The Contractor shall restore or replace, when and as directed, any public or private property damaged by his Work, equipment, or employees, to a condition at least equal to that existing immediately prior to the beginning of operations. To this end the Contractor shall do as required all necessary highway or driveway, walk, and landscaping Work. Suitable materials, equipment, and methods shall be used for such restoration. The restoration of existing property or structures shall be done as promptly as practicable as Work progresses and shall not be left until the end of the Contract period.

1.19 INTERRUPTION OF WATER OR SEWER SERVICE

A. The Contractor shall plan his Work and shall follow a procedure so as not to inconvenience the general public.

B. All affected customers shall be notified with a minimum of 72 hours' notice prior to interruption of water or sewer service. Notification shall be performed by the Owner or the Owner's representative. Contractor shall notify the Owner a minimum of 24 hours in advance of the 72-hr interruption notice period.

C. A list of all recipients of notices will be provided to the Department of Public Works immediately.

D. Failure to comply with notification requirements may result in temporary termination of Work until such time that notification is issued.

E. The 72 hour notice requirement is for planned interruptions. Unplanned interruptions require immediate notification of the Nantucket Department of Public Works. Unplanned interruptions are those that could not possibly have been foreseen. Interruptions such as failure of an isolation valve to provide a tight seal when there are personnel such as the Engineer or other Department staff who could provide information as to the reliability of a valve are considered interruptions that should be planned.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION 01046

SECTION 01050

FIELD ENGINEERING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplemental Conditions, Division 0 and Division 1 Specification Sections, apply to this section.

1.2 SUMMARY OF WORK

A. The work covered under this Section of the Specifications includes the following:

1. Examination of Site and conditions of construction.

2. Pre-Construction Photographs of all public and private property within the limits of work on Sea Street, Step Lane, Centre Street, Lily Street, Liberty Street, Winter Street, Pine Street, Silver Street, Pleasant Street, Atlantic Avenue, Surfside Road and South Shore Road.

3. Establishment of lines, grades, and easements.

4. Connections to existing facilities.

5. Restoration and protection of public and private property.

B. Related Sections include the following:

1. Division 0 – Bidding and Contract Requirements

2. Division 1 – General Requirements

1.3 SUBMITTALS

A. Shop Drawings: Submit the following in accordance with Section 01300 - Submittals:

1. Pre-Construction Photographs and Video to record the conditions of all buildings, utilities, and appurtenances prior to construction that includes the following:

a. Submit separate report for each property within the limit of work. Each report shall include location and description of the site; results of visual inspection; color photographs; and sketches as required. Points where deterioration has occurred shall be noted and color

photographs taken to show the deterioration or other deficiencies. The absence of deficiencies shall also be recorded.

b. The Contractor shall request private owners to sign the report before final submission to the Engineer. If the owner refuses to sign the report, the Contractor shall so notify the Engineer.

d. A video survey taken while walking along the Sea Street Pump Station Force Main No.3 Alignment on Sea Street, Step Lane, Centre Street, Lily Street, Liberty Street, Winter Street, Pine Street, Silver Street, Pleasant Street, Atlantic Avenue, Surfside Road and South Shore Road.

d. Two copies of the pre-construction photographs, video, and reports shall be submitted to the Engineer for review and approval.

e. Incorporate additional information and revisions required by Engineer and resubmit report.

f. Photographs and videos shall be submitted to the engineer electronically. Photographs, which, in the opinion of the Engineer, are unsatisfactory, shall be retaken by the Contractor at no additional cost to the Owner. Each photograph shall be labeled with an identification number for reference and a legible description indicating name of project, title of contract, number of contract, building or structure, owner, date taken, location identification, description data, Contractor's name, and Owner.

g. Four copies of each approved report shall be made: two copies (one of which is the original submittal) for the Engineer, one copy shall be provided to the building owner, and one shall be retained by the Contractor.

2. Post construction record Drawings shall be provided by the Contractor.

3. The Contractor shall submit the record drawing as an AutoCAD drawing file, meeting the Town of Nantucket's AutoCAD specifications and as a PDF document.

1.4 QUALITY ASSURANCE

A. Provide in accordance with Section 01400 – Quality Assurance

1.5 DELIVERY, STORAGE, AND HANDLING

A. Provide in accordance with Section 01610 – Delivery, Storage, and Handling

1.6 COORDINATION

A. Provide in accordance with Section 01040 – Project Coordination

1.7 PROJECT/SITE CONDITIONS

A. Environmental Requirements:

1. Unfavorable Construction Conditions:

a. During unfavorable weather, wet grounds, or other unsuitable construction conditions, confine operations to Work which will not be affected adversely by such conditions.

b. No portion of Work shall be constructed under conditions which adversely affect quality or efficiency thereof, unless special means or precautions are taken to perform Work in a manner acceptable to the Engineer.

B. Field Measurements:

1. Lines and Grades:

a. All Work shall be done to lines, grades, and elevations indicated on Drawings or specified herein.

b. Elevations shown refer to the North American Vertical Datum of 1988 (NAVD88). The Horizontal coordinates, in feet, are based upon the North American Datum of 1983 (NAD 83). The Contractor shall be responsible for maintaining or subsequently replacing these controls to the satisfaction of the Engineer if these controls are disturbed. The Contractor shall be responsible for verifying all vertical control information that is used.

i. Points shall be used as datum for Work.

ii. Contractor shall be responsible for transferring all lines and grades from basic survey control points.

c. Contractor to perform all additional survey, layout, and measurement Work.

i. The Contractor shall provide survey Work by a firm having successfully completed at least two projects of similar size and complexity within the last five years, and who shall

employ experienced personnel and provide adequate supervision to satisfaction of the Engineer at all times when operations are in progress.

ii. Surveyor shall be a registered land surveyor (RLS) in the State of Massachusetts.

d. Keep the Engineer informed, in writing, two weeks in advance, of times and places at which Work is to be performed, so that horizontal and vertical control points may be established and any checking deemed necessary by the Engineer may be performed.

e. Remove and reconstruct Work which is improperly located as determined by the Engineer and at no additional cost to the Owner.

2. Easements and Rights-of-Way:

a. Easements and rights-of-way for utilities, if required, will be provided by the Owner.

b. All easements must be clearly delineated in the field by the Contractor.

c. Confine construction operations within limits indicated on Drawings and/or within limits of easements or public ways.

d. Place construction tools, equipment, excavated materials, and pipeline materials and supplies, so as to cause least possible damage to property and interference with traffic.

3. Erosion Control Layout

a. Erosion control lines shall be staked out for inspection and approval by the Engineer and Town of Nantucket Conservation Agent prior to the installation of erosion controls and environmental protections.

b. Erosion control lines shall be laid out as indicated on the drawings and shall establish the limits of work within the roadway.

4. Access

a. Obtain the necessary permission from the property owners or tenants as may be required for entry onto private property.

b. If unable, after repeated reasonable attempts, to obtain permission from owners or tenants to enter the properties, immediately notify the Engineer.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Use new materials in restoration of existing facilities except where soil materials and plants may be reused as appropriate, and as approved by the Engineer.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examination of Site and Verification of Conditions:

1. Before starting operations, examine Site to become acquainted with conditions to be encountered.

2. Verify exact locations of sewers, water mains, gas mains, above or below ground electrical wires, other utilities, conduits and structures which may interfere with Work.

3. Verify and stake-out exact locations of the proposed Work.

4. The Contractor shall make videotape recordings of all features within the proposed construction limits of work in digital format prior to construction to document the areas for restoration.

5. The Contractor shall report immediately to the Engineer any finding that, in their opinion, may indicate that the required construction will adversely affect any building or structure. Excavation and support of excavation operations shall not proceed until written instruction is received from the Engineer.

3.2 APPLICATION

A. Site Layout: Prior to any construction activities at the Site, the Contractor shall establish control points shown on the Project Drawings and coordinate this Work with the Engineer. The Contractor shall use the information on the Drawings, where available, and shall supplement this with any necessary file searches to provide the necessary information to perform a complete line survey around the entire limits of the Work area. The Contractor shall also establish permanent vertical benchmarks within the limit of Work, as noted on the Drawings.

B. Connections to Existing Facilities:

1. Make connections to existing facilities as indicated on Drawings or as specified.

2. Obtain permission from specific utility owners in writing prior to undertaking

connections.

a. Protect facilities against deleterious substances and damage.

3. Plan in advance all connections to existing facilities which are in service.

a. All equipment, materials, and labor shall be on hand at time of undertaking connections to existing facilities in service.

b. Work shall proceed continuously if necessary to complete connections within the time designated by the Engineer.

c. Existing water distribution systems to be connected to shall not be taken out of service during periods of high demand; coordinate any disruptions to service with the Owner.

C. Restoration and Protection of Public and Private Property:

1. Protect, shore, brace, support, and maintain all underground pipes, conduits, drains, and other underground construction uncovered or otherwise affected by construction operations.

2. Restore all public and private property including pavement, surfacing, curbs, walks, utility poles, guy wires, fences, and other surface structures affected by construction operations, together with all loam and seed and landscaping to their original condition or better, whether within or outside easements.

3.3 CONTRACT CLOSEOUT

A. Provide in accordance with Section 01700 - Contract Closeout.

END OF SECTION 01050

SECTION 01063

MISCELLANEOUS REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplemental Conditions, Division 0 and Division 1 Specification Sections, apply to this section.

1.2 SUMMARY

A. The Contractor shall conform to all miscellaneous requirements as herein specified.

B. Related Sections include the following:

1. Division 0 – Bidding and Contract Requirements

2. Division 1 – General Requirements

1.3 INTERFERENCE WITH EXISTING WORKS

A. The Contractor shall at all times conduct his operations so as not to interfere with existing works. The Contractor shall develop a program, in cooperation with the Engineer and Owner, which shall provide for the construction and putting into service of the new works in the most orderly manner possible. This program shall be adhered to except as deviations therefrom are expressly permitted. All work of connecting with, cutting into, and reconstructing existing pipes or structures shall be planned to interfere with the operation of the existing facilities for the shortest possible time when the demands on the facilities best permit such interference, even though it may be necessary to work outside of normal working hours to meet these requirements. Before starting work which will interfere with the operation of existing facilities, the Contractor shall do all possible preparatory work and shall see that all tools, materials, and equipment are made ready and at hand. The Contractor shall make such minor modifications in the work relating to existing structures as may be necessary, without additional compensation.

B. The Contractor shall have no claim for additional compensation by reason of delay or inconvenience in adapting his operations to meet the above requirements.

C. The Contractor shall have no claim for additional compensation by reason of delay or inconvenience in adapting his operations to the need for continuous flow of sewage.

1.4 HYDRAULIC UPLIFT OF STRUCTURES

A. The Contractor shall be responsible for the protection of all structures against hydraulic uplift until such structures have been accepted finally by the Owner.

1.5 SAFETY PRECAUTIONS

A. The Contractor's attention is directed to the potential hazards involved in performing work on the sewer system due to the presence of sewer gasses which can become explosive when mixed with air. The Contractor shall be responsible for the utilization of thorough and adequate safety precautions to prevent injury to persons and facilities involved in the work.

1.6 BURIED UTILITY WARNING AND IDENTIFICATION TAPE

A. Provide detectable aluminum foil plastic backed tape or detectable magnetic plastic tape manufactured specifically for warning and identification of buried piping. Tape shall be detectable by an electronic detection instrument. Provide tape in rolls, 3 inches minimum width, color coded for the utility involved with warning and identification imprinted in bold black letters continuously and repeatedly over entire tape length. Warning and identification shall be CAUTION BURIED SEWER PIPING BELOW or similar. Use permanent code and letter coloring unaffected by moisture and other substances contained in trench backfill material. Bury tape with the printed side up at a maximum depth of 12 inches below the top surface of earth or the top surface of the subgrade under pavements.

1.7 WATERTIGHTNESS

A. All structures, pipes, and equipment which are to contain water shall be watertight under all operating conditions for which they are intended. The Contractor shall furnish all labor, materials and equipment and do all work required by the Engineer to make all such parts of the work watertight, or to replace them if in the opinion of the Engineer any leakage is excessive. All such parts of the work filled with water for testing watertightness shall be left filled as ordered by the Engineer.

1.7 WORK HOURS AND SITE ACCESS

A. Except for work conducted between the intersection of Silver Street and Pleasant Street and the intersection of Surfside Road and Miacomet Road, Construction shall be limited to the hours between 7:00 a.m. and 5:00 p.m., Monday through Friday with the exception of observed holidays. Construction work hours for work between the intersection of Silver Street and Pleasant Street and the intersection of Surfside Road and Miacomet Road will be Monday through Friday from 4:00 p.m. to 2:00 a.m. Work outside the above time periods will be permitted only on an emergency basis and only with the approval of the Owner. Requests to work outside of the established work hours shall be submitted in writing to the Engineer at least 72-hours in advance.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION 01063

SECTION 01080

ABBREVIATIONS AND DEFINITIONS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplemental Conditions, Division 0 and Division 1 Specification Sections, apply to this section.

1.2 RELATED SECTIONS

A. Section 01095 – Reference Standards

1.3 ABBREVIATIONS

A. Where any of the following abbreviations are used in the Contract Documents, they shall have the meaning set forth opposite each. Abbreviations for trade associations and standards organizations are listed in section 01095 - Reference Standards.

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 Water Works Association
Fed. Spec.	Federal Specifications issued by the Federal Supply Service of the General Services Administration, Washington, D. C.
125-lb. ANSI or 250 lb. ANSI	American National Standard Institute for Cast-iron 250-lb. ANS Pipe Flanges and Flanged Fittings, Designation B16.1, for the Appropriate class
AWG	American or Brown and Sharpe Wire Gage
NPT	National Pipe Thread
OS&Y	Outside screw and yoke

Stl. WG	U. S. Steel Wire, Washburn and Moen, American Steel and Wire or Roebling Gage
USS Gage	United States Standard Gage
WOG	Water, Oil, Gas
WSP	Working steam pressure
AASHTO	American Association of State Highway and Transportation Officials
ACI	American Concrete Institute
AFBMA	Anti-Friction Bearing Manufacturers Association
AGA	American Gas Association
AGMA	American Gear Manufacturers Association
IEEE	Institute of Electrical and Electronics Engineers, Inc.
AISC	American Institute of Steel Construction
AMCA	Air Moving and Conditioning Association
ANSI	American National Standards Institute
API	American Petroleum Institute
ASCE	American Society of Civil Engineers
ASHRAE	American Society of Heating, Refrigerating and Air Conditioning Engineers
ASME	American Society of Mechanical Engineers
ASTM	American Society for Testing and Materials
AWPA	American Wood-Preservers' Association
AWWA	American Water Works Association
CS	Commercial Standard
IBR	Institute of Boiler and Radiator Manufacturers
IPS	Iron Pipe Size

JIC	Joint Industry Conference Standards
NBS	National Bureau of Standards
NEC	National Electrical Code; latest edition
MUTCD	Manual on Uniform Traffic Control Devices
NEMA	National Electrical Manufacturers Association
NFPA	National Fire Protection Association
SMACNA	Sheet Metal and Air Conditioning Contractors National Association, Inc.
UL	Underwriters' Laboratories

1.4 DEFINITIONS

A. Wherever the words defined in this section or pronouns used in their stead occur in the Contract Documents, they shall have the meanings herein given.

B. General: Basic Contract definitions are included in the Conditions of the Contract.

C. Indicated: The term indicated refers to graphic representations, notes, or schedules on the Drawings, or other Paragraphs or Schedules in the Specifications, and similar requirements in the Contract Documents. Terms such as shown, noted, scheduled, and specified are used to help the reader locate the reference. There is no limitation on location.

D. Directed: Terms such as directed, requested, authorized, selected, approved, required, and permitted mean directed by the Engineer, requested by the Engineer, and similar phrases.

E. Approve: The term approved, when used in conjunction, with the Engineer's action on the Contractor's submittals, applications, and requests, is limited to the Engineer's duties and responsibilities as stated in the Conditions of the Contract.

F. Regulations: The term regulations includes laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, as well as rules, conventions, and agreements within the construction industry that control performance of the Work.

G. Furnish: The term furnish means supply and deliver to the Project Site, ready for unloading, unpacking, assembly, installation, and similar operations.

H. Install: The term install describes operations at the Project Site including the actual unloading, unpacking, assembly, erection, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations.

I. Replace: The term replace means dismantle, remove, and dispose of existing equipment and materials and furnish and install new specified item.

J. Provide: The term provide means to furnish and install, complete and ready for the intended use.

1. The term experienced, when used with the term Installer means having a minimum of five previous projects similar in size and scope to this Project, being familiar with the special requirements indicated, and having complied with requirements of the authority having jurisdiction.

2. Trades: Using terms such as carpentry is not intended to imply that certain construction activities must be performed by accredited or unionized individuals of a corresponding generic name, such as carpenter. It also does not imply that requirements specified apply exclusively to tradespersons of the corresponding generic name.

K. Project Site is the space available to the Contractor for performing construction activities, either exclusively or in conjunction, with others performing other Work as part of the Project. The extent of the Project Site is shown on the Drawings and may or may not be identical with the description of the land on which the Project is to be built.

L. Testing Agencies: A testing agency is an independent entity engaged to perform specific inspections or tests, either at the Project Site or elsewhere, and to report on and, if required, to interpret results of those inspections or tests.

M. Elevation: The figures given on the Drawings or in the other Contract Documents after the word "elevation" or abbreviation of it shall mean the distance in feet above the datum adopted by the Engineer.

N. Rock: The word "rock," wherever used as the name of an excavated material or material to be excavated, shall mean only boulders exceeding 1 cu. yd. in volume, or solid ledge rock which, in the opinion of the Engineer, requires, for its removal, drilling and blasting, wedging, sledging, barring, or breaking up with a power-operated tool.

O. Earth: The word "earth", wherever used as the name of an excavated material or material to be excavated, shall mean all kinds of material other than rock as above defined.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION 01080

SECTION 01095

REFERENCE STANDARDS

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplemental Conditions, Division 0 and Division 1 Specification Sections, apply to this section.

1.2 QUALITY ASSURANCE

A. Should specified reference standards conflict with the Contract Documents, refer to Article 3 of the General Conditions.

1.3 INDUSTRY STANDARDS

A. Applicability of Standards: Except where the Contract Documents include more stringent requirements, applicable construction industry standards have the same force and effect as if bound or copied directly into the Contract Documents to the extent referenced. Such standards are made a part of the Contract Documents by reference.

B. Publication Dates: Comply with the standards in effect as of the date of the Contract Documents.

C. Conflicting Requirements: Where compliance with two or more standards is specified, and where the standards may establish different or conflicting requirements for minimum quantities or quality levels, refer requirements that are different, but apparently equal, and uncertainties to the Engineer for a decision before proceeding.

1. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of the requirements. Refer uncertainties to the Engineer for a decision before proceeding.

D. Copies of Standards: Each entity engaged in construction on the project is required to be familiar with industry standards applicable to its construction activity. Copies of applicable standards are not bound with the Contract Documents.

1. Where copies of standards are needed to perform a required construction activity, the Contractor shall obtain copies directly from the publication source.

E. Abbreviations and Names: Trade association names and titles of general standards are frequently abbreviated. The following acronyms or abbreviations, as referenced in Contract Documents, are defined to mean the associated names. Names and addresses are subject to change and are believed, but not assured, to be accurate and up-to-date as of date of Contract Documents.

ACI
American Concrete Institute
P.O. Box 19150
Detroit, Michigan 48219-0150
Telephone: (313) 532-2600

Al
Asphalt Institute
Research Park Drive
P.O. Box 14052
Lexington, Kentucky 40512-4052
Telephone: (606) 288-4960

ANSI
American National Standards Institute
11 West 42nd Street
13th Floor
New York, New York 10036
Telephone: (212) 642-3300

ASTM
American Society for Testing and Materials
1916 Race Street
Philadelphia, Pennsylvania 19103
Telephone: (215) 299-5400

AWWA
American Water Works Association
6666 West Quincy Avenue
Denver, Colorado 80235
Telephone: (303) 794-7711

MSS
Manufacturers Standardization Society of
the Valve and Fittings Industry
127 Park Street, N.E.
Vienna, Virginia 22180
Telephone: (703) 281-6613

NAPA
National Asphalt Pavement Association
6811 Kenilworth Avenue
Calvert Building
Suite 620
Riverdale, Maryland 20737
Telephone: (301) 779-4880

NFPA National Fire Protection Association
One Batterymarch Park
Quincy, MA 02169
Telephone: (617)- 770-3000

WSC Water Systems Council
600 South Federal Street
Suite 400
Chicago, Illinois 60605
Telephone: (312) 922-6222

F Federal Government Agencies: Names and titles of Federal Government standard- or specification-producing agencies are often abbreviated. The following acronyms or abbreviations referenced in the Contract Documents indicate names of standard- or specification-producing agencies of the Federal Government. Names and addresses are subject to change and are believed, but not assured, to be accurate and up-to-date as of the date of the Contract Documents.

(Material is usually first published in the "Federal Register")
CFR Code of Federal Regulations
(available from the Government Printing Office)
North Capitol Street between G and H Streets, N.W.
Washington, D.C. 20402
Telephone: (202) 783-3238

EPA Environmental Protection Agency
401 M Street, S.W.
Washington, D.C. 20460
Telephone: (202) 382-2090

NIST National Institute of Standards and Technology
(U.S. Department of Commerce)
Gaithersburg, Maryland 20899
Telephone: (301) 975-2000

OSHA Occupational Safety and Health Administration
(U.S. Department of Labor)
Government Printing Office
Washington, D.C. 20402
Telephone: (202) 523-6091

1.4 GOVERNING REGULATIONS AND AUTHORITIES

A. The Engineer has contacted authorities having jurisdiction where necessary to obtain information to prepare Contract Documents. Contact authorities having jurisdiction directly for information and decisions regarding the Work.

Town of Nantucket, Department of Public Works
Telephone: (508) 228-7244

1.5 SUBMITTALS

A. Permits, Licenses, and Certificates: For the Owner's records, submit copies of permits, licenses, certifications, warranties, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, and similar documents, correspondence, and records established in conjunction with compliance with standards and regulations bearing upon performance of the Work.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

END OF SECTION 01095

SECTION 01110

ENVIRONMENTAL PROTECTION MEASURES

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplemental Conditions, Division 0 and Division 1 Specification Sections, apply to this section.

B. Other Specification Sections that directly relate to work of this Section include, but are not limited to:

1. Section 02020 – Erosion and Sediment Control

1.2 SCOPE OF WORK

A. The Work covered by this Section consists of furnishing all labor, materials and equipment and performing all Work required for the prevention of environmental pollution in conformance with applicable laws and regulations, during and as the result of construction operations under this Contract. For the purpose of this Specification, environmental pollution is defined as the presence of chemical, physical, or biological elements or agents which adversely affect human health or welfare; unfavorably alter ecological balances of importance to human life; affect other species of importance to man; or degrade the utility of the environment for aesthetic and/or recreational purposes.

B. The control of environmental pollution requires consideration of air, water and land, and involves management of noise and solid waste, as well as other pollutants.

C. The Contractor shall take sufficient precautions during construction to minimize the run-off of polluting substances such as silt, clay, fuels, oils, bitumens and calcium chloride into the wetland resource areas and surface water bodies located within or adjacent to the limits of work.

D. Schedule and conduct all Work in a manner that will minimize the erosion of soils in the area of the Work. Provide erosion control measures such as diversion channels, sedimentation or filtration systems, berms, staked hay bales, seeding, mulching or other special surface treatments as are required to prevent silting and muddying of streams, rivers, impoundments, lakes, etc. All erosion control measures shall be in place in an area prior to any construction activity in that area.

E. These Specifications are intended to ensure that construction is achieved with a minimum disturbance to the existing ecological balance between a water resource and its surroundings. These are general guidelines. It is the Contractor's responsibility to determine the specific construction techniques to meet these guidelines.

F. All phases of sedimentation and erosion control shall comply with and be subject to the approval of the Massachusetts Department of Environmental Protection.

G. Contractor shall be responsible for maintenance of the erosion control structures and devices, and replacing as needed to maintain the required protection and performance.

H. Contractor shall submit a Construction Period Stormwater Pollution Prevention Plan (SWPPP) for review and approval of the Engineer and Conservation Commission. SWPPP shall be project specific and support filing of Notice of Intent for NPDES Construction General Permit coverage.

I. The Contractor is responsible for preparing and submitting all applicable regulatory construction permits required to perform the work.

1.3 APPLICABLE REGULATIONS

A. Comply with all applicable Federal, State and local laws, regulations, and orders of conditions concerning environmental pollution control and abatement.

1.4 SUBMITTALS

A. The Contractor shall submit the following in accordance with Section 01300 and as specified herein:

1. Construction Period Stormwater Pollution Prevention Plan in accordance with Standard 9 of the Massachusetts Stormwater Handbook for review and approval by the Engineer and Town of Nantucket Conservation Commission.

2. Copy of Notice of Intent and supporting documentation for coverage under the National Pollutant Discharge Elimination System (NPDES) 2012 Construction General Permit submitted to the United States Environmental Protection Agency.

1.5 NOTIFICATIONS

A. The Engineer will notify the Contractor in writing of any non-compliance with the foregoing provisions or of any environmentally objectionable acts and corrective action to be taken. State or local agencies responsible for verification of certain aspects of the environmental protection requirements shall notify the Contractor in writing, through the Engineer, of any non-compliance with State or local requirements. The Contractor shall, after receipt of such notice from the Engineer or from the regulatory agency through the Engineer, immediately take corrective action. Such notice, when delivered to the Contractor or his/her authorized representative at the Site of the Work, shall be deemed sufficient for the purpose. If the Contractor fails or refuses to comply promptly, the Owner may issue an order stopping all or part of the Work until satisfactory corrective action has been taken. No part of the time lost due to any such stop orders shall be made the subject of a claim for extension of time or for excess costs

or damages by the Contractor unless it is later determined that the Contractor was in compliance.

1.6 MEETINGS

A. Following layout of the erosion control line(s), the Contractor shall meet with the Engineer and Conservation Agent to review the location of the proposed erosion control line(s) prior to installation. Contractor shall make any necessary revisions to the erosion control layout and proceed with installation.

B. Following installation of the erosion control line(s) and environmental protection measures, the Contractor shall meet with the Owner, Engineer, and Conservation Agent to review the installation and the Order of Conditions issued for this project.

1.7 IMPLEMENTATION

A. Prior to commencement of the Work, meet with the Engineer to develop mutual understandings relative to compliance with this provision and administration of the environmental pollution control program.

B. Remove temporary environmental control features, when approved by the Engineer, and incorporate permanent control features into the project at the earliest practicable time.

C. The Commission shall be notified of the placement of any and all erosion controls, and work shall not begin before inspection by the Commission.

PART 2 – PRODUCTS

2.1 EROSION CONTROLS

A. Erosion Control barriers as shown on the Drawings to be used for run-off control to protect wetlands and other environmentally protected areas.

B. Silt Sacks to be used where inserted into existing catch basins to prevent siltation of the existing drainage system, as necessary. Silt sacks for catch basin inlet protection shall be ACF Environmental High Flow or equal. Minimum physical properties of the geosynthetic shall be as follows:

Property	Test Method	Units	Test Results
Trapezoid Tear	ASTM D-4533	lbs.	90x71
UV Resistance	ASTM D-4355	%	99.4
AOS	ASTM D-4751	US Sieve	20
Flow Rate	ASTM D-4491	gal/min/sf	100.6
Permittivity	ASTM D-4491	sec^{-1}	4.81

C. Silt fence shall be erected in a continuous fashion from a single roll of fabric such as polypropylene, nylon, polyester, or polyethylene yarn.

D. Where silt fence is required, provide the following woven geotextile fabric for silt fence:

1. GEOTEX 2130 as manufactured by Propex, Chattanooga, TN.

2. Or acceptable equivalent product.

E. The bottom of fabric shall be installed 4-6 inches below the ground.

F. Stakes shall be spaced 6 feet on center on the downstream side of the fabric.

2.2 MATERIALS

A. Physical Properties of Minimum Average Roll of the woven geotextile fabric for silt fence shall be:

	Property	ASTM Test Method	Units	Value
1.	Grab Strength	D4632	lbs [N]	100 [450](min.)
2.	Permissivity	D4491	sec - 1	0.10 (min.)
3.	Apparent Opening Size	D4751	Sieve #	20-30
4.	Ultraviolet Stability	D4355	%	90 (min.)
5.	Filtering Efficiency		%	75 (min.)
6.	Tensile Strength: Standard		lb./linear inch	30 (min.)
7.	Tensile Strength: Extra Strength		lb./linear inch	50 (min.)
8.	Elongation		%	20 (max.)
9.	Slurry Flow Rate		gal/ft2/min	0.3 (min.)

PART 3 – EXECUTION

3.1 INSTALLATION

A. Install sedimentation barriers in all locations as directed, surrounding base of all deposits of stored excavated material outside of disturbed area, and where directed by the Engineer.

B. Install all erosion controls and environmental protection measures in accordance with manufacturer's printed instructions.

C. Overlap silt fence 18 inches minimum for unsewn lap joint. Overlap fabric 6 inches at seam for sewn joint.

D. Stake spacing for silt fences shall be no more than 10 feet apart for extra-strength fabric and 6 feet apart for standard strength fabric.

E. Construct earth berms or diversions to intercept and divert runoff water from critical areas.

F. Protect catch basins and drainage swales from sedimentation by installing inlet protection under catch basin grating casting as shown on the Drawings.

G. Do not place excavated soil material adjacent to water-course in manner that will cause it to wash away by high water or runoff.

H. Prevent damage to vegetation by excessive watering or silt accumulation in the discharge area.

I. Do not dump spoiled material into any streams, wetlands, surface waters, or unspecified locations.

J. Prevent indiscriminate, arbitrary, or capricious operation of equipment in streams, wetlands or surface waters.

K. Do not pump silt-laden water from trenches or excavations into surface waters, streams, wetlands, or natural or man-made channels leading thereto.

L. Prevent damage to vegetation adjacent to or outside of construction area limits.

M. Do not dispose of trees, brush, debris, paints, chemicals, asphalt products, concrete curing compounds, fuels, lubricants, insecticides, washwater from concrete trucks or hydroseeders, or any other pollutant in streams, wetlands, surface waters, or natural or man-made channels leading thereto, or unspecified locations.

N. Do not alter flow line of any stream unless indicated or specified.

O. Clean and dispose of debris from sedimentation barriers on a weekly basis.

P. Upon completion of Work and upon approval of Engineer, remove and legally dispose of sedimentation barriers and environmental protection measures.

Q. A copy of the Order of Conditions shall be kept on-site throughout construction.

R. The Contractor shall maintain oil and hazardous material spill prevention and response equipment on-site at all times.

3.2 PROVISIONS FOR CONTROL OF EROSION

A. Special precautions shall be taken in the use of construction equipment to prevent operations which promote erosion. Erosion control measures, such as siltation basins, hay check dams, mulching, jute netting and other equivalent techniques, shall be used as appropriate. Flow of surface water into excavated areas shall be prevented.

B. Disposal of drainage shall be in an area approved by the Owner. The Contractor shall prevent the flow or seepage of drainage back into the drainage area. Drainage shall not be disposed of until silt and other sedimentary materials have been removed. Particular care shall be taken to prevent the discharge of unsuitable drainage to a water supply or surface water body.

C. As a minimum, the following shall apply:

1. Silt fence and filter sock shall be provided at points where drainage from the Work Site may contain polluting substances. The point of control shall be within the limits of the new construction and shall be contained in such a way as to not allow sediment to pass. Other methods which reduce the sediment content to an equal or greater degree may be used as approved by the Engineer.

2. Drainage leaving the Site shall flow to water courses in such a manner to prevent erosion.

D. Measures for control of erosion must be adequate to assure that turbidity in the receiving water will not be increased more than 10 standard turbidity units (s.t.u.), or as otherwise required by the State or other controlling body, in waters used for public water supply or fish unless limits have been established for the particular water. In surface water used for other purposes, the turbidity must not exceed 25 s.t.u. unless otherwise permitted.

E. An adequate stockpile of erosion control materials shall be on-site at all times for emergency or routine replacement.

3.3 PROTECTION OF STREAMS, WETLANDS, AND SURFACE WATER

A. Care shall be taken to prevent, or reduce to a minimum, any damage to any surface water body from pollution by debris, sediment or other material, or from the manipulation of equipment and/or materials in or near such streams. Water that has been used for washing or processing, or that contains oils or sediments that will reduce the quality of the water in the water body shall not be directly returned to the water body. Such waters will be diverted through a settling basin or filter before being directed into the water bodies.

B. The Contractor shall not discharge water from dewatering operations directly into any live or intermittent stream, channel, wetlands, surface water or any storm sewer. Water from dewatering operations shall be treated by filtration, settling basins, or other approved method to reduce the amount of sediment contained in the water to allowable levels.

C. All preventative measures shall be taken to avoid spillage of petroleum products and other pollutants. In the event of any spillage, prompt remedial action shall be taken in accordance with a contingency action plan approved by the Massachusetts Department of Environmental Protection.

D. Water used to rinse concrete trucks or other equipment shall not be discharged to the wetland resource area, municipal storm sewer, or sanitary sewer.

3.4 PROTECTION OF LAND RESOURCES

A. Land resources within the project boundaries and outside the limits of permanent Work shall be restored to a condition, after completion of construction which appears to be natural and not detract from the appearance of the project. Confine all construction activities to areas shown on the Drawings.

B. Outside of areas requiring earthwork for the construction of the new facilities, the Contractor shall not deface, injure, or destroy trees or shrubs, nor remove or cut them without prior approval. No ropes, cables, or guys shall be fastened to or attached to any existing nearby trees for anchorage unless specifically authorized by the Engineer. Where such special emergency use is permitted, first wrap the trunk with a sufficient thickness of burlap or rags over which softwood cleats shall be tied before any rope, cable, or wire is placed. The Contractor shall in any event be responsible for any damage resulting from such use.

C. Where trees may possibly be defaced, bruised, injured, or otherwise damaged by the Contractor's equipment, dumping or other operations, protect such trees. Monuments and markers shall be protected similarly before beginning operations near them.

D. Any trees or other landscape feature scarred or damaged by the Contractor's equipment or operations shall be restored as nearly as possible to its original condition. The Engineer will decide what method of restoration shall be used and whether damaged trees shall be treated and healed or removed and disposed of.

E. All scars made on trees by equipment, construction operations, or by the removal of limbs larger than 1-in in diameter shall be coated as soon as possible with an approved tree wound dressing. All trimming or pruning shall be performed in an approved manner by experienced workmen with saws or pruning shears. Tree trimming with axes will not be permitted.

F. Climbing ropes shall be used where necessary for safety. Trees that are to remain, either within or outside established clearing limits, that are subsequently damaged by the Contractor and are beyond saving in the opinion of the Engineer and the Tree Warden, shall be immediately removed or replaced.

G. The locations of the Contractor's storage, and other construction buildings, required temporarily in the performance of the Work, shall be cleared portions of the job Site or areas to be cleared as shown on the Drawings and shall require written approval of the Engineer and shall not be within wetlands or floodplains. The preservation of the

landscape shall be an imperative consideration in the selection of all Sites and in the construction of buildings. Drawings showing storage facilities shall be submitted for approval of the Engineer.

H. If the Contractor proposes to construct temporary roads or embankments and excavations for plant and/or Work areas, he/she shall submit the following for approval at least ten days prior to scheduled start of such temporary Work.

1. A layout of all temporary roads, excavations and embankments to be constructed within the Work area.

2. Details of temporary road construction.

3. Drawings and cross sections of proposed embankments and their foundations, including a description of proposed materials.

4. A landscaping drawing showing the proposed restoration of the area. Removal of any trees and shrubs outside the limits of existing clearing area shall be indicated. The drawing shall also indicate location of required guard posts or barriers required to control vehicular traffic passing close to trees and shrubs to be maintained undamaged. The drawing shall provide for the obliteration of construction scars as such and shall provide for a natural appearing final condition of the area. Modification of the Contractor's approved Drawings shall be made only with the written approval of the Engineer. No unauthorized road construction, excavation or embankment construction including disposal areas will be permitted.

I. Remove all signs of temporary construction facilities such as haul roads, Work areas, structures, foundations of temporary structures, stockpiles of excess of waste materials, or any other vestiges of construction as directed by the Engineer. It is anticipated that excavation, filling and plowing of roadways will be required to restore the area to near natural conditions which will permit the growth of vegetation thereon. The disturbed areas shall be prepared and seeded as approved by the Engineer.

J. All debris and excess material will be disposed of outside wetland or floodplain areas in an environmentally sound manner.

3.5 PROTECTION OF AIR QUALITY

A. Burning. The use of burning at the Project Site for the disposal of refuse and debris will not be permitted.

B. Dust Control. The Contractor will be required to maintain all excavations, embankment, stockpiles, access roads, plant sites, waste areas, borrow areas, and all other work areas within or without the project boundaries free from dust which could cause the standards for air pollution to be exceeded, and which would cause a hazard or nuisance to others. Refer to Section 02080.

C. An approved method of stabilization consisting of sprinkling or other similar methods will be permitted to control dust. The use of petroleum products is prohibited. The use of chlorides may be permitted with approval from the Engineer.

D. Sprinkling, to be approved, must be repeated at such intervals as to keep all parts of the disturbed area at least damp at all times, and the Contractor must have sufficient competent equipment on the job to accomplish this if sprinkling is used. Dust control shall be performed as the Work proceeds and whenever a dust nuisance or hazard occurs, as determined by the Engineer.

3.6 MAINTENANCE OF POLLUTION CONTROL FACILITIES DURING CONSTRUCTION

A. During the life of this Contract, maintain all facilities constructed for pollution control as long as the operations creating the particular pollutant are being carried out or until the material concerned has become stabilized to the extent that pollution is no longer being created.

B. Secondary containment shall be provided for all pumps used on the project (e.g. dewatering and sewer bypass).

C. Maintenance, storage, and repair of construction equipment shall not be permitted within the limits of wetland resource area. Contractor shall remove equipment to the temporary staging area or off-site for all maintenance, storage, and repair.

D. Equipment refueling with the exception of pumping systems shall not be permitted within 100 feet of wetland resource areas or surface water bodies.

3.7 NOISE CONTROL

A. The Contractor shall make every effort to minimize noises caused by his/her operations. Equipment shall be equipped with silencers or mufflers designed to operate with the least possible noise in compliance with State and Federal regulations as well as Local Ordinances.

B. Contractor should note local residences within the proximity of the Work and shall make all efforts to minimize noise disruptions.

3.8 CONTRACT CLOSEOUT

A. Provide in accordance with Section 01700.

END OF SECTION 01110

SECTION 01170

SPECIAL PROVISIONS

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplemental Conditions, Division 0 and Division 1 Specification Sections, apply to this section.

1.2 GENERAL OBLIGATIONS OF THE CONTRACTOR

A. General obligations of the Contractor shall be as set forth in the Contract Documents. Unless special payment is specifically provided in the payment paragraphs of the Specifications, all incidental Work and expense in connection with the completion of Work under the Contract will be considered a subsidiary obligation of the Contractor and all such costs shall be included in the appropriate items in the Bid Form in connection with which the costs are incurred.

1.3 SITE INVESTIGATION

A. The Contractor shall satisfy himself/herself as to the conditions existing within the project area, the type of equipment required to perform the Work, the character, quality and quantity of the subsurface materials to be encountered insofar as this information is reasonably ascertainable from an inspection of the Site, as well as from information presented by the Drawings and Specifications. Any failure of the Contractor to acquaint himself/herself with the available information will not relieve him/her from the responsibility for estimating properly the difficulty or cost of successfully performing the Work. The Owner assumes no responsibility for any conclusions or interpretation made by the Contractor on the basis of the information made available by the Owner.

1.4 CONTRACTOR'S EMERGENCY CONTACT AND RESPONSE REQUIREMENT

A. The Contractor will be required to designate a contact person as well as an emergency response crew who can be notified by the Owner and the Engineer during Contract related emergencies, 7 days a week, 24 hours a day throughout the length of this Contract.

B. The name of the designated person, a daytime contact telephone number, an evening contact telephone number, and a portable cellular telephone number must be furnished to the Owner at the pre-construction meeting. The Contractor must also provide a mobile cellular telephone that will remain at the Construction Site during the hours of construction. The phone will be in a location that will allow the Contractor to respond to calls as well as the Owner or Engineer.

C. The contact person shall be required to respond to any Town of Nantucket notification in this regard within one hour of such notice by calling (508) 228-7200 x 7800 (Nantucket Sewer Department) during normal working hours or the Nantucket Police Department (508) 228-1212 after hours. Upon being advised by the Town of Nantucket of the location and nature of the emergency, the Contractor will be required to provide an emergency coordinator or contact at the Site within one hour of the initial notification and to mobilize the necessary response crew(s) and have them at the Site of the emergency within two hours of the initial notification.

D. The Contractor's failure to comply with the above notification and response requirements shall result in a one thousand dollar ($1,000.00) fine. In addition the Contractor shall be liable for any and all damages, liabilities and costs which result from his/her failure to respond to any emergency within the designated time periods. The Town assumes no responsibility or costs for the Contractor's negligence in complying with these requirements. If the subject fine or other liabilities are not paid by the Contractor upon request, it shall be deducted from any payment(s) which may be due the Contractor by the Town, solely at the discretion of the Town.

E. The Contractor shall not use any Owner personnel to fulfill these requirements.

F. This requirement shall be considered an incidental part of the Contract, no matter how many times the Contractor is alerted during this Contract, and no payment will be made for any costs incurred or associated with the emergency contact and response requirements.

G. In the event of a malfunction or break in the sewer main or sewer bypass piping and appurtenances during construction that results in a discharge of sewage to the environment, the Contractor shall notify the Town of Nantucket immediately.

1.5 PUBLIC UTILITIES

A. The Contractor shall comply with the requirements of the Commonwealth of Massachusetts Statute - Chapter 82, Section 40, for excavations in public and private property. Compliance shall include the following:

1. The Contractor shall notify public utility companies in writing at least 72 hours (excluding Saturdays, Sundays and legal holidays) but not more than 30 days before excavating in areas where underground utility plant (pipes, cables, manholes, etc) exist.

2. The Contractor shall be responsible for providing the Utility Companies with a schedule of his/her activities in areas where the utilities exist.

3. The Contractor shall immediately notify utility companies of any damage to their utilities resulting from construction operations.

4. The express approval of the Owner shall be obtained before public water is used. Hydrants shall only be operated under the supervision of the Owner's

personnel. The water is to be metered. A meter must be attained by the Water Department. The Contractor will be responsible for all associated fees and charges for water use.

B. The Contractor shall notify DIGSAFE at least 72 hours before digging, trenching, blasting, demolishing, boring, backfilling, grading, landscaping or other earth moving operations in any public ways, rights of way and easements.

1.6 PERMITS

A. The Contractor shall obtain all necessary permits for proper execution of certain phases of the project. The Contractor shall fill out all forms and furnish all Drawings required to obtain the permits. A copy of the approved permit shall be submitted to the Engineer. All fees associated with these permits shall be paid by the Contractor as part of the project. Work shall not commence on any phase of the Work requiring a permit until the permit is obtained.

B. The Contractor shall obtain the required street opening and trench opening permits from the Nantucket Department of Public Works for excavations within the street or sidewalk area.

1.7 TRAFFIC AT STREET INTERSECTIONS

A. The Contractor shall consult with the Nantucket DPW to determine requirements for signage and officer details.

B. The Contractor shall minimize interferences with the normal flow of traffic. The Contractor shall take all actions ordered by the Engineer to minimize the disruption of normal traffic flow.

C. The Contractor shall note the proximity of the project to local residential areas and all efforts shall be taken to minimize traffic disruptions.

1.8 SEQUENCE OF WORK

A. The Contractor shall submit a sequence of construction for the overall project for the Engineer's review and approval. A suggested sequence of construction is provided within the Drawings.

B. The Work of this Contract requires the removal and replacement of active water mains in the same location. Water service must be maintained at all times while the Work is being performed, though short interruptions will be permitted as noted herein for temporary bypass and permanent system activation and deactivation. The Contractor shall submit to the Engineer for review a bypass plan which details how water service will be maintained. The plan shall incorporate the following constraints:

1. Unless otherwise approved by the Owner and Engineer there shall be no water service interruptions during the day in areas where Work is to occur at night.

C. The Work of this Contract requires removal and replacement of active sewers in the same location, and reconnecting existing sewer service connections to the new sewer. Continuous sewage flows must be maintained at all times while the work of this contract is being performed. The Contractor shall submit to the Engineer for review a plan which details how continuous sewage flows will be maintained.

D. Operation of the existing sewer, drain, water and other utilities must be maintained throughout the duration of the Project.

E. The Contractor shall submit to the Engineer at least thirty (30) days prior to the construction of any work that will interfere with the existing utilities for review a sequence of operations, giving detailed plans and schedules of his proposed operations. The sequence shall be updated as requested by the Engineer.

F. Owner's Work Schedule

1. The Owner observes a five-day work week, Monday through Friday, from 7:00 AM to 5:00 PM, except on Owner holidays, as noted below.

2. Owner Holidays – Do no work on the following holidays except as authorized in writing by the Owner:

- New Year's Day
- Martin Luther King's Birthday
- President's Day
- Patriot's Day
- Memorial Day
- Juneteenth
- Independence Day
- Labor Day
- Columbus Day
- Veterans' Day
- Thanksgiving Day
- Christmas Day

1.9 MONTHLY PRICE ADJUSTMENTS

A. The Price Adjustment for liquid asphalt, diesel fuel and gasoline, structural steel and reinforcing steel, and cement concrete mixes as specified by MassDOT are attached following this Section.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION 01170

SECTION 01170A

SPECIAL PROVISIONS - PRICE ADJUSTMENTS

DOCUMENT 00811
SPECIAL PROVISIONS
MONTHLY PRICE ADJUSTMENT FOR HOT MIX ASPHALT (HMA) MIXTURES
ENGLISH AND METRIC UNITS
Revised: 07/08/2016

This provision applies to all projects using greater than 100 tons (91 megagrams) of hot mix asphalt (HMA) mixtures containing liquid asphalt cement as stipulated in the Notice to Contractors section of the bid documents.

Price Adjustments will be based on the variance in price, for the liquid asphalt component only, between the Base Price and the Period Price. They shall not include transportation or other charges. Price Adjustments will occur on a monthly basis.

Base Price

The Base Price of liquid asphalt on a project as listed in the Notice to Contractors section of the bid documents is a fixed price determined by the Department at the time of the bid using the same method as the determination of the Period Price detailed below. The Base Price shall be used in all bids.

Period Price

The Period Price is the price of liquid asphalt for each monthly period as determined by the Department using the average selling price per standard ton of PG64-28 paving grade (primary binder classification) asphalt, FOB manufacturer's terminal, as listed under the "East Coast Market - New England, Boston, Massachusetts area" section of the Poten & Partners, Inc. "Asphalt Weekly Monitor". This average selling price is listed in the issue having a publication date of the second Friday of the month and will be posted as the Period Price for that month. The Department will post this Period Price on its website at http://www.mhd.state.ma.us/ within two (2) business days following its receipt of the relevant issue of the "Asphalt Weekly Monitor". Poten and Partners has granted the Department the right to publish this specific asphalt price information sourced from the Asphalt Weekly Monitor. This method of period price determination was formerly called the New Asphalt Period Price Method. Separate website postings using both the New Asphalt Period Price Method and the Old Asphalt Period Price Method were discontinued after June 2013.

Price Adjustment Determination, Calculation and Payment

The Contract Price of the HMA mixture will be paid under the respective item in the Contract. Price Adjustments, as herein provided, either upwards or downwards, will be made after the work has been performed using the monthly period price for the month during which the work was performed.

Price Adjustments will be paid only if the variance from the Base Price is 5% or more for a monthly period. The complete adjustment will be paid in all cases with no deduction of the 5% from either upward or downward adjustments.

The Price Adjustment applies only to the actual virgin liquid asphalt content in the mixture placed on the job in accordance with the Standard Specifications for Highways and Bridges, Division III, Section M3.11.03.

Price Adjustments will be separate payment items. The pay item numbers are 999.401 for a positive price adjustment (a payment) and 999.402 for a negative price adjustment (a deduction). Price Adjustments will be calculated using the following equation:

Price Adjustment = Tons of HMA Placed X Liquid Asphalt Content % X RAP Factor X (Period Price - Base Price)

No Price Adjustment will be allowed beyond the Completion Date of this Contract, unless there is a Department-approved extension of time.

******** END OF DOCUMENT ********

DOCUMENT 00812

SPECIAL PROVISIONS
MONTHLY PRICE ADJUSTMENT FOR DIESEL FUEL AND GASOLINE –
ENGLISH UNITS

Revised: 01/26/2009

This monthly fuel price adjustment is inserted in this contract because the national and worldwide energy situation has made the future cost of fuel unpredictable. This adjustment will provide for either additional compensation to the Contractor or repayment to the Commonwealth, depending on an increase or decrease in the average price of diesel fuel or gasoline.

This adjustment will be based on fuel usage factors for various items of work developed by the Highway Research Board in Circular 158, dated July 1974. These factors will be multiplied by the quantities of work done in each item during each monthly period and further multiplied by the variance in price from the Base Price to the Period Price.

The Base Price of Diesel Fuel and Gasoline will be the price as indicated in the Department's web site (www.mhd.state.ma.us) for the month in which the contract was bid, which includes State Tax.

The Period Price will be the average of prices charged to the State, including State Tax for the bulk purchases made during each month.

This adjustment will be effected only if the variance from the Base Price is 5% or more for a monthly period. The complete adjustment will be paid in all cases with no deduction of the 5% from either upward or downward adjustments.

No adjustment will be paid for work done beyond the extended completion date of any contract.

Any adjustment (increase or decrease) to estimated quantities made to each item at the time of final payment will have the fuel price adjustment figured at the average period price for the entire term of the project for the difference of quantity.

The fuel price adjustment will apply only to the following items of work at the fuel factors shown:

ITEMS COVERED	**FUEL FACTORS**	
	Diesel	**Gasoline**
Excavation: and Borrow Work: Items 120, 120.1, 121, 123, 124, 125, 127, 129.3, 140, 140.1, 141, 142, 143, 144., 150, 150.1, 151 and 151.1 (Both Factors used)	0.29 Gallons / CY.	0.15 Gallons / CY
Surfacing Work: All Items containing Hot Mix Asphalt	2.90 Gallons / Ton	Does Not Apply

******** END OF DOCUMENT ********

DOCUMENT 00813

SPECIAL PROVISIONS

PRICE ADJUSTMENTS FOR STRUCTURAL STEEL AND REINFORCING STEEL

October 11, 2018

This special provision applies to all projects containing the use of structural steel and/or reinforcing steel as specified elsewhere in the Contract work. It applies to all structural steel and all reinforcing steel, as defined below, on the project. Compliance with this provision is mandatory, i.e., there are no "opt-in" or "opt-out" clauses. Price adjustments will be handled as described below and shall only apply to unfabricated reinforcing steel bars and unfabricated structural steel material, consisting of rolled shapes, plate steel, sheet piling, pipe piles, steel castings and steel forgings, and.

Price adjustments will be variances between Base Prices and Period Prices. Base Prices and Period Prices are defined below.

Price adjustments will only be made if the variances between Base Prices and Period Prices are 5% or more. A variance can result in the Period Price being either higher or lower than the Base Price. Once the 5% threshold has been achieved, the adjustment will apply to the full variance between the Base Price and the Period Price.

Price adjustments will be calculated by multiplying the number of pounds of unfabricated structural steel material or unfabricated reinforcing steel bars on a project by the index factor calculated as shown below under Example of a Period Price Calculation.

Price adjustments will ***not*** include guardrail panels or the costs of shop drawing preparation, handling, fabrication, coatings, transportation, storage, installation, profit, overhead, fuel costs, fuel surcharges, or other such charges not related to the cost of the unfabricated structural steel and unfabricated reinforcing steel.

The weight of steel subject to a price adjustment shall not exceed the final shipping weight of the fabricated part by more than 10%.

Base Prices and Period Prices are defined as follows:

Base Prices of unfabricated structural steel and unfabricated reinforcing steel on a project are fixed prices determined by the Department and found in the table below. While it is the intention of the Department to make this table comprehensive, some of a project's unfabricated structural steel and/or unfabricated reinforcing steel may be inadvertently omitted. Should this occur, the Contractor shall bring the omission to the Department's attention so that a contract alteration may be processed that adds the missing steel to the table and its price adjustments to the Contract.

The Base Price Date is the month and year in which MassDOT opened bids for the project. This date is used to select the Base Price Index.

Period Prices of unfabricated structural steel and unfabricated reinforcing steel on a project are variable prices that have been calculated using the Period Price Date and an index of steel prices to adjust the Base Price.

The Period Price Date is the date the steel was delivered to the fabricator as evidenced by an official bill of lading submitted to the Department containing a description of the shipped materials, weights of the shipped materials and the date of shipment. This date is used to select the Period Price Index.

The index used for the calculation of Period Prices is the U.S. Department of Labor Bureau of Labor Statistics Producer Price Index (PPI) Series ID WPU101702 (Not Seasonally Adjusted, Group: Metals and Metal Products, Item: Semi-finished Steel Mill Products.) As this index is subject to revision for a period of up to four (4) months after its original publication, no price adjustments will be made until the index for the period is finalized, i.e., the index is no longer suffixed with a "(P)".

Period Prices are determined as follows:

Period Price = Base Price X Index Factor
Index Factor = Period Price Index / Base Price Index

Example of a Period Price Calculation:

Calculate the Period Price for December 2009 using a Base Price from March 2009 of $0.82/Pound for 1,000 Pounds of ASTM A709 (AASHTO M270) Grade A36 Structural Steel Plate.

The Period Price Date is December 2009. From the PPI website*, the Period Price Index = 218.0.

The Base Price Date is March 2009. From the PPI website*, the Base Price Index = 229.4.

Index Factor = Period Price Index / Base Price Index = 218.0 / 229.4 = 0.950
Period Price = Base Price X Index Factor = $0.82/Pound X 0.950 = $0.78/Pound

Since $0.82 - $0.78 = $0.04 is less than 5% of $0.82, no price adjustment is required.

If the $0.04 difference shown above was greater than 5% of the Base Price, then the price adjustment would be 1,000 Pounds X $0.04/Pound = $40.00. Since the Period Price of $0.78/Pound is less than the Base Price of $0.82/Pound, indicating a drop in the price of steel between the bid and the delivery of material, a credit of $40.00 would be owed to MassDOT. When the Period Price is higher than the Base Price, the price adjustment is owed to the Contractor.

* To access the PPI website and obtain a Base Price Index or a Period Price Index, go to http://data.bls.gov/cgi-bin/srgate

End of example.

The Contractor will be paid for unfabricated structural steel and unfabricated reinforcing steel under the respective contract pay items for all components constructed of either structural steel or reinforced Portland cement concrete under their respective Contract Pay Items.

Price adjustments, as herein provided for, will be paid separately as follows:

Structural Steel
Pay Item Number 999.449 for positive (+) pay adjustments (payments to the Contractor)

Pay Item Number 999.457 for negative (-) pay adjustments (credits to MassDOT Highway Division)

Reinforcing Steel
Pay Item Number 999.466 for positive (+) pay adjustments (payments to the Contractor)

Pay Item Number 999.467 for negative (-) pay adjustments (credits to MassDOT Highway Division)

No price adjustment will be made for price changes after the Contract Completion Date, unless the MassDOT Highway Division has approved an extension of Contract Time for the Contract.

BASE PRICES

The Department's table of Base Prices specified above is updated monthly. The current table is attached to this Document 00813 and included in each new contract.

DOCUMENT 00814

SPECIAL PROVISIONS
PRICE ADJUSTMENT FOR PORTLAND CEMENT CONCRETE MIXES

January 12, 2009

This provision applies to all projects using greater than 100 Cubic Yards (76 Cubic Meters) of Portland cement concrete containing Portland cement as stipulated in the Notice to Contractors section of the Bid Documents. This Price Adjustment will occur on a monthly basis.

The Price Adjustment will be based on the variance in price for the Portland cement component only from the Base Price to the Period Price. It shall not include transportation or other charges.

The Base Price of Portland cement on a project is a fixed price determined at the time of bid by the Department by using the same method as for the determination of the Period Price (see below) and found in the Notice to Contractors.

The Period Price of Portland cement will be determined by using the latest published price, in dollars per ton (U.S.), for Portland cement (Type I) quoted for Boston, U.S.A. in the **Construction Economics** section of *ENR Engineering News-Record* magazine or at the ENR website http://www.enr.com under **Construction Economics**. The Period Price will be posted on the MassHighway website the Wednesday immediately following the publishing of the monthly price in ENR, which is normally the first week of the month.

The Contract Price of the Portland cement concrete mix will be paid under the respective item in the Contract. The price adjustment, as herein provided, upwards or downwards, will be made after the work has been performed, using the monthly period price for the month during which the work was performed.

The price adjustment applies only to the actual Portland cement content in the mix placed on the job in accordance with the Standard Specifications for Highways and Bridges, Division III, Section M4.02.01. No adjustments will be made for any cement replacement materials such as fly ash or ground granulated blast furnace slag.

The Price Adjustment will be a separate payment item. It will be determined by multiplying the number of cubic yards of Portland cement concrete placed during each monthly period times the Portland cement content percentage times the variance in price between the Base Price and Period Price of Portland cement.

This Price Adjustment will be paid only if the variance from the Base Price is 5% or more for a monthly period. The complete adjustment will be paid in all cases with no deduction of the 5% from either upward or downward adjustments.

No Price Adjustment will be allowed beyond the Completion Date of this Contract, unless there is a Department-approved extension of time.

****
*

END OF DOCUMENT

SECTION 01200

PROJECT MEETINGS

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplemental Conditions, Division 0 and Division 1 Specification Sections, apply to this section.

1.2 COORDINATION WITH THE OWNER

A. As part of this Contract, the Contractor shall coordinate his/her activities with the Owner. In addition, the Contractor will give the Owner significant notice on any Work that may be required to meet the Contract schedule.

1.3 PRECONSTRUCTION CONFERENCE

A. A pre-construction conference will be held between the Contractor, the Engineer, the Owner, and applicable agency representatives to review, in detail, the Contractor's proposed methods of complying with the requirements of the Contract Documents.

B. Contractor will be notified of the time, date and place where the pre-construction conference will be held.

1.4 PROGRESS MEETINGS WITH ENGINEER

A. In addition to other regular project meetings for other purposes (as indicated elsewhere in the Contract Documents), hold general progress meetings weekly with times coordinated with preparation of payment requests. Meeting dates shall be established by the Engineer. Require every entity then involved in the planning, coordination or performance of Work to be properly represented at each meeting. Include (when applicable) consultants, separate Contractors (if any), principal subcontractors, suppliers/manufacturers/fabricators, governing authorities, insurers, special supervisory personnel and others with an interest or expertise in the progress of the Work. Review each entity's present and future needs including interface requirements, time, sequence, deliveries, access, site utilization, temporary facilities and services, hours of Work, hazards and risks, housekeeping, submittals, change orders, and documentation of information for payment requests. Discuss whether each element of current Work is ahead of schedule. Determine how behind-time Work will be expedited and secure commitments from the entities involved in doing so. Discuss whether schedule revisions are required to ensure that current Work and subsequent Work will be completed within the Contract Time. Review everything of significance which could affect the progress of the Work.

B. Within seven days after each progress meeting date, the Engineer will forward copies of the minutes-of-the-meeting to the Contractor.

C. Immediately following each progress meeting where revisions to the Progress Schedule/Critical Path Schedule have been made or recognized (regardless of whether agreed to by each entity represented), revise the Schedule. Reissue revised Schedule within 10 days after meeting. At intervals matching the preparation of payment requests, revise and reissue the Schedule to show actual progress of the Work in relation to the latest revision of the Schedule.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION 01200

SECTION 01300

SUBMITTALS

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplemental Conditions, Division 0 and Division 1 Specification Sections, apply to this section.

1.2 DESCRIPTION OF REQUIREMENTS

A. This Section specifies the general methods and requirements of submissions applicable to the following Work-related submittals: Shop Drawings, Product Data, Samples, Construction Photographs, and Construction Schedules. Additional general submission requirements are contained in Article 7 of the Standard General Conditions. Detailed submittal requirements will be specified in the technical Specifications sections.

B. All submittals shall be clearly identified by reference to Specification Section, Paragraph, Drawing No. or Detail as applicable. Submittals shall be clear and legible and of sufficient size for sufficient presentation of data.

1.3 SHOP DRAWINGS, PRODUCT DATA, SAMPLES

A. Shop Drawings

1. Shop Drawings, as defined in the Standard General Conditions, and as specified in individual Work Sections include, but are not necessarily limited to, custom-prepared data such as fabrication and erection/installation (working) Drawings, scheduled information, setting diagrams, actual shop work manufacturing instructions, custom templates, special wiring diagrams, Coordination Drawings, individual system or equipment inspection and test reports including performance curves and certifications, as applicable to the Work.

2. All Shop Drawings submitted by subcontractors for approval shall be sent directly to the Contractor for checking. The Contractor shall be responsible for their submission at the proper time so as to prevent delays in delivery of materials.

3. The Contractor shall check all subcontractors' Shop Drawings regarding measurements, size of members, materials, and details to satisfy himself that they conform to the intent of the Drawings and Specifications. Shop Drawings found to be inaccurate or otherwise in error shall be returned to the subcontractors for correction before submission thereof.

4. All details on Shop Drawings submitted for approval shall show clearly the relation of the various parts to the main members and lines of the structure, and where correct fabrication of the Work depends upon field measurements; such measurements shall be made and noted on the Drawings before being submitted for approval.

5. Submittals for equipment specified under Division 2 shall include a listing of all installations where identical or similar equipment has been installed and been in operation for a period of at least one year.

B. Product Data

1. Product data as specified in individual Sections, include, but are not necessarily limited to, standard prepared data for manufactured products (sometimes referred to as catalog data), such as the manufacturer's product specification and installation instructions, availability of colors and patterns, manufacturer's printed statements of compliance's and applicability, roughing-in diagrams and templates, catalog cuts, product photographs, standard wiring diagrams, printed performance curves and operational-range diagrams, production or quality control inspection and test reports and certifications, mill reports, product operating and maintenance instructions and recommended spare-parts listing and printed product warranties, as applicable to the Work.

C. Samples

1. Samples specified in individual Sections, include, but are not necessarily limited to, physical examples of the Work such as sections of manufactured or fabricated Work, small cuts or containers of materials, complete units of repetitively-used products, color/texture/pattern swatches and range sets, specimens for coordination of visual effect, graphic symbols and units of Work to be used by the Engineer or Owner for independent inspection and testing, as applicable to the Work.

1.4 CONTRACTOR'S RESPONSIBILITIES

A. The Contractor shall review Shop Drawings, product data and samples, including those by subcontractors, prior to submission to determine and verify the following:

1. Field measurements

2. Field construction criteria

3. Catalog numbers and similar data

4. Conformance with the Specifications

B. Each Shop Drawing, sample and product data submitted by the Contractor shall have affixed to it the following Certification Statement including the Contractor's Company

name and signed by the Contractor: "Certification Statement: by this submittal, I hereby represent that I have determined and verified all field measurements, field construction criteria, materials, dimensions, catalog numbers and similar data and I have checked and coordinated each item with other applicable approved Shop Drawings and all Contract requirements." Shop Drawings and product data sheets 11-in x 17-in and smaller shall be bound together in an orderly fashion and bear the above Certification Statement on the cover sheet. The cover sheet shall fully describe the packaged data and include a listing of all items within the package. Provide to the Resident Project Representative a copy of each submittal transmittal sheet for Shop Drawings, product data and samples at the time of submittal of said Drawings, product data and samples to the Engineer.

C. The review and approval of Shop Drawings, samples, or product data by the Engineer shall not relieve the Contractor from his/her responsibility with regard to the fulfillment of the terms of the Contract. All risks of error and omission are assumed by the Contractor and the Engineer will have no responsibility therefor.

D. No portion of the Work requiring a Shop Drawing, sample, or product data shall be started nor shall any materials be fabricated or installed prior to the approval or qualified approval of such item. Fabrication performed, materials purchased or on-site construction accomplished which does not conform to approved Shop Drawings and data shall be at the Contractor's risk. The Owner will not be liable for any expense or delay due to corrections or remedies required to accomplish conformity.

E. Project Work, materials, fabrication, and installation shall conform to approved Shop Drawings, applicable samples, and product data.

1.5 SUBMISSION REQUIREMENTS

A. Make submittals promptly in accordance with approved schedule, and in such sequence as to cause no delay in the Work or in the Work of any other Contractor.

B. Each submittal, appropriately coded, will be returned within 30 working days following receipt of submittal by the Engineer.

C. Assemble complete submittal package into a single indexed file incorporating submittal requirements of a single Specification Section and transmittal form with links enabling navigation to each item. Unrelated Items/Specification Sections shall not be provided within the same submittal package.

D. Name file with submittal number or other unique identifier, including revision identifier.

1. File name shall use Specification Section number followed by a dash and then a sequential number (e.g., 02510-1). Resubmittals shall include an alphabetic suffix after the sequential submittal number (e.g., 02510-1A).

E. Submittal items required:

1. Shop Drawings as defined in Paragraph 1.3 A: Submit Electronically.

2. Product Data as defined in Paragraph 1.3 B: Submit Electronically.

3. Samples: Submit the number stated in the respective Specification Sections.

F. Submittals shall contain:

1. The date of submission and the dates of any previous submissions.

2. The Project title and number.

3. Contractor identification.

4. The names of:

a. Contractor

b. Supplier

c. Manufacturer

5. Identification of the product, with the Specification section number, page and paragraph(s).

6. Field dimensions, clearly identified as such.

7. Relation to adjacent or critical features of the Work or materials.

8. Applicable standards, such as ASTM or Federal Specification numbers.

9. Identification of deviations from Contract Documents.

10. Identification of revisions on resubmittals.

11. An 8-in x 3-in blank space for Contractor and Engineer stamps.

12. American Iron and Steel (AIS) Certifications as required by Section 00826.

1.6 REVIEW OF SHOP DRAWINGS, PRODUCT DATA, WORKING DRAWINGS AND SAMPLES

A. The review of Shop Drawings, data, and samples will be for general conformance with the design concept and Contract Documents. They shall not be construed:

1. as permitting any departure from the Contract requirements;

2. as relieving the Contractor of responsibility for any errors, including details, dimensions, and materials;

3. as approving departures from details furnished by the Engineer, except as otherwise provided herein.

B. The Contractor remains responsible for details and accuracy, for coordinating the Work with all other associated Work and trades, for selecting fabrication processes, for techniques of assembly, and for performing Work in a safe manner.

C. If the Shop Drawings, data or samples as submitted describe variations and show a departure from the Contract requirements which Engineer finds to be in the interest of the Owner and to be so minor as not to involve a change in Contract Price or time for performance, the Engineer may return the reviewed drawings without noting an exception.

D. Submittals will be returned to the Contractor under one of the following codes.

Code 1 - "NO EXCEPTION TAKEN" is assigned when there are no notations or comments on the submittal. When returned under this code the Contractor may release the equipment and/or material for manufacture.

Code 2 - "MAKE CORRECTIONS AS NOTED". This code is assigned when a confirmation of the notations and comments IS NOT required by the Contractor. The Contractor may release the equipment or material for manufacture; however, all notations and comments must be incorporated into the final product.

Code 3 - "SUBMIT SPECIFIED ITEM". This combination of codes is assigned when a confirmation of the notations and comments IS required by the Contractor. This confirmation shall specifically address each omission and nonconforming item that was noted. Confirmation is to be received by the Engineer within 10 calendar days of the date of the Engineer's transmittal requiring the confirmation.

Code 4 - "REVISE AND RESUBMIT". This combination of codes is assigned when notations and comments are extensive enough to require a resubmittal of the package. This resubmittal is to address all comments, omissions and non-conforming items that were noted. Resubmittal is to be received by the Engineer within 10 calendar days of the date of the Engineer's transmittal requiring the resubmittal.

Code 5 - "REJECTED" is assigned when the submittal does not meet the intent of the Contract Documents. The Contractor must resubmit the entire package revised to bring the submittal into conformance. It may be necessary to resubmit using a different manufacturer/vendor to meet the Contract Documents.

E. Resubmittals will be handled in the same manner as first submittals. On resubmittals the Contractor shall direct specific attention, in writing on the letter of transmittal and on resubmitted Shop Drawings by use of revision triangles or other similar methods,

to revisions other than the corrections requested by the Engineer, on previous submissions. Any such revisions which are not clearly identified shall be made at the risk of the Contractor. The Contractor shall make corrections to any Work done because of this type revision that is not in accordance to the Contract Documents as may be required by the Engineer.

F. Partial submittals may not be reviewed. The Engineer will be the only judge as to the completeness of a submittal. Submittals not complete will be returned to the Contractor, and will be considered "Rejected" until resubmitted. The Engineer may, at his/her option, provide a list or mark the submittal directing the Contractor to the areas that are incomplete.

G. If the Contractor considers any correction indicated on the Shop Drawings to constitute a change to the Contract Documents, the Contractor shall give written notice thereof to the Engineer at least seven working days prior to release for manufacture.

H. When the Shop Drawings have been completed to the satisfaction of the Engineer, the Contractor shall carry out the construction in accordance therewith and shall make no further changes therein except upon written instructions from the Engineer.

1.7 DISTRIBUTION

A. Distribute reproductions of approved Shop Drawings and copies of approved product data and samples, where required, to the job site file and elsewhere as directed by the Engineer.

1.8 RECORD DOCUMENTS

A. Maintain on Site one set of the following record documents; record actual revisions to the Work:

1. Drawings

2. Specifications

3. Addenda

4. Change orders and other modifications to the Contract

5. Reviewed Shop Drawings, Product Data, and Samples

6. Manufacturer’s instruction for assembly, installation, and adjusting

B. Record information concurrent with construction progress, not less than weekly. Ensure entries are complete and accurate, enabling future reference by Owner.

C. Store record documents separate from documents used for construction.

D. Specifications: Legibly mark and record at each product section description of actual products installed, including the following:

1. Manufacturer's name and product model and number.

2. Product substitutions or alternates used.

3. Changes made by Addenda and modifications.

E. Record Drawings and Shop Drawings: Legibly mark each item to record actual construction including:

5. Measured horizontal and vertical locations of underground utilities and appurtenances, including fire hydrants, gate valves, and service boxes, referenced to permanent surface structures.

6. Field changes of dimension and detail.

7. Details not on original Contract drawings.

8. Refer to Project Closeout Section 01700 for Record Drawing submittal requirements.

1.9 SCHEDULES

A. Provide all schedules required in the Standard General Conditions.

B. The Contractor shall submit a progress schedule before starting any Work, in accordance with the Standard General Conditions. The Contractor shall review the progress schedule with the Engineer periodically. Such review shall be made on a monthly basis or more frequently as required by the Engineer. The progress schedule shall be updated as required by the Engineer.

1.10 "OR EQUAL"

A. Refer to Paragraph 6.05 of the Standard General Conditions.

B. Should the Contractor seek approval of a product other than the brand or brands named in these specifications, it shall furnish written evidence that such product conforms in all respects to the specified requirements, and that it has been used successfully elsewhere under similar conditions. Where the specified requirements involve conformance to recognized codes or standards the Contractor shall furnish evidence of such conformance in the form of test or inspection reports, prepared by a recognized agency, and baring an authorized signature.

C. Manufacturers' standard data and catalog cut sheets will not be considered sufficient in themselves, and the Engineer will not be responsible for seeking further data from

the manufacturer, or for otherwise researching the product. Failure to provide complete data will be cause for rejection of the product.

D. The Contractor shall be responsible for all additional costs including license fees, foundation, piping and electrical work necessary to accommodate the proposed "or equal" equipment. Items which result in a cost reduction shall be presented and a change order reflecting 65% of the cost savings will be prepared and the contract price modified.

1.11 PROFESSIONAL ENGINEER (P.E.) CERTIFICATION FORM

A. If specifically required in other Sections of these Specifications, the Contractor shall submit a Massachusetts P.E. Certification for each item required, in the form attached to this Section, completely filled in and stamped.

1.12 GENERAL PROCEDURES FOR SUBMITTALS

A. Coordination of Submittal Times: Prepare and transmit each submittal sufficiently in advance of performing the related Work or other applicable activities, or within the time specified in the individual Work sections, of the Specifications, so that the installation will not be delayed by processing times including disapproval and resubmittal (if required), coordination with other submittals, testing, purchasing, fabrication, delivery and similar sequenced activities. No extension of time will be authorized because of the Contractor's failure to transmit submittals sufficiently in advance of the Work.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION 01300

P.E. CERTIFICATION FORM

The undersigned hereby certifies that he/she is a Professional Engineer registered in the Commonwealth of Massachusetts and that he/she has been employed by (Name of Contractor) _____ to design _____ in accordance with Specification Section _____. The undersigned further certifies that he/she has performed the design of the _____, that said design is in conformance with all applicable local, state and federal codes, rules, and regulations, and that his/her signature and P.E. stamp have been affixed to all calculations and drawings used in, and resulting from, the design.

The undersigned hereby agrees to make all original design drawings and calculations available to the Owner or the Owner's representative with seven days following written request therefor by the Owner.

_____
P.E. Name

_____
Signature

_____
Address

_____
Contractor's Name

_____
Signature

_____
Title

_____
Address

SECTION 01311
CONSTRUCTION PROGRESS SCHEDULES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplemental Conditions, Division 0 and Division 1 Specification Sections, apply to this section.

1.2 SUMMARY

A. Prepare and submit to Engineer for review projected construction schedules. Update and revise schedules weekly, prior to each progress meeting, to reflect progress of Work.

1.3 FORM OF SCHEDULES

A. Prepare in form of network analysis system using the Critical Path Method.

B. Perform data preparation, analysis, charting and updating in accordance with pertinent recommendations contained in current edition of "CPM in Construction" manual of the Associated General Contractors.

C. The network analysis system shall consist of a detailed network, mathematical analysis and a network diagram.

1. The network diagram shall show the order and interdependence of activities and the sequence in which the Work is to be accomplished as planned by the Contractor. The basic concept of a network analysis diagram will be followed to show how the start of a given activity is dependent on the completion of preceding activities and its completion restricts the start of following activities.
2. Detailed network activities shown on the network diagram shall include, in addition to environmental protection and construction activities, the submittal for approval of samples and Shop Drawings, the procurement of critical materials and equipment and their installation and testing.
3. Related activities shall be grouped on the network. The activities on the critical paths shall be highlighted. The network shall be time scaled using units of approximately one-half inch equals one week or other suitable scale approved by the Engineer. Weekends and holidays shall be indicated. Where slack exists, the activities shall be shown at the earliest time they are scheduled to be accomplished. Sheet size shall be 22" x 34" minimum.
4. The mathematical analysis of the network diagram shall include a tabulation of each activity shown on the detailed network diagram. The following information shall be furnished as a minimum for each activity.
    a. Preceding and following event numbers.
    b. Activity description.
    c. Estimated duration of activities in units of working days (being the best estimate available at time of computation).
    d. Earliest start date (by calendar date).
    e. Earliest finish date (by calendar date).
    f. Scheduled or actual start date (by calendar date).
    g. Scheduled or actual finish date (by calendar date).
    h. Latest start date (by calendar date).
    i. Latest finish date (by calendar date).
    j. Slack or float.
    k. Monetary value of activity.
    l. Responsibility for activity (Prime Contractor, subcontractors, suppliers).

m. Manpower required by trade and by total. Graphic representatives will be allowed.
n. Equipment required.

5. The mathematical analysis shall list the activities in sorts or groups as follows:
   a. By the preceding event number from lowest to highest and then in the order of the following event number.
   b. By the amount of slack, then in order of activity number.
   c. By responsibility in order of earliest start date.

1.4 REVIEW OF SYSTEM

A. Participate in a review and evaluation of the proposed network diagrams and analysis by the Engineer. Revisions necessary as a result of this review shall be resubmitted to the Engineer within 10 days after the conference. Twenty (20) days will be allowed for checking and further action by the Engineer. Progress payments will be withheld pending attainment of a mutually acceptable schedule. The mutually acceptable schedule shall then be the schedule to be used by the Contractor for planning, organizing, directing and executing the Work and for reporting progress. If the Contractor thereafter desires to make changes in his method of operating and scheduling he shall notify the Engineer in writing stating the reasons for the change. If the Engineer considers these changes to be of a major nature he/she may require the Contractor to revise and submit, without additional cost to the Owner, all of the affected portion of the network diagram and mathematical analysis to show the effect on the entire project. A change may be considered of a major nature if the time estimated to be required or actually used for an activity or the logic of sequence of activities is varied from the original plan to a degree that there is reasonable doubt as to the effect on the Contract completion date or dates. Changes which effect activities with adequate slack time shall be considered as minor changes, except that an accumulation of minor changes may be considered as a major change when their cumulative effect might affect the Contract completion date.

1.5 UPDATES

A. Submit at intervals of 30 days a report of the actual construction progress by updating the mathematical analysis. All Contract changes, including pending and approved change orders and field orders shall be included in the update schedule. Revisions causing changes in the detailed network shall be noted on the network or a revised issue of the affected portions of the detailed network furnished. The network shall be revised as necessary for the sake of clarity.

B. The report shall show the activities or portions of activities completed during the reporting period and their total value as basis for the Contractor's periodic request for payment. Coordinate with the schedule of breakdown of lump sum items. The report shall state the percentage of the Work actually completed and schedule as of the report date and the progress along the critical path in terms of days ahead or behind the allowable dates. If the project is behind schedule, progress along other paths with negative slack shall be reported. Percentage of Work actually completed will be reviewed by the Engineer. If the Contractor fails to submit the required monthly reports and updates within the time prescribed, the Engineer may withhold approval of progress payment estimates until such time as the Contractor submits the required reports and updates. Three copies of the report shall be submitted for each update.

C. Simultaneously submit a narrative report with the updated analysis which shall include but not be limited to a description of the problem areas, current and anticipated delaying factors, their impact, and an explanation of corrective actions taken or proposed.

1.6 SUBMITTALS

A. Refer to Article 2 of the Standard General Conditions for requirements for schedules and schedules of values.

B. Within 15 days after execution of the AGREEMENT, submit 3 copies of a preliminary schedule indicating planned operations during first 60 days. Include cost of activities expected to be completed before submission and approval of the complete schedule.

C. Within 30 days after execution of the AGREEMENT, submit 3 copies of the complete network analysis system. After review, submit 3 copies of the mutually acceptable system.

D. Submit 3 copies of monthly reports and updates by the tenth day of the month.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION 01311

SECTION 01350
HEALTH AND SAFETY PLAN

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplemental Conditions, Division 0 and Division 1 Specification Sections, apply to this section.

1.2 SUMMARY OF WORK

A. The Contractor shall, prior to the start of Work on the Site, prepare and submit for review, a Site-specific health and safety plan. Work may not proceed at the project Site until the Owner and/or Engineer have reviewed and approved Contractor's health and safety plan. Any delays incurred by the Contractor relating to reviews of the health and safety plan shall be the responsibility of the Contractor and constitute no additional costs or claims to the Owner. The Contractor is responsible for all safety precautions and maintaining a safe work site.

B. The Excavation of contaminated soils areas is not anticipated. However, the Contractor shall provide appropriate equipment (e.g., temporary fencing, drums) in the event hazardous materials are spilled or encountered.

C. Individuals involved in the excavation of potentially impacted soils shall be properly informed and trained in the recognition and response strategies involved with the hazards posed by these contaminants. The Contractor shall provide appropriate equipment (e.g., temporary fencing, drums) in the event hazardous materials are spilled or encountered. Contractor shall be aware of site-specific work conditions including sanitary/sewage environmental conditions and hazards. Contractor shall provide appropriate equipment (e.g. gloves, face shields, blowers, oxygen meters, etc.) in working around hazards as described herein.

D. The Contractor shall be cognizant of the minimum standards set forth in OSHA 29 CFR 1910.120. The health and safety plan shall include, but not be limited to the following:

1. Identification of Contractor's Site Safety Officer.
2. Identification of Contractor's Designated Field Personnel.
3. Type of Medical Surveillance Program.
4. Identification of Hazard and Risks Associated with Project.
5. Contractor’s air/oxygen monitoring plan.
6. Contractor’s dust suppression plan. If air monitoring indicates a higher level of protection than modified Level D, work will stop at no cost to Owner until proper engineering controls/dust suppression sufficiently address the elevated air monitoring results. Modified Level D protection for all onsite personnel is the minimum project requirement.
7. Contractor's Standard Operating Procedures including Personnel Training and Field Orientation; Personal Hygiene Requirements & Guidelines; Confined Space Entry Requirements, Field Monitoring Requirements of Site Contaminants; Respiratory Protection Training & Requirements; Levels of Protection and Selection of Equipment Procedures; Zone Delineation of the Project Site; Site Security and Entry Control Procedures; Contingency and

Emergency Procedures; and Listing of Emergency Contacts.

8. The Contractor must be aware of Site specific requirements such as Site security during non-working hours, limited Work space, working adjacent to surface water bodies, and minimizing the effects of soil excavation to adjacent structures.
9. The Contractor shall make available complete sets of personal protective equipment and clothing to the Owner and Engineer for use during Site inspections by the Owner and Engineer. These shall be supplied and maintained at no cost to the Owner, and shall be returned to the Contractor upon completion of the Work, except for expendable disposal protective clothing. Contractor shall provide a repository for collection of disposable health and safety materials. Collection and disposal of contaminated expendable supplies shall be at cost to the Contractor.
10. The Contractor shall be cognizant and adhere to the Massachusetts COVID-19 guidelines.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION 01350

SECTION 01370

SCHEDULE OF VALUES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplemental Conditions, Division 0 and Division 1 Specification Sections, apply to this section.

1.2 SUMMARY OF WORK

A. This section includes the following:

1. Provide schedule of values covering each lump sum bid item.

1.3 SUBMITTALS

A. Shop Drawings: Submit the following in accordance with Section 01300 - Submittals:

1. Schedule of values.

a. Revise and resubmit schedule until acceptable to the Engineer.

2. Itemize separate line item cost for Work involving each lump sum item.

a. Ensure that the sum of the items listed in the schedule of values for each lump sum item equals the price bid for the respective lump sum item.

b. For "Mobilization and Demobilization", items such as Bond premium and temporary construction facilities may be listed separately in the schedule, provided amounts can be substantiated.

3. Breakdown installed costs into:

a. Delivered cost of product.

b. Total installed cost with overhead and profit. Do not list overhead and profit as separate items.

c. For water pipelines, include a breakdown for testing, chlorinating and putting into service.

d. For all items paid 90%/10% for install/test, separate into two items (90%/10% of bid price) for pay request.

4. An unbalanced schedule of values providing for overpayment on items of Work performed first will not be accepted.

1.4 SEQUENCING AND SCHEDULING

A. Prepare schedule of values covering each lump sum item after review of tentative schedule at preconstruction conference, but before submission of first application for payment.

B. Before submitting any application for payment, obtain the Engineer's approval of the Schedule of Values.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION 01370

SECTION 01380

CONSTRUCTION PHOTOGRAPHS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplemental Conditions, Division 0 and Division 1 Specification Sections, apply to this section.

1.2 SUMMARY OF WORK

A. Provide digital construction photographs pertinent to the Contract work during the Contract period as specified and as directed by the Engineer.

1.3 SUBMITTALS

A. Description of techniques, materials, equipment, and resolution proposed to be used.

B. Two copies on USBs containing all digital construction photos submitted on a monthly basis.

1.4 QUALITY ASSURANCE:

A. Photographer to use techniques, material and equipment capable of producing photographs of high quality and resolution.

PART 2 - PRODUCTS

2.1 DIGITAL FILES

A. Remain the property of the photographer.

B. Capable of producing sharp prints of high resolution (minimum of 12 megapixels) typical of an 8 inch by 10 inch print.

C. Photographer to retain digital files for a period of at least two years from the date of final acceptance of the entire work under the Contract.

D. A minimum of 30 digital construction photos documenting construction activities shall be saved to a USB and submitted to the Engineer on a monthly basis.

2.3 PRINT IDENTIFICATION

A. Each file shall carry identification consisting of date photograph taken (Month/Day/Year format) and primary subject of photograph.

PART 3 - EXECUTION

3.1 GENERAL REQUIREMENTS

A. All views to contain a relative dimension reference that is easily recognizable by the average person. In views where dimensions are critical use a recognizable measuring devices such as folding ruler, measuring tape in a manner the markings are clear and sharp in the photograph and the device located in close relationship with subject of photograph.

3.2 SITE PHOTOGRAPHY REQUIRED

A. Provide photographs at following stages of construction:

1. Sewer Force Main Alignment before commencement of any construction. Provide photos and documentation of all private and public property structures (driveway entrances, fencing, walls, etc) that will be affected by proposed construction. Refer to Section 01050 for preconstruction survey requirements.

2. At 1-month intervals, progress photography during construction. Photos of any month need show only new work performed during month.

3. Sewer Force Main Alignment upon completion of construction. Provide post-construction photos and documentation of site restoration of all private and public property structures (buildings, fencing, walls, etc).

4. Such special photographs required by Engineer.

B. Views:

1. Coordinate with Engineer on views to be taken. In general, views from locations to adequately illustrate state of project and condition of construction.

2. At least 3 different views of photographic subject except over-all site photography to have at least 4 different views unless otherwise approved by Engineer.

3. Succeeding photography of same photographic subject to be taken, insofar as practical, from the same view points as preceding photographic sessions. Variations in this procedure to be approved by Engineer.

END OF SECTION 01380

SECTION 01400

QUALITY ASSURANCE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplemental Conditions, Division 0 and Division 1 Specification Sections, apply to this section.

1.2 SUMMARY

A. This section covers Quality Assurance and Control requirements for this Contract.

B. The Contractor is responsible for controlling the quality of Work, including Work of its subcontractors and suppliers and for assuring the quality specified in the Technical Specifications is achieved.

C. Refer to the Article 6 - Contractor's Responsibilities, of the Standard General Conditions.

1.3 TESTING LABORATORY SERVICES

A. All tests which require the services of a laboratory to determine compliance with the Contract Documents shall be performed by an independent commercial testing laboratory acceptable to the Engineer. The laboratory must be certified by the Commonwealth of Massachusetts for the parameters tested and required under the project. The laboratory shall be staffed with experienced technicians, properly equipped, and fully qualified to perform the tests in accordance with the specified standards.

B. Preliminary Testing Services: Unless otherwise specified, the Contractor shall be responsible for all testing laboratory services in connection with concrete materials and mix designs, the design of asphalt mixtures, gradation tests for structural and embankment fills, backfill materials, and all other tests and engineering data required for the Engineer's review of materials and equipment proposed to be used in the Work. The Contractor shall obtain the Engineer's acceptance of the testing laboratory before having services performed, and shall pay all costs for services.

C. Quality Control Testing Services: Perform all quality control tests in the field or in the laboratory on concrete, asphalt mixtures, moisture-density (Proctor) and gradation tests on structural and embankment fills, and backfill materials, in-place field density tests on structural and embankment fills, and other materials and equipment, during and after their incorporation in the Work. Field sampling and testing shall be performed in the general manner indicated in the Specifications, with minimum interference with construction operations. The Engineer shall determine the exact time and location of field sampling and testing, and may require such additional sampling and testing as necessary to determine that materials and equipment conform with data previously furnished by Contractor and with the Contract Documents.

D. Arrangements for delivery of samples and test specimens to the testing laboratory will be made by the Contractor. The laboratory tests shall be performed within a reasonable time consistent with the specified standards. Furnish a written report of each test to the Engineer.

E. Contractor shall furnish all sample materials and cooperate in the sampling and field testing activities, interrupting the Work when necessary. When sampling or testing activities are performed in the field, the Contractor shall furnish personnel and facilities to assist in the activities.

F. The Contractor shall not retain any testing laboratory against which the Owner or the Engineer have reasonable objection, and if at any time during the construction process the services become unacceptable to the Owner, or the Engineer, either the Owner or the Engineer may direct in writing that such services be terminated. The request must be supported with evidence of improper testing or unreasonable delay. If the Engineer determines that sufficient cause exists, the Contractor shall terminate the services and engage a different testing laboratory.

G. Transmittal of Test Reports: Written reports of testing and engineering data furnished by the Contractor for the Engineer's review of materials and equipment proposed to be used in the Work shall be submitted as specified for Shop Drawings.

H. The testing laboratory shall furnish four copies of a written report of each test performed by laboratory personnel in the field or laboratory to the Contractor. Distribution shall be two copies of each test report to the Engineer's Representative, one copy to the Owner, and one copy for the Contractor within three days after each test is completed.

1.4 QUALITY ASSURANCE

A. Codes and Standards: Refer to Article 3 – Documents: the Standard General Conditions.

B. Copies of applicable referenced standards are not included in the Contract Documents. Where copies of standards are needed by the Contractor for superintendence and quality control of the Work, the Contractor shall obtain a copy or copies directly from the publication source and maintain at the jobsite, available to the Contractor's personnel, subcontractors, and Engineer.

C. Quality of Materials: Unless otherwise specified, all materials and equipment furnished for permanent installation in the Work shall conform to applicable standards and Specifications and shall be new, unused, and free from defects and imperfections, when installed or otherwise incorporated in the Work. Material and equipment shall not be used by the Contractor for any purpose other than that intended or specified unless such use is authorized by the Engineer.

D. Where so specified, products or workmanship shall also conform to the additional performance requirements included within the Contract Documents to establish a higher or more stringent standard or quality than that required by the referenced standard.

1.5 OFFSITE INSPECTION

A. When the Specifications require inspection of materials or equipment during the production, manufacturing, or fabricating process, or before shipment, such services shall be performed by an independent testing laboratory, or inspection organization acceptable to Engineer in conjunction with or by the Engineer.

B. The Contractor shall give appropriate written notice to the Engineer not less than 30 days before offsite inspection services are required, and shall provide for the producer, manufacturer, or fabricator to furnish safe access and proper facilities and to cooperate with inspecting personnel in the performance of their duties.

C. The inspection organization shall submit a written report to the Contractor who shall provide copies to the Engineer.

1.6 MATERIALS AND EQUIPMENT

A. The Contractor shall maintain control over procurement sources to ensure that materials and equipment conform to specified requirements in the Contract Documents.

B. The Contractor shall comply with manufacturer’s printed instructions regarding all facets of materials and/or equipment movement, storage, installation, testing, startup, and operation. Should circumstances occur where the Contract Documents are more stringent than the manufacturer’s printed instructions, the Contractor shall comply with the Specifications. In cases where the manufacturer’s printed instructions are more stringent than the Contract Documents, the Contractor shall advise the Engineer of the disparity and conform to the manufacturer’s printed instructions. In either case, the Contractor is to apply the more stringent Specification or recommendation, unless approved otherwise by the Engineer.

1.7 SHOP AND FIELD TESTING

A. The Contractor is also responsible for providing the shop and field testing specified in the technical Specification sections.

B. The Contractor and its subcontractor shall perform inspections, tests, and other services as required by the Contract Documents.

C. Contractor shall provide twenty one days’ notice to the Engineer so that the Engineer may witness Contractor and/or Subcontractors off-site and on-site tests. The Engineer’s witnessing of tests does not relieve the Contractor and/or subcontractors of their obligation to comply with the requirements of the Contract Documents.

1.8 MANUFACTURER'S FIELD SERVICES

A. When specified in the technical Specifications sections, the Contractor shall arrange for and provide technical representation from manufacturers of respective equipment, items or components. The manufacturer's representative shall be a factory trained service

engineer/technician with the type and length of experience specified in the technical Specifications.

B. Services Furnished Under This Contract: An experienced, competent, and authorized factory trained service engineer/technician representative of the manufacturer of each item of equipment for which field services are indicated in the Specifications shall visit the Site of the Work and inspect, operate, test, check, adjust if necessary, and approve the equipment installation. In each case, the manufacturer's service representative shall be present when the equipment is placed in operation. The manufacturer's service representative shall revisit the jobsite as often as necessary until all problems are corrected and the equipment installation and operation are satisfactory to the Engineer.

1.9 CERTIFICATION FORMS AND CERTIFICATES

A. The Contractor shall be responsible for submitting the certification forms and certificates in conformance with the requirements specified in Section 01300 - Submittals.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION

3.1 QUALITY CONTROL

A. Quality control is the responsibility of the Contractor, and the Contractor shall maintain control over construction and installation processes to assure compliance with specified requirements.

B. Certifications for personnel, procedures, and equipment associated with special processes (e.g., welding, cable splicing, instrument calibration, surveying) shall be maintained in the Contractor’s field office, available for inspection by the Engineer. Copies will be made available to the Engineer upon request.

C. Means and methods of construction and installation processes are the responsibility of the Contractor, and at no time is it the intent of the Engineer or Owner to supersede or void that responsibility.

END OF SECTION 01400

SECTION 01500

TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplemental Conditions, Division 0 and Division 1 Specification Sections, apply to this section.

1.2 WORK HOURS

A. Refer to Miscellaneous Requirements Section 01063 for work hour requirements.

1.3 DIMENSION OF EXISTING STRUCTURES

A. Where the dimensions and locations of existing structures are of importance in the installation or connection of any part of the Work, the Contractor shall verify such dimensions and locations in the field before the fabrication of any material or equipment which is dependent on the correctness of such information.

1.4 INTERFERENCE WITH AND PROTECTION OF STREETS

A. Contractor shall not close or obstruct any portion of a street, road, or private way without obtaining permits therefore from the proper authorities. If any street, road or private way shall be rendered unsafe by the Contractor's operations, he shall make such repairs or provide such temporary ways or guards as shall be acceptable to the proper authorities.

B. Streets, roads, private ways, and walks not closed shall be maintained passable and safe by the Contractor, who shall assume and have full responsibility for the adequacy and safety of provisions made therefore.

C. The Contractor shall, at least 24 hours in advance, notify the DPW, Police, Fire and School Departments in writing, with a copy to the Engineer, if the closure of a street or road is necessary. He shall cooperate with the Police Department in the establishment of alternate routes and shall provide adequate detour signs, plainly marked and well lighted, in order to minimize confusion.

1.5 TEMPORARY UTILITIES

A. Temporary Light and Power: The Contractor shall at his own expense, provide his own temporary light and power as required for the prosecution and completion of work.

B. Temporary Heat: The Contractor shall, at his own expense, provide sufficient temporary

heat to maintain a minimum temperature of 50 degrees F at all times in all areas designated elsewhere in these documents.

C. Temporary Telephone: The Contractor shall have installed at his own expense a job telephone for his use and for the use of the Engineer. The Contractor shall pay all phone charges.

D. Temporary Water: Water for drinking purposes and other usage will be provided by the Contractor at his own expense.

E. Sanitary Provisions: The Contractor shall provide and maintain sanitary accommodations for the use of his employees and the Engineer, as may be necessary to comply with the requirements and regulations of the local and state departments of health.

F. Maintaining Operation of the Existing Facilities:

1. The Contractor shall be responsible for careful consideration of the construction, scheduling and anticipation of potential interference with existing utilities, operations and structures. The Contractor shall maintain close communications with the Engineer and provide the Engineer with a detailed description of each proposed activity sufficiently in advance of its commencement for review and comments to be made.

2. Temporary facilities which may be required include, but are not limited to, electrical power; lighting; heating; cooling; ventilating; telephone; potable water; fire protection; drainage; sanitary facilities; trench covers; protection of existing utilities; structures; streams; trees and shrubs; access roads; sewage conveyance; piping.

1.6 ACCESS TO THE WORK

A. The Contractor shall provide sufficient and proper facilities at all times for inspection of all work under this project in preparation or in progress, by the Owner, the agents and employees of the Owner, by authorized representatives of the State of Massachusetts and the Federal Government and by the Engineers.

B. The Contractor shall furnish the Engineer or his authorized representative and other personnel mentioned above with such facilities and assistance as are necessary to ascertain performance of the work in accordance with the plans and specifications.

1.7 PRECAUTIONS DURING ADVERSE WEATHER

A. During adverse weather and against the possibility thereof, the Contractor shall take all necessary precautions so that the Work may be properly done and satisfactory in all respects. When required, protection shall be provided by use of tarpaulins, wood and building-paper shelters, or other suitable means.

B. During cold weather, materials shall be preheated, if required, and the materials and adjacent structure into which they are to be incorporated shall be made and kept sufficiently warm so that a proper bond will take place and a proper curing, aging, or drying will result. Protected spaces shall be artificially heated by suitable means which will result in a moist or a dry atmosphere according to the particular requirements of the work being protected. Ingredients for concrete and mortar shall be sufficiently heated so that the mixture will be warm throughout when used.

1.8 FIELD OFFICES (ENGINEER'S AND CONTRACTOR'S)

A. The Contractor shall provide and maintain at an approved location for the duration of the contract, two (2) separate office buildings or trailers, minimum interior dimensions of 10 feet x 36 feet. One shall be for the exclusive use of the Engineer and one shall be for the exclusive use of the Contractor. The plans and construction of the offices shall be approved by the Engineer.

B. The offices shall be equipped with electric lights, heating facilities, air conditioner, water, and internet service. Doors and windows shall be equipped with locks and the windows shall have security screens and horizontal blinds. Trailers shall have an insulated skirt installed around the lower perimeter. The offices shall each be equipped withthe following furniture and accessories:

1. (1) Flat top desk with drawers.

1. (1) Table at least 2 feet 8-inches wide and 6 feet long.

2. (1) Drafting table with lamp.

3. (1) Desk chair.

4. (8) Folding chairs.

5. (1) 4-section lockable, fireproof file case.

6. (2) 5000 BTU air conditioners.

7. (1) 5-pound fire extinguisher.

8. (1) Industrial type first aid kit.

9. (1) Coffee maker.

10. (1) Microwave/refrigerator combo.

11. (1) Water cooler/dispenser and five gallon water bottles for the duration of the contract.

12. (1) Photocopy/scanner capable of enlarging and reproductions of both 8.5”x11” and 11”x17” paper sizes, similar to model HP LaserJet Enterprise MFP M725 or approved equal.

13. Five-500 sheet reams of 8.5” x 11” copy paper.

14. Five-500 sheet reams of 11” x 17” copy paper.

15. Additional items listed in paragraph C below.

16. General Field Office Computer Equipment:

    a. High speed internet connection via cable modem or DSL, in that order of preference.

    b. All cables, routers, network connections, manuals, and associated equipment.

C. The Contractor shall maintain the offices during construction and remove them upon approved substantial completion. The cost for operation of the Engineer's and Contractor’s field offices shall be the responsibility of the Contractor and included into his Bid price. Operation and maintenance shall be construed at a minimum, to include: supplying paper towels, liquid hand sanitizing gel, copying paper, bottled water, coffee, paper cups, monthly utility costs, heating and cooling costs, restocking of the first aid kits, cleaning of the copier on a monthly basis and cleaning/house-keeping of the inside of the trailers on aweekly basis.

D. Contractor shall pay for all associated costs related to high-speed internet connection.

E. The Contractor shall furnish a parking area large enough to accommodate a minimum of ten cars adjacent to the offices.

PART 2 - PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

END OF SECTION 01500

SECTION 01610

DELIVERY, STORAGE, AND HANDLING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplemental Conditions, Division 0 and Division 1 Specification Sections, apply to this section.

1.2 SUMMARY OF WORK

A. This section specifies the general requirements for the delivery, handling, storage and protection for all items required in the construction of the Work. Specific requirements, if any, are specified with the related item.

1.3 TRANSPORTATION AND DELIVERY

A. Transport and handle items in accordance with manufacturer's printed instructions.

B. Schedule delivery to reduce long term on-site storage prior to installation and/or operation. Under no circumstances shall equipment be delivered to the Site more than one month prior to installation without written authorization from the Engineer.

C. Coordinate delivery with installation to ensure minimum holding time for items that are hazardous, flammable, easily damaged or sensitive to deterioration.

D. Deliver products to the Site in manufacturer's original sealed containers or other packing systems, complete with instructions for handling, storing, unpacking, protecting and installing.

E. All items delivered to the Site shall be unloaded and placed in a manner which will not hamper the Contractor's normal construction operation or those of subcontractors and other Contractors and will not interfere with the flow of necessary traffic.

F. Provide equipment and personnel to unload all items delivered to the Site.

G. Promptly inspect shipment to assure that products comply with requirements, quantities are correct, and items are undamaged. For items furnished by others (i.e. Owner, other Contractors), perform inspection in the presence of the Engineer. Notify Engineer verbally, and in writing, of any problems.

1.4 STORAGE AND PROTECTION

A. Store and protect products in accordance with the manufacturer's printed instructions, with seals and labels intact and legible. Storage instruction shall be studied by the Contractor and reviewed with the Engineer. Instructions shall be carefully followed and

a written record of this kept by the Contractor. Arrange storage to permit access for inspection.

B. Store loose granular materials on solid flat surface in a well-drained area. Prevent mixing with foreign matter.

C. Cement and lime shall be stored under a roof and off the ground and shall be kept completely dry at all times. All structural, miscellaneous and reinforcing steel shall be stored off the ground or otherwise to prevent accumulation of dirt or grease, and in a position to prevent accumulations of standing water and to minimize rusting. Beams shall be stored with the webs vertical. Precast concrete shall be handled and stored in a manner to prevent accumulations of dirt, standing water, staining, chipping or cracking. Brick, block and similar masonry products shall be handled and stored in manner to reduce breakage, cracking and spalling to a minimum.

D. All mechanical and electrical equipment and instruments subject to corrosive damage by the atmosphere (even though covered by canvas) shall be stored in a weathertight building to prevent injury. The building may be a temporary structure on the site or elsewhere, but it must be satisfactory to the Engineer. Building shall be provided with ventilation to prevent condensation. Maintain temperature and humidity within range required by manufacturer.

PART 2 - PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

END OF SECTION 01610

SECTION 01700

CONTRACT CLOSEOUT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplemental Conditions, Division 0 and Division 1 Specification Sections, apply to this section.

1.2 SUMMARY OF WORK

A. This section specifies administrative and procedural requirements for project closeout, including but not limited to:

1. Closeout procedures.

2. Final cleaning.

3. Adjusting.

4. Record Documents.

1.3 RELATED WORK

A. Cleaning up requirements are included in Cleaning Up Section 01710.

B. Requirements for Substantial and Final Completion Procedures are included in Article 14 of Standard General Conditions Section 00700.

1.4 CLOSEOUT PROCEDURES

A. Submit written certification that Contract Documents have been reviewed, Work has been inspected, and that Work is complete in accordance with Contract Documents and ready for Engineer's inspection.

B. Provide submittals to Engineer that are required by governing or other authorities.

C. Submit final Application for Payment identifying total adjusted Contract Sum, previous payment, and sum remaining due.

D. Submit all warranties (as applicable).

E. Submit written notice that all subcontractors and suppliers have been paid in full.

F. Submit written notice showing the disposition of all insurance filings and claims.

G. Copy of “Statement of Compliance” filed with the Division of Labor and Workforce Development, as required under the State Wage Rate Provisions.

1.5 RECORD DOCUMENTS

A. Maintain on Site, one set of the following documents; actual revisions to the Work shall be recorded in these documents:

1. Contract Drawings

2. Specifications

3. Addenda

4. Change orders and other Modifications to the Contract

5. Reviewed Shop Drawings, product data, and samples.

6. Written interpretations and clarifications.

7. Field orders.

8. Field test reports properly verified.

9. Upon completion of the project Record Drawings shall be submitted to the Engineer.

B. Store As-built Documents separate from documents used for construction.

C. Record information concurrent with construction progress.

D. Specifications: Legibly mark and record at each Product section description of actual Products installed, including the following:

1. Manufacturer’s name, address and telephone number and product model and serial number.

2. Product substitutions or alternates utilized.

3. Changes made by Addenda and Modifications.

E. Contract Drawings and Shop Drawings: Legibly mark each item to record actual construction including:

1. Measured horizontal and vertical location of excavation limits referenced to permanent surface bounds.

2. Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.

3. Measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of the Work.

4. Field changes of dimension of detail.

5. Details not on original Contract Drawings.

1.6 FINAL CLEANING

A. Complete the following cleaning operations before requesting inspection for Certification of Substantial Completion.

1. Clean the Site, including landscape development areas, of rubbish, litter and other foreign substances. Sweep paved areas broom clean; remove stains, spills and other foreign deposits. Rake grounds that are neither paved nor planted, to a smooth even-textured surface.

1.7 ADJUSTING

A. Adjust operating products and equipment to ensure smooth and unhindered operation.

PART 2 - PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

END OF SECTION 01700

SECTION 01710

CLEANING UP

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplemental Conditions, Division 0 and Division 1 Specification Sections, apply to this section.

1.2 SUMMARY OF WORK

A. During its progress, the Work and the adjacent areas affected thereby shall be cleaned up and all rubbish, surplus materials, and unneeded construction equipment shall be removed and all damage repaired so that the public and property owners will be inconvenienced as little as possible.

B. Where material or debris has washed or flowed into or been placed in existing watercourses, ditches, gutters, drains, pipes structures, Work done under this Contract, or elsewhere during the course of the Contractor's operations, such material or debris shall be entirely removed and satisfactorily disposed of during the progress of the Work, and the ditches, channels, drains, pipes, structures, and Work, etc., shall, upon completion of the Work, be left in a clean and neat condition.

C. On or before the completion of the Work, the Contractor shall, unless otherwise especially directed or permitted in writing, tear down and remove all temporary buildings and structures built by him; shall remove all temporary Works, tools, and machinery or other construction equipment furnished by him; shall remove, acceptably disinfect, and cover all organic matter and material containing organic matter in, under, and around privies, houses, and other buildings used by him; shall remove all rubbish from any grounds which he has occupied; and shall leave the roads and all parts of the premises and adjacent property affected by his operations in a neat and satisfactory condition.

D. The Contractor shall thoroughly clean all materials and equipment installed by him and his subcontractors, and on completion of the Work shall deliver it undamaged and in fresh and new-appearing condition.

E. The Contractor shall restore or replace, when and as directed, any public or private property damaged by his Work, equipment, or employees, to a condition at least equal to that existing immediately prior to the beginning of operations. To this end the Contractor shall do as required all necessary driveway, walk, retaining wall, hardscape, and landscaping Work. Suitable materials, equipment, and methods shall be used for such restoration. The restoration of existing property or structures shall be done as promptly as practicable as Work progresses and shall not be left until the end of the Contract period.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION 01710

SECTION 01740

WARRANTIES AND BONDS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplemental Conditions, Division 0 and Division 1 Specification Sections, apply to this section.

1.2 SUMMARY OF WORK

A. This Section specifies general administrative and procedural requirements for warranties and bonds required by the Contract Documents, including manufacturers' standard warranties on products and special warranties.

1.3 RELATED WORK

A. Refer to General Conditions of the Contract for the general requirements relating to warranties and bonds.

B. General closeout requirements are included in Section 01700 - Contract Closeout.

C. Specific requirements for warranties for the Work and products and installations that are specified to be under warranty are included in the individual Sections of Divisions 2 and 3.

D. Certifications and other commitments and agreements for continuing services to Owner are specified elsewhere in the Contract Documents.

1.4 SUBMITTALS

A. Submit written warranties to the Owner prior to the date fixed by the Engineer for Substantial Completion. If the Certificate of Substantial Completion designates a commencement data for warranties other than the date of Substantial Completion for the Work, or a designated portion of the Work, submit written warranties upon request of the Owner.

B. When a designated portion of the Work is completed and occupied or used by the Owner, by separate agreement with the Contractor during the construction period, submit properly executed warranties to the Owner within fifteen days of completion of that designated portion of the Work.

C. When a special warranty is required to be executed by the Contractor, or the Contractor and a subcontractor, supplier or manufacturer, prepare a written document that contains

appropriate terms and identification, ready for execution by the required parties. Submit a draft to the Engineer for approval prior to final execution.

D. Refer to individual Sections of Divisions 2 and 3 for specific content requirements, and particular requirements for submittal of special warranties.

E. At Final Completion, compile two copies of each required warranty and bond properly executed by the Contractor, or by the Contractor, subcontractor, supplier, or manufacturer. Organize the warranty documents into an orderly sequence based on the table of contents of the "Warranties and Bonds" binder.

F. Bind warranties and bonds in heavy-duty, commercial quality, durable 3-ring vinyl covered loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2-in. by 11-in. paper.

G. Table of Contents: Neatly typed, in the sequence of the Table of Contents of the "Warranties and Bonds" binder, with each item identified with the number and title of the specification Section in which specified, and the name of the product or work item.

H. Provide heavy paper dividers with celluloid covered tabs for each separate warranty. Mark the tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product, and the name, address and telephone number of the installer, supplier, and manufacturer.

I. Identify each binder on the front and the spine with the typed or printed title "WARRANTIES AND BONDS," the Project title or name, and the name, address, and telephone numbers of the Contractor and equipment supplier.

J. When operating and maintenance manuals are required for warranted construction, provide additional copies of each required warranty, as necessary, for inclusion in each required manual.

1.5 WARRANTY REQUIREMENT

A. Related Damages and Losses: When correcting Work under warranty that has failed, remove and replace other Work that has been damaged as a result of such failure or that must be removed and replaced to provide access for correction of Work under warranty.

B. Reinstatement of Warranty: When Work covered by a warranty has failed and been corrected by replacement or rebuilding; reinstate the warranty by written endorsement. The reinstated warranty shall be equal to the original warranty with an equitable adjustment for depreciation.

C. Replacement Cost: Upon determination that Work covered by a warranty has failed, replace or rebuild the Work to an acceptable condition complying with requirements of Contract Documents. The Contractor is responsible for the cost of replacing or rebuilding

defective Work regardless of whether the Owner has benefited from use of the Work through a portion of its anticipated useful service life.

D. Owner's Recourse: Written warranties made to the Owner are in addition to implied warranties, and shall not limit the duties, obligations, rights and remedies otherwise available under the law, nor shall warranty periods be interpreted as limitations on time in which the Owner can enforce such other duties, obligations, rights or remedies.

E. Rejection of Warranties: The Owner reserves the right to reject warranties and to limit selections to products with warranties not in conflict with requirements of the Contract Documents.

F. The Owner reserves the right to refuse to accept Work for the Project where a special warranty, certification, or similar commitment is required on such Work or part of the Work, until evidence is presented that entities required to countersign such commitments are willing to do so.

G. Disclaimers and Limitations: Manufacturer's disclaimers and limitations on product warranties do not relieve the Contractor of the warranty on the Work that incorporates the products, nor does it relieve suppliers, manufacturers, and subcontractors required to countersign special warranties with the Contractor.

1.5 DEFINITION

A. Standard Product Warranties are pre-printed written warranties published by individual manufacturers for particular products and are specifically endorsed by the manufacturer to the Owner.

B. Special Warranties are written warranties required by or incorporated in the Contract Documents, either to extend time limits provided by standard warranties or to provide greater rights for the Owner.

PART 2 - PRODUCTS - (NOT USED)

PART 3 - EXECUTION - (NOT USED)

END OF SECTION 01740

SECTION 01850

TRAFFIC MANAGEMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplemental Conditions, Division 0 and Division 1 Specification Sections, apply to this section.

B. The Massachusetts Department of Transportation Construction Standards, most recent version, shall apply to all materials furnished under this section. When conflicts arise between this specification and the Construction Standards, the Contractor shall coordinate with the Owner and/or Engineer for a final decision.

1.2 SUMMARY OF WORK

A. This section includes the following:

1. Pedestrian, vehicular traffic and other safety control devices, construction signs, requirements, and management for the protection of the traveling public and working personnel during construction and related operations.

2. Establishing, maintaining, and removing detour routes as shown on the Plans or as directed by the Owner and/or Engineer in order to perform the proposed construction.

3. The design, application, and installation of all devices required by this section shall conform to the requirements of the Manual on Uniform Traffic Control Devices (MUTCD) latest edition, Part VI, published by the Federal Highway Administration (FHWA), the Massachusetts Amendments to the MUTCD latest edition, MassDOT Work Zone Safety Guidelines for Massachusetts Municipalities and Contractors, MassDOT Construction and Traffic Standard Details (1996), Americans with Disabilities Act (ADA), and the Massachusetts Department of Transportation Standard Specifications for Highways and Bridges with all subsequent Special Provisions and Supplemental Specifications, hereinafter referred to as the “MassDOT Standard Specifications”, Section 850, and MassDOT “Standard Details and Drawings for the Development of Temporary Traffic Control Plans”, except as modified herein.

4. Traffic management during construction and maintenance operations includes installing and maintaining temporary vehicular, pedestrian and construction facilities, furnishing, installing, inspecting, positioning, repositioning, and removing channelization devices necessary to maintain

pedestrian and vehicular traffic during construction and fencing of excavations as required for the protection of the public and all project personnel.

5. All construction vehicles not protected by any form of traffic control device on a project which is open to traffic shall have an amber flashing light mounted on the cab roof or on the highest practical point of the machinery. The light shall be in operation whenever the equipment is working on the highway or travelled way. Amber flashers must be a minimum of 40 candelas and have a flashing frequency of 50 to 60 times per minute. Either rotating beacons or strobe lights meeting these requirements are acceptable.

6. All materials provided by the Contractor under the items of this section shall remain the property of the Contractor upon completion of the project, unless otherwise specified below.

7. Any traffic management and traffic detours proposed by the Contractor shall be subject to approval by the Owner and/or the Engineer. The Contractor shall provide detailed Traffic Management Plans and detour maps indicating the proposed detour routes, all proposed signs, the proposed hours of operation, the proposed locations of police detail officers and barricades for each phase of construction two weeks before the intended implementation date for approval by the Owner and/or the Engineer. Work shall not proceed without specific notice to and approval of the Owner and/or the Engineer. Any detours or changes in normal traffic patterns or road closures shall be coordinated by the Contractor with the Owner and/or Engineer, local Police Department, and Fire Department.

8. "Approved by the Owner" throughout this Section shall mean the approval of the Town of Nantucket.

1.3 HOURS OF OPERATION

A. Refer to Section 01630 Miscellaneous Requirements for work hour requirements.

B. Construction shall be coordinated around other nearby construction projects and heavy seasonal traffic which may further prohibit construction in the streets during certain periods to retain adequate circulation. The Contractor shall not have any claim for the extension of time for the completion of work under this contract as a result of the restriction.

1.4 SUBMITTALS

A. Shop Drawings: Contractor shall submit the following in accordance with

Section 01300 – SUBMITTAL PROCEDURES:

1. Traffic Management Plans: Where designs for pedestrian and traffic control devices are not specification indicated on the Contract Drawings or for any variations from the Traffic Management Plans on the Contract Drawings, the Contractor shall prepare and submit to the Owner and/or Engineer for approval, a traffic management plan, complete with details of the proposed methods, including materials for approval two weeks before implementation. This includes but is not limited to road closures and detour routes for each phase of construction including time periods of work, temporary pedestrian and construction facilities, locations of signage, portable changeable message signs, police and other traffic control devices to maintain traffic and access to abutting properties.

2. Shop Drawings

    a. Submit complete shop drawings for traffic management plans, including temporary pedestrian sidewalks and driveways, as needed, certified by a Professional Engineer registered in the Commonwealth of Massachusetts.

    b. Show on the shop drawings all materials, including traffic control devices, signs and methods of installation.

    c. Include with the shop drawings alignment tapers, lane widths, police detail locations, temporary pavement markings, barriers and traffic control device spacing.

    d. The Contractor shall submit in writing proposed road closures and anticipated detour routes and signage based on the provided information for approval two weeks prior to implementation.

3. Safety Signing for Construction Operations. Where not indicated on the Contract Drawings, the Contractor shall submit temporary traffic management plans and sign placement and size sketches showing the proposed sign setups he intends to use to provide the necessary traffic control and protection during the progress of the work, plus the sign and legend size and layout. These sketches shall also be submitted to the Owner and/or Engineer for review and approval two weeks before work begins. Particular care shall be taken to establish and maintain methods and procedures that will not create unnecessary or unusual hazards to public safety. Traffic control devices required only during working hour operations shall be removed and the appropriate signs shall be covered at the end of each working day.

4. The Contractor shall submit to the Owner and/or Engineer the information required by this section a minimum of two weeks prior to the start of construction and prior to the start of construction at any new location

throughout the duration of Work under this Contract for approval. Work shall not proceed without specific notice to and approval of the Owner and/or Engineer.

1.5 QUALITY ASSURANCE

A. Provide in accordance with Section 01400.

1.6 DELIVERY, STORAGE AND HANDLING

A. Provide in accordance with Section 01610 and as specified.

B. No material shall be stored within the work area or on adjacent roadways or residential streets except which is needed for work being performed for that day.

1.7 TRAFFIC CONTROL REQUIREMENTS

A. The Contractor shall meet the following conditions, unless otherwise specifically approved by the Owner and/or Engineer:

1. All Work shall be prosecuted with proper regard for the convenience of the Public and in a manner to permit unimpeded traffic flow whenever possible. The interruption of traffic will not be permitted unless specifically allowed by the Owner and in accordance with the requirements of the Owner and/or Engineer and in conformance with MUTCD requirements.

2. Traffic control devices and signs shall be removed, demounted or properly covered for those periods of the day not in use or not applicable.

3. The Contractor shall not close or obstruct any portion of a street, road, or private way without obtaining permits therefore from the proper authorities. If any street, road or private way shall be rendered unsafe by the Contractor's operations, he shall make such repairs or provide such temporary ways or guards without delay that are acceptable to the Owner and/or Engineer.

4. Streets, roads, private ways, and walks under construction and not closed shall be maintained passable and safe at all times by the Contractor, who shall assume and have full responsibility for the adequacy and safety of provisions made therefore.

5. The Owner and/or Engineer shall be notified of any re-routing of traffic two weeks in advance. Approval must be obtained from the Owner and/or Engineer prior to any rerouting of traffic (except emergencies). Following receiving approval form the Owner and/or Engineer, it will be the Contractors responsibility to coordinate with other agencies or

departments including Police and Fire Department in writing a minimum of 72 hours prior to road closures. This will include providing the Police Department, Fire Department and Department of Public Works with the following information:

a. A list of streets and intersections where work will be in progress to be supplied at intervals as required by the Owner and/or Engineer.

b. Immediate notification of any utility breaks.

6. The Contractor is responsible for notifying abutters of anticipated construction adjacent to their property and the anticipated temporary alterations in circulation through distribution of written notices 72 hours in advance.

7. No operations shall be conducted, including the loading or unloading of vehicles, on or near the traveled lanes or road shoulders without first erecting warning signs and channelizing devices as directed. These precautions shall be maintained at all times while work is in progress.

8. Construction signs and channelizing devices shall be used to separate traffic from the work areas and for traffic control. Placement, other than as shown in the Contract Drawings or the MUTCD, will require prior approval from the Owner and/or Engineer.

9. Temporary signs and channelizing devices shall not be set up until there is adequate visibility or appropriate construction lighting. The Contractor shall schedule his work so that temporary signs and channelizing devices are removed and traffic is returned to its normal pattern before the end of the work period.

9. Work operations shall not be performed on the roadway in such a manner that traffic is obstructed or endangered from either side of the roadway.

10. The Contractor shall keep all roadway areas open to traffic as clear as possible at all times. Materials shall not be stored on any roadway area or within 10 ft. of the traveled way. Material shall be delivered to the installation areas as they are needed to provide a continuous installation. Location of storage areas shall be subject to approval.

11. The Contractor shall remove all equipment and construction vehicles from the traveled way and shoulders open to traffic during non-work hours. Vehicles shall be parked no closer than 10 feet from the traveled way in pre-approved areas unless specifically permitted.

12. Temporary signs and channelizing devices shall not be set up in inclement weather.

13. The Contractor shall provide necessary, unimpeded access for fire apparatus and other emergency vehicles through the work zones to abutting properties at all times.

14. Sweeping and cleaning of surfaces beyond the limits of the project required cleaning up material caused by spillage or vehicular tracking during the various phases of the work shall be considered as incidental to the work being performed under the Contract and there will be no additional compensation. Sweeping and cleaning shall be done daily.

1.8 EXCAVATIONS

A. The Contractor shall excavate for the amount of work to be completed and subsequently backfilled that same day. Open excavations shall not remain open through non-work hours, unless prior approval is obtained from the Owner and/or Engineer.

B. All open excavations shall be adequately safe guarded by providing temporary barricades, caution signs, lights and other means to prevent accidents to persons, and damage to property. The length of open trench will be controlled by the particular surrounding conditions, but shall always be confined to the limits prescribed by the Owner and/or Engineer. If the excavation becomes a hazard, or if it excessively restricts traffic at any point, special construction procedures shall be taken, such as limiting the length of open trench.

C. The Contractor shall not enter upon or occupy with men, tools, equipment or materials any property outside the rights-of-way or property of the Owner, except after the written consent of the Owner and/or Engineer.

D. The Contractor shall erect substantial barriers at the ends of open ditches; stockpiled construction materials or other obstructions and shall erect warning signs and provide adequate lights or flares to guard the barriers, trenches, and excavation.

E. At the end of each work day the Contractor shall fill in all open trenches, test pits or other excavations. Steel plates shall only be used with the approval of the Owner and Engineer. Steel plates shall be of adequate strength to carry traffic. Per Construction Drawings, steel plate strength shall be approved by the Engineer or the Owner. The roadway shall be free of construction debris and excavated material and shall be relatively smooth to provide safe passage.

F. At the end of each work week, backfilled excavations shall be paved with hot mix asphalt in accordance with the Drawings and Section 02576 of these specifications. Temporary paint pavement markings that match the existing markings disturbed by the excavation shall be applied to the new pavement in accordance with the MassDOT Standard Specifications and MUTCD.

1.9 COORDINATION OF WORK AREAS

A. The Contractor shall be responsible for the coordination of his/her work with all utility or roadway work being performed by the Town and/or utility owners in relation to this project or projects near this project in order to retain adequate circulation throughout the area. The Contractor shall phase all Work in a manner that will provide positive and safe through movement of traffic passing the construction site.

1.10 ACCESS TO PROPERTIES

A. At least one serviceable driveway access to all residences and businesses within the project shall be maintained at all times.

B. The Contractor shall coordinate the work with the schedules of delivery trucks to the adjacent stores and property owners so as not to impede their access.

1.11 HAULING

A. The Contractor is advised that all roads and bridges within or adjacent to the project shall be subject to legal loads and vehicles.

B. The Contractor is advised that no agreements have been made by the Town of Nantucket or the MassDOT with surrounding cities or towns to relieve the Contractor of liability for damage to local roads and bridges caused by the Contractor's operation. The Contractor shall contact appropriate officials of the surrounding cities or towns concerning hauling over city or town roads and bridges.

C. The Contractor shall furnish 60" x 30" approved signs reading "CONSTRUCTION VEHICLE - DO NOT FOLLOW" to be used on trucks hauling to the project, when such signs are deemed necessary by the Engineer. The color, type of sheeting and size of lettering shall conform to that of the permanent construction signs.

D. Each driver of any vehicle used on this contract shall be furnished written instructions concerning the manner of operation for that vehicle. Specifically, these instructions shall warn against stopping on the traveled portions of the roadway, against passing other vehicles, and against traveling in close proximity to other vehicles. A copy of these instructions shall be given to the Engineer.

1.12 DETOUR ROUTE

A. Temporary detours routes will not be permitted without prior approval by the Owner. Contractor shall submit detour routes and Traffic Management Plans to the Owner and/or Engineer for approval a minimum of two weeks prior to

anticipated implementation.

B. The Contractor shall coordinate and time construction with other construction projects nearby to maintain adequate circulation.

C. Temporary traffic control devices installed prior to the detour shall be covered or rendered inoperative until the detour begins. Temporary traffic control devices no longer needed after the last day of the detour shall be covered until they are removed.

D. Portable Changeable Message Signs (PCMS) will be in place and operational one week prior to anticipated construction to warn drivers of altered circulation patterns. Locations and messages for PCMS's will be shown on the Contractor's submitted Traffic Management Plans and as approved by the Owner and/or Engineer.

E. The Contractor shall cover all existing traffic signs that are in conflict with the detour route. Existing pavement markings that conflict with detour traffic shall be removed in accordance with the MassDOT Standard Specifications, Section 850.

F. Upon completion of the detour, the Contractor shall restore all pavement markings to the existing conditions and uncover existing traffic signs.

G. It is the intent of the project to maintain a minimum of one lane of traffic during construction.

1.13 PEDESTRIAN TRAFFIC

A. Sidewalks shall be maintained at all times throughout the construction period. Temporary sidewalks, pedestrian detours, and pedestrian and construction facilities shall be constructed as needed to maintain pedestrian traffic and business access, as shown on the Plans or as directed by the Owner and/or Engineer. Walkways of 5 feet minimum width (not including curb width) will be provided at all times unless otherwise approved by the Owner and/or Engineer. All permanent and temporary sidewalk construction shall be in accordance with ADA requirements including clearance around obstructions, slopes, and alignments.

B. Pedestrian access will be provided to abutting land uses such as residences and businesses at all times, as approved by the Owner and/or Engineer and in accordance with ADA requirements.

C. Temporary pedestrian walkways shall be separated from roadway and constructed areas by barricades as approved by the Owner and/or Engineer.

1.14 CONSTRUCTION AND ADVANCE WARNING SIGNS

A. Construction and advance warning signs shall be in accordance with the MUTCD, MassDOT Standard Specifications, Section 850 – Traffic Controls for Construction and Maintenance Operations and the provisions of this Section.

B. Construction and advance warning signs shall be replaced, covered, uncovered, furnished, positioned, repositioned, inspected, maintained, and removed as often as necessary and or directed by the Owner and/or Engineer, including regulatory, warning, and guide signs and temporary bus stop signs and taxi stop signs and their supports.

C. All signs which are damaged or are missing from their location will be replaced by the Contractor without additional compensation.

D. All signs will be maintained by the Contractor in a satisfactory manner including the removal of dirt or road film that causes a reduction in sign retroreflectivity.

E. Special construction signs will be furnished and installed by the Contractor during the work to improve traffic flow or safety, as directed by the Owner and/or Engineer.

1.15 TRAFFIC CONTROL DEVICES

A. Install, inspect, maintain, reposition and remove all temporary traffic control devices and construction elements as often as necessary and as directed by the Owner and/or Engineer in accordance with an approved construction staging sequence and traffic management plan.

B. Materials required for the work of this Section need not be new, but must be in first-class condition and acceptable to the Owner and/or Engineer and meeting requirements set for the MUTCD and MassDOT standards. Any materials, that in the judgment of the Owner and/or Engineer, are unsatisfactory in appearance or performance shall be removed and immediately replaced by the Contractor with acceptable units.

C. All traffic control devices shall be in accordance with MassDOT Standard Specifications, Section 850 and the provisions of this Section.

D. Temporary Safety Signing

1. Safety Signing shall consist of furnishing, positioning, repositioning, covering and uncovering, maintaining and removing, as needed and/or as directed: regulatory, warning, and guide signs together with their supports. If additional supports are needed due to site conditions they will be considered incidental to the work.

2. Any temporary safety sign no longer applicable shall either be removed

or covered as soon as possible.

3. No temporary safety sign shall be visible to traffic that may conflict with actual roadway conditions.

4. Signs over 50 square feet will require approval of design calculations and shop drawings of the breakaway support system if the signs are installed at an unprotected location.

5. Site conditions including signage will be returned to pre-construction conditions at the completion of that phase of construction.

E. Sign Covers

1. Cover any existing regulatory and warning signs as necessary and as directed by the Owner and/or Engineer.

2. Use a cover approved by the Owner, which shall be securely fastened to the existing sign and shall completely cover the legend of the existing sign. The cover shall remain in place as long as necessary at which time it shall be promptly removed.

3. Signs shall be covered without causing any damage to the existing sign. Damaged signs will be replaced by Contractor at no additional cost to the Owner.

F. Temporary Pavement Markings

1. Temporary Pavement Markings shall consist of furnishing, applying, maintaining and removing temporary white and yellow reflectorized pavement markings during construction and maintenance operations.

2. Temporary markings shall be effective for a period of 90 days. Re-application or replacement within the 90 day period shall be done at no additional cost to the Owner.

G. Pavement Marking Removal

1. Pavement Marking Removal shall consist of removing existing pavement markings no longer applicable as required to support the Traffic Management Plan through the approved techniques outlined, or as directed by the Owner and/or Engineer.

H. Arrow Board

1. Arrow Board shall consists of providing, operating, positioning, repositioning, maintaining and removing a portable truck-mounted or trailer-mounted flashing arrow unit on the project at designated locations

as shown on the approved traffic management plans or as directed.

I. Reflectorized Drums

1. Reflectorized Drums consists of furnishing, positioning, repositioning, maintaining, and removing reflectorized plastic drums and necessary ballast, as needed and/or as directed by the Engineer including locations of lane closures, shifting traffic, road closures, channelizing or otherwise re-directed traffic. The use of cones will not be permitted.

2. Traffic Drums shall conform to Drawing No. TR.7.1 of the MassDOT Construction and Traffic Standard Details, 1996 edition and MUTCD.

J. Pavement Marking Removal

1. Pavement Marking Removal shall consist of removing existing pavement markings as required to support the Traffic Management Plan or as directed through the approved techniques, outlined.

K. Temporary Barrier

1. Temporary Barrier shall consist of furnishing, installing, maintaining and final removal of temporary barriers, including delineation, for traffic control or work zone protection in construction zones. This barrier shall be continuous as a unit across bridges and other limited construction areas unless designated on the plans as "Temporary Restrained Barrier."

2. Vehicular traffic within 30 feet of the travelled way shall not be exposed to blunt ends of barrier without acceptable impact attenuators with delineation.

3. Temporary Barrier shall be removed, transported and reset from the alignments established along the roadway to new alignments as required by the construction and staged construction operations for the control of traffic or work zone protection.

4. Temporary Barrier shall be installed where required by the Owner to protect the work zones and excavations, which cannot be completed and backfilled within a daily work period. Barriers shall be removed when no longer required.

5. Temporary barrier for use for temporary pedestrian and construction facilities shall have three (3) sleeves cast in each section of barrier to receive a post for panel and fence installations.

6. Temporary barrier shall conform to Drawing Nos. E403.1.0 to E403.7.0 of the MassDOT Construction Standard Details dated June 2014 with the latest revision.

L. Temporary Restrained Barrier

1. Temporary Restrained Barrier shall consist of furnishing, installing, removing, transporting, resetting, maintaining and final removal of temporary restrained barriers on bridge decks and other locations including delineation, in accordance with details as shown on the traffic management plans and/or bridge plans and as directed by the Owner and/or Engineer.

2. The work shall also include furnishing and installing all hardware and associated materials necessary to restrain the barriers in position, or attach the barriers to the roadway or the bridge deck.

3. Only barrier systems that have been crash tested and approved by FHWA are acceptable for the intended use.

M. Portable Breakaway Barricades Type III

1. Portable Breakaway Barricades Type III shall consist of furnishing, positioning, transporting, repositioning, maintaining, and final removal of portable barricades as shown on the approved traffic management plan or as directed by the Owner and/or Engineer.

2. Barricades shall be maintained in good and serviceable condition throughout the duration of the Contract.

N. Temporary Impact Attenuators

1. Temporary Impact Attenuators shall consist of furnishing, installing, removing, relocating, reinstalling, maintaining, and final removal of temporary impact attenuators in conformance with the specifications of the manufacturer and MassDOT.

O. Truck Mounted Attenuator

1. Truck Mounted Attenuator shall consist of furnishing a moveable impact attenuator equipped with a flashing arrow board. The impact attenuator can be either a truck-mounted or a tow-behind unit and shall conform with the specifications of the manufacturer and MassDOT.

P. Temporary Fence

1. Temporary fence shall consist of furnishing and installing, removing and resetting and the dismantling of 6-foot high temporary fence to separate construction activities from public access and as determined and required by the Owner and/or Engineer.

2. The temporary fence shall be constructed at locations as directed by the Owner and/or Engineer. The Contractor shall install and maintain temporary construction fences around the construction site, stockpile areas, and any and all exposed excavations located outside the defined roadway area, accessible to the public until such time it is no longer necessary as determined by the Owner and/or Engineer. Carefully protect all areas of the site from intrusion and trespass. Protect Public Health Safety and Welfare at all times.

3. The Contractor is responsible for relocating the fence as many times as required to properly protect construction activities.

1.16 POLICE DETAILS

A. The Contractor shall coordinate with the Owner, Police Department, and Engineer to determine daily uniformed police detail requirements for the control of pedestrians and vehicular traffic within the project area for each stage of construction.

B. The decision to use a police detail at a specific project location shall be shown on the traffic management plans approved by the Owner and/or Engineer or as directed by the Owner and/or Engineer.

C. Contractor is responsible for scheduling of all uniformed police details. The Police Department will invoice the Owner directly for accepted Police Details.

D. It is the Contractor's responsibility to cancel Police Details a minimum of twenty four hours in advance of the start of the shift if conditions so warrant. The Contractor will be responsible to reimburse the Police when the cancellation notice is not given by the Contractor in a timely fashion. Lateness or failure to show on the part of the Contractor or inclement weather shall not excuse the Contractor from the obligation to give adequate notice to the Police Department. Payment for Police Details not cancelled as required will be the responsibility of the Contractor.

E. Road closures shall not be allowed without prior permission of the Owner, Police Department, and Fire Department.

1.17 PERMITS

A. The Contractor shall be responsible for obtaining any permits to perform the work.

PART 2 - PRODUCTS

2.1. GENERAL

A. Devices required under this Section need not be new but must be in first class condition and acceptable to the Owner and/or Engineer. The condition of the work zone traffic control devices shall meet the quality standards set forth in the Quality Standards for Work Zone Traffic Control Devices compiled by the American Traffic Safety Services Association (ATSSA). Any devices that, in the judgment of the Owner, are unsatisfactory in appearance and/or performance shall be removed and immediately replaced by the Contractor with acceptable devices.

2.2. TRAFFIC CONTROL DEVICES

A. Temporary Safety Signing

1. Rigid signs shall be fabricated from plywood, aluminum or approved alternate substrate material.

2. Plywood sign material shall be 5/8 inch Exterior MDO – General (one sided).

3. Aluminum sign material shall be Type A, 0.08 inches thick as specified in MassDOT Standard Specification Subsection 828.42.

4. Route marker overlay on directional sign panels shall be fabricated from Aluminum Alloy 5052-H38 0.08 inches thick.

5. The entire sign face shall be retro-reflectorized. Reflective sheeting shall meet the requirements of ASTM D4956 and AASHTO M268, and as Flexible High Intensity Prismatic (HIP) Sheeting to ASTM Type VII or better.

6. Rollup signs shall be fabricated from vinyl microprismatic retroreflective material.

7. Background sheeting for all construction warning signs shall be of a fluorescent orange color. The minimum spectral radiance factor, in accordance with Section 5.1 of ASTM E991, for the fluorescence shall be as follows:

New	110% minimum
Weathered	60% minimum

B. Temporary Pavement Markings

1. Glass beads, tapes and paints used for temporary pavement markings shall be lead free, conform to MassDOT Standard Specification, Subsections M7.01.07, M7.01.16, M7.01.23 and M7.01.24, and meet the retroreflectivity requirements of the MUTCD for a period of 90 days. Final determination as to pavement marking quality shall be made by the Engineer. The Contractor shall supply a retroreflectometer for this

purpose.

2. The colors of the marking materials shall be the standard highway colors of white or yellow and as outlined in the MUTCD.

C. Arrow Board

1. The unit shall consist of a black background panel meeting the requirements of MUTCD Type C and shall contain at least 15 amber lamps of approximately 8,000 initial maximum candelas each.

2. Panels shall have the capability of the following mode selections: (1) left or right flashing or sequential arrows; (2) left or right sequential chevrons; (3) flashing double arrow; (4) flashing caution and (5) alternating diamond caution.

3. Panels shall automatically provide for a minimum of 50 percent dimming from their rated lamp voltage at night. The flashing rate of the lamps shall not be less than 25 or more than 40 flashes per minute.

4. Minimum mounting height should be 7 feet above the roadway to the bottom of the panel, except on vehicle-mounted panels, which should be as high as practicable.

5. The arrow board shall include a radar detector activator meeting its requirements.

D. Reflectorized Drums

1. Reflectorized drums shall be plastic and shall meet the applicable requirements of the MUTCD.

2. Reflective sheeting for drums shall meet the requirements of ASTM D4956 and AASHTO M268, and the Flexible High Intensity (H/I) Sheeting for ASTM Type VI and shall be six inches wide.

3. Reflectorized drums are listed on the MassDOT Qualified Construction Materials list.

4. The first five drums used for any taper or as designated on the Traffic Management Plan shall be equipped with flashing lights, or as directed by the Owner and/or Engineer.

E. Temporary Barrier

1. Temporary barriers shall be precast and manufactured in accordance with the plans and Section 629 of the MassDOT Standard Specifications.

2. The Contractor shall supply a barrier and anchorage system that was crash tested in accordance with NCHRP 350, TL-3 or MASH, TL-3 and accepted by FHWA.

F. Temporary Restrained Barrier

1. Temporary restrained barriers for use on roadways or on bridges shall be restrained by blocking or other system, affixed to the roadway by pinning, set into the roadway surface or other tested system or bolted down to the bridge deck, and shall be manufactured in accordance with the plans and Section 629 of the MassDOT Standard Specifications.

2. The Contractor shall supply a barrier and anchorage system that was crash tested in accordance with NCHRP 350, TL-3 or MASH, TL-3 and accepted by FHWA. The Contractor shall provide evidence of FHWA acceptance.

G. Portable Breakaway Barricades Type III

1. Portable Breakaway Barricades shall conform to the plans and the following requirements:

a. Portable breakaway barricades shall comply with the latest version of the MUTCD.

b. Reflectorized sheeting conforming to M9.30.0. Type VI. Pipe shall be Polyvinyl Chloride (PVC) pressure rated SDR 21 or SDR 26 ASTM D2241. Fittings may be PVC ASTM D2665 or Acrylonitrile Butadiene Styrene (ABS) ASTM D2661 (Drainage Waste and Vent).

c. The alternating 6 inch wide reflectorized diagonal stripe shall be orange and white and shall slope downward at 45º toward the end by which the traffic is to pass. Barricades that block the passage of traffic or designate the end of the traveled way shall have alternating vertical orange and white stripes on the rails.

H. Temporary Impact Attenuators

1. Only those Temporary Impact Attenuators previously approved for the purpose intended and listed on the Qualified Construction Materials List may be used.

2. The temporary impact attenuator shall be designed to fit within reasonably close tolerance of the dimensions given on the plans or in the special provisions for a given location.

3. The Contractor shall provide a design for temporary impact attenuator at the design speed shown on the plans or other speed designated by the

Engineer.

I. Truck-Mounted Attenuator

1. Only those truck mounted attenuators previously approved for the purpose intended and listed on the Qualified Construction Materials List may be used. Since most approvals are conditional, any associated issues including but not limited to anticipated conditions, model, variations, modifications, proper installation of truck-mounted units and tow-vehicle specifications shall be resolved to the satisfaction of the Engineer before use in the field. The submitted information shall include estimated displacement characteristics for a variety of impacts (assumptions regarding both impacting vehicle weight and speed) so that appropriate temporary traffic control set-ups can be undertaken in the field.

2. The flashing arrow board shall conform to the requirements of Section 2.4, Subsection D.

J. Temporary Fence

1. The type of temporary Chain link fence shall be Contractor's option with approval from the Owner.

2. The Contractor shall submit the type of temporary chain link fence to the Owner for approval prior to placing at the construction area. Following types are acceptable:

   a. New materials or previously used salvaged chain link fencing in good condition.

   b. Posts: Galvanized steel pipe of diameter to provide rigidity. Post shall be suitable for setting in concrete footings, driving into ground, anchoring with steel base plates, or inserting in precast concrete blocks.

   c. Fabric: Woven galvanized steel wire mesh. Provide in continuous lengths to be wire tied to fence posts or prefabricated into modular pipe-framed fence panels.

   d. Gates:
      i. Provide personnel and vehicle gates of the quantity and size required for functional access to site.

      ii. Fabricate of same material as used for fencing.

3. Fence fabric shall be fastened to posts by means of No. 6 gauge zinc coated wire clips. No post tops are required.

PART 3 - EXECUTION

3.1. TRAFFIC CONTROL DEVICES

A. Temporary Safety Signing

1. Signs which are damaged or are missing from their locations shall be replaced by the Contractor without additional compensation.

2. All signs shall be maintained in a satisfactory manner including the removal of dirt or road film that causes a reduction in sign retroreflectivity.

3. All signs shall be mounted in compliance with the requirements of the MUTCD.

4. All signs not consistent with the use of the roadway shall be removed, completely covered, or turned away from traffic each day. In no case shall signs or their portable supports be left in the traveled way when the traffic management set-up has been removed.

5. Rollup signs shall only be used for single work shift setups.

B. Temporary Pavement Markings

1. The Contractor shall install all necessary temporary pavement markings prior to opening the roadway to traffic following the completion of each day's operations. The Contractor shall make all necessary arrangements for this work beforehand so that it may be properly coordinated with construction operations. Temporary pavement markers shall be installed in accordance with the requirements of the MUTCD.

C. Arrow Board

1. The arrow board shall be deployed as shown on the approved Traffic Management Plan or as directed. The unit shall be properly maintained throughout its use on the project.

D. Reflectorized Drums

1. Reflectorized drums are to be used as channeling devices in roadway work zones. The first five drums used for any taper or as designated on the Traffic Management Plan shall be equipped with flashing lights.

E. Temporary Barrier

1. The Temporary Barrier shall be installed where needed to provide

protection of work zone and as directed by the Owner and/or Engineer in accordance with these provisions.

2. Each run of temporary barrier units shall be fastened together to form a continuous chain.

3. Temporary impact attenuators with delineation shall be installed at ends of barriers within 30 feet of the travelled way. The Contractor shall not leave a barrier leading-end unprotected.

4. Delineators shall be installed in conformance with manufacturer's recommendations on the barriers at their termini; at 20-foot intervals on tangent sections; and 10 foot intervals on curved sections depending on radius as determined by the Owner and/or Engineer.

5. Delineators mounted on top of barriers separating opposing traffic shall have two sided amber reflectors delineating the left edge. Side mounted delineators shall have amber delineating the left edge, white delineating the right edge and have red as the back color. If mounted on the sides they shall be 6 inches below the top and on the side of traffic. Delineators shall be mounted at angles that provide maximum reflectorization.

6. Temporary Barriers shall be removed from existing locations, transported, and reset as needed in accordance with above requirements, as directed by the Owner and/or Engineer.

F. Temporary Restrained Barrier

1. The Contractor shall ensure that where the restrained barrier is to be pinned to the roadway, the pin holes are filled with a sand mortar mix upon removal of the barrier. If the barrier is to be restrained by setting it into the roadway in a planned slot, the roadway surface shall be restored by appropriate full depth HMA or Cement Concrete roadway reconstruction.

2. The Contractor shall ensure that the restrained barrier is required or directed by the Owner and/or Engineer to be bolted to the bridge deck, the deck reinforcement will not be damaged during the installation of the proposed barrier anchor bolts. Any damage to the deck reinforcement, which occurs during the course of the Contractor's operations, shall be repaired to the satisfaction of the Engineer at the Contractor's expense.

3. Impact or percussion drills are allowed if no distress occurs to the existing concrete. Their use is subject to the approval of the Owner and/or Engineer.

4. If core drilling, the holes may be cored using either a carbide or diamond bit. The diameter of the cored holes shall be in accordance with the

recommendations of the resin manufacturer. If a diamond bit is used to core the holes in the proposed deck, a sandblast, high-pressure water blast, or other mechanical means must be used to properly roughen the inner surface of the holes. The type of abrasive surface roughening used shall be approved by the Owner and/or Engineer.

5. On the concrete deck all holes shall be blown clear of any debris prior to placement of resin. The Contractor shall have the approval of the Engineer signifying that the holes are clean prior to placing the resin adhesive. The Contractor shall strictly follow the recommendations of the manufacturer for mixing and placing the adhesive material prior to the placement of the bolts. The Contractor shall not place adhesive material when the existing concrete temperature is below 40°F. Any excessive resin adhesive around the hole after placement of the bolt shall be struck off smooth while the resin adhesive is still workable.

6. The anchor bolt holes shall be repaired as needed by methods acceptable to the Engineer at no additional cost to Owner. Damage to the concrete-to-remain shall be repaired to a condition equal to or better than that prior to the beginning of these operations, at no additional cost to the Owner.

7. High strength bolts shall be installed through pockets formed in the barriers and bonded in holes drilled in either the existing or proposed concrete deck. The bolts shall be suitably coated to facilitate removal from the mating threads of the cured resin adhesive once the barriers are no longer needed. The process of removing the bolts shall cause no distress to the proposed deck concrete.

8. The bolt embedment length and resin adhesive shall be adequate to develop a minimum of 36 Kips of tension in the bolts. The embedment length shall not be less than 6½" in concrete and shall not extend below the bottom of the proposed deck.

9. Where the condition of the existing deck is unsuitable due to deterioration or insufficient embedment depth, bolts extending through the deck and fastened to an appropriately sized steel member which will provide the required pull strength may be used.

10. The details of the proposed bolted anchorage system and all installation and removal procedures shall be in accordance with the recommendations of the manufacturer, and shall be submitted to the Engineer for approval.

11. Field tests shall be performed to verify the effectiveness of the anchorage detail including the drilled hole diameter, embedment length, and the resin adhesive capacity. Two test bolts in both the existing concrete and the new concrete shall be installed and tested by the Contractor for pullout as required by the system manufacturer. If the desired strength is not achieved, the Contractor shall adjust the hole size, embedment length, bolt

size, and/or adhesive material to meet this test requirement. Retesting as required by the Engineer shall be performed by the Contractor, at no additional cost to the Owner.

12. All testing shall be performed by the Contractor and is incidental to the work under this item. The method of applying the tension test load to the bolts shall be in accordance with ASTM E488. The testing equipment used and the locations and details of the test bolts shall be submitted to the Engineer for approval. The Contractor shall perform this test as soon as possible in order to eliminate delays in construction due to the approval process. Bolts shall not be ordered until the embedment lengths have been approved.

13. The delineators shall be single units, with yellow or white lenses on both sides, placed 6" below the top and on the traffic side of the median barrier at 20' on center. The delineators shall be the type designed expressly for this type of attachment and may be made entirely of plastic.

14. Temporary impact attenuators with delineation shall be installed at ends of barriers within 30 feet of approaching traffic. The Contractor shall not leave a barrier leading end unprotected.

15. Temporary Barriers on Bridge shall be removed from existing locations and reset in accordance with above requirements, as directed by the Engineer.

G. Portable Breakaway Barricades Type III

1. The Contractor shall furnish, set up, move and remove Portable Breakaway Barricades Type III as required or directed by the Engineer. Portable Breakaway Barricades Type III shall be maintained in a good and serviceable condition throughout the project and shall be moved from place to place as required during construction and as directed by the Owner and/or Engineer.

H. Temporary Impact Attenuators

1. Excavation for temporary attenuator foundations and anchorage shall be made to the required depth and to a width that will permit the installation and bracing of forms where necessary. All soft and unsuitable material shall be replaced with compacted gravel borrow.

2. The temporary impact attenuator shall be installed in accordance with the manufacturers' specifications and recommendations. Copies of these specifications and recommendations shall be provided to the Owner and/or Engineer.

3. Temporary Impact Attenuators damaged by traffic shall be replaced by

the Contractor within 24 hours or as directed by the Owner and/or Engineer.

4. Temporary Impact Attenuators Removed and Reset consists of removing temporary impact attenuators furnished above, relocating and re-installing it at new locations in accordance with the specifications and recommendations of the manufacturer.

I. Truck-Mounted Attenuator

1. The truck-mounted attenuator shall be utilized as shown on the plans or as directed by the Owner and/or Engineer, at the proper orientation and height above the paved surface.

2. A damaged truck-mounted attenuator shall not be used. Any repairs to the attenuator shall be accompanied by a statement from the product manufacturer certifying the repairs that were performed. Any work that becomes delayed due to the lack of a properly functioning truck-mounted attenuator will not constitute justification for an extension of time.

J. Pavement Marking Removal

1. The Existing pavement markings shall be removed to the fullest extent possible by an approved method. Pavement marking removal methods shall not cause damage to the pavement or cause drastic change in texture, which could be construed as delineation at night, and shall be approved by the Engineer. It is not permissible to paint over existing markings with black paint in lieu of removal. Approved methods include but are not limited to:

   a. High pressure air.

   b. High pressure water (cold weather use not permitted)

   c. Sand blasting,

   d. Mechanical devices such as grinders, sanders, scrapers, scarifiers and wire brushes.

2. Painting over a pavement marking line by use of asphaltic liquids or paints will not be permitted.

3. Conflicting pavement markings shall be removed before any change is made in the traffic pattern.

4. Material deposited on the pavement as a result of removing markings shall be removed as the work progresses. Accumulations of sand or other material, which might interfere with drainage or could constitute a hazard

to traffic, will not be permitted.

5. Any damage to the pavement or surfacing caused by pavement marking removal shall be satisfactorily repaired by the Contractor at no additional cost to the Owner.

6. Where the removal operation is being performed near a lane occupied by traffic, a vacuum attachment operating concurrently with the removal operation must be in use. All residue shall be removed immediately from the surface being treated.

7. Existing raised pavement markers shall be removed by a method approved by the Engineer. Any damage to the pavement or surfacing caused by pavement marking removal shall be repaired at no additional cost by methods acceptable to the Engineer. Voids in the pavement shall be filled with like materials with adhesive bonding to the substrate.

8. Following completion of construction, permanent pavement markings shall be installed to replace pre-construction makings to comply with MUTCD.

K. Temporary Fence

1. The Contractor shall install and maintain temporary construction fences at the location as directed by the Owner and/or Engineer.

2. Gates shall be fabricated using welded construction or heavy pressed steel or malleable corner fitting securely riveted. Gates shall be properly braced and diagonally trussed to eliminate any possible sagging. Hinges shall be of sufficient strength and design to permit easy and trouble free operation. All single swing gates shall be equipped with two H.O. hinges and one yoke latch per gate. All double swing gates shall be equipped with a positive type latching device with padlock fitting.

3. Installation of temporary fencing shall not deter or hinder access to existing or proposed fire hydrants. Maintain 3 feet diameter clear space around fire hydrants. Where fire hydrant is blocked by fencing, provide access gate markings with black paint in lieu of removal.

4. The Contractor shall replace fence due to construction accidents, vandalism and/or any other manner by the Contractor at no additional cost to the Owner.

END OF SECTION 01850

DIVISION 2

SITE WORK

INDEX

Section	Title	Page
02015	Geotechnical Instrumentation and Monitoring	02015-1
02020	Erosion and Sediment Control	02020-1
02050	Demolition, Modification, and Abandonment	02050-1
02060	Tree Protection	02060-1
02080	Soil and Waste Management	02080-1
02101	Site Investigation	02101-1
02140	Dewatering and Discharge	02140-1
02160	Temporary Excavation Support Systems	02160-1
02200	Earthwork	02200-1
02212	Rock Excavation	02212-1
02273	Geotextile Fabric	02273-1
02440	Sewer Cleaning and Inspection	02440-1
02538	Temporary By-Pass Sewage Pumping	02538-1
02570	Sewers, Manholes, and Appurtenances	02570-1
02576	Pavement Repair and Resurfacing	02576-1
02616	Ductile Iron Pipe and Fittings For Potable Water Systems	02616-1
02622	Polyvinyl Chloride (PVC) Pressure Pipe	02622-1
02630	Ductile Iron Pipe and Fittings For Sewer Force Main	02630-1
02640	Hydrants, Valves, and Appurtenances	02640-1
02700	Asbestos-Cement Pipe Removal and Disposal	02700-1
02721	Storm Drainage Systems	02721-1
02725	Water Service Connections	02725-1
02736	Temporary Water Bypass	02736-1
02750	Abandonment of Existing Pipe	02750-1
02901	Miscellaneous Work and Cleanup	02901-1
02920	Topsoil	02920-1
02945	Turf	02945-1

SECTION 02015

GEOTECHNICAL INSTRUMENTATION AND MONITORING

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplemental Conditions, Division 0 and Division 1 Specification Sections, apply to this section.

B. Examine all Drawings and all other Sections of the Specifications for Requirements therein affecting the work of this Section.

C. Coordinate work with that of all other trades affecting or affected by work of this Section. Cooperate with such trades to assure the steady progress of all work under the Contract.

1.2 SUMMARY

A. Work in this Section shall include, but not be limited to, all materials, equipment, labor, and services required to install, protect, replace, and monitor geotechnical instrumentation specified herein.

B. The work included in this section includes the following:

1. Furnish all materials, equipment and labor and install ground surface and structure monitoring points as described in the Specifications and as determined in the field by the Engineer. The Engineer will assist the Contractor in determining the final locations.

2. The Contractor shall retain the services of Geotechnical Monitoring Consultant to install, monitor, and maintain geotechnical instrumentation that includes but is not limited to temporary excavation support wall monitoring points, ground surface and structure monitoring points and crack gauges and vibrations. Monitoring frequency, except as described elsewhere in this Section, shall be, at a minimum of three times per week, for all instruments located within 100 feet (30.5m) from the edge of the excavation, during all excavation, backfill, and compaction, and installation of temporary earth support unless otherwise directed by the Engineer. Monitoring includes; crack gauges, temporary earth support monitoring points, ground surface and structure monitoring points. Vibration monitoring shall be performed continuously during all excavation, backfill, and compaction and installation of temporary earth support.

3. Monitoring frequency for ground surface monitoring points and the structure monitoring points shall be monitored no less than weekly until at least four (4) months following substantial completion of the project, or more frequently and for a longer duration as requested by the Engineer at no additional expense to the Owner.

4. The contractor shall assume the installation and monitoring of 100 crack gauges at the locations to be determined from the results of the pre- construction condition survey (Section 01390).

5. Furnishing and installing of additional geotechnical instrumentation as requested by the Engineer shall be the Contractor's responsibility and shall be done at no additional cost to the Owner.

6. Replace instrumentation damaged or made inaccessible by the construction operations at no additional cost to the Owner.

7. Provide vibration monitoring during pile driving of steel sheet piling for temporary excavation support or other aspects of the work.

8. Any corrective work required to restore structures to their original condition at the beginning of the project should monitoring of structures reveal settlement or movement that exceeds allowable values.

1.3 SUBMITTALS

A. Submit the following in accordance with Section 01300 – SUBMITTALS.

1. Shop drawings that indicate the instrumentation locations, sizes, material types, manufacturers' data and specifications, installation procedures, and other data. Provide description of work and materials, as necessary.

2. Contractor submittals shall be acceptable to the Engineer prior to undertaking the work. The Contractor shall forward submittals in advance considering that resubmittals may be required.

B. The Geotechnical Monitoring Consultant shall submit initial baseline survey data on a plan indicating locations and elevations of all instrumentation monitoring points to the Engineer at least three days prior to beginning of the installation of the excavation support wall and excavation operations. Baseline vibrations shall be obtained prior to the start of construction for a minimum 8-hour work day period at the locations shown on the Drawings.

C. The Geotechnical Monitoring Consultant shall submit subsequent survey data on all instrumentation monitoring points to the Engineer prior to the beginning of work the following day. A faster turnaround of data reporting may be

required by the Engineer if threshold or limiting response values, as specified in this Section, are approached or exceeded. Data shall be tabulated or depicted graphically on plots and show incremental and cumulative movement since the start of excavation.

D. A mitigation plan shall be submitted to the Engineer by the Contractor prior to any excavation and prior to the installation of the excavation support system. The mitigation plan shall detail the Contractor's course of action in the event threshold or limiting response values are met or exceeded.

1.4 QUALITY CONTROL

A. The Contractors instrumentation installations shall be in conformance with the details shown in the Drawings.

B. Retain the services of Geotechnical Monitoring Consultant to monitor the geotechnical instrumentation, which includes and is not limited to excavation support system, structure and ground surface monitoring points and crack gauges and vibrations. The consultant shall be a Geotechnical Engineer registered in the State of Massachusetts and shall have demonstrated at least 5 years' experience and at least three (3) projects of similar type, size, and complexity including installation and monitoring of structure and ground surface settlement monitoring points, lateral deformation points, vibrations with seismographs and crack gauges. The Geotechnical Monitoring Consultant shall be approved by the Engineer and must be approved two weeks prior to mobilization for construction. The Geotechnical Monitoring Consultant shall adhere to all methods and standards described in this Specification.

C. The Contractor shall provide sufficient notice to the Engineer to allow the Engineer to be present to observe the Work. Cooperate with the Engineer in all respects to facilitate any testing or observations.

D. The Contractor may conduct additional testing or monitoring for its own information, at no additional cost to the Owner.

E. The presence of the Engineer (including observations and test results) shall not relieve the Contractor of its sole responsibility to perform the work in accordance with the Contract Documents, nor shall they be construed to relieve the Contractor from full responsibility for the means and methods of construction and for safety on the construction site.

F. Work not in conformance with the specified requirements shall be improved, or removed and replaced, at no additional cost to the Owner. All costs related to testing of nonconforming Work or materials shall be paid for by the Contractor, at no additional cost to the Owner.

G. Measurements of lateral movements of the instruments on the excavation support wall and vertical movements of the structure and ground surface

monitoring points are the responsibility of the Geotechnical Monitoring Consultant. Measure and report all data on movements of all instrumentation monitoring points to the nearest 0.01 ft. (.003m).

PART 2 – PRODUCTS

2.1 STRUCTURE AND GROUND SURFACE DEFORMATION MONITORING POINTS

A. Deformation monitoring points shall consist of 2-inch (7.62cm) long surveyors' "PK" nails, securely nailed in place, a #4 rebar 12 inches (30.40cm) long driven flush into the ground surface or ½-inch (1.27cm) diameter carriage bolts drilled 2 inches (5cm) into the structure surface and extending approximately 3 inches (7.6) from the structure face. Surface monitoring points may also consist of an observable point punch marked on the top horizontal surface of a manhole or catch basin rim. The steel surface within 3 inches (7.6cm) of the point shall be cleaned by wire brush to permit easy identification of the exact point. The point shall be clearly identified using fluorescent spray paint adjacent to the point.

2.2 CRACK GAUGES

A. Crack gauges on existing and new cracks developing during construction shall be monitored using a device such as the Avongard Calibrated Crack Monitor (Avongard Products, Waukegan, IL or approved equal) shall be bolted or epoxied to the surface. For uneven surfaces, such as stone, pairs of flat washers should be used, with the distance between the washers measured with a caliper. Assume 100 gauges to be installed and monitored. Location of the crack gauges will be determined in the field by the Engineer prior to construction.

2.3 TEMPORARY EXCAVATION SUPPORT WALL MONITORING POINTS

A. Temporary excavation support wall monitoring points shall consist of an observable point punch marked on the top horizontal surface of the piles or sheeting. The surface within 3 inches (7.6cm) of the point shall be cleaned by wire brush to permit easy identification of the exact point. The point shall be clearly identified using fluorescent spray paint adjacent to the point.

PART 3 – EXECUTION

3.1 GENERAL REQUIREMENTS

A. Do not install any instruments unless the Engineer is present.

3.2 INSTALLATION

A. Install excavation wall monitoring points at the locations proposed by the Contractor and accepted by the Engineer but not less than 30 feet (9.2m) on-

center on either side of the wall. Surface and structure monitoring points shall be installed at the locations shown on the Drawings. Locations of existing structure cracks shall be identified during the Pre-Construction Condition Survey. The base bid allows for a minimum of 100 existing and new cracks to be monitored.

B. Seismographs

1. The Independent Consultant will set up the seismograph where necessary to monitor vibration levels on facilities that may be affected by construction activities. These locations will include the ground at points between 3 and 6 feet from the faces of buildings or the floor slab near the closest exterior face of the buildings. Seismograph readings will be made when specified construction activities are within 200-feet of the seismograph location.

3.3 MONITORING

A. During and following the installation of the excavation support wall, the Geotechnical Monitoring Consultant shall be responsible for monitoring the horizontal position of individual components of the temporary excavation earth support systems until the structures are installed and the trench backfilled to the original street surface grade.

B. Observation points shall be located at the top of each sheet or pile at spacing of not more than 30 ft. (9.2m) on-center, suitable for horizontal position surveying.

C. Immediately following installation of each element of the lateral support system, the Geotechnical Monitoring Consultant shall establish a baseline parallel to each side of the excavation from which offset (horizontal displacement) measurements shall be made to the sheet or pile.

D. Offset (horizontal position) monitoring of the temporary lateral earth support systems shall be made at least once per day until the excavation is backfilled to within 2 ft of final grade, or as directed by the Engineer. A minimum accuracy of 0.01 ft. (.003m) shall be maintained.

E. Obtain the first initial baseline readings on excavation wall, structure and ground surface monitoring points no later than seven days prior to the start of installation of the excavation support wall or excavation operations. Obtain two sets of initial readings at least one day apart.

F. Monitoring frequency may be increased as directed by the Engineer for some or all of the monitoring points if the threshold or limiting response values are approached or exceeded during the Work, at no additional cost to the Owner.

G. The Geotechnical Monitoring Consultant shall monitor the ground surface and

structure monitoring points as shown on the Drawings. Instrumentation data obtained by the Geotechnical Monitoring Consultant shall be provided to the Engineer.

H. After each set of readings is obtained, the data shall be sent to the Engineer, where the data will be reviewed and interpreted. The Contractor shall make its own interpretations for the data. The Contractor shall monitor and interpret data from additional instrumentation that it deems necessary to ensure the safety of its work.

I. Reporting Data

1. Plan showing location and numbering system for monitoring points shall be submitted to the Engineer prior to start of excavation support wall system installation and excavation operations, along with results of two initial baseline surveys. Monitoring frequency shall be on a daily basis for all instruments located within 100 feet (30.5m) from the edge of the excavation unless otherwise directed by the Engineer.

2. Tables of results of surveys shall be submitted within one day of date of survey. The table of survey results shall include the initial measurement, the current measurement, and the amount of movement since start of excavation.

J. Criteria for "threshold" and "limiting" movements of wall elements of temporary excavation support systems have been established as follows:

1. "Threshold" Horizontal Movement: No greater than 1.0 inches (2.54cm) where no structures are present within 25 feet (7.62m) of the support of excavation system. No greater than 0.5 inch (1.27cm) where structures are present within 25 feet (7.62m) of the support of excavation system.

2. "Limiting" Horizontal Movement: No greater than 2.0 inches (5cm) where no structures are present within 25 feet (7.6m) of the support of excavation system. No greater than 1.0 inch (2.54cm) where structures are present within 25 feet (7.62m) of the support of excavation system.

K. Criteria for "threshold" and "limiting" settlement of sidewalk, paved roadway areas adjacent to the temporary excavation support systems have been established as follows:

1. "Threshold" Settlement: No greater than 0.25 inches (0.64cm).

2. Limiting" Settlement: No greater than 0.5 inch (1.27cm).

L. Criteria for "threshold" and "limiting" angular distortion (measure of building rotation due to vertical settlement) of adjacent buildings have been established

as follows:

1. "Threshold" Angular Distortion: No greater than 1/1000 for wood, steel and brick buildings. No greater than 1/1200 for historical stone structures. Where the angular distortion is defined as the ratio of the differential elevation between any two building points over the horizontal distance between those points.

2. "Limiting" Angular Distortion: No greater than 1/750 for wood and brick buildings. No greater than 1/900 for historical stone structures. Where the angular distortion is defined as the ratio of the differential elevation between any two building points over the horizontal distance between those points.

M. Criteria for "threshold" and "limiting" settlement of structures have been established as follows:

1. "Threshold" Settlement: No greater than 0.10 inches (2.54mm).

2. Limiting" Settlement: No greater than 0.25 inch (6.34mm).

N. Criteria for "threshold" and "limiting" vibration acceptance measured from seismographs set up where necessary to monitor vibration levels on facilities that may be affected by construction activities. These locations will include the ground at points between 3 and 6 feet from the faces of buildings or the floor slab near the closest exterior face of the buildings. Seismograph readings will be made when specified construction activities are within 200-feet of the seismograph location. The criteria during construction of temporary excavation support, excavation and backfilling shall be as follows:

1. "Threshold" values in peak particle velocity (inches per second): shall be 0.5 at frequencies of 60 Hz or less.

2. "Limiting" values in peak particle velocity (inches per second): shall be 0.7 at frequencies of 60 Hz or less.

O. The Contractor shall immediately notify the Engineer and shall take immediate steps to control further movement by revising construction procedures, providing supplemental bracing or other measures (working extended hours as approved or temporarily terminating work in the area of movement if necessary) as required if any of the following occur:

1. Field measurements indicate that any of the "threshold" movement criteria are reached or exceeded.

2. Field measurements or observations indicate that significant or sustained wall movements, beyond those reasonably expected, are occurring (total movement may be less than the "Limiting" movement

criteria). Movements of adjacent structures, utilities or other facilities are detected.

P. If "Limiting" movements are being approached or reached, the Owner may require the Contractor to temporarily terminate the work in the area where such movement is occurring and implement all necessary mitigation measures which are satisfactory to the Engineer, to arrest the movements, at no cost to the Owner.

Q. Installation of structures adjacent to earth support systems shall not be permitted until the results of optical surveys indicate no increase in lateral movement of the earth support system and adjacent surface and structure settlement for the one-week period immediately prior to the start of construction.

R. These criteria are intended to establish a minimum basis for the Contractor's design and procedures and does not relieve the Contractor of its responsibility for preventing detrimental movements and damage to adjacent structures, utilities or other work.

S. The Contractor shall submit, prior to excavation, a mitigation plan describing detailed procedures to be taken to control further movement in the event that threshold and limiting values have been reached. Such mitigation plan shall be revised as appropriate for each instance threshold and/or limiting values are reached.

T. In the event the Contractor does not comply with the mitigation plan, or continues to work in violation of threshold or limiting values being reached or exceeded, the Contractor shall not be allowed to continue work until proper mitigation procedures and corrections have been made as determined by the Engineer.

U. The Contractor shall be responsible for repairing all property damage caused by construction activities.

3.4 PROTECTION OF INSTRUMENTATION

A. Protect all instruments during the course of the Work. Any damage or loss of function caused by the Contractors operations, or by any other cause, to new or existing instrumentation devices, shall be immediately repaired or the equipment replaced at no additional cost to the Owner.

END OF SECTION 02015

SECTION 02020

EROSION AND SEDIMENT CONTROL

PART 1 - GENERAL

1.1 SUMMARY OF WORK

A. This Section specifies equipment and materials for an erosion and sediment control program for minimizing erosion and siltation during the construction phase of the project. The erosion and sediment control provisions detailed on the Drawings and specified herein are the minimum requirements for installation and maintenance of erosion controls. The Contractor shall provide additional erosion and sediment control materials and methods as required to affect the erosion and siltation control principles specified herein.

1.2 RELATED SECTIONS

A. Examine Contract Documents for requirements that affect work of this Section. Other Specification Sections that directly relate to work of this Section include, but are not limited to:

1. Section 01110 – Environmental Protection Measures

2. Section 02140 – Dewatering and Discharge

3. Section 02200 – Earthwork

4. Section 02273 – Geotextile Fabric

1.3 SUBMITTALS

A. Proposed methods, materials to be employed, and schedule for effecting erosion and siltation control and preventing erosion damage shall be submitted for approval. Submittals shall include:

1. List of proposed materials including manufacturer's product data.

2. Perimeter (Limit of Work) Erosion Controls damaged during construction shall be replaced immediately and installed per the Details. Schedule of any additional erosion control program indicating specific dates for implementing programs in each major area of work, including dewatering sedimentation basin(s) shall be submitted prior to installation.

1.4 REFERENCES

A. The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

1. Massachusetts Department of Public Works, and The Commonwealth of Massachusetts Department of Public Works; Construction Standards.

2. Massachusetts Department of Environmental Protection.

1.5 EROSION CONTROL PRINCIPLES

A. Erosion Control Principles

The following erosion control principles shall apply to the land grading and construction phases:

1. Stripping of vegetation, grading, or other soil disturbance shall be done in a manner which will minimize soil erosion.

2. Whenever feasible, natural vegetation shall be retained and protected.

3. Extent of area which is exposed and free of vegetation and duration of its exposure shall be kept within practical limits.

4. Temporary seeding, mulching, or other suitable stabilization measures shall be used to protect exposed critical areas during prolonged construction or other land disturbance. Prolonged exposure of unstabilized soil shall not exceed 60 days.

5. Drainage provisions shall accommodate increased runoff resulting from modifications of soil and surface conditions during and after development or disturbance. Such provisions shall be in addition to existing requirements.

6. Sediment shall be retained on-site.

B. Erosion Protection

Cut and fill slopes and stockpiled materials shall be protected to prevent erosion. Slopes shall be protected with permanent erosion protection when erosion exposure period is expected to be greater than or equal to two months, and temporary erosion protection when erosion exposure period is expected to be less than two months.

1. Permanent erosion protection shall be accomplished by seeding with grass and covering with an erosion protection material, as appropriate for prevailing conditions.

2. Temporary erosion protection and stabilization shall be accomplished by covering with an erosion protection material, as appropriate for prevailing conditions.

3. Except where specified slope is indicated on Drawings, fill slopes shall be limited to a grade of 3:1 (horizontal: vertical) cut slopes shall be limited to a grade of 2:1.

4. All erosion controls shall be removed upon successful completion of the work and stabilization of upland areas.

5. The perimeters of the temporary staging and any construction access points shall also be bounded by erosion and sedimentation controls.

6. Disturbed areas shall be stabilized daily to prevent erosion into the wetland resource areas or surface water bodies.

PART 2 - PRODUCTS

2.1 FILTER SOCK

A. Filter sock for construction of erosion control devices shall be blown or placed media (mulch or compost) in twelve-inch diameter biodegradable filter sock.

B. Wooden stakes (2-in. by 2-in. by 36-in.) shall be placed 10 foot on center, driven a minimum of 12 inches into the ground. The filter sock shall be placed as directed by the Engineer and/or as shown on the Drawings and in accordance with the construction details on the Drawings.

C. Fiber Rolls shall be placed a minimum of 1 foot back from drain inlets.

2.2 SILT FENCHING

A. Silt Fence shall be erected in a continuous fashion from a single roll of fabric such as polypropylene, nylon, polyester, or polyethylene yarn.

B. Where silt fence is required, provide the following woven geotextile fabric for silt fence:

1. Mirafi 100X as manufactured by Mirafi, Pendergrass, GA.

2. GEOTEX 2130 as manufactured by Propex, Chattanooga, TN.

3. Or acceptable equivalent product.

C. Silt Fence for Erosion Control shall have the following minimum physical properties:

1.	Filtering Efficiency:	75%
2.	Tensile Strength:	30 lb./linear inch (standard), 50 lb. linear inch (extra strength)

3. Elongation: 20%

4. Ultraviolet Radiation: 90%

5. Slurry Flow Rate: 0.3 gal/sf/minute

D. The bottom of fabric shall be installed 4-6 inches below the ground.

E. Stakes shall be spaced 6 feet on center on the downstream side of the fabric.

2.3 DEWATERING (SILT) BAGS

A. Silt bags shall be utilized for trench dewatering activities. The silt bags shall be in accordance with the construction details on the Drawings.

2.3 SEDIMENTATION CONTROL AT CATCH BASINS (SILT SACKS)

B. Silt sacks for catch basin inlet protection shall be ACF Environmental High Flow or equal. Minimum physical properties of the geosynthetic shall be as follows:

Property	Test Method	Units	Test Results
Trapezoid Tear	ASTM D-4533	lbs.	90x71
UV Resistance	ASTM D-4355	%	99.4
AOS	ASTM D-4751	US Sieve	20
Flow Rate	ASTM D-4491	gal/min/sf	100.6
Permittivity	ASTM D-4491	sec^{-1}	4.81

2.3 TEMPORARY SEED COVER

A. If required, seed mixture for temporary cover by hydroseeding application shall conform to the following:

Quantity per 1000 sq. ft. Coverage	Material
27-1/2 lb.	Wood Fiber Mulch
4 lb.	Seed
½ lb.	Annual Ryegrass
22 lb.	10-6-4 Fertilizer
69 gal.	Water

B. Hydroseeding Equipment

Hydroseeding equipment may be either portable or truck mounted, with dual agitation, a minimum working volume of 1000 gallons and a minimum spray range of 80 ft.

1. Hydroseeding equipment must be capable of uniformly applying the slurry mix including wood fiber mulch if required, at the specified rate, and at the required locations.

2. Hydromulching equipment, either trailer or truck mounted, must be capable of uniformly applying straw or hay mulch at a minimum mulching rate of 8 tons per hour, at a distance of not less than 80 ft.

PART 3 - EXECUTION

3.1 HYDROSEEDING

A. If required for long-term disturbance greater than 60 days, seed for temporary cover shall be spread by the hydroseeding method, utilizing power equipment commonly used for that purpose. Seed, fertilizer, mulch and water shall be mixed and applied to achieve application quantities specified. Material shall be applied in 2 equal applications, with the equipment during the second pass moving perpendicular to direction employed during the first pass. Hydroseeding shall not be done when it is raining or snowing, or when wind velocity exceeds 5 mph.

B. If the results of hydroseeding application are unsatisfactory, the mixture and/or application rate and methods shall be modified to achieve the required results.

C. After the grass has appeared, all areas and parts of areas which fail to show a uniform stand of grass, for any reason whatsoever, shall be reseeded and such areas and parts of areas seeded repeatedly until all areas are covered with a satisfactory growth of grass.

3.2 MAINTENANCE AND REMOVAL OF EROSION CONTROL DEVICES

A. Wetland area, water courses, and drainage swales adjacent to construction activities shall be monitored continuously for evidence of silt intrusion and other adverse environmental impacts, which shall be corrected immediately upon discovery.

B. Culverts and drainage ditches shall be kept clean and clear of obstructions during construction period.

C. Erosion Control Devices

1. Sediment behind the erosion control device shall be checked twice each month and after heavy rain. Silt shall be removed if greater than 6 in. deep.

2. Condition of erosion control devices shall be checked twice each month or more frequently as required. Damaged and/or deteriorated items shall be replaced. Erosion control devices shall be maintained in place and in effective condition.

3. Filter sock shall be inspected frequently and maintained or replaced as required to maintain both their effectiveness and essentially their original condition. Underside of bales shall be kept in close contact with the earth below at all times, as required to prevent water from washing beneath bales.

4. Sediment deposits shall be properly disposed of, in a location and manner which will not cause sediment nuisance elsewhere.

D. Removal of Erosion Control Devices

1. Erosion control devices shall be maintained until all disturbed earth has been vegetated or restored, at which time they shall be inspected by the Conservation Agent prior to removal. After removal, areas disturbed by these devices shall be regraded and seeded.

2. Erosion protection material shall be kept securely anchored until acceptance of the entire Project.

END OF SECTION 02020

SECTION 02050

DEMOLITION, MODIFICATION, AND ABANDONMENT

PART 1 – GENERAL

1.1 SUMMARY OF WORK

A. The Contractor shall furnish all plant, labor, tools, equipment, materials, and supplies as required for utility and structure removal, demolition, modification, and/or abandonment as specified.

B. The Work of this Section shall include demolition of, roadway and sidewalk; removal or abandonment in place of existing water mains, drains, sewers, and appurtenance structures; and demolition.

1.2 DESCRIPTION

A. The Work of this Section includes, but is not limited to, the following:

1. Obtaining all necessary permits, providing necessary notifications, and complying with all local, state, and federal laws regarding safety and demolition.

2. Stockpiling, removal, and legal disposal or recycling of demolished materials. Salvage value accrues to the Town.

3. The protection of areas outside the limits of Work including paved roadways.

4. The protection of utilities, which are scheduled to remain.

5. The control of dust.

B. Refer to the Drawings for additional requirements for demolition.

1.3 RELATED DOCUMENTS

A. Section 02200 – Earthwork

B. Section 02576 – Pavement Repair and Resurfacing

C. Section 02750 – Abandonment of Existing Pipe

1.4 SUBMITTALS

A. The Contractor shall submit the following items:

1. A utility demolition plan which has been fully coordinated with the Owner, that describes the locations, cutting, capping, removal, and disposal of existing utility services, and the maintenance and protection of temporary and permanent services.

2. Disposal receipts from the recycling site or solid waste disposal facility at the completion of the project.

1.5 REPAIR OF DAMAGE

A. Any damage to existing facilities to remain, as caused by the Contractor's operations shall be repaired at no additional cost to the Owner.

B. Damaged items that are to remain in place shall be repaired or replaced with new materials as required to restore damaged items or surfaces to a condition equal to and matching that existing prior to damage or start of Work of this Contract.

1.6 PROTECTION OF EXISTING WORK

A. Before beginning any cutting, trenching or demolition Work, the Contractor shall carefully review the Work sequence and examine the Drawings and Specifications to determine the extent of the Work. The Contractor shall take all necessary precautions to prevent damage to existing facilities, which are to remain in place, and be responsible for any damage that is caused by the operations. Existing facilities so damaged shall be repaired or replaced to their undamaged condition at no additional cost to the Owner.

B. The Contractor shall carefully consider all bearing loads and capacities for placement of equipment and material on site. In the event of any questions as to whether an area to be loaded has adequate bearing capacity, the Contractor shall consult with the Owner prior to the placement of such equipment or material.

1.7 JOB CONDITIONS

A. The Owner assumes no responsibility for actual condition of the facilities to be removed, abandoned or modified. The Contractor shall visit the site; inspect all facilities to get familiarized with all existing conditions and utilities.

B. The Owner may occupy portions of the utilities, structures, properties or other facilities immediately adjacent to demolition area. Conduct demolition, modification and abandonment so Owner's operations will not be disrupted. Provide not less than 24 hour notice to Owner of activities that will affect Owner's operations.

C. Traffic: Conduct operations and removal of debris to ensure minimum interference with the normal use of public ways and other adjacent facilities. Do not close or obstruct traffic ways, streets, walks, or other used facilities without the written permission of the Owner and authorities having jurisdiction. The Contractor shall coordinate with the Owner to provide access, circulation, vehicle parking, and security to the areas that are to remain. Traffic management shall be performed in accordance with Section 01850 – Traffic Management.

D. Protection: Prevent injury to persons and damage to abutting property. Provide adequate shoring and bracing to prevent uncontrolled collapse. Immediately repair damaged property to its condition before being damaged. Take effective measures to prevent windblown dust. Do not create ice hazards by water spraying in cold weather.

E. If materials suspected of containing hazardous materials are encountered, do not disturb; immediately notify Engineer.

F. Storage or sale of removed items or materials on-site will not be permitted.

G. Utilities: Maintain service to all properties connected to portions of Work in this Contract. All above and below grade utilities, other than those scheduled to be removed, replaced, abandoned or demolished, shall be supported and protected in accordance with this section.

1.8 QUALITY ASSURANCE

A. Comply with Section 01400 – Quality Assurance.

B. Regulatory Requirements: Comply with governing EPA notification regulations before beginning demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.

1.9 WARRANTY

A. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during demolition by methods and with materials so as not to void existing warranties.

PART 2 – PRODUCTS

2.1 MATERIALS

A. Comply with material and installation requirements specified in individual Specification sections.

2.2 MATERIALS OWNERSHIP

A. Coordinate with Engineer and Owner, who will make final determination as to whether an item is to be salvaged or removed. Except for items or materials indicated or determined to be reused, salvaged, reinstalled, or otherwise indicated to remain Owner's property, demolished materials shall become Contractor's property and shall be removed from Project site.

2.3 REPAIR MATERIALS

A. Use repair materials identical to existing materials. If identical materials are unavailable or cannot be used for exposed surfaces, use materials that visually match existing adjacent surfaces to the fullest extent possible. Use materials whose installed performance equal or surpasses that of existing materials.

PART 3 – EXECUTION

3.1 DEFINITIONS

A. Remove: Detach items from existing construction and legally dispose of them off-site, unless indicated to be removed and salvaged or removed and reinstalled. Disposal shall be at a recycling facility to the extent possible.

B. Remove and Salvage: Detach items from existing construction and deliver them to Owner ready for reuse.

C. Remove and Reinstall: Detach items from existing construction, prepare them for reuse, and reinstall them where indicated.

D. Remove and Replace: Detach items from existing construction, legally dispose of them off-site (unless indicated to be removed and salvaged or reinstalled), and replace as noted in Construction Documents.

E. Existing to Remain: Items so designated are existing items of construction that are not to be removed and that are not otherwise indicated to be removed, removed and salvaged, or removed and reinstalled.

F. Abandon: Items so designated are existing facilities that are not located within the alignment of proposed Work that shall be permanently abandoned in place. See Section 02750 – Abandonment of Existing Pipe for additional requirements.

3.2 DEMOLITION AND ABANDONMENT PROCEDURES

A. Disposal of all materials shall be performed in compliance with applicable local, state, and federal codes and requirements. Provide labor, equipment, and materials to perform Work as specified and indicated.

B. The Contractor shall flush all pipe and structures to be removed or abandoned to remove solids, wastewater, and other objectionable material prior to commencing demolition, modification, or abandonment.

C. Existing pipe and structures shall be removed where designated on the Drawings or where necessary to install new pipe or structures.

D. Refer to Section 02750 – Abandonment of Existing Pipe for Pipe Abandonment requirements.

E. Where existing structures such as catch basins, drain manholes, and sewer manholes are to be abandoned in place, the Contractor shall remove the frames, grates, covers, and shall remove the top section as required to cut the structures down a minimum of 5 feet below final grade. The Contractor shall check that all pipe penetrations and any other holes have been capped, plugged or bulkheaded, shall crack and compact the structure bottom and fill abandoned manholes with flowable fill. Backfill around the structure to existing grade in accordance with Section 02200 – Earthwork.

F. Hydrants removed shall be delivered by the Contractor to the Nantucket Water Department.

G. Fill excavations with solid fill resulting from earth removal operations and/or with select borrow material in accordance with Section 02200 – Earthwork. Final grade to be restored in kind unless otherwise noted.

H. Exercise precautions for fire prevention. Make fire extinguishers approved for Class A, B and C fires available at all times in areas where performing demolition or abandonment Work with burning torches. Do not burn demolition debris on site.

3.3 REHABILITATION/MODIFICATION PROCEDURES

A. Certain areas of existing piping, conduits, and the like will be affected by Work necessary to complete modifications under this Contract. The Contractor shall be responsible to rehabilitate those areas affected by his construction activities.

B. When new piping is installed in existing manholes, catch basins or other structures, the Contractor shall accurately position core-drilled openings in the concrete as shown or otherwise required. Openings shall be of sufficient size to permit a final alignment of pipelines and fittings without deflection of any part and to allow

adequate space for satisfactory installation of a flexible connector to ensure water tightness around openings so formed.

C. When new piping is to be connected to existing piping, the existing piping shall be cut square and ends properly prepared for the connection shown. Any damage to the lining and coating of the existing piping shall be repaired by the Contractor.

3.4 DISPOSAL OF REMOVED/DEMOLISHED MATERIALS

A. The Contractor shall prepare and transport all demolition debris, materials, refuse, and abandoned equipment to an approved disposal site as part of the Work under this section. All costs associated with the proper performance of this Work shall be borne solely by the Contractor at no additional cost to the Owner.

B. Disposal and transportation of demolition debris shall be in accordance with Specification Section 02080.

C. Recyclable demolition debris, such as pavement, concrete, and metal items, shall be disposed of at recycling facilities as much as possible. The Contactor shall provide the Engineer with weight slips for all materials disposed of at a recycling facility.

D. Promptly dispose of demolished materials. Do not allow demolished materials to accumulate on-site. Demolition material shall not be reused as fill. Removal of demolition debris shall be conducted to ensure minimum interference with roads, streets, walks, and other adjacent occupied or used facilities which shall not be closed or obstructed without permission from the Owner. Alternate routes shall be provided around closed or obstructed traffic ways.

E. Burning: Do not burn demolished materials.

3.5 REPAIR OF DAMAGE

A. Any damage to existing facilities to remain, as caused by the Contractor's operations shall be repaired at no additional cost to the Owner. Damaged items shall be repaired or replaced with new materials as required to restore damaged items or surfaces to a condition equal to and matching that existing prior to damage or start of Work of this Contract.

END OF SECTION 02050

SECTION 02060

TREE PROTECTION

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplemental Conditions, Division 0 and Division 1 Specification Sections, apply to this section.

1.2 SUMMARY OF WORK

A. This Section includes the protection of trees that interfere with, or are affected by, execution of the Work, whether temporary or new construction.

B. This Contractor shall be required to coordinate with the Nantucket Tree Advisory Committee for the duration of construction. The Contractor shall consult with the Nantucket Tree Advisory Committee prior to the start of construction regarding methods of tree protection.

Nantucket Tree Advisory Committee
Phone: 508-228-7244
188 Madaket Road
Nantucket, MA 02544

1.3 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Qualification Data: For firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of engineers and owners, and other information specified.

C. Certification: From a qualified arborist that trees indicated to remain have been protected during construction according to recognized standards and that trees were promptly and properly treated and repaired when damaged.

1.4 QUALITY ASSURANCE

A. Tree Service Qualifications: An experienced tree service firm to be consulted as necessary.

B. Arborist Qualifications: An arborist certified by the International Society of Arboricultural or licensed in the jurisdiction where Project is located, to be consulted as necessary.

C. Pre-installation Conference: Conduct conference at Project site prior to start of work.

1. Before starting tree protection, meet with representatives of authorities having jurisdiction, Owner, Engineer, consultants, and other concerned entities. Review tree protection procedures and responsibilities. Notify participants at least three working days before convening conference. Record discussions and agreements and furnish a copy to each participant.

PART 2 – PRODUCTS

2.1 MATERIALS

A. Filter Fabric: Refer to Section 02273 – Geotextile Fabrics

PART 3 – EXECUTION

3.1 PREPARATION

A. Do not allow fires under or adjacent to remaining trees or other plants.

3.2 TREE REPAIR AND REPLACEMENT

A. Promptly repair trees damaged by construction operations within 24 hours. Treat damaged trunks, limbs, and roots according to written instructions of the qualified arborist.

B. Remove and replace dead and damaged trees that the qualified arborist determines to be incapable of restoring to a normal growth pattern.

1. Provide new trees of the same size and species as those being replaced; plant and maintain as recommended.

2. Provide new trees of 6-inch caliper size and of a species selected by Engineer when trees more than 6 inches in caliper size, measured 12 inches above grade, are required to be replaced.

END OF SECTION 02050

SECTION 02080

SOIL AND WASTE MANAGEMENT

PART 1 - GENERAL

1.1 QUALIFICATIONS

A. The Contractor shall demonstrate the necessary skills, experience, training, and qualifications to conduct the work as specified herein.

B. The Contractor shall possess all required licenses, insurance, permits and trained employees to properly execute the work as specified herein.

C. All personnel involved in the transportation of waste from the site shall have the required skills, experience, training, and qualifications including, but not limited to, Department of Transportation (DOT) and Occupational Safety and Health Administration (OSHA) training.

1.2 EXISTING CONDITIONS

A. The following documents are available for review and appended to these Technical Specifications.

1. Appendix A – Geotechnical Memorandum

B. The Contractor is obligated to review existing environmental assessment reports and manage the soil and groundwater in accordance with applicable state and federal regulations.

1.3 DEFINITIONS

A. Asphalt, Brick and Concrete (ABC): Asphalt, Brick and Concrete material that is waste from construction or found in fill material during excavation. ABC material found in clean, reusable fill may be reused onsite to the greatest extent possible. All excess ABC generated during construction shall be disposed of offsite at an appropriate, licensed facility that will accept ABC waste.

B. Area of Excavation: For the purposes of reusing soil on-site, the *area of excavation* is considered to be the approximate area in which the soil was removed provided that area is consistent in soil strata, color, texture, geotechnical properties and has substantially similar visual and olfactory characteristics. Soil returned to the *area of excavation* shall be returned to approximately the same horizontal and vertical location from which it originated provided that it is not placed in an area that differs substantially in physical or chemical characteristics as can be observed and measured during excavation. Soil returned to the area of excavation shall be placed and compacted as specified in the Contract Specifications.

C. Authorized Excavation: Earth Excavation or "Excavation" consists of removal of materials encountered to the elevations and widths indicated in the Contract Drawings, Specifications, or as directed by the Engineer.

D. Background: (see Section 1.3.W.1)

E. Bill of Lading (BOL): A document signed by a waste transporter or the transporter's representative and issued to a waste generator that evidences the receipt of waste to a specified disposal facility or location. BOL is typically utilized as accompanying documentation during transport of Regulated soils. Soils subject to management under 310 CMR 40.0035.

F. Competent Person: for purposes of this Specification, the term shall mean one who is capable of identifying existing and predictable hazards in the surroundings or working conditions which are unsanitary, hazardous, or dangerous to employees, and who has authorization to take prompt corrective measures to eliminate them [29 CFR 1926.32(f)].

G. Containerized Waste (as defined in 310 CMR 40.0000) means discarded oil and/or hazardous material at a site in drums, tanks, engineered impoundments, or other fabricated containers, including, without limitation:

1. discarded oil and/or hazardous material that was generated at a site as a results of manufacturing industrial, commercial or other process-related activities, and

2. discarded oil and/or hazardous material discovered, managed, generated, or accumulated as part of a response action.

H. Contaminated Media:

1. Contaminated Debris (as defined in 310 CMR 40.0000) means any debris that contains oil and/or hazardous material associated with a release for which notification is required by 310 CMR 40.0300 and 40.1600.

2. Contaminated Groundwater (as defined in 310 CMR 40.0000) means groundwater containing oil and/or hazardous material at concentrations equal to or greater than a release notification threshold established by 310 CMR 40.0300 and 40.1600.

3. Contaminated Sediments (as defined in 310 CMR 40.0000) means sediments containing oil and/or hazardous material associated with a release for which notification is required by 310 CMR 40.0300 and 40.1600.

4. Contaminated Soil (as defined in 310 CMR 40.0000) means soil containing oil and/or hazardous material associated with a release for which notification is required by 310 CMR 40.0300 and 40.1600.

5. Contaminated Surface Water (as defined in 310 CMR 40.0000) means surface water containing oil and/or hazardous material associated with a release for which notification is required under 310 CMR 40.0300 and 40.1600.

I. Debris (as defined in 310 CMR 40.0000) means solid material that is a manufactured object, plant or animal matter that is intended for disposal or is otherwise no longer serving its intended use. The term shall include demolition and construction waste, hay,

vegetation, and other organic and inorganic absorbent materials used to contain or absorb releases of oil and/or hazardous material. The term shall not include:

1. any material for which a specific treatment standard is provided in 40 CFR Part 268, Subpart D; or
2. process residuals such as smelter slag and residues from the treatment of waste, wastewater, sludges or air emission residues.

J. Demolition and Construction Waste (as defined in 310 CMR 40.0000) means any waste materials and rubble resulting from the construction, remodeling, repair or demolition of buildings, pavement, roads or other structures. Demolition and construction waste includes, but is not limited to, concrete, bricks, lumber, masonry, road paving materials, rebar and plaster.

K. Disposal shall mean safe and legal reuse, recycling, or disposal off the site in a manner as required to comply with all applicable statutes and regulations.

L. Hazardous Material as defined 310 CMR 40.0006.

M. Hazardous Waste:

1. Hazardous waste as defined 310 CMR 40.0006; or
2. Hazardous waste as defined in 40 CFR 261.3.
3. A waste, or combination of wastes, that, because of its quantity, concentration, or physical, chemical, or infectious characteristics may:
    a. Cause or significantly contribute to an increase in mortality or cause or significantly contribute to an increase in a serious irreversible or incapacitating reversible illness; or
    b. Pose a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported, disposed of, or otherwise managed.

N. Licensed Site Professional and LSP (as defined in 310 CMR 40.0006) each means a hazardous waste site cleanup professional, as defined in M.G.L. c.21A, §19, holding a valid license issued by the Board of Registration of Hazardous Waste Site Cleanup Professionals pursuant to M.G.L. c.21A, §§19 through 19J.

O. Liquid Waste: materials generated onsite due to work performed and are waste or excess including but not limited to collected groundwater, collected stormwater, non-aqueous phase liquids, Contractor-supplied fuels and fluids, and drummed liquids.

P. Material Shipping Record (MSR): A document signed by a waste transporter or the transporter's representative and issued to an acceptance facility that evidences that receipt of unregulated soils or waste to a specified disposal facility or location. For the shipment of contaminated soil, urban fill, and dredge materials not subject to management under 310 CMR 40.0035.

Q. Massachusetts Contingency Plan or MCP: 310 CMR 40.0000

R. Natural Soils: Natural soil is defined for the purposes of the Contract as unconsolidated sand, gravel, silt and clay, and the organic material which has become part of the unconsolidated soil matrix. For this section only, soil may include broken and fragmented rock.

S. Peat: A substance of vegetable origin, consisting of roots and fibers, moss, etc., in various stages of decomposition, and found, as a kind of turf or bog. Peat shall be considered natural soil when it is encountered in small amounts (layers 1-foot (304.8 mm) or less in thickness) and when it is impractical to separate the peat from the natural soil or urban fill strata. Otherwise, peat shall be considered a distinctive stratum.

T. Regulated Soil: Soils requiring management in accordance with 310 CMR 40.0000, and require BOL to document transport. (see Section 1.3.W.3)

U. Remediation Waste: as defined in 310 CMR 40.0006 means any Uncontainerized Waste, Contaminated Media, and/or Contaminated Debris that is managed pursuant to 10 CMR 40.0030. Remediation Waste does not include Containerized Waste.

V. Solid Waste (Waste): materials generated on site due to work performed and are waste or excess, including but not limited to asphalt, brick and concrete (ABC) waste, demolition waste, decontamination waste, dredging spoils (dewatered), metal waste, plaster/drywall, plastic waste, rock, rubber waste, sediment, tar waste, trash, vegetation debris, wood waste.

W. Soil Classification Categories: Unless specifically stated otherwise, terms used in this specification are as defined in the Massachusetts Contingency Plan (MCP), 310 CMR 40.0006. The following definitions and soil classifications apply to these specifications:

1. Background or Unregulated Soil: Any fill or natural soil material which meets the regulatory definition of "background" as defined in 310 CMR 40.0006 may be reused as common fill/ordinary borrow provided it also meets the physical requirements as specified herein and as specified in Section 02200 - Earthwork. Suitable soil which does not have any evidence of contamination may be reused within the area of excavation without first performing laboratory analyses. For record keeping purposes soil/fill that meet the definition of background, shall be transported under a Material Shipping Record (MSR). Background means those levels of oil and hazardous material that would exist in the absence of an MCP Disposal Site, including both Natural Background and Anthropogenic Background.

   Background soil may also be re-used off-site without restriction provided it is reused in an area where background concentrations are equal to or greater than the site-specific background determined at the off-site location in accordance with DEP Policy WSC#13-500 Similar Soils Provision Guidance (or most recent update). The Contractor is responsible for determining the background levels at the point of excavation. It is also the Contractor's responsibility to identify one or more disposal facilities/locations with background levels appropriate to receive the material to be disposed or reused. It is the Contractor's responsibility to determine these background levels in advance so as to comply with 310 CMR 40.0032(3)(b) and so as not to delay or adversely affect construction operations.

2. Impacted: Any soil or fill material which contains oil or hazardous materials (OHM) at concentrations greater than background levels but less than release notification thresholds established by 310 CMR 40.0300 and 40.1600. Impacted soil may be reused in the area of excavation or as fill provided it is reused in an area of equal or greater contamination and meets the physical requirements as specified herein and as specified in Section 02210 - Earth Excavation, Backfill, Fill and Grading. Impacted soils requiring off-site transportation and disposal/reuse shall be transported using a Material Shipping Record (MSR).

3. Contaminated or Regulated Soils: Any soil or fill material which contains oil or hazardous materials at concentrations equal to or greater than a release notification threshold established by 310 CMR 40.0300 and 40.1600, except where the presence of the material is consistent with the regulatory definition of "background" as defined in 310 CMR 40.0006.

   Any soils which contain either petroleum or chemical odor or visual indications of oil or hazardous materials shall be handled as potentially contaminated soils. Soil/fill that may be contaminated shall be set aside by the Contractor for assessment by the Contractor's environmental professional (LSP) in a secure manner to prevent exposure to humans and the environment and in accordance with 310 CMR 40.0036. Soil/fill that is staged and characterized can be reused within the area of excavation or elsewhere on site provided the material has been tested and has equal or less contamination than the point where it is to be reused and it is not reused beneath a permanent structure such as a building foundation. Any excavated soil/fill material not reused within the area of excavation must be characterized prior to off-site reuse/disposal. After analytical results are available, soil/fill shall be handled in accordance with the type and degree of contamination (if any) present in the soil/fill, and recommendations of the Contractor's LSP.

   Contaminated soil that cannot be reused on site shall be reused off-site, recycled, or disposed as a solid waste at an appropriately permitted facility unless it also meets the regulatory definition of hazardous waste as defined in 40 CFR Part 261 or contains detectable asbestos. Contaminated soils requiring off-site transportation and reuse/disposal or recycling shall be transported using a Material Shipping Record (MSR) or Bill of Lading (BOL), as appropriate. Subcategories of Contaminated soil are defined as follows:

   a. Unlined Landfill Material: Soils that meet all applicable criteria (i.e., COMM 97-001 and/or facility-specific permit requirements) for off-site reuse as daily cover, intermediate cover, or pre-cap contouring material at in-state unlined landfills. Note: per COMM 97-001, sediments may not be re-used as Unlined Landfill Material.

   b. Lined Landfill Material: Soils that meet all applicable criteria (i.e., COMM 97-001 and/or facility-specific permit requirements) for off-site reuse as daily cover, intermediate cover, or pre-cap contouring material at in-state lined landfills.

   c. Asphalt Batch Plant Material: Soils that meet all applicable criteria for recycling at an asphalt batching plant and/or the specific licensing requirements for the proposed recycling facility. Soil that does not meet the applicable

COMM 97-001 criteria for Unlined or Lined Landfill Material that is characterized by the following: TPH concentrations in excess of 5,000 milligrams per kilogram (mg/kg), or total SVOC concentrations in excess of 100 mg/kg, or total non-chlorinated VOC concentrations in excess of 10 mg/kg, and total lead concentrations below 3,000 mg/kg and TCLP metal concentrations below applicable hazardous levels. Material classified as Asphalt Batch Plant Material shall be excavated and transported to an asphalt batch plant for recycling. This material cannot be used as daily cover at or disposed of at a Massachusetts Unlined or Lined Landfill.

d. Out-of-State Non-Hazardous: Soilsthat contain concentrations of contaminants that exceed in-state lined and unlined landfill reuse criteria as well as asphalt batch plant acceptance criteria, but meet the criteria for regional thermal treatment facilities or out-of-state recycling facilities, and are not classified as a Resource Conservation and Recovery Act (RCRA) Hazardous Waste.

4. Hazardous Waste: A waste, or combination of wastes, that, because of its quantity, concentration, or physical, chemical, or infectious characteristics may cause or significantly contribute to an increase in mortality or cause or significantly contribute to an increase in a serious irreversible or incapacitating reversible illness; or pose a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported, disposed of, or otherwise managed. Also included within the definition of hazardous waste is hazardous waste as defined 310 CMR 40.0006 and 40.CFR 261.3. Hazardous waste as defined in 40 CFR 261.3 is a solid waste that exhibits any of the characteristics of hazardous waste in excess of regulation levels presented in 40 CFR 261, subpart C and/or that is listed in 40 CFR 261, subpart D; that is a mixture of solid and hazardous waste; or that is derived from a listed waste. Subcategories of Class C soils shall be as follows:

a. Post-treatment Non-Hazardous: Soils classified as hazardous waste that have been treated on-site to reduce the toxicity characteristic (e.g., for TCLP lead).

b. Hazardous: Material determined to contain "listed" or "characteristic" hazardous waste constituents which cannot be readily treated on-site. This material must be transported to an out-of-state approved RCRA Subtitle C hazardous waste disposal or treatment facility under a Uniform Hazardous Waste Manifest.

X. Special Waste: Any waste that is determined not to be a hazardous waste pursuant to 310 CMR 30.000 and that exists in such quantity or in such chemical or physical state, or any combination thereof, so that particular management controls are required to prevent an adverse impact from the collection, transport, transfer, storage, processing, treatment or disposal of the waste. Asbestos and PCB-contaminated soils/fill are examples of special waste categories. See Specification Section 02700 for Asbestos Cement Pipe requirements.

Y. Transportation Documentation or Shipping documentation means the document used to identify and accompany soil or waste during transport such as a Material Shipping Record (MSR), Bill of Lading (BOL), or Uniform Hazardous Waste Manifest. Also referred to as a shipping record.

Z. Unauthorized Over Excavation: Consists of removal of materials beyond indicated elevations and width limits indicated in the Contract Documents without direction of the Engineer. Over-excavation material handling, transportation and disposal, backfilling and compaction shall be at the Contractor's expense. Over-excavations shall be backfilled and compacted as specified for excavations of the same class, unless otherwise directed by the Engineer

AA. Unauthorized Excavation: Consists of removal of materials beyond indicated sub-grade elevations or Contract-defined limits as shown in the Contract documents without specific direction of the Engineer. Unauthorized excavation, handling material, transportation and disposal, backfilling and compaction shall be at the Contractor's expense. Unauthorized excavations shall be backfilled and compacted as specified for excavations of the same class, unless otherwise directed by the Engineer.

BB. Unknown Materials: Any material, that is not readily identifiable as nonhazardous waste, and which has not been previously characterized or encountered during site investigation activities. The Unknown Material classification is to be used in the event that an unexpected, unusual material is encountered for which special handling procedures shall be required in order to handle the material safely. Such wastes include but are not limited to:

1. Unlabelled drums or containers containing material which is not readily identifiable as a non-hazardous substance.
2. Any material, which varies significantly from material previously observed on site and which cannot be readily identified as a nonhazardous.
3. Waste material of unusual color or odor or material with indications of hazardous levels (e.g. exceeding OSHA permissible exposure limits) of contaminants as evidenced on an organic vapor monitor or other similar instrument.

The Owner reserves the right to apply generator knowledge to classify and profile the material as a previously encountered waste or as a known waste. In the event that a material is encountered which the Contractor is uncertain as to its nature, the Owner or their representative shall assess the material with the Contractor and inform the Contractor as to the nature of the material (known or unknown).

CC. Unregulated Soil: (see Section 1.3.W.1)

DD. Urban Fill: Fill, also known as urban, or miscellaneous fill, is defined as a mixture of soil and other materials which have been located in the area through man-made processes primarily for the purpose of grading, backfilling or filling in low areas. Material commonly associated with urban fill includes, but are not limited to; coal, glass, brick, ash, wood fragments and other similar granular materials. Urban fill shall not include boulders, ledge, consolidated rock, asphalt, concrete, railroad timbers, rail, cobblestones or any other abandoned building materials.

EE. Waste Manifests: the hazardous waste shipping/transportation documentation required to ship all hazardous waste and subject to provisions in 49 CFR 172 Subpart C.

1.4 DESCRIPTION OF WORK

A. General

1. This Section includes furnishing all labor, equipment, materials, and incidentals required to perform all operations in connection with the handling and disposition, stockpiling, transport, in-project reuse and/or off-site reuse or disposal of excess excavated materials resulting from the construction operations as specified. In-project reuse shall be defined as material that is reused within the Project, such as approved use of excavated soils as backfill into the excavation trench after installation of new utilities.

2. This Section includes proper handling and management of waste materials, including, but not limited to, construction debris, building demolition, municipal waste, boulders, regulated and unregulated soils, ash, rubble, asphalt, brick and concrete (ABC), asbestos containing material, asbestos cement pipe (Section 02700), hazardous materials and empty or crushed drums and/or drum parts.

3. Coordinate work with that of all other trades or contracts affecting or affected by work of this Section. Cooperate with such trades to assure the steady progress of all work under the Contract.

4. All work shall be conducted in compliance with Contractor-prepared plans as specified in Paragraph 1.7 Submittals of this Section.

5. Implementation of the submitted HASP and other applicable includes establishing work zones (e.g., support zone, contamination reduction zone, exclusion zone), preparing a decontamination pad(s) and staging area(s), performing the appropriate environmental monitoring, training and medical monitoring of personnel, coordinating waste disposal and waste characterization as needed, etc.

6. The Contractor shall develop, implement, maintain, supervise, and be responsible for all soil management practices during the course of this contract. An OSHA Competent Person, with demonstrated experience in clean and contaminated soil and hazardous waste handling (e.g. L.S.P.), shall be present during all excavation, backfilling, field screening, segregating, handling, and characterization of all soils excavated in the course of completing this contract to ensure that soil is managed in accordance with applicable laws, regulations, and this Section.

7. Demobilizing the site, including, but not limited to, removing and disposing of excess or waste soils, rock, solid waste, demolition waste, construction-related equipment and materials used for personnel and equipment decontamination and related waste such as personal protective equipment (PPE), decontamination water/solids, temporary covers, and wash-water storage tanks; disconnection of temporary utilities; and final clean-up to pre-construction conditions.

8. The Contractor is responsible for being aware of potential hazards at the site and reviewing all existing information which provides evidence of contamination within the limit of the work.

B. Soil and Waste Management

1. This Section describes the general parameters and requirements for testing (including field screening and laboratory chemical analysis), excavation, handling, storage, tracking, transport, and in-project reuse or off-site reuse/disposal of soils.

2. In the course of the work, it may be necessary to excavate and handle potentially contaminated soil or hazardous material. The soil or hazardous materials management practices specified herein apply to all soil and/or hazardous materials excavated during the course of this Contract. Contaminated soils and hazardous materials/hazardous waste shall be managed in accordance with 310 CMR 40.0000 and 310 CMR 30.000.

3. The Contractor shall segregate soils during excavation and stockpiling to avoid mixing soils (i.e. topsoil, fill and natural soils shall be segregated, in addition to regulated, unregulated soils, etc.).

4. Characterization of soil, and unknown material for disposal/off-site reuse purposes; field screening and soil management/segregation; temporary storage/staging; and characterization (as may be necessary for unknown materials and/or for compliance with receiving facility requirements); and disposal and/or off-site reuse of excavated soil and waste material. All laboratory chemical analyses conducted shall utilize currently accepted U.S. EPA and applicable state agency analytical protocols and procedures.

5. The Contractor shall characterize all excavated and stockpiled soil and fill material prior to off-site reuse or disposal. Characterization requirements may vary depending on the source/location of the excavated soil/fill, the site selected to receive soil suitable for off-site reuse, or the disposal facility permits and policies. The Contractor is responsible for final waste characterization and shall determine if any additional waste characterization is required at no additional cost to the Owner.

6. Providing and constructing a secure soil staging area sized to adequately segregate soils in accordance with the conditions specified without impeding construction-related activities. The Contractor is to use existing information and obtain additional information as may be needed to minimize the need for a staging area. If a staging area is required to characterize unknown or excess material for any reason, the Contractor is responsible for locating, selecting, preparing and securing the area.

7. Excavated soil/fill that is contaminated or may be suspected as contaminated or containing hazardous materials shall be stockpiled and covered prior to characterization and off-site reuse or disposal. Since individual disposal facilities will have different permit conditions and specific pre-characterization data requirements the Contractor is responsible for final soil characterization prior to transport and disposal. The Contractor is hereby made aware that for the purposes of disposal, final soil characterization is the responsibility of the Contractor and costs for securing a staging area and conducting waste characterization shall be incorporated into the Contractor's bid price for construction.

8. During construction activities, excavated soil/fill waste shall be field-screened by the Contractor and either loaded directly for off-site disposal (provided the excavated material is consistent with previously conducted investigations) or stockpiled in a soil/fill waste staging area located by the Contractor and approved by the Owner and Engineer. Stockpiles of soils shall be minimized to reduce the amount of waste

material stored onsite. Stockpiled materials that are to be disposed of shall remain onsite for only as long as it would reasonably take to characterize (if not done in advance), load and transport offsite to an approved disposal facility. Soils that are to be re-used as fill material shall be stockpiled and maintained per Section 3.4 Staging Areas.

9. Soil suspected of having the characteristics of a hazardous waste or of containing a listed hazardous waste shall not be removed from the excavation except at the direction of the Engineer.

10. Soil/fill waste shall not be staged within 100 feet (30.5 meters) of a reservoir, wetland or Area of Critical Environmental Concern or in a 100-year floodplain. Soil/fill waste shall not be staged in the work area over night. Contaminated material requiring additional waste characterization due to waste disposal facility requirements or in order to assess unknown materials, shall be staged securely pending analytical sampling and characterization by the Contractor.

11. The Contractor shall reuse excavated soil at the point of origin to the maximum degree possible. Soil/fill which cannot be reused immediately at the point of origin shall either have been pre-characterized for off-site reuse or disposal by the Contractor and directly loaded for off-site transport (provided the excavated soil/fill is consistent in visual, olfactory and field screening characteristics with subsurface investigation conducted prior to construction pursuant to the MCP) or it shall be staged at a location determined and secured by the Contractor pending analytical characterization.

12. Excavating soil, fill and waste containing potential asbestos-containing material (e.g., transite board) shall conform to Section 02700 – Asbestos Cement Pipe Removal and Disposal. No off-site staging of asbestos materials or asbestos containing soils shall be allowed except at the direction of the Owner.

13. Removing characterized on-site materials for off-site re-use or disposal.

14. Placing and grading of certified clean fill (including fill from on-site which is determined to be suitable for re-use). The Contractor is to maximize the in-project reuse of on-site materials by using soil suitable for such reuse prior to importing material on site.

15. In the event that a previously uncharacterized, unknown material is encountered the Contractor shall manage the material separately and will temporarily stage the material pending characterization as specified herein.

16. All Investigation Derived Wastes are the property and responsibility of the Contractor and are to be disposed of by the Contractor under a Uniform Hazardous Waste Manifest, Material Shipping Record or by a Bill of Lading, as appropriate. The parties understand and agree that any consultant or sub-consultant (at any tier) is not, and has no responsibility as, a generator, treater, storer, transporter, or disposer of hazardous or toxic substances found or identified at the project site, and that the Contractor agrees to assume responsibility for and indemnify and hold any consultant or sub-consultant (at any tier) harmless from the foregoing.

C. Groundwater Management

1. Management of contaminated groundwater: If groundwater potentially impacted by oil and/or hazardous material (OHM), based on visual or olfactory evidence, is encountered in the course of the work, construction dewatering and discharge permits and groundwater treatment may be necessary depending upon the discharge method(s) and/or location(s) utilized by the Contractor. The Owner and Engineer shall be notified by the Contactor if groundwater potentially impacted by OHM is identified. Refer to Section 02140 – Dewatering and Discharge.

1.5 RELATED WORK

A. Section 01024 - Measurement and Payment

B. Section 01350 - Health and Safety Plan

C. Section 01500 - Temporary Facilities and Controls

D. Section 02050 – Demolition and Abandonment

E. Section 02700 – Asbestos Cement Pipe Removal and Disposal

F. Section 02140 – Dewatering and Discharge

G. Section 02220 – Earthwork

1.6 REFERENCES

A. All work at the site must be performed in accordance with all applicable federal, state, and local regulations, permits and licenses. Comply with applicable requirements of the following standards and those referenced in this Section. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern.

B. OSHA regulations (including, but not limited to, 29 CFR 1910.1000, 29 CFR 1926, and CFR 1910.120), 40-hour Occupational Safety and Health Administration (OSHA) training (plus 8-hour refresher training) and all other applicable state and federal regulations regarding health and safety requirements;

C. The applicable parts of the Code of Federal Regulation (CFR) Title 40: Protection of Environment, pertaining to the Comprehensive Environmental Response and Liability Act (CERCLA) and the Superfund Amendments and Reauthorization Act (SARA), RCRA, and the National Emission Standards for Hazardous Air Pollutants (NESHAPS) as regulated by the U.S. Environmental Protection Agency (U.S. EPA);

D. Massachusetts Site Assignment Regulations for Solid Waste Facility Regulations 310 CMR 16.000.

E. Massachusetts Solid Waste Management Facility Regulations 310 CMR 19.00.

F. State regulations specified in the Massachusetts Contingency Plan (MCP) (310 CMR 40.0000), and Massachusetts General Law 21E - Massachusetts Oil and Hazardous

Materials Release Prevention and Response Act, and applicable Massachusetts Department of Environmental Protection (MassDEP) guidelines and policies;

1. Massachusetts Department of Environmental Protection, Bureau of Waste Site Cleanup Policy No. WSC-94-400 entitled "Interim Remediation Waste Management Policy for Petroleum Contaminated Soils," dated April 21, 1994.
2. Massachusetts Department of Environmental Protection Bureau of Waste Prevention Policy No. COMM-97-001 entitled "Reuse and Disposal of Contaminated Soils at Massachusetts Landfills," dated August 15, 1997.
3. Massachusetts Department of Environmental Protection, Bureau of Waste Prevention Policy No. WSC#-13-500 "Similar Soils Provision Guidance," dated September 4, 2013.
4. Massachusetts Department of Environmental Protection, Policy #COMM-15-01 "Interim Policy on the Re-Use of Soil for Large Reclamation Projects," dated August 28, 2015.
5. MassDEP Technical Update. Background Levels of Polycyclic Aromatic Hydrocarbons and Metals in Soil (2002);

G. Department of Transportation (DOT) regulations 49 CFR, and state transportation licenses and permits;

H. NIOSH/OSHA/USCG/EPA: "Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities" October 1985, DHHS (NIOSH). Publ. No. 85-1 15;

I. Department of Transportation training;

J. U.S. Army Corps of Engineers 404 permit;

K. General Contractor's license;

L. National Pollutant Discharge Elimination System (NPDES) Notice of Intent (NOI) to discharge and associated general permits;

M. Massachusetts Water Resources Authority pretreatment and construction dewatering requirements and permits;

N. Excavation and/or grading permits;

O. Special use permits;

P. Special waste haulers certificate;

Q. Massachusetts Wetlands Protection Act and associated Order of Conditions;

R. Town of Nantucket wetland regulations and bylaws; and The Contractor's Soil and Waste Management Plan (SWMP) and Health and Safety Plan to protect the workers and the public.

1.7 SUBMITTALS

A. The Contractor shall prepare a Work Plan that generally describes the work to be performed under 02080 Part 3 (Execution). The work plan shall include, but not be limited to detailing the submittal and implementation of the following:

1. Soil and Waste Management Plan;
    a. Dust, Vapor and Odor Control Plan;
    b. Air Monitoring Plan;
    c. Equipment and Personnel Decontamination Plan
2. Site-Specific Health and Safety Plan (See Section 01350);
3. Dewatering Plan (See Section 02140);
4. Stormwater Handling Plan;
5. Spill and Discharge Control Plan;
6. Asbestos Management Plan (See Section 02700); and
7. MCP required reports as necessary (RAM, URAM, status reports, closure reports).

The Soil and Waste Management Plan (S/WMP) shall be submitted at least three weeks prior to the beginning of any intrusive work at the site. All other required plans shall be submitted to the Owner or Engineer and/or their representative for review and approval at least two weeks prior to beginning any intrusive work at the site. Plans shall be consolidated provided the requirements of each plan are fully incorporated therein.

B. Soil and Waste Management Plan (S/WMP): The S/WMP shall outline measures for sampling, field screening, laboratory analysis, and disposal/ off-site reuse of soils and wastes generated at the Project site. At a minimum, this plan shall address the following:

1. Methods, procedures, and equipment used for excavating, characterizing, segregating, reusing/backfilling, loading, and transporting contaminated soil/solid waste materials encountered during excavation operations;
2. A list of all transporters and receiving facilities, complete with license numbers, permit numbers (as appropriate), contact person, and address and telephone number that the Contractor utilizes for soil management and waste disposal. In addition, a copy of a memorandum of understanding between the Contractor and each disposal facility shall be attached to the Soil and Waste Management Plan. The memorandum of understanding shall detail that the disposal facility agrees to accept a specified quantity of waste as characterized in the contract specifications and detail what if any restrictions may apply. The Contractor shall provide copies of the permits held by each disposal facility which the Contractor plans to use to dispose of non-hazardous solid waste, hazardous waste, PCB-impacted waste and asbestos-containing waste. The transporters shall have adequate financial insurance and liability insurance mechanisms to handle any accidents, and associated third-party compensation;

3. A summary of the history of compliance actions for each receiving facility proposed to be used by the Contractor. The compliance history shall include a comprehensive list of any state or federal citations, notices of non-compliance, consent decrees or violations relative to the management of waste (including remediation waste) at the facility. The Owner reserves the right to reject any facility on the basis of poor compliance history;

4. If hazardous wastes are to be transported, Contractor shall have or obtain a valid EPA identification number to transport hazardous materials and any other permits or licenses as required by federal, state and local laws, regulations, ordinances and procedures.

5. Procedures for securing the staging area, controlling dust and soil/solid waste migration, preventing damage to uncontaminated areas via contaminant migration and for decontaminating vehicles and personnel exiting the staging area;

6. The means and methods for decontaminating all equipment and personnel, including provisions for installing an equipment decontamination pad if required or specified.

7. Means, methods and equipment for locating and protecting stockpiles.

8. Methods and procedures for identifying stockpiled material (e.g., labeling, marking containers) and procedures for identification and tracking;

9. Methods, procedures, and equipment used for obtaining the necessary information needed to satisfy the off-site reuse/disposal facility requirements specified herein and/or by the facility;

10. Methods, procedures, and equipment proposed for assessing and handling Unknown Materials. The S/WMP shall indicate which laboratory(ies) the Contractor shall utilize for chemical analysis of soil, groundwater and unknown materials.

    a. An Unknown Materials information sheet shall be developed as part of the Contractor's S/WMP, upon which the Contractor shall record information such as container type, size, and condition; and, any identifying characteristics of the unknown material. The format of the information sheet shall be as accepted by the Owner and/or its representatives;

    b. The Contractor’s plan for notifying the Owner and Engineer in the event that an unknown material as defined in this specification is encountered. The plan shall include the phone numbers and names of the Owner’s representative(s) that the Contractor would contact in such an event.

11. Provisions for separation of incompatible materials and segregation of different class of soil;

12. Procedures for consolidating (i.e., bulking) compatible materials for disposal.

13. Procedures for dewatering as well as handling, characterization, storing, treating and disposing of groundwater due to dewatering. Refer to Section 02140 – Dewatering and Discharge.

14. Procedures for diverting and handling site stormwater. This would include handling, treatment and discharge of storm water.

15. Provisions, procedures and equipment used for control of dust, vapor and odor; including measures to control objectionable dust, vapors, and odors originating from the site (Section 3.7). This shall describe procedures to minimize the creation of dust, and the control of objectionable vapors and odors originating from the site.

16. Provisions, procedures and equipment used to monitor air at the site (Section 3.6). This shall include site specific monitoring for potential hazards in the air; including the proposed instrument(s) to be used, the expected hazards (e.g., dust, VOCs), the monitoring frequency, the monitoring locations, and the reporting procedures.

C. Soil Management/Tracking Documentation:

Prior to off-site disposal or reuse, the Contractor shall provide to the Engineer a letter from the disposal facility indicating that the facility has reviewed the available data relative to the soil/solid waste to be delivered and agrees that the soil/solid waste meets their acceptance criteria. The letter shall be signed by a duly authorized representative of the receiving facility.

Within the time constraints established in state and/or Federal laws and regulations, the Contractor shall submit to appropriate authority(ies) and the Owner, as applicable, Uniform Hazardous Waste Manifests, Material Shipping Records, and/or Bills of Lading (collectively referred to as transportation documentation) for all soils, rock, ACB, asbestos pipe, asbestos containing materials (ACM), hazardous waste and waste disposed or reused of off-site utilizing such documents. Copies of all transportation documentation and all other documents used to track and/or permit off-site transportation of soils or wastes shall be submitted to the Owner and Engineer within ten (10) days of shipment. All transportation documentation shall be signed by the transporter and receiving/disposal facility. The Contractor is responsible for preparation of all transportation documentation, manifests, Bills of Lading, Material Shipping Records, and all other related documents completely and accurately prior to submitting them to the Owner and/or its representative for generator and LSP signatures. The Contractor shall be responsible for submitting to the Owner's LSP all information necessary for preparation of LSP opinion letters to disposal facilities and coordinating disposal documentation with all parties. The Owner's LSP and the Owner shall the sign any MassDEP Bill of Lading forms where required only after the Contractor has provided the information required for preparation of electronic MassDEP forms. The Contractor shall be responsible for paying for any and all fines associated with inaccurate, incorrect, or improperly completed transportation documentation and all other related documents, including fines resulting from late or untimely submittals.

D. Stormwater Handling Plan

The Stormwater handling plan shall provide provisions to ensure compliance with Section 3.10, other portions of the Contract Documents, and all applicable local, state and federal permits.

E. Quality Control Plan

The Contractor shall prepare a Quality Control plan for the development, implementation, and maintenance of a quality control system to ensure that the specified quality is achieved for all materials and work performed.

F. Spill and Discharge Control Plan (SDCP): The SDCP shall provide contingency measures and reporting responsibilities for potential uncontrolled spills and discharges of contaminated and/or hazardous materials, including, but not limited to: fuels, oils, contaminated groundwater, granular solid waste, leachate, decontamination water, sewage, and other on-site waste materials. In addition to the above listed items, the SDCP shall specifically contain: procedures for containing dry and liquid spills; absorbent material available on site; storage of spilled materials; governmental reporting (i.e., notification) procedures; decontamination procedures; discharges of sanitary or combined sewers into storm drains either by flow handling/bypassing or accidental or unintentional discharge; and procedures for protecting wetlands and surrounding public and private property.

The Spill and Discharge Plan shall indicate the location and quantity of the materials to be staged on site and the basis for the quantities (i.e. indicate the vessel which will be on site containing the greatest volume of oil or hazardous materials). No fuel or oil tanks or drums may be temporarily staged on site unless they are stored within a secondary containment system. Fuel deliveries shall be performed in a designated area which has either secondary spill containment or an impervious surface with absorbent berms located around the point of fuel delivery. The Spill and Discharge Plan shall indicate the location of the fueling area and the nature of secondary containment which the Contractor intends on utilizing.

1. Notification Procedures: The Contractor shall prepare in advance of work activities a notification list, complete with phone numbers, addresses, and contact names for all parties to be notified in the event of a spill. This list shall be posted on-site at all times and shall include:

    a. Owner’s designated representatives;

    b. Owner;

    c. Fire Department;

    d. Engineer;

    e. Massachusetts Department of Environmental Protection (as required per 310 CMR 40.0000). The Owner shall be notified immediately of an uncontrolled spill or discharge. If human health or the environment are potentially threatened, the Contractor shall take immediate action to abate the conditions and notify emergency personnel;

    f. Appropriate emergency personnel.

2. Spill Incident Report(s): In the event of an uncontrolled spill or discharge, a written report detailing each uncontrolled spill or discharge shall include, at a minimum, the cause and resolution of incident, outside agencies involved, and date and time of occurrence. The report shall be submitted to the Owner within 48 hours of the

incident. The Contractor shall document all spills on the as-built Drawings and submit the Drawings to the Owner at project completion. The Contractor shall be responsible for remediating any spills or releases of oil or hazardous materials as a result of the Contractor's activities. The site shall be remediated to pre-release conditions at no additional cost to the Owner.

G. Medical surveillance records, OSHA 40-hour training forms, accident forms, and all other documentation requirements of the Contractor's safety and health program for personnel working on the site (who are subject to exposure to potentially contaminated soil) shall be up-to-date and kept on file at the site. The Contractor shall provide documentation of employee status upon request of the Engineer and/or their representative.

PART 2 – PRODUCTS

2.1 DUST CONTROL

A. Dust suppression may be achieved by applying controlled amounts of water or dust suppression chemicals to the project site, and through covering of soil stockpiles, etc. Dust suppression shall be carried out in accordance with the approved SWMP.

2.2 SPILL CONTROL

A. At a minimum, the Contractor shall maintain on-site absorbent pads, booms and absorbent materials in sufficient quantity to address a release of fuel oil, hydraulic oil or other OHM that the Contractor intends to use or store on site, including fuel oil and hydraulic oil that is used within earth moving equipment. The quantity of spill containment materials maintained on site shall be sufficient to respond to a catastrophic release from the vessel containing the greatest quantity of oil or hazardous material on-site.

2.3 SOIL MANAGEMENT/TRACKING DOCUMENTATION

A. Provide completed Bills of Lading (BOLs), Material Shipping Records (MSRs), manifests, certificates of disposal, weight slips and all other documentation relative to disposal, reuse, treatment, recycling or other means of off-site use of soil and waste materials.

B. Provide appropriate equipment and materials to protect and delineate stockpiles as necessary.

PART 3 – EXECUTION

3.1 GENERAL

A. All work in this section will be performed in accordance with the Contractor's Work Plan, S/WMP, Site-Specific HASP and any other site specific plans/reports that have been approved by the Owner and Engineer.

B. The primary concern of the Contractor in the excavating, handling, sampling, bulking, and on-site storage of soil/solid waste and/or drummed material (if encountered) will be to protect the health and safety of the site workers, the public, and the environment.

C. The Contractor shall keep a copy of the Health and Safety Plan (HASP) on site during all operations and shall conduct daily health and safety meetings. Failure to keep a copy of the HASP on-site, or any other breach of the Contractor's Plan, may be cause for stopping work at the cost of the Contractor. Delays caused by the Contractor's failure to comply with the health and safety regulations or any health and safety plan shall not entitle the Contractor to recover any additional costs or time lost. The Contractor shall not be allowed to resume activities until corrective measures are accepted by the Engineer and/or their representative and implemented.

D. The Contractor shall reuse geotechnically suitable excavated material prior to using imported backfill to reduce the volume of material to be reused/disposed off-site. Imported backfill shall be used only as accepted by the Engineer. Urban fill soils and roadway base/subbase shall be re-used to the maximum extent before reusing naturally occurring soils. If off-site disposal is required, natural soils shall be preferentially disposed or reused. Contamination shall not be exacerbated as a result work activities.

3.2 SOIL/FILL WASTE CHARACTERIZATION

Soil and fill material shall be classified based on the criteria established in the accepted SWMP.

A. Initial Characterization of Soil/Fill Waste Material: A summary of existing conditions and investigation findings performed by the Engineer during design, including a summary of analytical results, shall be available to the Contractor.

B. The Contractor shall review all the existing conditions information supplied by others. The Contractor shall use the information and shall either perform independent sampling and characterization of soil/fill waste strata to be encountered during construction in advance of excavation such that excavated soil or wastes can be segregated and directly transported to an appropriate facility or the Contractor shall make the necessary arrangements to secure a staging area(s) suitable for storing soil stockpiles or wastes pending analyses, at no additional cost to the Owner. No staging of asbestos materials or asbestos containing soils shall be allowed except at the direction of the Owner. The Contractor shall identify known or suspected areas where hazardous materials may be encountered, including but not limited to asbestos, PCB, lead-based paint.

C. Soil shall be preliminarily segregated based on the Soil Classification Categories detailed in Section 1., except as indicated below.

1. Potential Asbestos Containing Material (PACM). If soil/fill waste suspected of containing asbestos is encountered during excavation, the Contractor shall immediately contact the Engineer to discuss the nature and extent of the PACM and to assess potential hazards and appropriate handling procedures. Prior to handling and removing the PACM, MassDEP shall be contacted for approval. Discovery and management of PACM shall be documented in the S/WMP. Evidence of PACM includes but is not limited to the presence of suspect asbestos-containing building

debris such as cementitious (transite) piping, vinyl floor tiling, roofing paper or paper-like insulation materials or any other suspect asbestos containing material observed in the soil/fill waste. Following MassDEP approval, such soil/fill waste shall be segregated and stockpiled pending confirmatory analysis to determine appropriate disposal requirements.

2. Unknown Material. If unknown material is encountered during excavation, the Contractor shall immediately contact the Owner and Owner's representative to discuss the nature and extent of the unknown material and to assess potential hazards and appropriate handling procedures. Prior to handling and removing the unknown material from the excavation area, the Contractor and Owner and/or its representatives, shall visually assess the material and its potential hazards. Drums shall be assessed to determine whether they are leaking, corroded, pitted, bulging (evidence of reactive waste), crushed, empty, filled-in-place. Crushed, empty, and/or skeletal parts of drums shall be handled as solid waste, as specified. Note any evidence of staining or olfactory indications of contamination. The Contractor shall record any identification or markings on the drummed material(s). Discovery and management of unknown materials shall be documented as required in the SWMP.

D. Final Waste Characterization: Final waste characterization shall be the responsibility of the Contractor. The Contractor shall be responsible for determining the characterization requirements of each disposal facility in advance to facilitate timely off-site removal and to adequately estimate the disposal costs. The Contractor shall perform additional segregation based on disposal requirements. Disposal or off-site reuse of the material shall depend on sampling and characterization analytical results. At the request of the Engineer or Owner, the Contractor shall provide a split sample. The Contractor shall perform or observe all sampling and shall provide notice in advance to the Engineer so that the Engineer may observe the sampling procedure.

Stockpiles within the staging area shall be sampled and characterized within a timely manner so as not to impede construction activities or preclude the reuse of soil/fill on site. If soil/fill cannot be reused on site due to the Contractor's delay in sampling material, the Contractor shall dispose of the soil/fill at no additional cost to the Owner including the additional cost of imported fill material used in its place to meet project requirements.

3.3 SOIL/SOLIDS WASTE MANAGEMENT

A. The Contractor shall reuse, recycle or dispose of all excess soil and wastes resulting from excavation activities in accordance with federal, state and local regulations and these specifications, as well as all other state laws through which the waste material is being transported.

B. The Contractor shall obtain receipts of disposal for disposed wastes as applicable.

C. The Contractor shall be responsible for preparing and keeping in proper order all waste manifests, BOLs, MSRs, and shall designate one person who shall be made available to sign all transportation documentation. The Contractor shall be responsible for obtaining the generator's signature and all other signatures required for the proper completion of the transportation documentation. The Contractor shall allow a minimum of five (5)

working days from the date of the submittal for any documents requiring the signature of the Owner and/or the LSP. The transportation documentation shall document the handling of the excess excavated soil or waste from the time it is generated until the time it is properly reused or disposed.

D. The Contractor shall be responsible for obtaining all federal, state, and local permits and variances to allow transport of materials and wastes on public roadways.

E. Transportation of wastes shall be in compliance with any relevant federal, state and local requirements, and such as to assure that waste material is not released during transit.

F. Soil and fill material that is managed under a Utility-Related Abatement Measure (URAM) Plan pursuant to the MCP, and which is staged off-site may be re-used within fourteen (14) calendar days of excavation. Any material which is suitable for re-use as ordinary borrow, based on analytical results and could have been placed on site, but was not, due to Contractor delay (i.e. analytical results were not available within 10 days following excavation) will be disposed in accordance with the applicable regulations by the Contractor at no cost to the Owner.

G. Soil and fill material that is managed under a URAM Plan pursuant to the MCP, which is staged off-site and which is determined at the staging area to be characteristically hazardous may be treated (stabilized) within the "Area of Contamination" only and must be reused with 14 days or disposed of within ninety (90) calendar days of excavation. No treatment may occur at the staging area. Pursuant to the MCP and RCRA, hazardous Remediation Waste (e.g., Hazardous soils) shall be removed from the site within 90 days. All other Remediation Waste (e.g., Contaminated soils) shall be removed within 120 days unless exceptions identified at 310 CMR 40.0031(7) apply.

H. Contaminated and Hazardous excavated soils shall be completely covered and secured in accordance with this. Soils exhibiting evidence of potential contamination including but not limited to odors and/or staining shall be covered prior to characterization and off-site reuse or disposal.

I. The Contractor shall be responsible to inform the Owner if hazardous waste disposal will not be performed within 90 days of hazardous waste characterization. This notification shall take place a minimum of 30 days prior to the 90-day deadline. No hazardous waste stockpiled at the site shall remain on site more than 90 days after it is characterized. In accordance with 310 CMR 40.0031, all other Remediation Waste shall not remain on site or temporary off-site storage location more than 120 days from initial date of generation.

J. Transporters of solid wastes that include, but are not limited to, contaminated soil/fill (including OHM-contaminated soil), construction and demolition debris non-hazardous laboratory wastes, bottles, tires, metal parts, tree stumps, brush, and grass cuttings will utilize trucks or dumpsters specifically designed to ensure that material, dust, or liquid is not released in transit. No truck shall be allowed to exit the site until all free liquids are drained from soil being transported off-site. Moisture content of the soil/waste shall be reduced by the Contractor, to or below the maximum acceptance limits required by the disposal facility. Material shall be covered at all times. The vehicle in which the waste is transported shall be driven directly to the intended destination without any stops or

detours in between, except those necessary in response to road conditions, vehicle service needs, or emergencies. Discharge or release of material during transport shall be immediately reported to the Owner. Transporters shall clean up any discharge that occurs in transit, at the Contractor's expense.

K. Manifesting of solid waste shall be required and shall include at a minimum: vehicle identification; date of loading and disposal; tonnage, as measured at the disposal site; and signature of the Owner and/or its representative, transporter, and disposal facility's representative. Transportation of the wastes shall be accompanied by the appropriate manifests such as a MassDEP Bill of Lading, as required in the Code of Massachusetts Regulations (CMR) 310 CMR 40.0030, a Material Shipping Record or by a Uniform Hazardous Waste Manifest. The original shall be returned to the Owner, and/or their representative, within ten (10) working days of disposal.

3.4 STAGING AREAS AND STOCKPILING

A. Prior to disposal, the Contractor shall maintain segregated excess excavated soil and waste stockpiles in conformance with all applicable federal, state and local waste disposal regulations. No staging of asbestos materials or asbestos containing soils shall be allowed except at the direction of the Owner.

B. The Contractor's staging area shall be large enough to store equipment, materials and all stockpiled soils. The Contractor shall protect the staging area from contamination due to excavating, handling, storing and disposing of hazardous materials.

C. Stockpiled soils determined to be Contaminated or Hazardous, as described herein, shall be securely covered at the close of each day and continuously when not being added to or otherwise being handled by the Contractor. Stockpiles shall also be covered at times as directed by the Engineer.

D. Stockpiles of soils that are known or suspected to be hazardous within the soil staging areas shall be placed on a 20-mil HDPE liner/filter fabric and bermed to minimize the potential for contamination release. Each soil category shall be staged in separate areas with barriers to keep different soil types from mixing. Waste characterized as RCRA hazardous waste or other Hazardous soils shall not be stored on site for a period greater than ninety (90) days. All other waste, including Unregulated or Contaminated soils, must be disposed of off-site within 120 days of excavation. At the end of each working day, contaminated soils will be covered with 10-mil polyethylene to minimize the potential for release of contaminants.

E. Covers on stockpiles of soils that are known or suspected to be hazardous shall be secured with tires, ropes, anchors or equivalent material. The cover system shall be capable of resisting actual wind gusts at the site, with a minimum wind capacity of 40 miles per hour. The stockpile covers shall be installed and secured at the end of each working day and at all times when earthwork is not taking place on site. Stockpile covers shall be immediately re-covered should wind forces expose any of the excavated materials. Failure to adequately protect the stockpiles may result in non-payment.

F. Stockpiles are to be segregated based on visual, olfactory, and field screening results. Similar material may be stockpiled together. Each stockpile must be clearly separated from adjacent stockpiles.

G. Stockpiles will be clearly designated by a sign post or marker which can be cross-referenced with samples collected from the pile for characterization purposes. The signs/markers are not to be moved, except by authorized personnel and not until the soil is ready to be either reused on site or loaded for off-site disposal.

H. Unknown, potentially hazardous soils/debris and drummed materials encountered during the project shall be located in a separate bermed location. The Contractor's Soil and Waste Management Plan shall provide construction details of the dimensions and protective measures proposed for the staging area(s). The construction details and protective measures are subject to the approval of the Owner and/or its representatives. The Contractor shall select the area to facilitate handling of the material and to minimize interference with other ongoing construction activities. The Owner or Engineer must agree with the location prior to construction. In the event that excavation is conducted near storm water drainage basins or inlet manholes, the Contractor must protect the drainage structures with filter fabric or provide similar protection to prevent sediment loading and migration of contaminated soils and sediments.

I. If the soil storage area consists of an unimproved or otherwise pervious surface, and soil to be stockpiled is known or suspected to be contaminated, the Contractor shall install a lining of 6-mil (or greater) polyethylene, to protect the soil from the potential of intermixing with existing subsurface soils.

J. Stockpiles shall be no greater than 250 cubic yards in volume. If space constraints, etc. make it infeasible to maintain separate stockpiles of soils to 250 cubic yards, the Waste Management Plan shall include a map with the locations of the composite samples for each stockpile shall be provided to the Resident Engineer prior to the submittal of the samples to the off-site analytical laboratory. This will allow any portion of the stockpile, which came back as contaminated soil to be properly segregated and managed separately.

K. Stockpiles shall be established and maintained as per EPA requirements under the Construction General Permit Section 2.1.2.4. Requirements include the following.

   a. Locate the piles outside of any natural buffers and physically separated from other storm water controls;

   b. Protect from contact with storm water (including run-on) using a temporary perimeter sediment barrier;

   c. For all soils, provide cover or appropriate temporary stabilization to minimize sediment discharge and to contain and securely protect from wind; nevertheless, the Contractor shall provide cover for any stockpiles containing contaminated soils as specified herein;

   d. Do not hose down or sweep soil or sediment accumulated on pavement or other impervious surfaces into any storm water conveyance (unless connected to a sediment basin, sediment trap, or similarly effective control), storm drain inlet, or surface water; and

e. Unless infeasible, contain and securely protect from wind.

3.5 HAZARDOUS WASTES

A. Transporters of hazardous wastes shall be in conformance with Code of Federal Regulations (CFR) 40 CFR, Part 171, all other federal laws and regulations and 310 CMR 30.400, and all other state laws through whose boundaries the waste material is being transported. The transporter shall provide copies of its EPA identification number, Massachusetts transporter's license, and proof of driver training in transporting hazardous waste.

B. The disposal site shall be in conformance with 40 CFR, Part 264 and relevant laws of the state in which the facility is located. The Contractor shall provide copies of the disposal facility's EPA and state treatment and disposal permit.

C. Manifesting of hazardous wastes shall be in conformance with 40 CFR, Part 264, Subpart E, 310 CMR 30.310 and 310 CMR 30.405.

D. Actual quantities which are subject to unit rates shall be tabulated by the Contractor and verified by the Engineer on a daily basis. The Contractor shall not be reimbursed for unit rate work performed without the prior approval of quantities by the Engineer.

3.6 EQUIPMENT AND PERSONNEL DECONTAMINATION

A. Equipment and personnel decontamination facilities shall be provided by the Contractor when hazardous materials are expected to be encountered and handled onsite. Equipment and personnel decontamination area(s), conforming with the Contractor's HASP and these Specifications, will be constructed in such a manner to protect existing site surfaces, materials, and structures from contamination. The equipment decontamination area(s) will be sized adequately to provide for the decontamination of the largest piece of equipment to be decontaminated. Filter fabric will be placed over an impermeable liner to protect the liner from rips, punctures, or tears from traffic and heavy equipment.

B. The Contractor shall establish a site-specific decontamination protocol and decontamination areas for personnel and equipment utilized at the subject site. Personnel and equipment decontamination shall be conducted in compliance with the HASP.

C. The decontamination protocol shall include (i) the means, methods, and materials for the proposed decontamination procedures; (ii) the procedures employed to contain and store the wash or rinse liquids/sludges; (iii) procedures used to sample, analyze, and characterize the contaminated wash or rinse liquids/sludges; (iv) procedures to contain or clean contaminated equipment and PPE; and (v) the procedures for handling and disposing of solid wastes generated from site decontamination activities. All sample analysis shall be completed by a certified laboratory. The Contractor shall be responsible for the cost of this analytical work. The Contractor shall submit a copy of the analytical results and laboratory certifications to the Owner for review prior to proceeding with disposal. The Contractor shall be responsible to properly manifest and dispose of all residual wastes generated from on-site activities in conformance with federal, state, and local environmental and transportation regulations. The Contractor shall be responsible

for the manifests and procedures to be used to package and dispose of contaminated solid wastes, wash, or rinse liquids at an EPA or state-approved treatment or disposal facility. The Contractor shall be responsible for any releases from site or decontamination activities due to its work, and will remediate any release for which the Contractor is responsible to pre-existing conditions at the Contractor's expense.

D. Provisions for collecting decontamination water will be incorporated into the maintenance of the decontamination pad and will include placing an impermeable liner over a sloped surface such that water is directed, if necessary, into an area for subsequent pumping to 55-gallon drums or other appropriate tankage. Following completion of the work, the wash water shall be characterized by the Contractor and disposed off-site, in accordance with federal, state, and local regulations.

3.7 ENVIRONMENTAL FIELD MONITORING / DUST CONTROL

A. The air monitoring program is to be designed to protect public health and the environment from the potential generation of dust and contaminant release during work. All personnel shall be made aware of the potential hazards and be informed of air monitoring information by the Contractor.

B. Dust control measures shall be implemented by the Contractor during all soil handling operations, loading and transport of waste material from the site in accordance with the Contractor's Dust Control Plan.

C. Air monitoring shall occur when excavating or handling soils that are known or suspected to be hazardous or contain OHM. The Contractor shall keep accurate documentation of all air monitoring, which will be made available to the Engineer or Owner upon request.

1. At a minimum, the air monitoring shall include daily monitoring and documentation of one upwind, and two downwind conditions during periods of activity on the site and when there is a potential for dust being generated on the site. The air monitoring information including air monitoring in the vicinity of all site activities shall also be utilized for establishing levels of personal protection measures in the Contractor's Site Specific Health and Safety Plan. The Contractor shall submit his/her air quality monitoring program for review and approval prior to commencement of site activities.

2. Air monitoring shall include headspace analyses in a jar or plastic bag performed using a portable photoionization detector or other appropriate instrument for the anticipated conditions. The Contractor shall be responsible for properly calibrating the instrument each day and recording the calibration in a daily log which shall include the following information:

   a. Name of device or instrument calibrated.

   b. Date of calibration.

   c. Results of calibration.

   d. Name of person performing the calibration.

   e. Identification of the calibration gas.

3. The Contractor is responsible for providing fully charged instrument(s) at the start of each work day.

4. When applicable, field screening samples shall be taken from numerous locations within the excavation. Samples shall be taken from any area that appears to be visibly contaminated or where an odor is noted.

D. If there are indications of contamination, the frequency of air monitoring will be determined by an Industrial Hygienist or competent environmental health professional. The Contractor's Site Health and Safety Officer and Superintendent will be responsible for assuring that monitoring is conducted in an appropriate manner, and that work practices, engineering controls and/or Personal Protective Equipment are proper for the conditions.

E. Dust shall be controlled during excavation of soil/fill waste material to limit potential spread of contaminants and potential exposure of contaminants to workers and the public.

F. During construction, real-time dust monitoring shall be conducted under windy and/or excessively dry working conditions or when directed by the Engineer. The monitoring shall consist of total dust testing using MIE, INC. MINIRAM PDM-3 DUST MONITORS, or like instruments. The total dust criteria at the site shall conform to the requirements of the HASP. Should fugitive dust quantities exceed 20 percent of the ambient level or action levels indicated within the HASP, the Contractor shall perform additional measures to reduce the total dust concentrations.

G. Nuisance dust levels shall be reduced by pre-wetting the surface soils and by establishing and maintaining clean access roads. The Contractor's Dust, Vapor, and Odor Control Plan shall describe the procedures and materials to minimize dust. At a minimum, the Contractor shall provide clean water, free from salt, oil, and other deleterious materials.

H. Areas of exposed earth to be excavated shall be lightly sprayed with water before excavation if there is potential for nuisance dust generation. Additional water spray may be utilized only when any indication of excessive dust is observed. To the extent feasible, the Contractor shall minimize the use of water within the limits of excavation.

I. Unimproved access roads shall be sprayed with water on a regular basis to minimize the generation of dust.

J. All containers temporarily storing waste material shall be covered at all times except as necessary to place waste material into the container. The Contractor shall monitor the covers daily to ensure the covers are in place and effectively eliminating the generation of dust and make appropriate notes in the site log.

3.8 VAPOR AND ODOR CONTROL

The Contractor shall provide the materials and labor to control objectionable vapors and odor in accordance with the Contractor’s SWMP. The Contractor shall limit the exposure area and shall cover the exposure area with synthetic reusable covers, lime, foam suppressants, or other

methods to reduce off-site odors to acceptable levels. The Contractor shall not use soil suitable for on-site reuse as cover to control vapor and odors.

3.9 BULKING

Following characterization and compatibility testing of waste material, the Contractor shall place compatible materials into common containers to reduce transport and disposal costs, when practicable and with the approval of the Engineer. In addition, materials that are improperly contained shall be transferred into the appropriate containers. Drums and containers used during this project shall meet the appropriate DOT, OSHA, and U.S. EPA regulations for the materials contained. The Contractor shall describe the bulking procedures in the Soil and Waste Management Plan.

3.10 CONTAMINATED LIQUIDS

The Contractor shall collect and properly dispose of contaminated liquids and other liquids generated or encountered on site during construction. Contaminated liquid sources include decontamination water, and drummed liquids encountered during excavation. The Contractor shall be responsible for treating and disposing of contaminated groundwater as required by applicable regulations and Section 02140 – Dewatering and Discharge.

3.11 STORMWATER CONTROL

The Contractor shall protect all work from erosion while onsite. The Contractor shall divert all stormwater from work areas that may contain oil or hazardous materials (OHM). Stormwater that may contact OHM, polychlorinated biphenyls (PCBs), lead, asbestos or other types of impacted soil shall be collected within the immediate area of the contact, treated (as determined by sampling and testing) and disposed of in accordance with all local, state and federal regulations. Stormwater that is collected, stored onsite and sampled shall be tested and characterized for determining proper transportation, disposal and/or discharge in accordance with Section 02140 – Dewatering and Discharge.

3.12 BACKFILLING AND COMPACTION

Excavated areas shall be backfilled with appropriate backfill material (including excavated material suitable for reuse and, when necessary, imported off-site material) as specified in Section 02200 - Earthwork.

3.13 CLEANUP

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

Sample Waste Stream Disposal Summary Table

Material Type	Pre-Approval by Receiving Facility	Testing/ Analysis	Transportation Documentation	Proposed Receiving Facility/Facilities
Asbestos Containing Material (ACM)	Required	Not required	WSR	
Asbestos Cement Pipe (ACP)	Required	Not required	WSR	
Unregulated Soils	Required	Required	MSR	
Impacted/Regulated Soils	Required	Required	BOL	
Hazardous materials	Required	Required	HWSM	
Catch basin cleanings	Required	Required	WSR	
Street Sweepings	Required	Not required	WSR	
Contaminated Dewatering liquids	Required	Required	BOL	
Uncontaminated dewatering liquids	Required	Not required	Not required	
Sanitary Sewerage	Not required	Not required	Not required	
Asphalt, Brick and Concrete Material (ABC)	Not required	Not required	MSR, MassDEP notification form if crushed	
Construction Debris	Not required	Not required	Not required	
Vegetation	Not required	Not required	Not required	
Municipal Solid Waste	Not required	Not required	Not required	
Recyclable Materials	Not required	Not required	Not required	

END OF SECTION 02080

SECTION 02101

SITE INVESTIGATION

PART 1 – GENERAL

1.1 SITE CONDITIONS

A. The Contractor acknowledges that they have satisfied themselves as to the nature and location of the Work, the general and local conditions, particularly those bearing upon transportation, disposal, handling, and storage of materials, availability of labor, water, electric power, roads, and uncertainties of weather, groundwater table or similar physical conditions at the site, the conformation of subsurface materials to be encountered, the character of equipment and facilities needed prior to and during the prosecution of the work and all other matters which can in any way affect the work or the cost thereof under this Contract. Any failure by the Contractor to acquaint themselves with all available information concerning these conditions will not relieve them from responsibility for estimating properly the difficulty or cost of successfully performing the Work.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

END OF SECTION 02101

SECTION 02140

DEWATERING AND DISCHARGE

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this section.

B. Examine all Drawings and all other Sections of the Specifications for requirements therein affecting the work of this Section.

1.2 DESCRIPTION

A. Dewatering consists of the removal of surface water and/or groundwater as necessary to perform the construction required by the Contract in accordance with the drawings and specifications. Furnish all labor, materials, equipment, and incidentals required to:

1. Design, furnish, operate, maintain, and remove temporary dewatering systems of sufficient scope, size and capacity to control hydrostatic pressures and to lower, control, remove and dispose of groundwater and surface water to maintain stable, undisturbed subgrades, and allow work to be performed under dry and stable conditions, and comply with all applicable permit and other regulatory requirements.

2. Work to be done as part of dewatering includes, but is not limited to:

a. Trench dewatering required for installation of sewer force mains, water mains and services, gravity sewer mains and services, gravity sewer manholes, stormwater systems, system appurtenances, and exploratory excavations. Lower groundwater in all excavations 2 feet below the lowest excavation level with sump pumping or deep wells.

b. Control hydrostatic pressure.

c. Prevent surface water from entering the excavation during construction.

d. Implement erosion and sedimentation control measures for disposing of discharge water. Continuously monitor and maintain dewatering operations to ensure erosion control, stability of excavations and constructed slopes, that excavation does not flood, and that damage to subgrades and permanent structures is prevented.

e. Prevent surface water from entering excavations by grading, dikes, or other means.

f. Provide system to treat/settle all water removed from excavations, except water that is infiltrated into the ground on-site in a manner that does not result in negative on- or off-site impacts.

g. Provide an Environmental Site Professional/Dewatering Specialist/Field Representative (hereinafter referred to as the Dewatering Professional) who will be responsible for dewatering, infiltration, treatment and discharge of dewatering flows as specified and in compliance with all applicable permits and regulations.

h. Accomplish dewatering without damaging existing buildings, structures, and site improvements adjacent to excavation.

i. Remove dewatering system when no longer required for work activities.

3. Groundwater within the excavation area shall be lowered to at least 2 feet [60 cm.] below the lowest excavation levels as specified and as indicated. Direct discharge into the wetland resource area or surface water bodies will not be allowed.

4. Common dewatering methods include, but are not limited to, sump pumping, deep wells, well points, vacuum well points or any combinations thereof.

5. Uncontaminated groundwater or accumulated surface runoff removed from excavations shall be infiltrated to the ground if feasible, by means of a temporary infiltration trench or basin. The temporary infiltration trench or basin must be: 1) open to the surface or "open-air"; and 2) wider than it is deep. Otherwise, the Contractor must obtain an Underground Injection Control (UIC) permit from the Massachusetts Department of Environmental Protection (MassDEP) Bureau of Resource Protection (BRP) in accordance with 310 CMR 27.00.

   If ground infiltration is not feasible, treated water shall be discharged to the local sewer system in accordance with the appropriate permits and regulations or transported off-site to an approved facility. In no case shall dewatering flows be directly or indirectly released to surface waters or storm drains prior to settling and, if appropriate, any additional treatment. The Contractor is responsible for acquiring all proper permitting required for the chosen method of discharge. Flow from dewatering activities may be discharged to sanitary sewers only when following passage through a silt sack.

   Surface flow that could lead to off-site discharge is not permitted. If ground infiltration or discharge into the sanitary sewer system is not feasible, treated water shall be directly or indirectly discharged to a surface water in accordance with a National Pollutant Discharge Elimination System (NPDES) permit issued by the U.S. Environmental Protection Agency (EPA).

6. If work is expected to be conducted within soil or groundwater affected by oil or hazardous materials, or if the groundwater appears to be impacted, prior to any discharge, the groundwater or accumulated surface runoff shall be sampled and tested to meet the requirements of the NPDES Remediation General Permit, or other permit requirements if an alternative discharge/disposal method (e.g., discharge to sanitary sewer, off-site disposal) is selected by the Contractor. The Contractor is responsible for coordinating the selected method of permitting and discharge or disposal with the Owner's Licensed Site Professional (LSP) to meet the applicable requirements of the Massachusetts Contingency Plan (310 CMR 40.0000).

   Upon sampling, testing and characterization of groundwater or accumulated surface runoff, proper treatment or disposal of ground water or accumulated surface runoff

shall be determined. Treatment, discharge or disposal of groundwater shall be in accordance with all applicable regulations and shall be approved by the Engineer and Owner prior to final discharge or disposal.

B. Related Sections:

1. Section 01110 – Environmental Protection Measures
2. Section 02160 - Temporary Excavation Support Systems
3. Section 02200 - Earthwork

1.3 PERFORMANCE REQUIREMENTS

A. Delegated Design: Design dewatering system, including comprehensive engineering analysis by a qualified professional engineer registered in the Commonwealth of Massachusetts, using performance requirements and design criteria indicated. All costs for delegated design shall be included in the bid price for the Work of this Section.

B. Any damage resulting from the failure of the dewatering operations of the Contractor, and any damage resulting from the failure of the Contractor to maintain all the areas of work in a suitable dry condition, shall be repaired by the Contractor, as directed by the Designer, at no additional cost to the Owner. The Contractor's pumping and dewatering operations shall be carried out in such a manner as to prevent damage to the Contract work and so that no loss of ground will result from operations. Precautions shall be taken to protect new work from flooding during storms or from other causes. Pumping shall be continuous to protect the work and/or to maintain satisfactory progress.

C. All pipelines or structures not stable against uplift during construction or prior to completion shall be thoroughly braced or otherwise protected. Water from the trenches, excavations, and storm water management operations shall be disposed of in such a manner as to avoid public nuisance, injury to public health or the environment, damage to public or private property, or damage to the work completed or in progress.

D. The presence of groundwater in soil will not constitute a condition for which an increase in the Contract price may be made. Under no circumstances place concrete, fill lay piping or install appurtenances in excavations containing free water.

E. The Contractor shall furnish and operate pumps and related equipment, including standby equipment, and all necessary piping to keep all excavations clear of surface, rain or groundwater during the operations, the water at all times and shall be responsible for any damage to the subgrade, completed work or adjacent properties from such water. All piping exposed above surface for this use shall be properly covered to allow traffic to pass without obstruction. Prevent erosion and siltation of surrounding area.

F. The Contractor is responsible for correcting any disturbance of natural bearing soils, compacted fills or structures caused by an inadequate dewatering system or by interruption of the continuous operation of the dewatering system as specified.

1.4 SUBMITTALS

Submit the following in accordance with Section 01300 – Submittals:

A. Shop Drawing: For dewatering system. Show arrangement, locations, and details of filters, pumps, power units and discharge lines; means of discharge; control of sediment and disposal of water.

B. Qualifications of the both the Contractor's dewatering specialist or firm (design) and the Dewatering Professional (all other responsibilities) shall be submitted for approval prior to execution of any dewatering. The submittal shall include, but is not limited to:

1. Qualifications of firm's Registered Professional Engineer as specified in Section 1.5, B.

2. Qualifications of the Dewatering Professional who shall oversee the installation, operation and maintenance of the dewatering system.

C. Submit a Dewatering and Discharge Plan at least two weeks prior to start of any dewatering operation. Do not submit design calculations. The review will be only for the information of the Owner and third parties for an overall understanding of the project relating to access, maintenance of existing facilities and proper utilization of the site. The Contractor shall remain responsible for the adequacy, regulatory compliance, and safety of the means, methods and sequencing of construction activities related to dewatering. The plan shall include the following items as a minimum:

1. Dewatering Plan and details stamped and signed by a Massachusetts Registered Professional Engineer that conforms to the requirements of the dewatering permit(s), the Wetlands Protection Act Order of Conditions, and all other applicable regulations and permits including, but not limited to, requirements for equipment, monitoring, sampling and reporting.

2. Certificate of Design: Refer to Section 01300 for form.

3. A list of equipment including, but not limited to, pumps, prime movers, and standby equipment.

4. A description of the proposed method of dewatering, water infiltration, containment, treatment discharge and disposal; and installation, maintenance, and system removal procedures.

5. A description of erosion/sedimentation control measures and best management practices to eliminate or minimize impacts from potential pollutants.

6. List of all applicable laws, regulations, rules, and codes to which dewatering design conforms.

7. If emergency dewatering requirements should arise the Contractor shall submit a contingency plan for Engineer review and approval.

8. Contractor shall submit a modified Dewatering Plan **within 24 hours**, if open pumping from sumps and ditches results in boils, loss of fines, softening of the ground or other adverse impacts on or off-site.

D. Field quality control reports. Data for the required discharge reports, as applicable, shall be collected and maintained by the Contractor's Dewatering Professional. It shall consist of periodic sampling and analysis of system influents, midfluents and/or effluents and discharge quantities and other requirements of the relevant permits. The Contractor's Dewatering Professional shall also coordinate analysis of samples at an appropriately certified analytical laboratory and shall comply with all permit reporting requirements.

E. Other Informational Submittals: Photographs: Show existing conditions of adjoining construction and site improvements that might be misconstrued as damage caused by dewatering operations.

1.5 QUALITY ASSURANCE

A. Provide in accordance with Section 01400 and as specified.

B. Employ the services of a Dewatering Professional and a Massachusetts Registered Professional Engineer having the following qualifications:

1. The Massachusetts Registered Professional Civil Engineer shall have completed the design of at least five (5) successful dewatering projects of equal size and complexity and with equal systems within the last five (5) years consisting of deep wells, well points, vacuum well points, and sump pumping for heavy Civil projects of similar size, type, and complexity in developed areas with trench box or steel/timber sheeting support of excavation systems.

2. The dewatering system installer's Supervisor shall have a minimum of five (5) years of experience in installation of well points, deep wells, recharge systems, or equal systems.

3. The Dewatering Professional responsible for day to day operation of the system shall have the following minimum qualifications:

a. Completion of at least five (5) successful dewatering projects of equal size and complexity with equal systems within the last five (5) years consisting of: system operation and troubleshooting, collection of readings, maintenance of logs and other required documents, collection of samples, coordination of analysis of samples, and compliance with reporting requirements during pumping for heavy Civil projects of similar size, type, and complexity in developed areas.

b. Current certification from MassDEP to operate the proposed treatment system, as applicable.

C. If subgrade soils are disturbed or become unstable due to dewatering operation or an inadequate dewatering system, notify the Engineer, stabilize the subgrade, and modify system to perform as specified at no additional cost to the Owner.

D. If oil and/or other hazardous materials are encountered after dewatering begins, immediately notify the Engineer.

E. Notify the Engineer immediately if any settlement or movement is detected on structures. If the settlement or movement is deemed by the Engineer to be related to the dewatering,

take actions to protect the adjacent structures and submit a modified dewatering plan to the Engineer within 24 hours. Implement the modified plan and repair any damage incurred to the adjacent structures at no additional cost to the Owner.

F. Direct discharges from construction dewatering to surface water bodies or wetland resource areas are prohibited.

1.6 PROJECT/SITE CONDITIONS

A. Subsurface Investigations: Refer to Appendix A.

PART 2 – PRODUCTS

2.1 MATERIALS

A. Provide settlement markers, piezometers and/or any other geotechnical instruments in accordance with the submitted dewatering plan or as specified.

B. Provide casings, well screens, piping, fittings, pumps, power and other items required for dewatering system.

C. Provide sand and gravel filter around the well screen. Wrapping geotextile fabric directly around the well screen shall not be allowed.

D. When deep wells, well points, or vacuum well points are used, provide pumping units capable of maintaining high vacuum and handling large volumes of air and water at the same time.

E. Provide and store auxiliary dewatering equipment, consisting of pumps and hoses on the site in the event of breakdown, at least one (1) pump for every five (5) used.

F. Provide dewatering equipment, including an appropriately sized settling tank, and maintain erosion/sedimentation control devices as indicated or specified and in accordance with the Dewatering Plan.

G. Provide temporary pipes, hoses, flumes, channels, crushed stone, geotextile fabric, sedimentation barriers, or any combination of equipment for the transport of discharge water over-ground to the discharge location.

H. Provide sampling and analysis equipment to test for turbidity.

PART 3 – EXECUTION

3.1 GENERAL

A. Execution of any earth excavation, installation of earth retention systems, and dewatering shall not commence until the related submittals have been submitted, approved by the Owner and Engineer, and the Dewatering Professional is on site and has begun the duties specified herein.

B. Furnish, install, operate, and maintain dewatering, ground infiltration, treatment and discharge systems as indicated or specified and in accordance with the Dewatering Plan. Delays due to insufficient storage capacity, inadequate Contractor Dewatering Plan, or permitting delays will be at no additional cost to the Owner. The Contractor is responsible to evaluate available data and determine the necessary dewatering system so as not to impede construction activities.

C. Carry out dewatering program in such a manner as to prevent undermining or disturbing foundations of existing structures or of previously completed or ongoing work.

D. Do not excavate below the seasonal high groundwater elevation until the dewatering system is operational.

E. Unless otherwise specified, continue dewatering uninterrupted until all structures, pipes, and appurtenances below the seasonal high groundwater level have been completed and sufficiently backfilled and/or anchored such that they will not be floated or otherwise damaged by an increase in groundwater elevation.

F. Discontinue open pumping from sumps and ditches, if such pumping is resulting in boils, loss of fines, softening of the ground, instability of the slopes or other adverse impacts on or off-site. Modify the Dewatering Plan and submit to the Engineer at no additional cost to the Owner.

G. Where subgrade materials are disturbed or become unstable due to dewatering operations, remove and replace the materials in accordance with Section 02200 at no additional cost to the Owner.

3.2 DEWATERING DISCHARGE

A. Install and monitor recharge systems when specified and/or indicated and in accordance with the submitted dewatering plan.

B. Install sand and gravel filters in conjunction with well points and deep wells to prevent the migration of fines from the existing soil during the dewatering operation.

C. Groundwater or accumulated surface runoff to be infiltrated does need not be treated, unless known to be contaminated or noticeably impacted with oil or hazardous waste. Contractor shall provide infiltration as described in Section 1.2.A.3 that complies with relevant local, state and federal regulations.

D. The effluent (discharge) shall be tested for turbidity on a daily basis and shall not exceed 280 NTU, averaged over 5 consecutive days. Sufficient measures shall be employed to provide effective ways to remove turbidity, color and potential coliform organisms (from sewer work) prior to discharge.

E. Transport pumped or drained water to discharge location in compliance with applicable permits and without interference to other work; damage to or contamination of pavement, other surfaces, or property; erosion; or siltation.

F. Provide separately controlled pumping lines.

G. The Engineer reserves the right to sample discharge water at any time. If discharge water quality is poor, the Engineer may request additional measures to improve water quality.

H. The Contractor shall not discharge silty water in the wetland resource area or surface water body.

I. Immediately notify the Engineer and Owner if groundwater is encountered that is suspected to be contaminated with substances other than those for which the treatment system has been designed. Do not pump water found to be contaminated with oil or other hazardous material to the discharge locations. Sampling, testing and characterization of the groundwater shall include (but not be limited to) criteria within part 1.2 of this specification section to determine the final disposal of the groundwater. Groundwater disposal shall follow all local, state and federal permits and regulations.

3.3 COMPLIANCE WITH DEWATERING AND RELATED PERMITS AND REGULATIONS

A. Discharging groundwater and allowing for natural infiltration may not be a viable option for controlling groundwater in the project area. Should dewatering activities be required where the Contractor needs to discharge groundwater to a location other than the point of origin, then the Contractor shall store, treat and discharge the water in accordance with applicable permits and regulations. Periodic sampling, as may be required to demonstrate treatment effectiveness and compliance with pretreatment standards specified in any local, state, or federal discharge permit required shall be the responsibility of the Contractor and its Dewatering Professional. If on-site infiltration, discharge to the local sanitary sewer system or off-site disposal are not feasible options, the Contractor shall be responsible for seeking coverage under one of the following EPA NPDES permits: Construction General Permit (CGP) for projects disturbing >1 acre; Dewatering General Permit (DGP) for projects disturbing <1 acre; or Remediation General Permit (RGP) for any project with known groundwater contamination. The Contractor shall be prepared to comply with standard local permit conditions including periodic testing of the effluent and with standard NPDES permit conditions including periodic testing of the treatment system influent, midfluent and effluent. The Dewatering Plan shall include a description of procedures and information related to the collection of readings, maintenance of logs and other required documents. At a minimum, the Dewatering Plan shall describe compliance with relevant provisions of the applicable NPDES Permit or other discharge permit and the local Conservation Commission Order of Conditions. Copies of the applicable NPDES or other permit authorization to discharge shall be provided to the Owner prior to the start of dewatering activities.

B. The Contractor, through its Dewatering Professional:

1. Shall furnish all labor, equipment and materials necessary to obtain accurate representative samples of the groundwater and for analysis for the set of analytical parameters specified above and as required by local, state and federal permits and regulations.

2. Shall coordinate sampling activities with the Engineer. The Engineer reserves the right to sample treated and untreated dewatering flows at any time.

3. Shall take readings from the treatment system in accordance with the Dewatering Plan.

4. Shall collect an initial sample of untreated and treated groundwater at the beginning of dewatering activities within the construction area. Sampling and start-up shall be conducted in accordance with applicable permits.

5. Shall prepare and keep in proper order all records required by regulatory authorities and permits.

6. Shall maintain logs and other records in accordance with the Specifications, regulatory agency and permit requirements, and the Dewatering Plan.

7. Shall coordinate analysis of samples by an appropriately certified analytical laboratory in accordance with the Specifications, regulatory agency and permit requirements, and the Dewatering Plan, and ensure that laboratory detection limits meet permit requirements.

8. Shall comply with reporting requirements in a timely manner and in the format required by the relevant permit. Reporting in compliance with permit requirements includes, but is not limited to: notification to the appropriate regulatory agencies, Owner and Engineer prior to discharge; submittal of laboratory analytical reports for each sampling event; submittal of reports for each reporting period during which no discharge occurs; notification of non-compliant discharges; notification of termination of discharge; and response to permit-related questions posed by regulatory agencies or the Owner and Engineer.

    a. If water will be discharged under a National Pollutant Discharge Elimination System (NPDES) permit, submit notifications and reports to both the Environmental Protection Agency (EPA) and the appropriate regional office of the Massachusetts Department of Environmental Protection (MassDEP) and the Engineer. Comply with pre-discharge notification, discharge reporting, notification of no discharge, and termination of discharge notification requirements; and respond to inquiries or correspondence from EPA or MassDEP regarding permit issues.

    b. If water will be discharged under a local permit, submit notifications and reports as required in the permit.

    c. Observe and record daily the elevation of the groundwater during the length of the dewatering operation and provide data to Engineer on daily basis. For monthly or less frequent reporting deadlines, provide the Engineer with copies of all reports fourteen (14) days prior to the reporting deadline, and submit reports to the appropriate agency(ies). Provide copies of other dewatering documents to the Engineer immediately.

9. Install and maintain erosion/sedimentation control devices at the point of discharge as indicated or specified and in accordance with the Dewatering Plan.

10. The Contractor shall obtain all federal, state, county, and local permits and variances to allow transport of materials on public roadways, should such transport be necessary.

11. The Contractor shall dispose of all wastes resulting from construction dewatering activities in accordance with local, federal and state regulations.

12. The Contractor is solely responsible for the implementation of the permit requirements, and is solely responsible for any punitive action resulting from any violation of the permit. The actual permit issued shall become part of this Contract by either addendum or by change order. If the actual permit is included by change order, no additional costs for implementing the permit will be considered by the Owner, when the actual permit is issued.

3.4 REMOVAL

A. Do not remove dewatering system without written approval from the Engineer.

B. Backfill and compact sumps or ditches with screened gravel or crushed stone wrapped with geotextile fabric in accordance with Section 02273 – Geotextile Fabric.

C. All dewatering wells shall be abandoned upon completion of the work, and completely backfilled with cement grout.

3.5 CONTRACT CLOSEOUT

A. Provide in accordance with Section 01700 – Contract Closeout.

END OF SECTION 02140

SECTION 02160

TEMPORARY EXCAVATION SUPPORT SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY OF WORK

A. This section includes the following:

1. Design, furnish and install temporary excavation support systems as required to maintain lateral support, prevent loss of ground, limit soil movements to acceptable limits and protect from damage existing and proposed improvements including, but not limited to, pipelines, utilities, structures, roadways, and other facilities.

2. Common types of excavation support system include, but are not limited to: singular or multiple stages comprised of cantilevered or internally braced soldier piles and lagging, steel sheetpile wall, timber sheetpile wall, trench box, or combinations thereof. Trench box temporary excavation support system is only acceptable for pipe or utility trench excavations. Temporary unsupported open cut excavation with stable sloping sides is allowed where applicable.

3. Wherever the word "sheeting" is used in this section or on the contract drawings, it shall be in reference to any type of excavation support system specified except trench box.

4. Construction of the temporary excavation support systems shall not disturb the existing structures or the completed proposed structures. Damage to such structures shall be repaired by the Contractor at no additional cost to the Owner.

5. The Contractor shall bear the entire cost and responsibility of correcting any failure, damages, subsidence, upheaval or cave-ins as a result of improper installation, maintenance or design of the temporary excavation support systems and any and all damage to adjacent utilities. The Contractor shall pay for all claims, costs and damages that arise as a result of the work performed at no additional cost to the Owner.

1.2 RELATED SECTIONS

A. Drawings and general provisions of the Contract, including General and Supplemental Conditions and Division 1 Specification Sections, apply to this section, and:

1. Section 02140 – Dewatering and Discharge

2. Section 02200 – Earthwork

3. Section 02015 – Geotechnical Instrumentation and Monitoring

1.3 SUBMITTALS

A. Shop Drawing: Submit the following in accordance with Section 01300 - Submittals:

1. Submit the following qualifications four (4) weeks prior to the construction:

a. Qualifications of Contractor's temporary excavation support system designer as specified in Paragraph 1.4 D.

b. Qualifications of Contractor's temporary excavation support system installer as specified in Paragraph 1.4 E.

c. Qualifications of Contractor's independent tieback testing laboratory as specified in Paragraph 1.4 F, if a tieback system is utilized.

d. Qualifications of Contractor's temporary excavation support system installation supervisor as specified in Paragraph 1.4 G.

2. Submit a temporary excavation support plan stamped and signed by a Massachusetts Registered Professional Engineer at least two weeks prior to start of the construction. Do not submit design calculations. The review will be only for the information of the Owner and third parties for an overall understanding of the project relating to access, maintenance of existing facilities and proper utilization of the site. The Contractor shall remain responsible for the adequacy and safety of the means, methods and sequencing of construction. The plan shall include the following items as a minimum:

a. Proposed temporary excavation support system(s), details, location, layout, depths, extent of different types of support relative to existing features and the permanent structures to be constructed, and methods and sequence of installation and removal.

b. Certificate of Design: Refer to Section 01300 for form.

c. If utilizing a tieback system, include tieback installation procedures and criteria for acceptance of tiebacks for performance and proof tests. Submit the tieback testing results to the Engineer for information only.

d. Requirements of dewatering during the construction, per Section 02140.

e. Minimum lateral distance from the edge of the excavation support system for use for vehicles, construction equipment, and stockpiled construction and excavated materials.

f. List of equipment used for installing the excavation support systems.

3. Submit a Construction Contingency Plan specifying the methods and procedures to maintain temporary excavation support system stability if the allowable movement of the adjacent ground and adjacent structures is exceeded.

4. For excavation support systems left in place, submit the following as-built information prior to backfilling and covering the excavation support systems:

a. Survey locations of the temporary excavation support systems, including coordinates of the ends and points of change in direction.

b. Type of the temporary excavation support system.

c. Elevations of top and bottom of the excavation support systems left in place.

1.4 QUALITY ASSURANCE

A. Provide in accordance with Section 01400 and as specified.

B. Conform to the requirements of the OSHA Standards and Interpretations: "Part 1926 Subpart P - Excavation, Trenching, and Shoring", and all other applicable laws, regulations, rules, and codes.

C. All welding shall be performed in accordance with AWS D1.1.

D. Prepare design, including calculations and drawings, under the direction of a Professional Engineer registered in Massachusetts and having the following qualifications:

1. Not less than ten (10) years experience in the design of specific temporary excavation support systems to be used.

2. Completed not less than five (5) successful temporary excavation support system projects of equal type, size, and complexity within the last five (5) years.

E. Temporary Excavation Support System Installer's Qualifications:

1. Not less than three (3) years experience in the installation of similar types and equal complexity as the proposed system.

2. Completed not less than three (3) successful excavation support systems of similar type and equal complexity as the proposed system.

F. If utilizing a tieback system, employ an independent testing laboratory to test the tieback system with the following qualifications:

1. Be accredited by the American Association of State Highway and Transportation Officials (AASHTO) Accreditation Program.

2. Employ personnel conducting testing who are trained in the methods and procedures to test and monitor tieback systems of similar type and equal complexity, as the proposed system.

3. Have not less than five (5) years experience in testing of tieback systems of similar type and equal complexity as the proposed system.

4. Have successfully tested at least three (3) tieback systems of similar type and equal complexity as the proposed system.

G. Install all temporary excavation support systems under the supervision of a supervisor having the following qualifications:

1. Not less than five (5) years experience in installation of systems of similar type and equal complexity as the proposed system.

2. Completed at least five (5) successful temporary excavation support systems of similar type and equal complexity as the proposed system.

1.5 DESIGN CRITERIA

A. Design of temporary excavation support systems shall meet the following minimum requirements:

1. Support systems shall be designed for earth pressures, hydrostatic pressure, equipment, temporary stockpiles, construction loads, and other surcharge loads.

2. Design a bracing system to provide sufficient reaction to maintain stability.

3. Limit movement of ground adjacent to the excavation support system to be within the allowable ground deformation as specified.

4. Design the embedment depth below bottom of excavation to minimize lateral and vertical earth movements and provide bottom stability. Toe of braced temporary excavation support systems shall not be less than 5 feet below the bottom of the excavation to prevent any boil over conditions.

5. Design temporary excavation support systems to withstand an additional 2 feet of excavation below proposed bottom of excavation without redesign except for the addition of lagging and/or bracing.

6. Maximum width of pipe trench excavation shall be as indicated on the drawings.

7. Do not cast permanent structure walls directly against excavation support walls.

1.6 DELIVERY, STORAGE AND HANDLING

A. Store sheeting and bracing materials to prevent sagging which would produce permanent deformation. Keep concentrated loads which occur during stacking or lifting below the level which would produce permanent deformation of the material.

1.7 PROJECT/SITE CONDITIONS

A. Subsurface Conditions: Refer to Appendix A of the Specifications.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Structural Steel: All soldier piles, wales, rakers, struts, wedges, plates, waterstop and accessory steel shapes shall conform to ASTM A36.

B. Steel Sheet Piling: ASTM A328, continuous interlocking Z-type. Steel sheet shall be ASTM A572 Grade 60.

C. Timber Sheeting shall be composed of a 3 layer laminated timber with tongue and groove connecting edges. The toe of the sheeting shall be cut on a diagonal so that, in driving, the pile will be continuously wedged back against the previously driven pile. Timber sheet piling shall conform to the requirements of AASHTO M. 09.01-1.

D. Timber Lagging Left in Place: Pressured treated per appropriate AWPA standards.

E. Tieback Tendons: Tieback tendons shall be high strength steel wire strand cables conforming to ASTM A416, or bars conforming to ASTM A722. Splicing of individual cables shall not be permitted.

F. Raker Ties: ASTM A615 Grade 60.

G. Cement Grout Materials and Admixtures for Tieback Anchorages: Grout cube strength shall be a minimum 3500 psi at 7 days and 5000 psi at 28 days.

H. Concrete: Refer to Section 03300.

I. Tamping tools adapted for backfilling voids after removal of the excavation support system.

J. Provide specific trench box sizes for each pipe and utility excavation with structural capacity of retaining soil types as described in OSHA's 29 CFR Part 1926 Subpart P.

K. The boxes shall be composed of sections, the number of which shall be dictated by the depth of excavation. The forward end of the box shall be equipped with cutting edges to facilitate the movement of the box along the trench bottom and shall be equipped with eyelets or hooks by which the excavator may pull the boxes along.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Installation of the temporary excavation support systems shall not commence until the related earth excavation and dewatering submittals have been reviewed by the Engineer with all Engineer’s comments satisfactorily addressed.

B. Install excavation support systems in accordance with the temporary excavation support plan.

C. If utilizing a tieback system, all performance and proof tests shall be conducted in the presence of the Engineer. Testing performed without the Engineer present will not be accepted. Repeat testing in the Engineer's presence at no additional cost to the Owner.

D. Do not drive sheeting within 100 feet of concrete less than seven (7) days old.

E. Carry out program of temporary excavation support in such a manner as to prevent undermining or disturbing foundations of existing structures of work ongoing or previously completed.

F. Bottom of the trench box excavation support system shall be above the pipe invert prior to installing the pipe.

G. Install and survey geotechnical instrumentation in accordance with the temporary excavation support plan and the requirements listed in the Geotechnical Instrumentation and Monitoring section. Notify the Engineer immediately if any geotechnical instrumentation is damaged. Repair or replace damaged geotechnical instrumentation at the sole option of the Engineer and at no additional cost to the Owner.

H. Continuously monitor movements of the ground adjacent to excavation support systems and adjacent structures. In event of the measured movements approaching or exceeding the allowable movements, take immediate steps to arrest further movement by revising procedures such as providing supplementary bracing, filling voids behind the trench box, supporting utilities or other measures (Construction Contingency Plan) as required.

I. Notify utility owners if existing utilities interfere with the temporary excavation support system. Modify the existing utility with the utility owner's permission or have the utility owner make the modifications at no additional cost to Owner.

3.2 GROUND DEFORMATION ADJACENT TO EXCAVATION SUPPORT SYSTEMS

A. Criteria for "threshold" and "limiting" movements of wall elements of excavation support system have been established as follows:

1. "Threshold" Horizontal Movement:

Dx = No greater than 1.25 inch where no buildings are present within 25 ft. of support system

Dx = No greater than 0.5 inch where buildings are present within 25 ft. of support system.

Where
Dx = measured horizontal wall movement at any level.

2. "Limiting" Horizontal Movement:

Dx = No greater than 2.0 inches where no buildings are present within 25 ft. of support system

Dx = No greater than 0.75 inch where buildings are present within 25 ft. of support system.

B. The Contractor shall notify the Engineer and shall take immediate steps to control further movement by revising his procedures, providing supplemental bracing or other measures (working 24 hours per day or temporarily terminating work in the area of movement if necessary) as required if any of the following occur:

1. Field measurements indicate that any of the "threshold" movement criteria are reached or exceeded.

2. Field measurements or observations indicate that significant or sustained wall movements are occurring (total movement may be less than the "Limiting" movement criteria).

3. Movements of adjacent structures, utilities or other facilities are detected.

C. If "Limiting" movements are being approached or reached, the Engineer, based on his judgment and review of the movement monitoring data, may require the Contractor to temporarily terminate the work in the area where such movement is occurring and implement all necessary mitigation measures which are satisfactory to the Engineer, to arrest the movements, at no cost to the Owner.

D. Horizontal or vertical movement of any point on adjacent structures shall not exceed 0.5 inches. The Contractor shall establish and monitor survey points on the adjacent structures. The Contractor shall take all necessary measures to prevent greater settlements, at no additional cost to the Owner.

E. These criteria are intended to establish a minimum basis for the Contractor's design and procedures and in no way relieve the Contractor of his sole responsibility for preventing detrimental movements and damage to adjacent structures, utilities or other work.

F. Monitoring personnel shall use a procedure for reading and recording geotechnical instrumentation data which compares the current reading to the last reading during data collection to eliminate spurious readings. Refer to Geotechnical Instrumentation and Monitoring for requirements.

G. Plot the observed ground deformation readings versus time. Annotate the plots with construction loading and excavation events having an impact on the readings. Evaluate plots by means of secondary rate-of-change plots to provide early warning of accelerating ground movements.

H. Implement Construction Contingency Plan under direction of the temporary excavation support system designer, installation supervisor and the Engineer.

3.3 REMOVAL OF EARTH RETENTION SYSTEM

A. Sheeting shall <u>not</u> be left in place unless otherwise indicated or approved in writing by the Engineer.

B. When indicated or approved by the Engineer, remove the temporary excavation support system without endangering the constructed or adjacent structures, utilities, or property. Immediately backfill all voids left or caused by withdrawal of temporary excavation support systems with bank-run gravel, screened gravel or select borrow by tamping with tools specifically adapted for that purpose.

C. When tiebacks are used, release tension in tiebacks as the excavation is backfilled. Do not leave tensioned tieback in place at the completion of the work.

D. The excavation support system left-in-place shall be cut-off a minimum of 2 feet below the bottom of the next higher foundation level or a minimum of 5 feet below finished grade.

E. Conduct survey of the locations and final cut-off elevations of the excavation support systems left in place.

F. Submit as-built information, prior to backfilling.

3.4 CONTRACT CLOSEOUT

A. Provide in accordance with Section 01700 – Contract Closeout.

END OF SECTION 02160

SECTION 02200

EARTHWORK

PART 1 – GENERAL

1.1 SUMMARY OF WORK

A. This Section includes excavations of normal depth in earth for trenches and structures; backfilling such excavations to the extent required; filling; rough grading; miscellaneous earth excavation; temporary excavation support; the removal, hauling and stockpiling of suitable excavated material for subsequent use in the work; all re-handling, hauling and placing of stockpiled materials for use in refilling, filling, backfilling, grading and such other operations; the removal and satisfactory disposal off the site of unsuitable material; compaction; and appurtenant work, complete, in accordance with the Drawings and Specifications, and as directed.

B. Related Sections includes the following:

1. Section 02080 – Soil and Waste Management
2. Section 02140 – Dewatering and Discharge
3. Section 02160 – Temporary Excavation Support
4. Section 02212 – Rock Excavation
5. Section 02570 – Sewers, Manholes, and Appurtenances
6. Section 02576 – Pavement Repair and Resurfacing

1.2 SUBMITTALS

A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.

B. Backfill Materials: If requested by the Engineer, the Contractor shall pay for and submit a grain size analysis and curve performed in accordance with ASTM D422 for each proposed source of backfill for review by the Engineer. The grain size analysis shall indicate that the backfill material conforms to the gradation requirements specified.

C. Controlled Density Fill: Proposed Mix Designs for the type(s) of Controlled Density Fill shall be submitted for review and approval by the engineer.

D. If requested by the Engineer, submit a controlled density fill (CDF) mix design

showing the proportions and gradations of all materials.

E. If requested by the Engineer, submit a moisture-density curve indicating the maximum dry-density and optimum moisture content as determined by ASTM D1557 for each proposed source of backfill for review by the Engineer.

F. Submit the qualifications of the independent geotechnical testing laboratory performing soil testing and inspection services during earthwork operations. The geotechnical testing laboratory must demonstrate to the Engineer's satisfaction, based on evaluation of laboratory submitted criteria conforming to ASTM D3740, that it has the experience and capability to conduct required field and laboratory geotechnical testing. In addition, the laboratory shall be supervised by a Registered Professional Engineer in the State of Massachusetts.

G. Submit an excavation, backfilling, and filling plan at least one week prior to start of any earth moving activities. The review will be only for the information of the Owner and third parties for an overall understanding of the project relating to access, maintenance of existing facilities and proper utilization of the site. The Contractor shall remain responsible for the adequacy and safety of the means, methods and sequencing of construction. The plan shall include, but not be limited to the following items:

1. Detailed sequence of work.

2. General description of construction methods.

3. Numbers, types, and sizes of equipment proposed to perform excavation and compaction.

4. Details of dust control measures.

5. Proposed locations of stockpiled excavation and/or backfill materials.

6. Proposed surplus excavated material off-site disposal areas and required permits.

1.3 EXCAVATION CLASSIFICATIONS

A. Earth Excavation or "Excavation" consists of removal of materials encountered to the subgrade elevations indicated and subsequent reuse or disposal of the materials removed. All excavation is classified as earth excavation unless it otherwise meets the classifications provided below for exploratory excavation, unauthorized excavation, additional excavation, or rock excavation.

B. Exploratory Excavation, also referred to as test pits, shall consist of the removal of materials for the purpose of locating underground utilities or structures as an aid in establishing the precise location of new work. Exploratory excavation shall be

performed as shown on the plans and as directed by the Engineer. Exploratory excavation shall be paid for under the unit cost pay item. Exploratory excavation not directed or approved by the Engineer shall be at the Contractor's expense.

C. Unauthorized Excavation consists of removal of materials beyond indicated subgrade elevations or dimensions without specific direction of the Engineer. Unauthorized excavation, as well as remedial work directed by the Engineer, shall be at Contractor's expense.

D. Additional Excavation:

1. When excavation has reached required subgrade elevations, notify the Engineer who will review subgrade conditions.

2. If unsuitable bearing materials are encountered at required subgrade elevations, carry excavations deeper and replace excavated material as directed by the Engineer.

3. Removal of unsuitable material and its replacement as directed will be paid on the basis of contract conditions relative to changes in work or as provided for under the unit rates for this classification.

E. Rock Excavation:

1. Determination of rock excavation classification will be made by the Engineer as specified in Section 02212 – Rock Excavation.

1.4 EXCAVATION

A. The Contractor shall perform all excavations of every description and of whatever substances encountered, in a manner as required to allow for placing of temporary earth support, forms, installation of pipe and other work, and to permit access to the Engineer for the purpose of observing the work. Excavations shall be to such widths as will give suitable space for the required work. Bottoms of trenches and excavations shall be protected from frost and shall be firm, dry and in an acceptable condition to receive the work; work shall not be placed on frozen surfaces nor shall work be placed on wet or unstable surfaces.

B. All excavations made in open cut will be controlled by the conditions existing at the various locations and shall always be confined to the limits as designated by the Engineer. In no case shall earth be excavated or disturbed by machinery so near to the finished subgrade for structures and pipelines as to result in the disturbance of the earth below the subgrade. The final excavation to subgrade should be accomplished with a smooth faced bucket or by hand if directed by the Engineer.

C. The Contractor shall satisfy all dewatering requirements specified in Section 02140

– Dewatering and Discharge, before performing trench excavations.

1.5 TEMPORARY EARTH SUPPORT

A. The Contractor shall furnish, place and maintain such sheeting, shoring, and bracing at locations necessary to support the sides of excavations and to prevent danger to persons or damage to pavements, facilities, utilities, or structures, and to prevent injurious caving or erosion or the loss of ground, and to maintain pedestrian and vehicular traffic as directed and required. See Section 02160 – Temporary Excavation Support for additional requirements.

B. In all sheeting, shoring and bracing operations, care shall be taken to prevent injury to persons or damage to structures, facilities, utilities and services. Any injuries to persons shall be the responsibility of the Contractor; and any damage to the work occurring as a result of settlement, water or earth pressure, or other causes due to inadequate bracing or other construction operations of the Contractor shall be satisfactorily repaired or made good by the Contractor, at no additional expense to the Owner.

C. Where sheeting is to be used, it shall be driven ahead of excavation operations to the extent practicable so as to avoid the loss of material from behind the sheeting; where voids occur outside of the sheeting, they shall be filled immediately with selected fill, thoroughly compacted.

D. The Contractor shall leave in place all sheeting and bracing at the locations and within the limits ordered by the Engineer in writing. The Contractor shall cut off the sheeting at elevations to be determined by the Engineer.

E. Conform to the requirements of the OSHA Standards and Interpretations: “Part 1926 Subpart P-Excavation, Trenching, and Shoring”.

F. The Contractor shall comply with all federal, state, and local safety regulations, and requirements.

PART 2 – PRODUCTS

2.1 BACKFILL MATERIALS

Processed Gravel for Pavement Sub-base

A. Processed Gravel for pavement sub-base shall be hard, durable stone of proper size and gradation and coarse sand, unfrozen and substantially free from vegetation, roots, loam and other organic matter, clay, snow, frozen particles and other fine or harmful substances.

Processed gravel shall conform to the MassDOT Standard Specs, Section M1.03.1 "Processed Gravel for Sub-Base" and shall be graded within the following limits:

Sieve Designation	Percentage Passing
3-in	100
1-1/2-in	70 to 100
1/4-in	50 to 85
No. 4	30 to 60
No. 200	0 to 10

Common Fill

B. Common fill (structural fill, gravel borrow, or backfill) shall consist of inert material that is hard, durable stone and coarse sand free from frost, frozen lumps, loam and clay, surface coatings, and deleterious materials.

Graduation requirements for gravel shall be determined by AASHTO-T11 and T27 and shall conform to the following:

Sieve Designation	Percent Passing
1/2 in.	50-85
No. 4	40-75
No. 50	8-28
No. 200	0-10

Maximum size of stone in gravel shall be 6 inches largest dimension

Screened Gravel

C. Screened gravel for use as directed by the Engineer shall consist of hard, durable, particles of proper size and gradation, free from sand, loam, clay, excess fines and deleterious materials. The size of the particles shall be uniformly graded gravel such that not less than 95 percent of the particles will pass a 1/2-in sieve, 40 to 70 percent will pass the 3/8-in sieve, and not more than 5 percent will pass a No. 4 sieve.

Crushed Stone

D. Crushed stone for use as directed by the Engineer shall consist of sound, durable stone, free of any foreign material, angular in shape, free from structural defects and comparatively free of chemical decay. The stone shall be maximum size of 1-1/2-in and a minimum size of 1/2-in. Crushed stone shall be used as ordered by the Engineer.

3/4-Inch Crushed Stone

E. ¾" Crushed Stone for pipe bedding and manhole subbase, or as directed by the Engineer, shall be durable, clean angular rock fragments obtained by breaking and crushing rock material. Sieve analysis by weight:

Sieve Designation	Percent Passing
1"	100
3/4"	95-100
1/2"	35-70
3/8"	0-25

Sand Borrow

F. Sand borrow for use as water main pipe bedding or as directed by the Engineer, shall conform to MassDOT Spec. M1.04.0

2.2 CONTROLLED DENSITY FILL

A. Controlled Density Fill: Controlled Density Fill shall meet the requirements as described in MassDOT Standard Specifications Subsection M4.08.0. Controlled Density Fill for this project shall be Type 1E - Very Flowable (Excavatable), as described in MassDOT Subsection M4.08.0.

B. Controlled Density Fill shall be batched at a ready mix plant and is to be used at a high or very high slump of approximately 10 to 12-inches.

2.3 RIP RAP

A. Rip Rap Stone: The rip rap stone material shall conform to the MHD requirements specified in Section M2.02.4.

PART 3 – EXECUTION

3.1 EXCAVATION

A. Cut pavement with a saw or pneumatic tools to prevent damage to remaining pavement without extra compensation. Where pavement is removed in large pieces, dispose of pieces before proceeding with excavation.

B. Do not remove excavation materials from the site of the work or dispose of except as directed or permitted by the Engineer.

C. Provide suitable and safe bridges and other crossings where required for accommodation of travel, and to provide access to private property during construction, and remove said structures thereafter.

D. Trenches shall be excavated to sufficient depths and to sufficient widths for installing new pipe/components where required, placing and removing of decking, sheeting and bracing, and for pumping and drainage facilities. The bottom of the excavations shall be firm and dry and in all respects acceptable to the Engineer. Trench width and depth shall be a practical minimum, as needed for proper execution for the work, and shall be performed in accordance with the Typical Trench Detail as shown on the Drawings.

E. While excavating and backfilling is in progress, traffic shall be maintained, and all utilities and other property protected as provided in the General Conditions and General Requirements.

F. Excavation and dewatering shall be accomplished by methods which preserve the undisturbed state of subgrade soils. The trench may be excavated by machinery to, or just below the designated subgrade, provided that material remaining in the bottom of the trench is no more than slightly disturbed. Subgrade soils which become soft, loose, "quick", or otherwise unsatisfactory as a result of inadequate excavation, dewatering or other construction methods shall be removed and replaced by gravel borrow as required by the Engineer at the Contractor's expense.

G. Clay and organic silt soils are particularly susceptible to disturbance due to construction operations. When excavation is to end in such soils, the Contractor shall use a smooth-edge bucket to excavate the last one foot of depth.

H. Where pipe is to be laid in screened gravel, the trench may be excavated by machinery to the normal depth of the pipe plus the depth of the stone, provided that the material remaining in the bottom of the trench is no more than slightly disturbed.

I. Where pipe is to be laid directly on the trench bottom, final excavation at the bottom of the trench shall be performed manually, providing a flat-bottom true to grade upon undisturbed material. Bell holes shall be made as required.

J. Excavate trenches to depths so as to permit pipe to be laid at elevations, slopes, or depths of cover indicated on drawings, and at uniform slopes between indicated elevations.

K. Make pipe trenches as narrow as practicable and do not widen by scraping or loosening materials from the sides. Make every effort to maintain sides of trenches firm and undisturbed until backfilling has been placed and compacted.

L. Excavate trenches with approximately vertical sides for entire depth of trench.

3.2 STOCKPILING OF SURPLUS EXCAVATED MATERIALS

A. The Contractor shall strip and stockpile excavated trench materials. Any bushes that are removed shall be protected and replanted in the same location. Removed curbing shall be stockpiled and numbered in a safe manner for future resetting. Where grassed areas are disturbed by stockpiled materials, the Contractor shall rake out the area and loam and re-seed at his expense.

B. Stockpiling of materials shall be included in the pay items for excavating and no allowances shall be made for any stripping and stockpiling requirements.

C. Should conditions make it impracticable or unsafe to stack material adjacent to the trench, the material shall be hauled and stored at a location provided by the Contractor. When required, it shall be re-handled and used in backfilling the trench.

3.3 PROTECTION OF EXISTING STRUCTURES

A. Carefully support and protect from damage, existing pipes, poles, wires, fences, curbing, property line markers, and other structures, which the Engineer determines must be preserved in place without being temporarily or permanently relocated. Should such items be damaged, restore without compensation therefore, to at least as good condition as that in which they were found immediately before the work was begun. Contractor shall hand dig around existing utilities.

B. Curbing, fencing, sign posts, utility poles, mailboxes, etc. in the vicinity of the Contractor's operations shall be adequately protected, and if necessary removed and restored after backfilling. All items which are damaged during construction shall be replaced with material fully equal to that existing prior to construction.

C. Enclose uncut tree trunks adjacent to work in wooden boxes of such height as may be necessary for protection from injury from piled material, equipment, operations, or otherwise due to work. Operate excavating machinery and cranes of suitable type with care to prevent injury to trees not to be cut and particularly to overhanging branches and limbs.

D. Cut all branches, limbs, and roots smoothly and neatly without splitting or crushing. Neatly trim, cut the injured portions and cover with an application of grafting wax or tree healing paint as directed.

E. Protect cultivated hedges, shrubs, and plants which might be injured by the Contractor's operations by suitable means or dig up and temporarily replant and maintain. After construction operations have been substantially completed, replant in original positions and care for until growth is reestablished. If cultivated hedges, shrubs, and plants are injured to such a degree as to effect their growth or diminish in their beauty or usefulness, replace by items of equal kind and quality existing at the start of the work.

F. Do not use or operate tractors, bulldozers, or other power-operated equipment on paved surfaces when their treads or wheels of which are so shaped as to cut or otherwise damage such surfaces.

G. Restore surfaces damaged by the Contractor's operations to a condition at least equal to that in which they were found immediately before work commenced. Use suitable materials and methods for such restoration.

3.4 RELOCATION AND REPLACEMENT OF EXISTING STRUCTURES

A. Whenever certain existing structures, as described below, are encountered, and the Engineer so directs, change the location, remove and later restore, or replace such structures, or assist the Owner in doing so. Such work to be paid for under applicable items of work, otherwise as Extra Work.

B. In removing existing pipes or other structures, include for payment only those new materials which are necessary to replace those unavoidably damaged as determined by the Engineer.

C. The preceding two paragraphs apply to pipes, wires, and other structures which meet the following: (a) are not indicated on the drawings or otherwise provided for, (b) encroach upon or are encountered near and substantially parallel to the edge of the excavation, and (c) in the opinion of the Engineer, will impede progress to such an extent that satisfactory construction cannot proceed until they have been changed in location, removed (to be later restored), or replaced.

3.5 EXCAVATION SUPPORT SYSTEM

A. Furnish, put in place and maintain sheeting and bracing required by Federal, State or local safety requirements to support the sides of the excavation and prevent loss of ground which could endanger personnel, damage or delay the work or endanger adjacent structures. If the Engineer is of the opinion that at any point sufficient or proper supports have not been provided, he/she may order additional supports placed at the expense of the Contractor. Compliance with such order shall not relieve the Contractor from his/her responsibility for the sufficiency of such supports. Care shall be taken to prevent voids outside of the sheeting, but if voids are formed, they shall be immediately filled and rammed.

B. When moveable trench bracing such as trench boxes, manhole boxes, moveable sheeting, shoring or plates are used to support the sides of the trench, care shall be taken in placing and moving the boxes or supporting bracing to prevent movement of the pipe, or disturbance of the pipe bedding and the screened gravel backfill.

C. When installing pipe; trench boxes, moveable sheeting, shoring or plates shall not be allowed to extend below mid-diameter of the pipe. As trench boxes, moveable sheeting, shoring or plates are moved, screened gravel shall be placed to fill any

voids created and the screened gravel and backfill shall be re-compacted to provide uniform side support for the pipe.

D. The Contractor will be permitted to use steel sheeting in lieu of wood sheeting for the entire job wherever the use of sheeting is necessary. The cost for use of sheeting will be included in the bid items for pipe and shall include full compensation for driving, bracing and later removal of sheeting.

E. All sheeting and bracing shall be carefully removed in such manner as not to endanger the construction of other structures, utilities, or property, whether public or private. All voids left after withdrawal of sheeting shall be immediately refilled with sand by ramming with tools especially adapted to that purpose, by watering or otherwise as directed.

F. The Contractor shall receive no payment, for sheeting, bracing, etc., during the progress of the work. The Contractor shall receive no payment for sheeting which has actually been left in the trench for the convenience of the Contractor.

G. Sheeting driven below mid-diameter of any pipe shall remain in place from the driven elevation to at least 1-ft above the top of the pipe.

3.6 BACKFILLING

A. As soon as practicable after the pipe has been laid and jointed and inspected by the Engineer, backfilling shall begin and thereafter be prosecuted expeditiously. Screened gravel/crushed stone shall be placed by hand shovel in 6-inch thick lifts up to 12" above the top of pipe. This area of backfill is considered the zone around the pipe and shall be thoroughly compacted before the remainder of the trench is backfilled.

B. Where the pipes are laid in streets, the remainder of the trench up to a depth of 12-inches below the bottom of the specified permanent paving shall be backfilled with gravel borrow material in layers not to exceed 6-inches and thoroughly compacted. The sub-base layer shall be 12-inches of processed gravel thoroughly compacted.

C. To prevent longitudinal movement of the pipe, dumping backfill material into the trench and then spreading will not be permitted until selected material or screened gravel has been placed and compacted to a level 12-inches over the pipe.

D. Unfavorable Conditions:

1. In no case shall fill be placed over material that is frozen. No fill material shall be placed, spread or rolled during unfavorable weather conditions. When work is interrupted by heavy rains, fill operations shall not be resumed until the moisture content and the density of the previously placed fill are as specified.

2. In freezing weather, a layer of fill shall not be left in an uncompacted state at the close of the day's operations. Prior to terminating work for the day, the final layer of compacted fill shall be rolled with a smooth wheeled roller to eliminate ridges of soil left by compaction equipment.

E. An impervious dam or bulkhead cutoff of clay or other impervious material shall be constructed in the trench as directed, to interrupt the unnatural flow of groundwater after construction is completed. The dam shall be effectively keyed into the trench bottom and sidewalls. Provide at least one clay or other impervious material dam in the pipe bedding between each manhole where directed or every 300 feet, whichever is less.

F. Backfilling and filling operation shall be suspended in areas where tests are being made until tests are completed and the testing laboratory has advised the Engineer that adequate densities are obtained.

G. Subject to the approval of the Engineer, fragments of ledge and boulders smaller than 6-in may be used in trench backfill providing that the quantity in the opinion of the Engineer, is not excessive. Rock fragments shall not be placed until the pipe has at least 2-ft of earth cover. Small stones and rocks shall be placed in thin layers alternating with earth to insure that all voids are completely filled. Fill shall not be dropped into the trench in a manner to endanger the pipe.

H. Bituminous paving shall not be placed in backfilling unless specifically permitted, in which case it shall be broken up as directed. Frozen material shall not be used under any circumstances.

I. All road surfaces shall be swept and hose-cleaned immediately after backfilling. Dust control measures shall be employed at all times.

J. Exploratory excavation shall be backfilled as soon as the desired information has been obtained. The backfilled surface shall be maintained in a satisfactory condition for travel until resurfaced as specified.

3.7 COMPACTION

A. Compaction Requirements: The degree of compaction is expressed as a percentage of the maximum dry density at optimum moisture content as determined by ASTM Test D1557, Method C. The compaction requirements are as follows:

Area	ASTM Density Degree of Compaction
Pavement sub-base	95%
General fill below pavement sub-base	95%

B. Moisture Control:

1. Fill that is too wet for proper compaction shall be dried to a proper moisture content to allow compaction to the required density. If fill cannot be dried within 24 hours of placement, it shall be removed and replaced with drier fill.

2. Fill that is too dry for proper compaction shall receive water uniformly applied over the surface of the loose layer. Sufficient water shall be added to allow compaction to the required density.

C. Compaction Control:

1. In-place density tests shall be made in accordance with ASTM D1556, D2922 or D2167 as the work progresses, to determine the degree of compaction being attained by the Contractor. Any corrective work required as a result of such tests, such as additional compaction, or a decrease in the thickness of layers, shall be performed by the Contractor at no additional expense to the Owner. In-place density tests will be made by a geotechnical engineer selected by the Engineer or the Contractor's independent testing laboratory at the Contractor's expense.

2. The Engineer's duties do not include supervision or direction of the actual work by the Contractor, his employees or agents. Neither the presence of the Engineer nor any observation and testing performed by him shall excuse the Contractor from defects discovered in his work at that time or subsequent to the testing.

D. Material Testing Frequency: The following testing frequencies are minimum required for all structural and non-structural fill, grading and embankment.

1. Field In-Place Density and Moisture Content - Screened gravel and crushed stone shall be compacted as specified and indicated. For other backfill and fill materials, minimum test frequency shall be as follows, and no less than one test per lift:

a. Trenches under structures foundation preparation or roadways sub-base: Every 100 lin. ft. per lift.

b. Trenches in areas without structures or roadways: Every 250 lin. ft. per alternate lift.

c. Paved Roadways: Every 100 lin. ft. per lift.

d. Paved Areas: 2,000 sq. ft. per lift.

e. Under Structure: 1,000 sq. ft. per lift.

f. Around Structures: 1,500 sq. ft. per lift.

g. Embankment Fills: 5,000 sq. ft. per lift.

2. Moisture Density - One per source, except for screened gravel and crushed stone. Repeat the moisture density test for every 1,000 cubic yard of material use, and whenever visual inspection indicates a change in material gradation as determined by the Engineer.

3. Gradation Analysis - A minimum of one per source and for each moisture density test and whenever visual inspection indicates a change in material gradation.

4. Liquid Limit, Plastic Limit and Plasticity Index - Minimum of one test per 500 cubic yard [382 cubic meter] of soil for use as fill material and whenever classification of material is in doubt as determined by the Engineer.

E. Compaction Methodology:

1. Each layer of backfill material shall be thoroughly compacted by rolling, tamping, or vibrating with mechanical compacting equipment or hand tamping. If rolling is employed, it shall be by use of a suitable roller or tractor, being careful to compact the fill throughout the full width of the trench.

2. Backfilling operations shall be such that material is compacted in 6 inch lifts, including the trench around the barrel of the pipe. Compaction of each lift up to a minimum of 12-inches above the pipe shall be done by use of power-driven tampers weighing at least 20 pounds or by vibratory compactors. Care shall be taken as to not place excessive pressure on the new pipe.

3. Vibratory mechanical compaction is the preferred method for compaction. Should jetting be proposed by the Contractor, its viability to achieve the required degree of compaction shall be proven on a test section of trench, prior to allowing its use on a widespread basis. Compaction testing shall be used to determine the effectiveness of the jetting operation. Jetting shall be accomplished using a rigid pipe, long enough to reach deep into the trench. Large volumes of water under high pressure equivalent to that available from a fire hydrant, are necessary for jetting. The Contractor is made aware that municipal water will not be available due to limited supply. The Contractor shall provide water for jetting operations at his own expense. Jetting locations shall be frequent enough to achieve required compaction.

4. Where other methods are not practicable, compaction shall be by use of hand or pneumatic ramming with tools weighing at least 20 lbs. The

material being spread and compacted in layers not over 6-in thick. If necessary, sprinkling shall be employed in conjunction with rolling or ramming.

5. In backfilling trenches, each layer of backfill material shall be moistened and compacted to a density at least equal to that of the surrounding undisturbed earth, and in such a manner as to permit the rolling and compaction of the filled trench or excavation with the adjoining earth to provide the required bearing value, so that paving of the excavated and disturbed areas, where required, can proceed immediately after backfilling is completed.

3.8 FINE GRADING

A. Before surface or sub-base is spread, the subgrade shall be shaped to a true surface conforming to the Drawings. All depressions and high spots shall be filled with suitable material or removed and such areas again compacted until the surface is smooth and properly compacted. A tolerance of 1/2-inch above or below the finished subgrade will be allowed provided that this 1/2-inch above or below grade is not maintained for a distance longer than 50 feet and that the required crown is maintained in the subgrade. Any portion which is not accessible to a roller shall be thoroughly compacted by other mechanical methods.

B. Construction Tolerances:

1. Construct finished surfaces to plus or minus 1 inch of the elevations indicated.

2. Grade cut and fill areas to plus or minus 0.20 foot of the grades indicated.

3. Complete embankment edges to plus or minus 6 inches of the slope lines indicated.

4. Provide the Engineer with adequate survey information to verify compliance with above tolerances.

3.9 DUST CONTROL

A. Calcium chloride shall be applied when ordered by the Engineer and only in areas which will not be adversely affected by the application.

B. Calcium chloride shall be uniformly applied at a rate of 1-1/2 pounds per square yard or at any other rate as directed by the Engineer. Application shall be by means of a mechanical spreader, or other approved method. The number and frequency of applications shall be determined by the Engineer.

3.10 CONTROLLED DENSITY FILL

A. Controlled Density Fill shall be placed so as to not disturb adjacent structures, utilities or the sidewalls of trenches.

B. Controlled Density Fill shall be flowable, require no vibration after it has been placed for MassDOT Type 1E - Very Flowable (Excavatable), as described in MassDOT Subsection M4.08.0., and be excavatable by hand tools and/or small machines.

C. Controlled Density Fill shall be installed to the limits shown on the drawings, or required by permit and shall be kept below the top of the trench to allow for the placement of the required depth of pavement as specified in these documents or as indicated in the contract drawings.

D. Steel road plates shall protect the Controlled Density Fill until the fill reaches a point that it will not be deformed by traffic passing over it. Plates are not to be removed until the day that paving operations are performed. Refer to Drawings for additional requirements regarding steel road plates.

E. Road plates will be recessed so that the tops of the plates are at the same level as existing pavement adjacent to the trench. Asphalt fillets will be placed at all road plate edges, for protection of traffic and traffic noise reduction, the same day that the plates are placed.

END OF SECTION 02200

SECTION 02212

ROCK EXCAVATION

PART 1 – GENERAL

1.1 SUMMARY OF WORK

A. Rock excavation may be required where boulders, monolithic concrete, reinforced concrete or stone structures measuring in excess of one cubic yard solid in volume or larger are encountered or solid ledge which, in the opinion of the Engineer, requires drilling, wedging, sledging, barring, or hydraulically fracturing for removal, is encountered.

B. The following do not constitute rock excavation: hardpan; soft or disintegrated rock; concrete which can be removed with a pick; previously blasted rock or broken stone less than the above mentioned one cubic yard; stone walls; rocks that may fall into or be jarred loose from the sides of the trench beyond the maximum limits of excavation approved by the Engineer.

C. Rock excavation via blasting will not be permitted.

D. The Contractor shall also conform to any further regulations deemed necessary by the Fire Department Chief and the Engineer and be aware of any inspection fees as required by the fire department.

E. Fees for inspection shall be paid directly to the Town of Nantucket. All fees for inspection shall be included in the excavation cost.

1.2 SCOPE OF WORK

A. Furnish all labor, materials, equipment, and incidentals required to excavate and dispose of rock and boulders as shown on the Drawings and as specified herein.

B. All arrangements for inspections required by the Town of Nantucket shall be made by the Contractor.

1.3 RELATED WORK

A. Earth excavation and backfilling are included in Section 02200.

B. Environmental Protection is included in Section 01110.

1.4 DEFINITIONS

A. Typical of materials classified as rock are boulders 1.0 cu. yd. or more in volume, solid rock, rock in ledges, and rock-hard cementitious aggregate deposits. Intermittent drilling or ripping performed to increase production and not necessary to permit excavation of material encountered will be classified as earth excavation. Do not

perform rock excavation Work until material to be excavated has been cross-sectioned and classified by Engineer. Visual observation of the completed excavation may be made by the Engineer to modify the excavation classifications. Removal of rock excavation prior to classification by the Engineer shall be considered as earth excavation unless accepted by the Engineer in writing. Such excavation will be paid on the basis of Contract unit rates for this classification.

PART 2 – PRODUCTS

2.1 MATERIALS

A. Gravel Borrow shall be as specified in Section 02200 – Earthwork.

PART 3 – EXECUTION

3.1 BLASTING

A. Blasting will not be permitted by the Town. Rock excavation shall be performed by mechanical means only.

3.2 DISPOSAL OF ROCK AND BOULDERS

A. Fragmented rock with dimensions not exceeding 6-in in any direction may be mixed with common fill, providing compaction requirements will not be compromised.

B. Rock and boulders may be crushed and screened for reuse in the Work, provided that the resultant materials meet the requirements for gravel borrow, processed gravel, or crushed stone as specified in Section 02200.

C. Unused rock and boulders shall be removed and disposed of off-site.

END OF SECTION 02212

SECTION 02273

GEOTEXTILE FABRIC

PART 1 - GENERAL

1.1 SUMMARY OF WORK

A. This section includes the following:

1. Providing geotextile fabric in foundation preparation for separation of existing soil from screened gravel or crushed stone beneath structures.

2. Placing the geotextile fabric as temporary road reinforcement and riprap separation at pipe outlets, swales, and slopes, and as otherwise indicated or specified.

1.2 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this section, and.

1. Section 02020 – Erosion and Sediment Control

2. Section 02140 – Dewatering and Discharge

3. Section 02200 – Earthwork

1.3 SUBMITTALS

A. Shop Drawings: Submit the following in accordance with Section 01300 - Submittals:

1. At least two weeks prior to shipment, submit manufacturer's certificate of compliance and physical property data sheet indicating that requirements for materials and manufacture are in conformance as specified.

2. For informational purposes only, submit manufacturer’s printed installation instructions.

1.4 QUALITY ASSURANCE

A. General:

1. Producer of geotextile fabric to maintain competent laboratory at point of manufacture to insure quality control in accordance with ASTM testing procedures. Laboratory to maintain records of quality control results.

2. Do not expose geotextile fabric, except the geotextile fabric for silt fence, to ultraviolet radiation (sunlight) for more than 14 days total in period of time following manufacture until geotextile fabric is installed and covered with fill or backfill material.

3. Take all precautions to protect geotextile fabric from damage resulting from any cause. Either repair or replace geotextile fabric to Engineer's satisfaction at no additional cost to the Owner.

1.5 DELIVERY, STORAGE AND HANDLING

A. Provide in accordance with manufacturer's recommendations.

B. Provide geotextile fabric in rolls wrapped with protective covering to protect geotextile fabric from mud, dirt, dust, and debris. Label each roll of geotextile fabric with number or symbol to identify production run.

C. Protect geotextile fabric from sunlight during transportation and storage. Do not leave geotextile fabric exposed to sunlight for more than two weeks during installation operations.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Provide the following nonwoven (4.5 ounce per square yard) geotextile fabric, Model # US 120NW as manufactured by US Fabrics or approved equal.

2.2 MATERIAL

A. Geotextile fabric shall conform to test requirements for minimum average roll value (weakest principle direction) for strength properties of any individual roll tested from manufacturing lot or lots of particular shipment in excess of minimum average roll value (weakest principle direction) as specified hereafter:

B. Physical Properties of Minimum Average Roll of the 4.5-ounce per square yard nonwoven geotextile fabric shall be:

	Property	ASTM Test Method	Units	Value
1.	Tensile Strength	D4632	lbs	120
2.	Elongation at Break	D4632	%	50
3.	Trapezoidal Tear Strength	D4533	lbs	50
4.	Puncture Strength	D4833	lbs	70
5.	Permittivity	D4491	Sec^{-1}	1.5
6.	Apparent Opening Size	D4751	Sieve #	70

7.	Mullen Burst Strength	D3786	Psi	230
8.	UV Resistance %Retained	D4355	%	70
9.	Flow Rate	D4491	Gal/mins/sf	120

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install geotextile fabric in accordance with manufacturer's printed instructions.

B. Place geotextile fabric on the foundation subgrade prior to placing the screened gravel or crushed stone.

C. Overlap geotextile fabric 18 inches minimum for unsewn lap joint.

D. Do not permit traffic or construction equipment to travel directly on geotextile fabric.

E. Place geotextile fabric in relatively smooth condition to prevent tearing or puncturing. Lay geotextile fabric loosely but without wrinkles or creases so that placement of the backfill materials will not stretch or tear geotextile fabric. Leave sufficient slack in geotextile fabric around irregularities to allow for readjustments.

F. Patch all tears in geotextile fabric by placing additional section of geotextile fabric over tear with a minimum of 3 feet overlay.

G. Extend the geotextile fabric and wrap around the screened gravel or crushed stone along the perimeter of the foundation.

3.2 CONTRACT CLOSEOUT

A. Provide in accordance with Section 01700 – Contract Closeout.

END OF SECTION 02273

SECTION 02440

SEWER CLEANING AND INSPECTION

PART 1 – GENERAL

1.01 DESCRIPTION OF WORK:

A. Clean and inspect the pipelines indicated on the Drawings or as directed by the Engineer in a manner that is compliant with the guidelines set forth within this section. This Work includes furnishing all equipment and labor required to perform the services described herein.

B. All personnel performing inspection shall be NASSCO certified and shall have performed TV inspection within previous five years.

1.02 QUALITY ASSURANCE:

A. Refer to Section 01400 – Quality Assurance, for qualification requirements.

B. The work shall be performed by a company with not less than five (5) years of experience in providing the specified services. Supervisory personnel shall have at least three (3) years of experience in providing the specified services and shall be present at the jobsite during all work as specified herein.

1.03 REFERENCES:

A. The following standard is referenced as part of this specification:

The National Association of Sewer Service Companies (NASSCO) Recommended Specifications for Sewer Collection System Rehabilitation (Current Edition).

1.04 SUBMITTALS:

A. Submit detailed television inspection reports as specified herein. Submit inspection reports and USB video record for review and approval by Engineer weekly, minimum.

B. USB shall provide a visual and audio record of conditions encountered in the sewer and shall have an associated database that can be searched, sorted, stored, and transferred with all associated software at no additional cost. Database shall be compatible with Microsoft Excel or Access software.

C. Upon substantial completion of the Work submit one complete set of USB Storage Devices of TV inspection Work.

D. Refer to Section 01300 – Submittals, for required documentation to be submitted.

PART 2 – PRODUCTS

2.01 CLEANING EQUIPMENT

A. Pipe cleaning equipment shall consist of high velocity jet equipment as defined in the section SEWER LINE CLEANING of NASSCO (current version).

1. High velocity jet equipment shall have a selection of two or more high-velocity nozzles. The nozzles shall be capable of producing a scouring action from 15 to 45 degrees in all size and length lines indicated on the Drawings. Equipment shall also include a high velocity gun for washing and scouring manhole walls and floor. The gun shall be capable of producing flows from a fine spray to a solid stream. The equipment shall carry its own water tank, auxiliary engines, pumps, and hydraulically driven hose reel.

2.02 TELEVISION EQUIPMENT:

A. TV inspection equipment shall meet the standard set under TELEVISION INSPECTION, MAIN SEWERS of NASSCO (current version).

B. Television equipment shall include television camera, television monitor, cables, power source, lights, and other equipment. The television camera shall be specifically designed and constructed for operation in connection with sewer inspection.

C. Lighting for the camera shall be suitable to allow a clear picture, with minimal reflective glare, for the entire periphery of the pipe. The camera shall be operative in 100% humidity conditions. The camera, television monitor and other component of the video system shall be capable of producing a minimum 400 line resolution color video picture. Picture quality and definition shall be to the satisfaction of the ENGINEER.

D. The camera shall have a remote controlled, pan and tilt type lens and lighting system capable of turning perpendicular to the direction of flow and rotating 360 degrees while inside the pipe. The camera shall be able to view a minimum service connection length of 4 feet in order to determine whether the connection is active or inactive.

E. The remote reading footage counter shall be accurate to one (1) foot over the length of the particular section being inspected.

PART 3 – EXECUTION

3.01 ACCESS TO WORK:

A. Certain conditions may prevent the Contractor from completing portions of the Work contained herein. Upon discovery of such conditions, the Contractor shall immediately notify the Engineer who will in turn notify the Owner and attempt to arrive at a resolution. The Engineer will then direct the Contractor to either return to the location once the condition is remedied or will remove the subject pipe from the project. These decisions will be made at the Engineer's sole discretion and no additional cost will be

incurred for eliminating, re-scheduling or returning to areas of the Work as long as the Contractor is working on other areas of the project. These conditions include but are not limited to the following:

1. Paved over or otherwise buried manholes.
2. Obstructions in the pipe
3. High flow conditions
4. Need for police detail or traffic control measures

3.02 PIPE CLEANING:

A. The Contractor shall use high velocity jet as described in the most recent version of NASSCO Standard Specifications.

B. All sludge, dirt, sand, rocks, grease, and other solid or semisolid material resulting from the cleaning operation shall be disposed of in accordance with all applicable regulations and in a method acceptable to the Owner. Pipe cleaning shall be performed in advance of pipe television inspection.

C. The Contractor shall be responsible for the legal removal and transportation disposal of all debris removed from the sewers during the cleaning operation including any costs incurred. The Owner shall allow disposal of flowable sewer matter in the Owner's sewer system.

D. Light cleaning shall be conducted at a minimum to permit the passage of the closed circuit television camera. Acceptance by the Engineer of the cleaning results will be based on the results of television inspection. If the results are unsatisfactory, the Contractor shall repeat the cleaning until accepted by the Engineer at no additional cost to the Owner.

E. The Contractor shall coordinate water use with the Owner. Contractor shall be responsible for providing, installing and using all equipment needed to obtain water from hydrants in accordance with the Owner's requirements.

3.03 PIPE INSPECTION:

A. Pipe shall be visually inspected by means of closed-circuit television. The television camera used for the inspection shall be one specifically designed and constructed for such inspection.

B. Video Recordings: Electronic video equipment shall display and record during the entire inspection at a minimum the following data for each sewer reach video recorded.

1. Date recorded
2. Footage counter
3. Voice over narration noting any significant observations made during the inspection Work, including the following:

a. Length, size and type of pipe.

b. Location of offsets and misalignments of any part.
c. Location and type of defect in pipe such as cracks, holes, etc.
d. Protruding service connections.
e. Root intrusion.
f. Visible infiltration/inflow sources estimated in gallons per minute (GPM).
g. Type and depth of debris in pipe.
h. Sluggish flow or wastewater backing up into manhole.
i. Overall condition of pipe section (from manhole to manhole).

4. Sewer reach identification (street location, MH to MH)

C. Video and Television Logs: The Contractor shall prepare individual log sheets of each line section inspected, recording, at a minimum, the following information in tabular and graphic format, and submit duplicate copies electronically to Engineer at regular intervals not exceeding weekly intervals:

1. Project identification
2. List of Subcontractors at the site.
3. Count of personnel at the site, by job classification.
4. List of major equipment utilized on site.
5. Numbered pages including an index sheet listing the pipeline segments, street name and corresponding page of the report they are located.
6. Tabular and graphic display observation made during the inspection Work as listed herein.
7. Sewer reach identification (street location, MH to MH)

D. The camera shall be moved through the line in either direction at a uniform rate, stopping when necessary to ensure proper identification of the sewer's condition. In no case will the television camera be pulled at a speed greater than 20 feet per minute. Manual winches, power winches, TV cable and powered rewinds or other devices that do not obstruct the camera view or interfere with proper documentation of the sewer conditions may be used to move the camera through the sewer line.

E. If, during the inspection operation the television camera will not pass through the entire sewer section, the Contractor shall reset his equipment in a manner so that the inspection can be performed from the opposite manhole.

F. Flow control shall be in accordance with Section 02538 – Temporary By-Pass Sewage Pumping

G. Standing water within a sagging pipe shall be removed so that the pipe can be adequately television inspected. A minimum of 80% of the pipe shall be visible before television inspection. A minimum of one attempt using standard cleaning equipment shall be made to clear lines surcharged due to line sags. The Contractor shall maintain a list of line segments that are significantly surcharged and provide this list to the Engineer daily.

H. Television inspection shall be performed in advance of all testing and rehabilitation activities.

I. Accuracy of the measurement meters shall be checked daily by use of a walking meter, roll-a-tape, or other device approved by the Engineer. The measurements recorded in the log shall be zeroed at the point the camera lens begins the sewer line penetration of the upstream manhole, unless specific permission is given by the Engineer to do otherwise. Footage shall be shown on the video data view at all times and will be zeroed at the beginning of each run.

END OF SECTION 02440

SECTION 02538

TEMPORARY BY-PASS SEWAGE PUMPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplemental Conditions, Division 0 and Division 1 Specification Sections, apply to this section.

1.2 SUMMARY OF WORK

A. Furnish, install, field test, and operate temporary by-pass pumping systems for the purpose of diverting sewage flow around work areas for the duration of the project. The pumping system shall protect against surcharging of the existing sewer system upstream of the work area by installing adequate temporary by-pass pumping to handle dry weather and wet weather flows. Provide all labor, tools, materials, and equipment necessary to by-pass flow around the work areas.

B. The design, installation, and operation of temporary by-pass pumping systems shall be the Contractor's responsibility. The Contractor shall provide the services of a professional by-pass company who can demonstrate to the Owner and Engineer that the company specializes in the design and operation of temporary by-pass pumping systems. The by-pass system shall meet the requirements of all codes and regulatory agencies having jurisdiction.

C. By-passing operations shall be continuously monitored by the Contractor, regardless of duration or timing of by-passing. By-passing should be coordinated with low-flow times, to the extent feasible. Restore normal service to entire system at the end of normal working hours every day or post an attendant on-site. No unattended by-pass pumping will be allowed.

D. Maintain temporary by-pass pumping system so that they are completely functional throughout the required period of service.

E. Provide all maintenance including manufacturer recommended preventative maintenance and on-call repair services. Contractor shall provide repair services and/or replacement equipment 24 hours per day, 7 days per week within 4 hours of being notified.

F. The Contractor shall not allow sewage flow to discharge to any salt or fresh water body by means of overflow, by-pass pumping, or any other method that may contaminate these water areas.

G. Except as specifically permitted, the installation of the by-pass pipelines is prohibited in all saltmarsh/wetland areas. The pipeline must be located off streets and sidewalks

and on shoulders of the roads. When the by-pass pipeline crosses local streets and private driveways, the Contactor must place the by-pass pipelines in trenches and cover with temporary pavement. Upon completion of the by-pass pumping operations, and after the receipt of written permission from the Engineer, the Contractor shall remove all the piping, restore all property to pre-construction condition, and restore all pavement. The Contractor is responsible for obtaining any approvals from the Owner for placement of the temporary pipeline within public ways.

H. All sewer service connections must be equipped with temporary connections to the temporary sewer bypass main. Flows from service laterals will not be permitted to discharge into open excavations at any time.

I. Have readily available sufficient additional quantity of bypass pipe, connections of suitable sizes to replace or supplement the temporary facilities in event these prove inadequate in any way.

J. Perform all appurtenant work including but not limited to excavation and backfilling, constructing ramps at driveways and other access ways, replacement of temporary and permanent pavement, restoration of public and private property.

K. Related Sections: The following sections contain requirements that relate to this Section:

1. Section 02200 – Earthwork

2. Section 02570 – Sewers, Manholes, and Appurtenances

1.3 SUBMITTALS

A. Submit the following in accordance with the Conditions of Contract and Division 1 Specification Sections and as specified herein:

1. A detailed description of the proposed pumping systems, project approach, and requirements herewithin stamped by a Professional Engineer in the State of Massachusetts.

2. A minimum of five reference installations of projects with similar size in wastewater by-pass pumping applications. Include contact names and phone numbers.

3. A detailed description of each proposed temporary by-pass pumping system including pumps, pump drives, piping, hoses, valves, fittings, controls, wiring, and other ancillary accessories required to provide a complete operating system.

4. Complete list of system components to be provided.

5. Complete catalog information, descriptive literature, specifications, and identification of materials of construction.

6. Performance data for each type of equipment that will show compliance with specification requirements stated herein.

7. Detailed plans and sections showing the proposed pumping system layout including dimensions and elevations. Plan shall include but not limited to the following:

    a. Staging area and access requirements for all pumps.
    b. Number, size, material, location, and method of installation of suction piping.
    c. Number, size, material, location, and method of installation of discharge piping.
    d. Sewer plugging method and types of plugs.
    e. Pump size, capacity, number of units, diesel engine specifications, fuel tank capacity, fuel consumption requirements, and method of refueling.
    f. Calculations of static lift, pipe size selection, friction losses, flow velocity, and pump selection.
    g. Provide pump performance curves showing they meet calculated requirements for head, capacity, and NPSH.
    h. Proposed method of freeze protection.
    i. Proposed method of noise control for each pump with external dBA value.
    j. Temporary pipe supports, anchorage, cover material, and other accessories as required to stabilize the piping system.
    k. Proposed pump controls and alarm panel and system for remote transmittal of alarms.
    l. A description and schedule for dismantling the by-pass system, and restoring normal operations.

8. Installation schedule and maintenance schedule.

9. Contact phone number and pager number for 24-hour service.

10. Recommend spare parts to be stored on-site for emergency maintenance.

11. Emergency response plan describing the intended means of handling but not limited to the following:

    a. Break or failure of by-pass piping.
    b. Failure of by-pass pump.
    c. Overflows.
    d. Backup into dwelling or onto private property.
    e. Operations during inclement weather including snow storms.

12. Procedures for start-up and testing of the by-pass pumping system to demonstrate compliance with specified automatic operation and maintenance requirements.

13. Field inspection reports.

14. Recommendations for short- and long-term storage.

1.4 QUALITY ASSURANCE

A. Provide in accordance with Section 01400 – Quality Assurance and as specified.

B. Use only materials that are suitable for gravity sewer transmission.

C. The Contractor shall employ the services of a professional by-pass pumping company who can demonstrate five years of recent and continuous specialization in the design, installation, operation, and removal of temporary by-pass pumping systems in wastewater applications. The complete system shall be furnished from a single vendor who shall be capable of providing service staff, repair parts and replacement of any deficient system component within 4 hours of a service call, twenty-four hours per day, and seven days per week.

D. The by-pass pumping system shall be standard equipment and totally suited for the application as detailed herein. The equipment to be furnished shall be satisfactory and safely designed, in accordance with the design parameters as detailed in these contract documents. It shall be constructed for continuous, automatic operation, for extended periods of time.

E. All items shall be designed and constructed in full accordance with all applicable state and local codes and regulations. Labor, materials, and costs required to meet state codes shall be the responsibility of the Contractor and the professional by-pass pumping company.

F. Provide services of factory-trained professional by-pass pumping company representative, specifically trained on type of equipment specified:

1. Man-day requirements listed exclusive of travel time, and do not relieve Contractor of obligation to provide sufficient service to place equipment in satisfactory operation.

2. Installation and Start-up/Testing: Sufficient time to assist in location of pumping system; coordination of piping, electrical, miscellaneous utility connections; calibration, testing and start-up, but not less than:

a. 1 day per pumping system set-up

3. Credit to the Owner unused service man-days specified above, at published field service rate plus travel costs.

1.5 FLOW DATA

A. The entire project area consists of active sanitary sewers; therefore, flows and flow data are variable depending on location and conditions. It is the responsibility of the Contractor to maintain flows in accordance with this specification under all flow conditions and, therefore, the Contractor is encouraged to visit the project locations prior to Work to visually inspect flow conditions.

B. Calculations of peak flows, pump rates, pump curves, and other relevant design data shall be provided by the Contractor prior to commencing the work. One by-pass pumping plan will be required at each by-pass location. Each by-pass pumping plan shall be stamped by a Massachusetts Registered Professional Engineer in accordance with Paragraph 1.3.

C. Portions of the project are subjected to tidal infiltration and inflow. The Contractor is required to account for tide elevations, tide cycles, and tidal I/I volume in the planning, bidding, and conduct of the work.

1.6 SAFETY REQUIREMENTS

A. Take all precautions for public safety.

B. Refer to Section 01500 – Temporary Facilities and Controls regarding water supply for Contractor's operations.

C. Refer to Section 01850 – Traffic Management regarding traffic control and street opening permits.

PART 2 - MATERIALS

2.1 PUMPING EQUIPMENT

A. Furnish pumping units and all accessories from a single vendor. Each temporary by-pass pumping system shall be complete including pumps, drives, piping, piping headers, valves, flow meter, controls, and appurtenances as required for a complete system.

B. The pumps, drives, and controls shall be designed and built for 24-hour continuous service at any and all points within the required range of operation, without overheating, without cavitation, and without excessive vibration or strain. All parts shall be so designed and proportioned as to have the strength, stability, and stiffness and be constructed to meet the specified requirements. Methods shall be provided for inspection, repairs, and adjustment.

C. All equipment shall be suitable for outdoor operation under adverse weather conditions. Provide protection from freezing as required to maintain system operation.

D. All pumps shall be centrifugal, end suction, fully automatic self-priming units that do not require the use of foot-valves, vacuum pumps, diaphragm pumps, or isolation valves or float apparatus in the priming system. Pump seals shall be high pressure, mechanical self-adjusting type with solid carbide faces capable of withstanding suction pressures to 100 psi without the pump running. The mechanical seal shall be cooled and lubricated in an oil bath reservoir, requiring no maintenance or adjustment. The oil bath reservoir shall not come in contact with or leak into the pumped water. Each pump shall be capable of running dry, with no damage for extended periods of time. All pump seal metal parts shall be stainless steel. All elastomers shall be Viton.

E. Each pump shall be driven by a diesel engine. Diesel engine shall be water cooled. Each pump and diesel engine shall be skid mounted with integral fuel tank and skid lifting bracket.

F. Provide automatic start/stop controls for the pumping system to automatically maintain system flow. Controls shall be contained in a local NEMA 4 rated control panel with provision to manually operate each pump, provide indication of pump operation, and indicate the total flow being pumped. The pump control panel shall include high/low water level alarms and remote auto-dialer to send alarms to a minimum of four telephone numbers.

G. Pumps shall be provided with noise protective acoustically-silenced enclosures that meet all local, MA DEP, and Town of Nantucket construction noise requirements and as a minimum: 80 dBA at seven feet; 65 dBA at thirty feet; 60 dBA at nearest residence; and less than 10 dBA raised above background levels; and no pure tone condition. Contractor shall be responsible for all materials, labor, and equipment to show compliance with the above requirements.

2.2 ADDITIONAL EQUIPMENT

A. Provide all required suction and discharge pipe and fittings, discharge manifold pipe and fittings, shutoff valves, check valves, flow meter, pressure regulating valves, insulation, freeze protection, and all required accessories.

B. All pipe and fittings shall be steel with flanged or quick connect coupling connections, or high density polyethylene pipe with fused joints. All joints must be 100 percent restrained. Suction piping shall be rated for 25-in Hg vacuum. Discharge piping, fittings, connections, valves, and other discharge piping accessories shall be rated for a minimum working pressure of 150 psi.

C. Lay flat hose shall be extra heavy duty, highly abrasive resistant and fitted with gasketed couplings. Hose shall be rated for a minimum working pressure of 150 psi.

D. Aluminum “irrigation” type piping or glued PVC pipe will not be allowed.

PART 3 - EXECUTION

3.1 GENERAL

A. The Contractor shall have adequate standby equipment available and ready for immediate operation and use in the event of an emergency or equipment breakdown. One stand-by pump for each size pump utilized shall be installed and piped into the suction and discharge manifold at the by-pass pump, ready for automatic start and use in the event of primary pump failure.

B. The Contractor shall adequately handle all flow, even instantaneous peak flows, without damage or overflow. The Contractor shall make himself aware of potential large instantaneous flow contributors connected to the sewer.

C. The Contractor shall remove manhole sections or make connections to the existing and construct temporary by-pass pumping structures only at the access locations indicated on the Drawings and maybe required to provide adequate suction conduit.

D. Plugging or blocking of sewage flows shall incorporate primary and secondary plugging devices. When plugging or blocking is no longer needed for performance and acceptance or Work, it is to be removed in a manner that permits the sewage flow to slowly return to normal without surge, to prevent surcharging or causing other major disturbances downstream.

E. Provide 1-inch minimum thick, tight plywood covers over by-pass discharge and suction manholes. Pipes to be sealed with foam rubber collar and sealed around all pipe penetrations.

F. All by-pass pipes shall be buried at all driveway and street crossings.

G. Contractor shall provide chain-link fence enclosures to secure pumping systems.

H. The by-pass pumping system shall not require excavation to reduce the suction lift without approval of the Engineer. Pumps may not be benched down to make the suction lift unless approved by the Engineer.

I. The Contractor shall exercise caution and comply with OSHA requirements when working in the presence of gases, combustible or oxygen-deficient atmospheres, and confined spaces.

3.2 TEMPORARY SERVICE CONNECTIONS

A. Furnish, install, maintain and later remove temporary service connections from the bypass to each building serviced by the gravity sewer main to be removed from service.

B. Lay temporary connections out of traveled and access ways where possible.

C. Temporary service connections ramped or in trench where directed and approved by the Engineer.

D. Provide temporary service connections equal to or larger size than permanent service connections.

3.3 DELIVERY, STORAGE AND HANDLING

A. Provide in accordance with Section 01610 – Delivery, Storage, and Handling and as specified herein. Ship equipment, materials and spare parts complete except where partial disassembly is required by transportation regulations or for protection of components.

B. Pack spare parts in containers bearing labels clearly designating contents and pieces of equipment for which intended.

C. Deliver spare parts at same time as pertaining equipment.

D. Store and safeguard equipment, material, and spare parts.

3.4 INSTALLATION

A. Installation shall be in accordance with the professional by-pass pumping company recommendations and approved shop drawing submittals.

B. Install pumping units on a firm level surface.

C. Equipment failing to meet specific conditions shall be removed and replaced at no additional cost to the Owner.

3.5 FIELD TEST AND QUALITY CONTROL

A. The Contractor shall have the professional by-pass pumping company factory representative present during field installation. It shall be the Contractor's responsibility to obtain the recommended installation procedures directly from the company, and comply with same.

B. Contractor shall have professional by-pass pumping company provide a factory service representative who has complete knowledge of the operation of the pumps, including mechanical, electrical, control, and alarm components as necessary to perform field testing and initial start-up to assure and demonstrate the proper performance of all equipment and components.

C. Field tests shall be performed by the Contractor under the instruction of the factory service engineer. All field testing to be witnessed by the Engineer in the field. Provide a minimum of seven (7) days notice prior to all field tests. Submit certification of successfully conducted field tests.

D. The Contractor shall perform leakage and pressure tests of the by-pass pumping discharge piping using clean water prior to actual operation. Field testing shall demonstrate a minimum of 8 hours of continuous operation. During the 8 hours of continuous operation, the system shall demonstrate the ability to automatically start and stop pumps in response to changing flow conditions.

E. In the event that a unit fails to pass a test, make all modifications required to place the unit in proper working order.

F. In the event that a unit fails a test a second time, remove the unit and replace with a satisfactory one, at no cost to the Owner.

G. The Contractor shall provide all necessary instrumentation, equipment, devices, and appurtenances, as well as temporary wiring or piping, required to perform field tests.

3.6 SYSTEM OPERATION

A. The by-pass pumping operations must be attended at all times. Unattended by-pass will not be allowed. If by-pass pumping must continue past working hours an attendant must be present at all times.

B. Perform all required maintenance on the equipment to maintain the system integrity and capacity as specified.

C. Provide clean-up and disposal of contaminated material and reporting for all product spills.

D. At the completion of the period of service, disconnect all temporary piping and remove all system components from the site. Restore the work site to its original condition

3.7 CONTRACT CLOSEOUT

A. Provide in accordance with Section 01700 – Contract Closeout.

END OF SECTION 02538

SECTION 02570

SEWERS, MANHOLES, AND APPURTENANCES

PART 1 - GENERAL

1.1 SUMMARY OF WORK

A. This Section specifies requirements for the proposed sewer pipelines, manhole structures, valves, and associated items.

B. The work includes furnishing and installing sewer pipes, fittings, manholes, valves, and other structures and appurtenances required and in accordance with the Drawings and Specifications.

1.2 RELATED SECTIONS

A. Drawings and general provisions of the Contract, and:

1. Section 02160 – Temporary Excavation Support Systems

2. Section 02140 – Dewatering and Discharge

3. Section 02200 – Earthwork

4. Section 02630 – Ductile Iron Pipe and Fittings for Sewer Force Main

5. Section 02622 – Polyvinyl Chloride (PVC) Pressure Pipe

1.3 SUBMITTALS

A. List of materials proposed and manufacturers' specifications and installation instructions.

B. Shop drawings for all material and structures prior to ordering materials, including pipe materials, connections, fittings and valves, and component construction, features, configuration, and dimensions.

C. Anti-flotation/buoyancy calculations for all sewer manholes proposed to be within the groundwater table.

D. American Iron and Steel (AIS) Certifications as required by Special Conditions – American Iron and Steel Provisions Section 00826.

1.4 INSPECTION

A. The supplier is responsible for the provisions and all test requirements specified in ASTM D2241 for PVC pressure rated sewer pipe. In addition, all PVC pipe may be inspected at the plant for compliance with these specifications by an independent testing laboratory selected and paid for by the Owner. The Contractor shall require the manufacturer's cooperation in these inspections.

B. Inspection of the pipe may also be made after delivery. The Contractor shall furnish all labor to assist the Engineer in inspecting the pipe. The pipe shall be subject to rejection at any time on account of failure to meet any of the specification requirements, even though pipe samples may have been accepted as satisfactory at the place of manufacture. Pipe rejected after delivery shall be marked for identification and shall be removed from the site at once.

C. Imperfections in materials may be repaired, subject to approval of the Engineer, after demonstration by the manufacturer that strong and permanent repairs result. Repairs shall be carefully inspected before final approval.

1.5 DELIVERY, STORAGE & HANDLING

A. All materials shall be adequately protected from damage during transit. Pipes shall not be dropped.

B. All pipe and other appurtenances shall be inspected before placement in the work and any found to be defective from any cause, including damage caused by handling, and determined by the Engineer to be unrepairable, shall be replaced at no cost to the Owner.

C. Storage and handling of pipes, manholes and other sewer system appurtenances shall be in accordance with the manufacturer's recommendations, subject to the approval of the Engineer.

D. Only nylon-protected slings shall be used for handling the pipe. No hooks or bare cables will be permitted.

E. Pipe shall be stored above ground at a height no greater than 5 feet, and with even support for the pipe barrel.

PART 2 – PRODUCTS

2.1 POLYVINYLCHLORIDE (PVC) PIPE (GRAVITY)

A. Gravity Pipe (>3 feet of cover): Gravity pipe shall be push-on joint SDR 35 PVC meeting the requirements of ASTM D3034 for sizes 3-inch to 15-inch. For sizes greater than 15-inch, pipe shall comply with ASTM F679, latest record. Pipe color shall be in accordance with the Uniform Color Code established by the APWA Utility Location and Coordination Council (adopted September 2000).

B. Gravity Pipe (<3 feet of cover): Gravity pipe shall be push-on joint C909 PVC meeting the requirements of AWWA C909 and/or ASTM F1483 for sizes 8-inch and 12-inch. Pipe color shall be in accordance with the Uniform Color Code established by the APWA Utility Location and Coordination Council (adopted September 2000).

C. Gravity Fittings: Fittings, couplings and adaptors shall be manufactured by Romac Industries Inc., Multi Fittings Corp., NAPCO Pipe and Fittings, or approved equal. Connections to existing gravity sewer services, and pipe to pipe connections shall be made with a Strongback coupling.

D. Joints: PVC pipe shall have an integral wall bell and spigot push-on joint with elastomeric gaskets secured in place in the bell of the pipe. The bell shall consist of an integral wall section with a solid cross section elastomeric gasket, factory assembled, securely locked in place to prevent displacement during assembly. Elastomeric gaskets shall conform to ASTM D3212. Where petroleum contamination is known or suspected to be in the soil and/or groundwater, nitrile gaskets shall be required.

E. Spigot Pipe Ends: Spigot pipe ends shall be supplied with bevels from the manufacturer to ensure proper insertion. Each spigot end shall have an "assembly stripe" imprinted thereon to which the bell end of the mated pipe will extend upon proper joining of the two pipes.

F. Insulation: Insulation for piping shall be waterproof, FoamGlas, Gilsulate 500XR, or approved equal.

G. Building Services and Fittings:

1. PVC services shall be sized as indicated on the Drawings. Minimum service size in 6-inch. Service slope shall be between 2% and 6%.

2. Provide wye fitting or T-wye fitting on main line pipe. Extend services to property line or as otherwise indicated on drawings. Service connections with a vertical drop of 4 feet to 12 feet between the house sewer invert at the street and the main sewer invert shall be by sloped line using 22.5-degree or 45 degree bends to facilitate cleaning.

3. Provide clean outs as shown and detailed on drawings. Sewer cleanouts shall be minimum 6-inch diameter or sized to match the service pipe, whichever is greater. The cleanouts shall be completed at finish grade and contained within a hand hole. Cleanouts shall include a removable PVC threaded plug cap. Cleanout Covers shall be heavy duty and conform to ASTM A48. Accepted products shall be U.S. Foundry Model 7621, General Foundries Model No. 11041, EJ Model 1566A, or approved equal and shall be marked with an "S" to indicate sewer.

4. Connections to existing gravity sewer services shall be made with a Strongback coupling. Reducers required to connect to existing gravity sewer services shall be Strongback reducer couplings.

5. Chimney drop sewer services shall only be allowed where the depth of the main line sewer is more than 12-feet from the ground surface. Chimney drop services shall be constructed of 6" C900 PVC Pipe and shall connect to the gravity sewer main via a Protecto 401 Epoxy Lined Ductile Iron Tee.

2.2 POLYVINYLCHLORIDE (PVC) PIPE (FORCE MAIN)

A. See Section 02622 - PVC Pressure Pipe

2.3 POLYVINYLCHLORIDE (PVC) PIPE FOR VENTING

A. Vent Pipe and Fittings: PVC Vent Pipe shall be Schedule 80 PVC with rubber rings and shall meet the requirements of ASTM D3034.

B. Joints: Rubber rings shall conform to ASTM F477 and joints shall be design tested to the requirements of ASTM D3139. Rubber rings capable of withstanding a pH of 9.5, and shall be petroleum resistant. Rubber rings shall provide a tight seal that protects the line from shock and vibration, and compensates for expansion and contraction of pipe lengths.

C. Gasketed joints shall meet the requirements of ASTM D3212.

2.4 PRECAST CONCRETE MANHOLES

A. Precast Units:

1. Gravity Sewer Manholes: All precast concrete manholes shall conform to ASTM C478. Four foot (4') and five foot (5') minimum inside diameter precast units (4,000 psi minimum compressive strength) with eccentric cone section tapering to twenty four inch (24") diameter (minimum) and one pour monolithic base section conforming to ASTM C478. All units shall be designed for HS-20 loading. Manhole wall thickness shall be 5 inches, minimum for 4' diameter manholes and 6 inches, minimum for 5' diameter manholes. Flattop manhole tops will be permitted with approval from the Engineer.

2. Sewer Force Main Manholes: All precast concrete manholes shall conform to ASTM C478. Eight foot (8') and six foot (6') minimum inside diameter, 5'x8' and 6'x8'rectangular precast units (4,000 psi minimum compressive strength) with flat top section including a thirty-six inch (36") diameter (minimum) opening, and one pour monolithic base section conforming to ASTM C478. All units shall be designed for HS-20 loading. Manhole wall thickness shall be 9 inches, minimum.

3. Precast Unit Joint Seals: Butyl Rubber section joint confirming to ASTM C443.

4. Rubber grade rings shall be installed between the manhole frame and precast concrete manhole. Refer to manhole details in Contract Drawings. Rubber grade rings shall be High Density PE Manhole Adjusting Rings manufactured by LadTech, EJ Prescott, or approved equal.

5. The date of manufacture, trademark and name of the manufacturer shall be clearly marked on the inside of each precast section.

B. Masonry:

1. Brick for construction of shelves and inverts shall be Grade SS conforming to ASTM C32. Red clay sewer brick inverts shall be smoothly rounded to the direction of flow. Inverts shall be constructed with 4,000 psi concrete in void areas and with sewer brick. All sewer inverts are to be constructed once the manhole is installed. Manhole inverts built above ground will not be accepted.

2. Mortar shall be in conformance with ASTM C270, Type M. Mortar shall be composed of one part Type II Portland cement (ASTM C150), two parts sand (ASTM C144), well graded with no grain larger than will pass a Number 8 sieve, and 20 percent hydrated lime conforming to ASTM C207 Type S.

3. Cement shall be Type I or II Portland cement conforming to ASTM C150, Standard Specification for Portland cement. Where masonry is exposed to salt water, Type II shall be used.

4. Hydrated lime shall be Type S conforming to ASTM D207.

5. Sand for masonry mortar shall conform to the gradation requirements of ASTM C144.

C. Manhole Frame and Cover:

1. Gravity Sewer Manholes: Manhole frames and covers for gravity sewer manholes shall be minimum Class 25 conforming to ASTM "Standard Specification for Gray Iron Castings," Designation: A48. Manhole frame shall have a clear opening of 24 inches and be a minimum of 6 inches in height. The surface of the covers shall have a diamond pattern with the word "SEWER" cast thereon for sanitary sewers. Letter size shall be three inches. Watertight manhole covers shall be secured with six (6) stainless steel bolts and have a watertight gasket. The frame and cover shall weight a minimum of 450 pounds and be watertight up to 15 psig external pressure. All manholes frames and covers shall be manufactured by East Jordan Iron Works (formerly LeBaron Foundry Co.), US Foundry, Amercast, or an approved equal.

2. Sewer Force Main Manholes: Manhole frames and covers for combination air/vacuum valves, blow off/clean out manholes, and intermediate access points shall be water tight, vandal proof heavy duty cast iron manufactured by East Jordan Iron Works (formerly LeBaron Foundry Co.) or an approved equal.

Manhole frame shall have a clear opening of 36 inches and be a minimum of 6 inches in height. The surface of the covers shall have a diamond pattern with the word "SEWER" cast thereon for sanitary sewers. Letter size shall be three inches. The frame and bolted cover shall be EJ Model #V-1600-5 or equal as specified in the Drawing Details.

3. Iron and steel products shall conform to American Iron and steel requirements of Section 00826.

D. Pipe Connections: Connections to precast concrete manholes shall be made by one of the methods as follows:

1. LOCK JOINT Flexible Manhole Sleeve cast into the manhole base. Stainless steel strap and exposed sleeve shall be protected with bitumastic coating.
2. PRESS WEDGE II gasket cast into the manhole base. The rubber wedge shall be driven into the V slot from the manhole exterior.
3. RES-SEAL compression ring with exposed metal protected by bitumastic coating.
4. KOR-N-SEAL neoprene boot cast into manhole base. Stainless steel clamp shall be protected by bitumastic coating.

E. Dampproofing Bitumastic Coating: The entire exterior surface of all masonry and concrete (whether precast or cast-in-place) structures associated with sewerage systems, such as: manholes, grease traps, holding tanks, tight tanks, septic tanks, aeration tanks, pump stations, valve pits, etc., shall receive two coats of waterproofing such as Carboline Bitumastic 300M as manufactured by SOMAY Products, Inc., Miami, FL; Sonnoshield HLM 5000 as manufactured by Sonneborn, Shakopee, MN or approved equal at a minimum thickness of 7 mils per coat and a total thickness of 14 mils; however, in no case shall the thickness per coat be less than that recommended by the manufacturer. Touch up in the field prior to backfilling as required by Engineer.

F. Drop Manholes: Drop manholes are required for any invert that is 2 feet or above the elevation of the manhole invert. All drop connections shall be external with the drop portion secured by anchor straps. The drop piping shall be constructed of minimum SDR 35 PVC and shall be secured with anchor straps. Drop piping shall be encased with controlled density fill.

2.5 VALVES AND APPURTENANCES FOR PRESSURE SEWER

A. Plug Valve:

1. Plug valves for force main isolation shall be 100% port eccentric plug valves made in accordance with AWWA Specification C517. Valves to be rated for 150 psi working pressure. Valve body and bonnet to be coated inside and out with fusion bonded epoxy. All interior coatings shall be suitable for wastewater.

5. All plug valves shall be equipped with a 2-inch square nut for direct quarter turn operation and shall open by turning to the left (counterclockwise).

6. All plug valves shall have mechanical joint connections that shall comply with ANSI/AWWA C111/A21.11.

7. Valve boxes shall be cast iron, three-piece screw type with drop cover marked "SEWER". They shall be set vertically and properly adjusted so that the cover shall be in the same plane as the finished surface of the ground or street. All sewer plug valves shall open left.

8. All plug valves furnished and installed shall include a stem extension that is terminated one (1) foot below existing grade. Valve extension to be manufactured by plug valve manufacturer.

9. Plug valves shall be suitable for direct bury service and shall be manufactured in the United States by DeZURIK, Kennedy Valve, Val-Matic or approved equal.

10. Iron and steel products shall conform to American Iron and steel requirements of Section 00826.

B. Check Valve:

1. Resilient seated check valves shall be manufactured from ductile iron meeting or exceeding ASTM A536. Valves shall be rated for 250 psig cold water working pressure and shall comply to ANSI/AWWA C508.

2. Valves shall have a ductile iron disc fully encapsulated with rubber. Disc travel to closure shall not be more than 35 degrees and shall seal drop tight at pressures above 5 psig.

3. Valves to be coated with fusion-bonded epoxy on all internal and external ferrous surfaces.

4. Bronze seat rings are not allowed. Disc shall be the only allowable moving part. No O-rings, pivot pins or other bearings are allowed. Disc must be reversible such that either side will seal equally.

5. Valves shall be equal to AMERICAN's Series 2100 ductile iron resilient seated check valve or approved equal.

6. Iron and steel products shall conform to American Iron and steel requirements of Section 00826.

C. Combination Wastewater Air Release/Vacuum Valve:

1. Valves shall be manufactured and tested in accordance with AWWA C512. Manufacturer shall have a quality management system that is certified to ISO 9001 by an accredited, certifying body. Valves shall be suitable for wastewater service.

2. Dual body valves shall provide an extended body with a through flow area equal to the nominal size. Floats shall be unconditionally guaranteed against a failure including pressure surges. A resilient bumper shall be provided on 4-in. and larger sizes to cushion the float during sudden opening conditions. The seat shall provide drop tight shut off to the full valve pressure rating.

3. Dual body valves shall consist of a Wastewater Air Release Valve piped to a Wastewater Air/Vacuum Valve with a full-ported brass ball valve.

4. The Wastewater Air Release Valve shall have an extended leverage mechanism with sufficient mechanical advantage so that the valve will open under full operating pressure. An adjustable threaded resilient orifice button shall be used to seal the precision discharge orifice in the cover.

5. The Wastewater Air Release Valve shall have backwash accessories which shall consist of an inlet shut-off valve, a blow-off valve, a clean water inlet valve, rubber supply hose, and quick disconnect couplings. Accessory valves shall be quarter-turn, full ported bronze ball valves.

6. The Wastewater Air/Vacuum Valves sizes 4-in. and larger shall have a cover fitted to the valve body by means of a machined register to maintain concentricity tween the top and bottom guide bushings at all times. The tandem float assembly shall have a hexagonal guide shaft supported in the body by circular bushings to prevent binding from debris. The upper float shall be protected against direct water impact by an internal baffle. The seat shall be a minimum of .5-in. thick on 2-in. and larger valves and secured in such a manner as to prevent distortion.

7. The valve body and cover shall be constructed of ASTM A126 Class B cast iron. The float, plug, guide shafts, and bushings shall be constructed of Type 316 stainless steel. Non-metallic guides and bushings are not acceptable. Resilient seats shall be Buna-N.

8. Valve interiors and exteriors shall be coated with an NSF/ANSI 61 certified fusion bonded epoxy in accordance with AWWA C550.

9. The manufacturer shall demonstrate a minimum of five (5) years experience in the manufacture of wastewater air valves. When requested, the manufacturer shall provide test certificates, dimensional drawings, parts list drawings, and operation and maintenance manuals. Wastewater Combination Air Valves for all high points shall be Series 48A/304 as manufactured by Val-Matic Valve

and Manufacturing Corporation, Elmhurst, IL, USA or approved equal. Wastewater Combination Air Valves for Intermediate Access Point Manholes shall be Series 48A/302 as manufactured by Val-Matic Valve and Manufacturing Corporation, Elmhurst, IL, USA or approved equal.

10. Iron and steel products shall conform to American Iron and steel requirements of Section 00826.

2.6 BURIED UTILITY WARNING AND IDENTIFICATION TAPE

A. Provide detectable aluminum foil plastic backed tape or detectable magnetic plastic tape manufactured specifically for warning and identification of buried piping. Tape shall be detectable by an electronic detection instrument. Provide tape in rolls, 3 inches minimum width, color coded for the utility involved with warning and identification imprinted in bold black letters continuously and repeatedly over entire tape length. Warning and identification shall be CAUTION BURIED SEWER PIPING BELOW or similar. Use permanent code and letter coloring unaffected by moisture and other substances contained in trench backfill material. Bury tape with the printed side up at a depth of 12 inches below the top surface of earth or the top surface of the subgrade under pavements.

PART 3 - EXECUTION

3.1 EXCAVATION AND BACKFILLING

A. The type of materials to be used in bedding and backfilling and the method of placement shall conform to the requirements of Section 02200 – Earthwork, and the details shown on the Drawings.

3.2 GRAVITY PIPE INSTALLATION

A. All sewer piping shall be laid accurately to the lines and grades shown in the Drawings and in conformance with pipe manufacturer's recommended procedures.

B. Laying Pipe: Each length of pipe shall be laid with firm, full and even bearing throughout its entire length, in a prepared trench. Pipe shall be laid with bells upgrade unless otherwise approved by the Engineer.

Every length of pipe shall be inspected and cleaned of all dirt and debris before being laid. The interior of the pipe and the jointing seal shall be free from sand, dirt and trash. Extreme care shall be taken to keep the bells of the pipe free from dirt and rocks so that joints may be properly lubricated and assembled.

No length of pipe shall be laid until the proceeding lengths of pipe have been thoroughly embedded in place, to prevent movement or disturbance of the pipe alignment.

Lay accurately to lines and grades indicated or required. Provide accurate alignment, both horizontally and vertically.

C. Pipe Extension: Where an existing pipe is to be extended, the same type of pipe shall be used, unless otherwise approved by the Engineer.

D. Full Lengths of Pipe: Only full lengths of pipe shall be used in the installation except that partial lengths of pipe may be used at the entrance to structures, and to accommodate the required locations of service connection fittings.

E. Pipe Entrances to Structures: All pipes entering structures shall be cut flush with the inside face of the structure, and the cut ends of the pipe surface within the structure shall be properly rounded and finished so that there will be no protrusion, ragged edges or imperfections that will impede or affect the hydraulic characteristics or the sewage flow. The method of cutting and finishing shall be subject to the approval of the Engineer.

F. Protection During Construction: The Contractor shall protect the installation at all times during construction, and movement of construction equipment. Vehicles and loads over and adjacent to any pipe shall be performed at the Contractor's risk and in accordance with all applicable federal, state and local safety regulations.

At all times when pipe laying is not in progress, all open ends of pipes shall be closed by approved temporary water-tight plugs. If water is in the trench when work is resumed, the plug shall not be removed until the trench has been properly dewatered and all danger of water entering the pipe eliminated. The Contractor is responsible for proper dewatering to ensure a stable pipe foundation. Proper dewatering to two feet (minimum) below the pipe invert to ensure joining of the pipe in a dry condition.

G. Water Pipe – Sewer Pipe Separation: When a sewer pipe crosses above or below a water pipe, the following procedures shall be utilized. The Contractor shall comply with these following procedures.

1. Relation to Water Mains

a. Horizontal Separation: Whenever possible sewers shall be laid at a minimum at least ten feet (10'), horizontally from any existing or proposed water main. Should local conditions prevent a lateral separation of 10 feet to a water main, if:

i. It is laid in a separate trench, or if
ii. It is laid in the same trench with the water mains located at one side on a bench of undistributed earth, and if
iii. In either case the elevation of the top (crown) of the sewer is at least 18 inches below the bottom (invert) of the water main.

b. Vertical Separation: Whenever sewers must cross under water, sewer is at least eighteen inches (18") below the bottom of the water main. When

the elevation of the sewer cannot be varied to meet the above requirements, the water main shall be relocated to provide this separation or reconstructed with mechanical-joint pipe for a distance of ten feet (10') on each side of the sewer. One full length of water main should be centered over the sewer so that both joints will be as far from the sewer as possible.

c. When it is impossible to obtain horizontal and/or vertical separation as stipulated above, both the water main and sewer shall be constructed of mechanical-joint cement lined ductile iron pipe or other equivalent based on water tightness and structural soundness. Both pipes shall be pressure tested by an approved method to assure water tightness or both pipes shall be encased in control density fill (CDF).

3.3 PVC PIPE JOINTS

A. All joints shall be made watertight.

B. Pipe shall be jointed in strict accordance with the pipe manufacturer's instruction. Jointing of all pipes shall be done entirely in the trench.

C. PVC Pipe

1. Lubricant for jointing of PVC pipe shall be applied as specified by the pipe manufacturer. Use only lubricant supplied by the supplied by the pipe manufacturer.

2. PVC pipe shall be pushed home by hand or with use of a bar and block. The use of power equipment, such as a backhoe bucket, shall only be used at the direction of the manufacturer.

3. The position of the gasket shall be checked to insure the joint has been properly made and is watertight. Care shall be taken not to exceed the manufacturer's recommended maximum deflection allowed for each joint.

4. Field-cut pipe ends shall be cut square and the pipe surface beveled to the size and shape of a factory-finished beveled end. All sharp edges shall be rounded off.

3.4 MANHOLES

A. General Requirements: All manholes shall be built in accordance with the Details and in the locations shown on the Drawings. Structures shall be constructed of precast concrete or brick masonry as depicted in the drawings. Personnel experienced and skilled in this work shall install all masonry, and any person not deemed to be such by the Engineer shall be removed and replaced by a person so qualified. Manholes shall be constructed as soon as the pipe laying reaches the location of the manhole. Should the Contractor continue laying pipe without making provisions for completion of the

manhole, the Engineer shall have the authority to stop the pipe laying operations until the manhole is completed. The Contractor shall accurately locate each manhole and set accurate templates to conform to the required line and grade. Any manhole that is incorrectly located or oriented improperly shall be removed and rebuilt in its proper location, alignment and orientation at no additional cost to the Owner.

B. Foundations: All manholes shall be constructed on a 12-inch later of compacted bedding material. The excavation shall be dewatered to provide a dry condition while placing bedding material and setting the base.

C. Inverts: Brick invert channels shall be constructed in all manholes to provide a smooth channel for sewage flow through the structure, and shall correspond in shape to the lower half of the pipe and extended vertically to the pipe crown. At changes in directions, the inverts shall be laid out in curves of the longest possible radii tangent to the centerline of the sewer pipes at the manhole side. Shelves shall be constructed to the elevation of the highest pipe crown and sloped to drain toward the flow channel at one inch per foot (1"/foot). All sewer inverts are to be constructed once the manhole is installed. Manhole inverts built above ground will not be accepted.

Special care shall be taken in laying brick inverts. Joints shall not exceed three-sixteenth inch in thickness and each brick shall be carefully laid in full cement mortar joint on bottom, side and end in one operation. No grouting or working in of mortar after laying of the brick will be permitted. Bricks forming the shaped inverts in manholes shall be laid on edge.

Invert channels shall be built for future extensions where shown on the Drawings and where directed by the Engineer.

D. Precast Manholes: Precast manholes shall be installed only after Shop Drawings have been approved. The top grade of the precast concrete flat top section shall be set sufficiently below finished grade to permit a maximum of five and a minimum of two HDPE Grade Rings to adjust the grade of the manhole frame. Manhole frames shall be set on a grout pad to make a watertight fit.

3.5 CONNECTIONS TO EXISTING FACILITIES

A. General Requirements: The Contractor shall make all required connections of the proposed sewer into existing sewer system, where and as shown on the Drawings and as required by the Engineer. The Contractor shall verify the location, size, invert, and type of existing pipes at all points of connection prior to ordering new utility materials.

C. Compliance with Requirements of Owner of Facility: Connections into existing sewer facilities shall be performed in accordance with the requirements of the Owner of the facility. The Contractor shall comply with all such requirements, including securing of all required permits, paying the costs thereof, and providing twenty-four (24) hour notice prior to beginning the work.

3.6 PIPE CONNECTIONS TO NEW STRUCTURES

A. Pipe connections for precast structures may be accomplished by the method described below. The Contractor shall make sure that the outside diameter of the pipe is compatible with the particular pipe connection used.

1. KOR-N-SEAL (or approved equal) neoprene boot cast into the manhole wall. The stainless steel clamp shall be protected from corrosion with a bitumastic coating.

2. LOCK-JOINT (or approved equal) rubber-like flexible sleeve cast into the manhole wall. The stainless steel clamp shall be protected from corrosion with a bitumastic coating.

3.7 PRESSURE TESTING OF SEWER FORCE MAIN

A. Hydrostatic and leakage test shall be conducted in accordance with AWWA Standard C600, and as directed by the Engineer.

B. Conduct pipe tests after concrete thrust blocks have cured to the required 3000 psi strength. Fill pipe 24 hours prior to testing, and apply test pressure to stabilize system. Use only potable water.

C. Prior to pressure testing, the entire pipe section shall be flushed to remove any rocks or debris, which may have inadvertently entered the pipe during construction.

D. Testing shall be conducted upon completion of each pipe segment. Under no circumstances the Contractor will be allowed to test the entire pipeline in one test. All pipe segments including fittings, valves, and other miscellaneous pipe components shall be tested at 150 psi.

E. The Contractor shall test the sewer force main in sections. The testing shall be ongoing throughout the construction of the sewer force main. The length of the testing shall be determined by the Engineer.

F. Once the pipe section has been filled at normal pressure and all entrapped air removed, the Contractor shall raise the pressure to 150 psi by a special pressure pump, taking water from a small tank of proper dimensions for satisfactorily measuring the rate of pumpage into the pipe. This pressure shall be maintained for a minimum of 2 hours, during which time the line shall be checked for leaks. Measured rate of water leakage shall not exceed the allowable leakage listed below.

Test Pressure	Nominal Pipe Diameter [inches]		
	16	20	24
150 psi	1.47	1.84	2.21

G. Interior piping in vaults, building, etc., shall have zero leakage.

H. The Contractor shall immediately locate any leaks and repair them. Pipe will be accepted only when leakage is zero. Approval does not absolve the Contractor from responsibility if leaks develop later within the warranty period.

3.8 PRESSURE TESTING OF SEWER GRAVITY MAIN (Gravity Sewers with Active Services)

A. Test all new gravity sewer lines with active services by conducting a low pressure air test on all joints using a packer after all services have been connected or capped at the property line and all trenches have been backfilled but before final surface restoration is complete.

1. Provide CCTV inspection equipment in accordance with Section 02440.

2. Provide packer type testing device capable of isolating joints by creating a sealed void space around the joint being tested, constructed such that low pressure air can be admitted into the void area. Packer shall contain a pressure gauge accurate to one tenth (0.1) psi in line with the feed line to monitor the void pressure and shall be capable of testing joints with flows up to 25% of the pipe diameter without other flow control methods.

B. Test Sewer Pipeline Joints as Follows:

1. Pull CCTV camera through sewer line in front of packer

2. Position packer on each joint to be tested.

3. Inflate the sleeves on each end of the packer.

4. Apply 4.0 psi pressure above the existing hydrostatic pressure on the outside of the joint to the void area created around the inside perimeter of the joint.

5. Shut of the air supply once pressure has stabilized at the required amount.

6. Monitor the void pressure for 30 seconds.

7. Joint shall fail the test if void pressure drops by more than 0.5 psi in thirty seconds and shall require repair. Repairing joints with chemical grout will not be accepted.

3.9 MANHOLE LEAKAGE TESTS

A. Leakage tests shall be made by the Contractor, and observed by the Engineer on each manhole. The test shall be by vacuum or by water exfiltration as described below. Leakage tests shall be performed prior to backfill.

B. Vacuum Test: The vacuum test shall be conducted in accordance with ASTM C1244. Test results will be judged by the length of time it takes for the applied vacuum to drop

from 10 inches of mercury to 9 inches. If the time is less than that listed in Table 1 of ASTM C1244, the manhole will have failed the test. Test times from are shown as follows.

Minimum Test Times for Various Manhole Diameters

Depth (Feet)	Diameter (Inches) 48	60	72
		Times (Seconds)	
0-12	30	39	49
12-16	40	52	67
16-20	50	65	81
20-24	59	78	97
26-30	74	98	121

If the manhole fails the initial test, the Contractor shall locate the leaks and make proper repairs. Leaks may be filled with a wet slurry of accepted quick setting material. If the manhole should again fail the vacuum test, additional repairs shall be made, and the manhole water tested as specified below.

C. Water Exfiltration Test: After the manhole has been assembled in place, all lifting holes shall be filled and pointed with an approved non-shrinking mortar. All pipes and other openings into the manhole shall be suitably plugged and the plugs braced to prevent blow out. The test shall be made prior to placing the shelf and invert. If the groundwater table has been allowed to rise above the bottom of the manhole, it shall be lowered for the duration of the test.

1. The manhole shall be filled with water to the top of the cone section. If the excavation has not been backfilled and observation indicates no visible leakage, that is, no water visibly moving down the surface of the manhole, the manhole may be considered to be satisfactorily water-tight. If the test, as described above, is unsatisfactory as determined by the Engineer or if the manhole excavation has been backfilled, the test shall be continued. A period of time may be permitted if the Contractor, so wishes, to allow for absorption by the manhole. At the end of this period, the manhole shall be refilled to the top of the cone, if necessary, and a measuring time of at least 8 hours begun. At the end of the test period, the manhole shall be refilled to the top of the cone, measuring the volume of water added. This amount shall be extrapolated to a 24-hour loss rate and the leakage determined on the basis of depth. The leakage for each manhole shall not exceed one gallon per vertical foot for a 24-hour period. If the manhole fails this requirement, but the leakage does not exceed 3 gallons per vertical foot per day, repairs by approved methods may be made as directed by the Engineer to bring the leakage within the allowable rate of one gallon per foot per day. Leakage due to a defective section or joint or exceeding the 3 gallon per vertical foot per day, shall be cause for rejection of the manhole. It shall be the Contractor's responsibility to uncover the rejected

manhole as necessary and to disassemble, reconstruct or replace it as directed by the Engineer. The manhole shall then be retested and, if satisfactory, interior joints shall be filled and pointed.

2. No adjustment in the leakage allowance will be made for unknown causes such as leaking plugs, absorption, etc. It shall be assumed that all loss of water during the test is a result of leaks through joints or through the concrete Furthermore, the Contractor shall take any steps necessary to assure the Engineer that the water table is below the bottom of the manhole throughout the test.

3. If the groundwater table is above the highest joint in the manhole, and there is no leakage into the manhole, as determined by the Engineer, such a test can serve to evaluate water-tightness of the manhole. However, if the Engineer is not satisfied with the results, the Contractor shall lower the water table and carry out the test as described hereinbefore.

3.10 CLEANING AND REPAIR

A. The Contractor shall clean the entire sewer system of all debris and obstructions. This shall include, removal of all formwork from structures, concrete and mortar droppings, construction debris and dirt. The system shall be thoroughly flushed clean and the Contractor shall furnish all necessary hose, pumps, pipe and other equipment that may be required for this purpose. No debris shall be flushed into existing sewers, storm drains or streams. All work of cleaning and repair shall be performed at no additional cost to the Owner.

3.11 ALIGNMENT TESTS FOR GRAVITY SEWER

A. Perform tests on correctness of horizontal and vertical alignment of sewer on each length of sewer installed, after all pipe has been installed, and after settlement period.

B. All pipe shall be cleaned prior to alignment testing.

C. Test alignment of sewers as follows:

1. Introduce water into the sewer lines to be tested from the upstream manhole prior to the test but no more than 24 hours in advance of the test.

2. Beam a source of light through the pipeline from both ends and the Engineer will directly observe the light in the downstream and/or upstream manhole of each pipe section.

3. The length of pipe, diameter of pipe and amount of light observed in the manhole at the end of each pipe section will determine acceptance of the alignment test by the Engineer.

4. Standing water shall not be allowed and if observed will be cause for rejection of a pipe section.

5. Failed alignment will be corrected by re-excavating and resetting of pipe section including SMHs at no additional cost to the Town.

3.12 REMEDIAL WORK

A. Perform all work necessary to correct deficiencies discovered as a result of testing and/or inspections.

B. Completely retest all portions of the original construction on which remedial work has been performed.

C. Perform all remedial work and retesting in a manner and at a time acceptable to the Engineer and at no additional cost to the Owner.

3.13 DEFLECTION TESTING

A. Allowable Deflection Test

1. Pipe deflection measured not less than ninety days (90) after the backfill has been completed as specified shall not exceed the limits defined below. Deflection shall be computed by multiplying the amount of deflection (nominal diameter less minimum diameter when measured) by 100 and dividing by the nominal diameter of the pipe.

SDR 35 PVC Gravity Sewer Pipe			
Size (in.)	Nominal Laying Length (ft.)	X Offset per Nominal Length (in.)	Maximum Deflection Percent
6	20	21	7.5
8	20	21	7.5
10	20	21	7.5

2. Deflection shall be measured with a rigid mandrel (Go/No-Go) device cylindrical in shape and constructed with a minimum of nine or ten evenly spaced arms or prongs. Drawings of the mandrel with complete dimensions shall be submitted to the Engineer for each diameter of pipe to be tested. The mandrel shall be hand pulled by the Contractor through all sewer lines.

3. Any section of sewer not passing the mandrel shall be uncovered at the Contractor's expense and the bedding and backfill replaced to prevent excessive deflection. Repaired pipe shall be retested.

3.14 FINAL INSPECTION

A. Upon Completion of the work, and before final acceptance by the Engineer, the entire sewer system shall be subjected to a final inspection in the presence of the Engineer. The work shall not be considered as complete until all requirements for line, grade, cleanliness, leakage tests and other requirements have been met.

END OF SECTION 02570

SECTION 02576

PAVEMENT REPAIR AND RESURFACING

PART 1 – GENERAL

1.1 SCOPE OF WORK

A. This section includes the removal and replacement of existing bituminous pavement and sub-base; installation of temporary and permanent trench pavement; bike path construction; milling; installation of permanent full-width, full-depth pavement; removal and resetting of curbing (as required); installation of new curbing; installation of bituminous berm; raising and adjusting castings and valve boxes; and installation of pavement markings.

B. The Contractor shall be required to comply with all requirements of Appendix B – Preserving Historic Pavement on Nantucket as part of the Contract.

1.2 RELATED WORK

A. Earthwork specifications are included in Section 02200

B. Appendix B – Preserving Historic Pavement on Nantucket

1.3 REFERENCE STANDARDS

A. Except as otherwise specified herein, the current Standard Specifications for Highways and Bridges, including all addenda, issued by the Commonwealth of Massachusetts, Highway Department (MassDOT), shall apply to materials and workmanship required for the work of this Section.

B. American Association of State Highways and Transportation Officials (AASHTO) AASHTO M144 - Standard Specification for Calcium Chloride.

C. Where reference is made to one of the above standards, the revision in effect at the time of bid opening shall apply.

1.4 SUBMITTALS

A. Shop Drawings: Submit the following in accordance with Section 01300 - Submittals.

1. Product Data: Submit complete data on materials to be used in construction, including gradation tests for pavement sub-base.

2. Design Data: Submit design mix for bituminous base and top (wearing) course.

3. Material Certificates: Provide copies of materials certificates signed by material producer and Contractor, certifying that each material item complies with, or exceeds, specified requirements.

1.5 QUALITY ASSURANCE

A. Provide in accordance with Section 01400 and as specified.

B. Laboratory Testing Required:

1. The bituminous mixture shall be compacted to at least 95% of the density achieved on the laboratory testing of the design mix for the project. The density of the Bituminous Concrete Pavement will be determined by using either the following tests; Nuclear Density Gauge Method ASTM D2950 or the Bulk Specific Gravity Method AASHTO-T166.

C. Thickness: Test in-place asphalt concrete courses for compliance with requirements for thickness. Repair or remove and replace unacceptable paving as directed by Engineer. In-place compacted thickness will not be accepted if exceeding the following allowable variation from required thickness:

1. Base Course: ¼-inch, plus no minus

2. Top Course: ¼-inch, plus no minus

1.6 PROJECT/SITE CONDITIONS

A. Environmental Requirements:

1. Do not place materials when underlying surface is muddy, frozen, or has frost, snow, or water thereon.

2. Do not place concrete when air temperature at time of placement, or anticipated temperature for following 24 hours, is lower than 40°F or higher than 90°F.

3. Apply prime and tack coats when ambient temperature is above 50°F and when temperature has not been below 35°F for 12 hours immediately prior to application.

4. Binder Course may be placed when air temperature is above 30°F and rising.

5. Grade Control: Establish and maintain required lines and elevations.

B. Existing Conditions:

1. Drawings show approximate locations of paving areas.

2. Drawings show approximate location of existing structures along pipeline route.

1.7 GUARANTEE

A. All final pavement placed in Town roadways shall be warranted by the Contractor for a period of one year. During this period all areas which have settled or are unsatisfactory for traffic shall be removed and replaced at no cost to the Town, including the cost of Traffic Police. Settlement in excess of one (1) inch shall be considered significant, and shall be repaired.

PART 2 – PRODUCTS

2.1 MATERIALS

A. Calcium chloride shall conform to AASHTO M144, Type I or Type II.

B. Bituminous concrete shall conform to Class I Bituminous Concrete Pavement, Type I-1, of Section 460 of the Massachusetts Highway Department Standard Specifications.

C. Binder Course and Modified Top Course shall conform to the Massachusetts Highway Department Standard Specifications, Section M3.11.00, Class I, bituminous concrete.

D. Tack coat shall be emulsified asphalt, grade RS-1 and conform to the Massachusetts Highway Department Standard Specifications, Section M3.11.06.

E. Pavement thickness for driveway aprons and sidewalks shall be installed in two courses as follows:

	Driveway Aprons	Sidewalk
1. Binder Course:	2 inches	1.5 inches
2. Top Course:	2 inches	1.5 inches

F. Cutback asphalt shall conform to the Massachusetts Highway Department Standard Specifications, Section M3.02.0.

G. Cobblestones shall be granite, of fairly uniform shape and color, free from cracks and other structural imperfections or flaws which would impair its structural integrity, and of smooth appearance. Natural color variations, characteristic of the deposit source will be permitted. Cobblestones shall be similar to existing cobblestones on various downtown streets. Samples shall be submitted for approval by the Nantucket Planning Board.

H. New granite curbing shall be 4” in width, with split face and back and thermal top with eased edge. Curbing shall be Williams Blue Sky by Williams Stone Company, Inc. or approved equal.

I. Brick Paving Block shall be for exterior paving, manufactured from extruded fireclay from shale and shall be fired to produce a dense paver and shall meet the requirements of ASTM C216-69-SWFBS with water absorption not more than 5 percent with five-hour bail. Laminated brick will not be acceptable. Standard Face brick will not be acceptable.

All brick shall be batched type burned to provide the various colors by controlled atmosphere and temperature conditions, required to obtain a rustic blend (70 percent red and 30 percent brown to black). The brick shall be highly resistant to abrasion and shall have an average compressive strength of 8000 or more psi over a 100-cycle freeze-thaw test.

The brick shall be wire-cut to a size of 4 x 8 x 2.25 inches. Brick shall be delivered to the site on pallets. Samples shall be submitted for approval by the Nantucket Planning Board.

J. Sub-base material shall be new processed gravel conforming to the Massachusetts Highway Department Standard Specifications, Section M1.03.1 "Processed Gravel for Sub-Base".

K. Sand borrow for placement under cobblestone and brick pavers shall conform to the Massachusetts Highway Department Standard Specifications, Section M1.04.0 Type A "Sand Borrow."

L. Stone dust shall conform to the following gradation requirements:

Passing Sieve Size	Percentage Passing
No. 4	100
No. 50	90
No. 200	65

M. Dense grade crushed stone for placement under cobblestone and brick pavers shall conform to the Massachusetts Highway Department Standard Specifications, Section M2.01.7 "Dense Graded Crushed Stone for Sub-base."

PART 3 – EXECUTION

3.1 GENERAL

A. After completion of the backfilling and installation of temporary trench pavement, final pavement shall not be placed until the temporary paving has been in place for at least 90 days, unless otherwise directed in writing by the Engineer.

B. Materials for pavement shall be mixed, delivered, placed, compacted, and tested in accordance with the referenced specification, Sections M3.11 and 460 and as specified herein.

C. Whenever the sub-base becomes dry enough to cause dust problems, spread calcium chloride uniformly over the gravel surface in sufficient quantity to eliminate the dust.

D. No vehicular traffic or loads shall be permitted on the newly completed pavement until adequate stability has been attained and the material has cooled sufficiently to prevent distortion or loss of fines. If the climatic or other conditions warrant it, the period of time before opening to traffic may be extended at the discretion of the Engineer.

E. Pavement Construction Period. No pavement shall be constructed during the period from November 15 to April 1 without approval in writing from the Engineer.

3.2 PREPARATION

A. Protection of Existing Roadways:

1. Prior to pavement installation, saw cut existing pavement to required width and depth to avoid damage to adjacent pavement, curbs, gutters, or other structures and as indicated on the drawings.

B. Sub-Surface Preparation:

1. Pavement Sub-base:

a. Pavement sub-base material shall be as specified in Section 02200, and as shown on the Drawings.

b. The sub-base to be placed under pavement shall be a minimum of 12-inches thick after compaction. Sub-base shall be evenly spread and thoroughly compacted in accordance with the Contract Documents. The sub-base shall be spread in layers not more than 6 - inches thick, compacted measure. All layers shall be compacted to not less than 95 percent of the maximum dry density of the material as determined by ASTM D1557 Method C at optimum moisture content.

c. Complete sub-base preparation, including dynamic compaction, for full width before placing surfacing materials.

2. Cobblestone Sub-base:

a. The subbase below the stone dust setting bed shall be fine graded and thoroughly compacted (as required under section 401. of the M.S.S.B.H).

3. Subgrade:

b. Prepare subgrade in accordance with Section 02200.

c. Complete subgrade preparation, including dynamic compaction, for full width before placing surface materials.

d. Stabilize subgrades in accordance with Section 02200 so that loaded construction vehicles do not cause rutting or displacement when depositing materials.

3.3 INSTALLATION

A. General

1. Pavement depths shall be as shown on Drawings or as specified herein.

2. Place bituminous concrete mixture on prepared surface, spread, and strike-off. Spread mixture at minimum temperature of 225 ˚F (107 ˚C). Place inaccessible and small areas by hand. Place each course to required grade, cross-section, and compacted thickness. Protect all adjacent construction from staining with mix or damage by mechanical equipment. Clean, repair, or replace any construction stained or damaged at no additional cost to the Owner.

B. Temporary Trench Pavement:

1. Processed gravel shall be placed and compacted within trenches daily or as directed by the Engineer (See drawings for depths).

2. In all locations specified in the Contract Documents or determined by the Engineer, a minimum 3-inch depth layer of temporary trench pavement shall be placed wherever existing pavement has been removed. All pavement edges shall be square and straight. Irregular, jagged edges will not be allowed.

3. The temporary pavement shall consist of a hot mixed binder course compacted in 2 lifts to a total thickness of 3-inches by steel-wheeled rollers of sufficient weight to thoroughly compact the bituminous concrete without damaging the existing pavement. The new pavement shall be rolled smooth and even with the existing pavement.

4. Tack coat shall be applied to existing edges.

5. The pavement sub-base shall be excavated, graded, and compacted to a depth below the existing pavement (see Drawings for depths).

6. Hose clean with water all road surfaces adjacent to the area to be paved. No paving is to be placed until sub-base surface is dry.

7. Temporary trench pavement shall be placed weekly over all trenches or as directed by the Engineer.

8. All pavement edges shall be painted with cutback asphalt, and all surfaces with tack coat, to insure a satisfactory bond between old and new pavement. Tack coat and cutback asphalt shall be applied immediately prior to placement of overlay pavement.

9. The trench pavement shall meet existing pavement at the same grade without overlapping or feathered edges.

C. Permanent Trench Pavement

1. For areas with temporary pavement, permanent trench pavement shall be placed after the 90-day settling period. The temporary trench pavement and sub-base shall be excavated, graded, and compacted to a depth below the existing pavement (see Drawings for depths).

2. Depth of permanent trench pavement is indicated on the Drawings.

4. The existing pavement shall be saw-cut, removed and properly disposed of one foot beyond the limits of temporary trench pavement to create an offset subbase joint. All pavement edges shall be square and straight. Irregular, jagged edges will not be allowed.

5. Hose clean with water all road surfaces adjacent to the area to be paved. No paving is to be placed until sub-base surface is dry.

6. The permanent trench pavement layer shall be 7-inches (3-inch base, 2-inch binder, and 2-inch top) of HMA flush with the existing pavement, placed and compacted by steel-wheeled rollers of sufficient weight to thoroughly compact the bituminous concrete without damaging the existing pavement.

7. Tack coat shall be applied to existing edges and between each lift.

6. The top course shall be placed and compacted to a thickness identified on the Drawings. The new pavement shall be rolled smooth and even with the existing pavement.

7. The finished surface of the top course, after compaction, shall be true to the established line and grade of the existing pavement.

D. Permanent Pavement – Full-Width, Full-Depth Reclamation and Pavement

1. Permanent pavement for the project site shall consist of full-width, full-depth reclamation. (See drawings for additional detail). Full-depth reclamation shall

include cutting of the existing asphalt mat, pulverizing the existing asphalt mat and bituminous concrete trench pavement, mixing the pulverized mat into existing subgrade base course, wetting and compacting the mixed pulverized asphalt mat and subgrade and/or base course, blading, shaping, rough grading, fine grading, sweeping, watering and providing dust control, and hauling and disposal of excess material off site.

2. In all locations specified in the Contract Documents or determined by the Engineer, a minimum 5.5-inch depth layer of permanent pavement shall be placed along the full-width of roadways. All pavement edges shall be square and straight. Irregular, jagged edges will not be allowed.

2. The permanent pavement shall consist of a hot mixed binder course compacted in 2 lifts to a total thickness of 4-inches by steel-wheeled rollers of sufficient weight to thoroughly compact the bituminous concrete without damaging the existing pavement. A 1.5" top wearing course shall be installed atop the 4" binder course. The new pavement shall be rolled smooth and even with the existing pavement.

3. The pavement sub-base shall be excavated, graded, and compacted to a depth below the existing pavement (see Drawings for depths).

4. Hose clean with water all road surfaces adjacent to the area to be paved. No paving is to be placed until sub-base surface is dry.

5. The permanent pavement shall be installed to match existing grades.

E. Pavement Placement

1. Unless otherwise permitted by the Engineer for particular conditions, only machine methods of placing shall be used. Methods other than machine methods may be used, at no additional cost to the Owner. The equipment for spreading and finishing shall be mechanical, self-powered pavers, capable of spreading and finishing the mixture true to line, grade, width, and crown. The mixtures shall be placed and compacted only at such times as to permit proper inspection and checking by the Engineer.

2. After the paving mixtures have been properly spread, initial and immediate compaction shall be obtained by the use of steel rollers having a weight of not less than 240 pounds per inch width tread. Begin rolling when mixture will bear roller weight without excessive displacement. Compact mixture with hot tampers or vibrating plate compactors in areas inaccessible to rollers. Accomplish breakdown rolling and repair displaced areas by loosening and filling, if required, with hot material. Follow breakdown rolling as soon as possible, while mixture is hot. Continue second rolling until mixture has been thoroughly compacted.

3. Final rolling of the pavement shall be performed by a steel wheel roller weighing not less than 285 pounds per inch width of tread at a mix temperature and time sufficient to allow for final smoothing of the surface and thorough compaction. Continue rolling until roller marks are eliminated and course has attained maximum density.

4. 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 match surrounding surface density and smoothness.

5. Immediately after placement of new pavement, make joints between existing and new pavements, or between successive days' work, to ensure continuous bond between adjoining work. Construct joints to have same texture, density, and smoothness as other section of bituminous concrete course. Clean contact surfaces and apply tack coat. All joints between the existing and new pavements shall be keyed on an angle (4' x 10') or as approved by the Owner, and shall be sealed with bitumen RS-1 and sanded.

6. The Contractor shall furnish and install paving to provide transition or aprons for driveways and walkways impacted by new pavement installation.

F. Pavement Markings:

1. The Contractor shall replace all reflectorized pavement markings removed or covered-over in carrying out the work, and as directed by the Engineer, no sooner than 48 hours after completion of overlay pavement. Paint shall conform to Massachusetts Highway Department (MHD) specifications for Fast Drying White Water-borne Traffic Paint M7.01.23 and Fast Drying Yellow Water-borne Traffic Paint M7.01.24.

2. The Contractor shall provide temporary markings on the temporary pavements where existing markings are removed at no additional cost to the Owner.

G. Cobblestone Placement:

1. Cobblestones shall be carefully laid on a stone dust setting bed as shown on the plans, and shall be solidly rammed in position by hand.

2. The cobblestones shall be set with the long axis of each stone vertical to the roadway surface. The cobblestones shall be set such that each cobblestone is touching another cobblestone.

3. The cobblestones shall be compacted and tamped with a mechanical plate compactor or by another method approved by the Board or its Agent. After a sufficient area of pavement has been laid, the pavement surface shall be tested with a 10-foot straight edge and laid parallel with the centerline and any variations exceeding xiv 1/2 inch shall be corrected and brought to proper grade. Any stones that become cracked during these procedures shall be removed and replaced.

4. The cobblestones shall be swept with a sand/cement mixture (three parts dry sand, one part cement) and fogged with water. The pavement surface shall be vibrated with a lightweight plate compactor to insure compaction between the joints. Additional joint filler of sand/cement mixture shall be uniformly distributed as necessary to fill all of the voids. The process shall be repeated for a maximum of five days until all the joints are full.

H. Curb and Gutter Replacement:

5. Replace curb and gutter with same material to pre-construction lines and curb sections. Reset granite curb to pre-construction line and grade.

6. Removal and replacement of curbing shall be done in accordance with Sections 501 and 580, as applicable of the MHD Specifications for Highways and Bridges.

7. Provide expansion joints at each intersection with existing curb sections.

8. Use expansion joints one inch wide. Fill with expansion joint material and cut to shape of curb section.

9. Existing granite curbing to be removed and reset shall be numbered prior to removal, stockpiled, and installed back in its exact original location.

H. Sidewalk and Driveway Replacement:

1. Gravel sidewalks:

a. Gravel sidewalks shall be restored to a condition at least equal to that existing immediately before the work was started.

2. Bituminous concrete sidewalks and driveways:

a. Construct in accordance with MHD Section 701, Sidewalks, Wheelchair Ramps and Driveways.

b. The subgrade shall be shaped parallel to the proposed surface of the sidewalk or driveway and shall be thoroughly rolled and tamped. All depressions occurring shall be filled with suitable material and again rolled or tamped until the surface is smooth and hard in order for a gravel foundation to be placed upon it.

c. The sidewalk or driveway shall be a minimum of 3 inches compacted inches thick, laid in two equal courses.

d. Sidewalk cross slopes cannot exceed 2 percent as required by the Americans with Disabilities Act (ADA). The Contractor shall merge new sidewalk slopes into existing sidewalk slopes as required by ADA.

3. Cement concrete sidewalks, and driveways:

   a. Construct in accordance with MHD Section 701, Sidewalks, Wheelchair Ramps and Driveways.

   b. Use 6x6, W10xW10 welded wire reinforcement.

   c. Concrete sidewalks shall be 4-inches thick and concrete driveways shall be 6-inches thick.

   d. The subgrade for the walk or driveway shall be shaped to a true surface conforming to the proposed slope of the walk, thoroughly rolled at optimum moisture content, and tamped with a power roller weighing not less than one ton and not more than 5 tons. All depressions occurring shall be filled with suitable material and again rolled or tamped until the surface is smooth and hard.

   e. After the subgrade has been prepared, a sub-base of gravel at optimum moisture content shall be placed, thoroughly rolled by a power roller, and tamped. The gravel shall be a minimum of 8 inches in thickness.

   f. The forms shall be smooth, free from warp, strong enough to resist springing out of shape, and deep enough to conform to the thickness of the proposed walk or driveway. All mortar or dirt shall be completely removed from forms that have been previously used. The forms shall be well staked, thoroughly braced, and set to the established lines with their upper edge conforming to the grade of the finished walk or driveway.

   g. The finished surface shall have sufficient pitch from the outside edge to provide for surface drainage. This pitch shall be 1/4 of an inch per foot unless otherwise directed by the Engineer. Before the concrete is placed, the sub-base for sidewalks shall be thoroughly dampened until it is moist throughout but without puddles of water.

4. General:

   a. Valve boxes, manhole frames, and all other castings shall be carefully set to the proposed finished grades.

I. Berms and Waterways

1. Bituminous curbing shall be replaced as required. Curbing shall be machine laid and conform to grade of roadway and adjacent curb areas.

2. Bituminous berms shall be replaced as required. Berms shall be machine laid and conform to the grade of the roadways. Berms shall be placed in accordance with MHD Specification 470.20.

3. Bituminous waterways which have been disturbed by construction operations shall be repaired or replaced. The waterways shall be repaired and constructed in accordance with the applicable requirements of Section 280 of the MHD Specifications. Waterways shall be placed in two 1-1/2-inch thick courses on a prepared gravel base. Material shall be compacted by tamping or rolling.

3.4 PROTECTION

A. Protect replacement work with barricades or other devices as approved by Engineer so that no damage occurs as a result of subsequent construction operations.

1. After final rolling, do not permit vehicular traffic on pavement until it has cooled and hardened.

2. Repair damages or other irregularities to satisfaction of Engineer, at no additional cost to the Owner, before final acceptance by the Engineer.

3.5 CONTRACT CLOSEOUT

A. Provide in accordance with Section 01700 – Contract Closeout.

END OF SECTION 02576

SECTION 02616

DUCTILE IRON PIPE AND FITTINGS
FOR POTABLE WATER SYSTEMS

PART 1 – GENERAL

1.1 SCOPE OF WORK

A. Furnish all materials, equipment, labor and incidentals; provide for the installation and testing; of all ductile-iron pipe and fittings, as indicated and specified.

1.2 RELATED WORK

A. Section 02140 – Dewatering and Discharge

B. Section 02160 – Temporary Excavation Support Systems

C. Section 02200 – Earthwork

D. Section 02640 – Fire Hydrants, Valves, and Appurtenances

E. Section 02725 – Water Service Connections

1.3 SUBMITTALS

A. Shop Drawings: Submit the following in accordance with Section 01300 - Submittals:

1. Submit Shop Drawings or descriptive literature, or both, showing dimensions, joint and other details for each type and class of pipe, fitting and restraint system to be furnished for the project. All materials furnished under the Contract shall be manufactured only in accordance with the Specifications. Submittals shall include material information, dimensions, pipe class information, weights, coating and lining system data.

2. Submit manufacturer's Certificates of Compliance with these Specifications and certification that the ductile iron pipe and fittings have been manufactured and tested in accordance with AWWA/ANSI specifications.

3. Submit the vendor's name, address and contact phone number for all materials to be furnished under the Contract.

4. Submit a detailed description of the proposed testing, flushing and disinfection procedures to be used for this project. This description shall contain the name of the person responsible for testing, flushing and disinfection Work equipment and chemicals to be used; and method of measuring flow during flushing procedures. Submit the name of the laboratory to be used for analysis. Review of this

description shall not be construed as an approval of any methods to be used; the Contractor shall be fully responsible for achieving the specified test results.

5. American Iron and Steel (AIS) Certifications as required by Special Conditions – American Iron and Steel Provisions Section 00826.

1.4 QUALITY ASSURANCE

A. Provide in accordance with Section 01400 and as specified.

B. Inspect and test at foundry according to applicable standard specifications.

C. Owner reserves right to inspect and test by independent service at manufacturer's plant or elsewhere at their own expense.

D. Visually inspect and hammer test before installation.

1.5 DELIVERY, STORAGE AND HANDLING

A. Provide in accordance with Section 01610.

1.6 REFERENCE STANDARDS

A. American Society for Testing and Materials (ASTM)

1. ASTM A307 - Standard Specification for Carbon Steel Bolts and Studs 60,000 PSI Tensile Strength.

B. American Water Works Association (AWWA)

1. AWWA C104 - Cement-Mortar Lining for Ductile-Iron Pressure Pipe and Fittings

2. AWWA C105 - Polyethylene Encasement for Ductile-Iron Piping for Water and Other Liquids

3. AWWA C110 - Ductile-Iron and Gray-Iron Fittings for Water

4. AWWA C111 - Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.

5. AWWA C115 - Standard for Flanged Ductile-Iron Pipe with Threaded Flanges

6. AWWA C150 - Thickness Design of Ductile-Iron Pipe

7. AWWA C151 - Ductile-Iron Pipe, Centrifugally Cast in Metal Molds or Sand-Lined Molds for Water or Other Liquids

8. AWWA C153 - Ductile-Iron Compact Fittings, 3-in through 16-in for Water and Other Liquids

9. AWWA C219 – Standard for Bolted, Sleeve-Type Couplings for Plain-End Pipe

10. AWWA C600 - Standard for Installation of Ductile-Iron Water Mains and Their Appurtenances

11. AWWA C651 - Disinfecting Water Mains

C. American National Standards Institute (ANSI)

1. ANSI B16.1 - Cast Iron Pipe Flanges and Flanged Fittings

D. Where reference is made to one of the above standards, the revision in effect at the time of bid opening shall apply.

PART 2 – PRODUCTS

2.1 MATERIALS

A. Ductile iron pipe shall be that of a manufacturer who can demonstrate at least 5 years of successful experience in manufacturing ductile iron pipe. The pipe shall be equipped with push-on type, restrained joint, or mechanical joint, as required. The pipe must be certified "lead free." Pipe shall be manufactured in the United States.

B. Ductile iron pipe shall conform to the latest edition of AWWA C150 and C151, Class 52. Ductile iron pipe shall be double cement-lined, asphalt seal coated, ductile iron. All ductile iron pipe shall be furnished in 18 (eighteen) foot sections and shall be rated for a minimum operating pressure of 350 psi.

C. All ductile iron pipe and fittings shall have a bituminous outside coating in accordance with AWWA C151 and C110, respectively, latest edition.

D. Gaskets shall meet the material requirements of ANSI/AWWA C111 for mechanical joint gaskets.

E. Provide serrated brass wedges for push-on joints to provide electrical continuity; two per joint for pipe 12-in. and smaller and four per joint for larger pipe.

F. Fittings shall be compact ductile iron Class 350 Mechanical Joint, conforming to ANSI Specification A21.53 (AWWA C153), latest edition. Fittings shall be suitable for use with restraints as specified hereinafter. All fittings must be certified "lead free." Fittings shall be manufactured in the United States. Fittings shall be made of the same material and have the same lining and coating as the pipe specified above. All fittings shall be marked with the weight and shall have distinctly cast upon them the pressure rating, the manufacturer's identification, nominal diameter of openings and the number of degrees

or fraction of the circle on all bends. Fittings shall be Tyler Union AWWA C153 Compact Fittings, or approved equal.

1. Hydrant tees shall have a rotatable mechanical joint gland on the 6-inch plain end branch to provide positive valve restraint, unless otherwise allowed by the Engineer.

2. Caps and plugs, installed in all new Work as indicated on the Drawings, shall be provided with a threaded corporation or bleeder valve so that air and water pressure can be relieved prior to a future connection.

3. All nuts and bolts shall be shall be of a type equal to ductile iron or KOR-10 steel T-bolts and nuts or equal.

G. All pipe and fittings shall have a bituminous outside coating in accordance with AWWA C151 and C110, respectively, latest edition. All pipe and fittings shall be cement-mortar lined and seal coated in accordance with AWWA C104, latest edition. Cement mortar lining shall be double thickness.

H. Joints for pipe and fittings shall be push-on or mechanical joints conforming to AWWA C111, latest edition.

I. Restraint joints shall be furnished for thrust restraint for installation on all fittings and valves, where indicated on the Drawings, or where required by the Engineer. The Town has standardized on Series 1100 Megalug as manufactured by EBAA Iron, ONE-LOK Series D-Slide Restraints as manufactured by SIGMA Corp., or approved equal.

J. Restraints for push-on joints shall be Field Lok gaskets by U.S. Pipe, Sure Stop 350 by McWane Ductile, or approved equal. Push-on joint restraints shall not affect the warranty by the pipe manufacturer.

K. Couplings shall be provided with AWWA approved plain, Grade 27, rubber gaskets and track-head bolts with nuts. Coupling shall be Smith Blair Style 441 or Dresser, Style 153, 360 or an approved equal.

L. Polyethylene pipe encasement shall conform to requirements of AWWA C105, latest edition. Virgin polyethylene shall conform to ANSI/ASTM D1248. Minimum nominal thickness shall be 8 mils. Polyethylene pipe encasement shall be V-BIO Poly as manufactured by U.S. Pipe and Foundry Company or approved equal.

M. Insulation shall be 2-inch thick polyisocyanurate foam with a density of 2.0 lbs/cf^3. A 30-mils thick bitumen adhesive shall be used as a vapor and moisture barrier for direct burial applications.

N. Concrete utilized for thrust blocks shall have a minimum compressive strength of 3,000 psi and conform to the specifications in Section 03300 – Concrete.

O. Iron and steel products shall conform to American Iron and Steel Requirements of Section 00826.

2.2 BURIED UTILITY WARNING AND IDENTIFICATION TAPE

A. Provide detectable aluminum foil plastic backed tape or detectable magnetic plastic tape manufactured specifically for warning and identification of buried piping. Tape shall be detectable by an electronic detection instrument. Provide tape in rolls, 3 inches minimum width, color coded for the utility involved with warning and identification imprinted in bold black letters continuously and repeatedly over entire tape length. Warning and identification shall be CAUTION BURIED WATER PIPING BELOW or similar. Use permanent code and letter coloring unaffected by moisture and other substances contained in trench backfill material. Bury tape with the printed side up at a depth of 12 inches below the top surface of earth or the top surface of the subgrade under pavements.

PART 3 – EXECUTION

3.1 HANDLING PIPE

A. The Contractor shall take care not to damage pipe by impact, bending, compression, or abrasion during handling, and installation. Joint ends of pipe shall be kept especially clean.

B. Pipe shall be stored above ground at a height no greater than 5 feet, and with even support for the pipe barrel.

C. Only nylon-protected slings shall be used for handling the pipe. No hooks, chains or bare cables will be permitted.

D. Gaskets shall be shipped in cartons and stored in a clean area, away from grease, oil, heat, direct sunlight and ozone producing electric motors.

3.2 LAYING DUCTILE IRON PIPE AND FITTINGS

A. The Contractor will be responsible for transporting materials to the job site as needed. Care shall be taken in loading, transporting and unloading to prevent injury to the pipe, lining or coatings. Pipe or fittings shall not be dropped. The Engineer shall examine all pipes and fittings prior to installation. Any pipe or fittings found defective shall not be installed and immediately removed from the site. Any damage to pipe linings or coatings may be repaired as directed by the Engineer, or removed from the site. Handling and installation of pipe and fittings shall be in accordance with the manufacturer's instruction and as specified herein. Any materials damaged during loading, transporting or unloading shall be replaced at the Contractor's expense.

B. Jointing of ductile iron pipe and fittings shall be done in accordance with the printed recommendations of the manufacturer and as specified. All pipe and fittings shall be thoroughly cleaned before laying; shall be kept clean until they are used in the Work;

and when installed, shall conform to the lines and grades required. Special care is required in cleaning the ends of the pipe; wipe the outside of the spigot end with a clean rag prior to applying lubricant; brush clean the inside of the bell end, paying special attention to the rubber joint area, prior to installing the gasket and lubricant; and check inside the pipe for overall cleanliness.

C. Ductile iron pipe and fittings shall be installed in accordance with requirements of AWWA C600, latest edition, except as otherwise provided herein. The joint surfaces and the gasket shall be painted with a lubricant just prior to making up the joint. The spigot end shall then be gently pushed home into the bell. The position of the gasket shall be checked to insure that the joint has been properly made and is watertight. Care shall be taken not to exceed the manufacturer's recommended maximum deflection allowed for each joint. A firm, even bearing throughout the length of the pipe shall be constructed by tamping selected common fill along the sides of the pipe forming a cradle under the pipe. Tamping shall continue until the fill is 1-foot over the top of the pipe. Pipe installation in rock shall be constructed as shown on the Drawings. (See Detail Sheet/Drawings). A 5-foot minimum cover shall be maintained over the top of the pipe. If any defective pipe is discovered after it has been installed, it shall be removed and replaced with a sound pipe in a satisfactory manner by the Contractor, at his/her own expense.

D. All pipe shall be sound and clean before laying. During pipe installation, care should be taken to protect the open end of the pipe. When installation is not in progress, including lunch time, the open ends of the pipe shall be closed with watertight plugs or other approved means. Good alignment shall be preserved during installation. Fittings, in addition to those shown on the Drawings, shall be provided, when required, for crossing utilities which are encountered during trench excavation. Solid sleeves shall be used only where approved by the Engineer.

E. When pipe cutting is required, cutting shall be done by machine, leaving a smooth cut at right angles to the axis of the pipe. Cut ends of pipe to be jointed with a bell shall be beveled to conform to the manufactured spigot end. Cement lining shall remain undamaged.

F. The Contractor shall have on hand at the start of the job, the following additional bends for each size of pipe to be installed: two 1/32 bends, two 1/16 bends and two 1/8 bends. These bends shall be replaced each time job conditions require their use.

G. Existing Utilities. To the extent possible, the Contractor shall maintain a minimum 10 ft. lateral separation between the new water mains and existing sanitary sewers, unless otherwise directed by the Engineer.

H. When crossing an existing sanitary sewer, the water main is preferred to cross above the sewer. The Contractor shall maintain an 18-inch clearance between the bottom of the water main and crown of the sanitary sewer. At crossing, the center of a full length of water pipe shall be located above the sewer so that both joints will be located as far from the sewer as possible. The Engineer may direct this full length of main to be

concrete encased when the 18-inch clearance is not possible, or when the water main is placed below the sanitary sewer.

I. The Contractor shall maintain a minimum clearance between the new water main and all other existing utilities of at least 12 inches.

J. New water mains shall pass under all existing utilities, except sewers unless otherwise noted on the Drawings or directed by the Engineer.

K. Ductile iron pipe installed within 5 feet of gas lines shall be fully encased with polyethylene material. Polyethylene shall be 8-millimeters thick and comply with AWWA C105, latest edition.

L. Ductile iron pipe shall be wrapped in polyethylene encasement where pipe depth is at or below normal groundwater level.

M. Water pipe, to be installed with less than 5-foot cover or where shown on the Drawings, shall be wrapped with an insulating foam jacket suitable for direct burial applications.

3.3 PUSH-ON JOINTS

A. Push-on joints shall be made in accordance with the manufacturer's instructions. Pipe shall be laid with bell ends looking ahead. A rubber gasket shall be inserted in the groove of the bell end of the pipe, and the joint surfaces cleaned and lubricated. Apply thin film of nontoxic gasket lubricant over inner surface of gasket in contact with spigot end. The plain end of the pipe being installed shall be aligned and inserted into the bell end of the pipe previously installed. It can then be pushed home with a jack or by other means. After joining the pipe, a metal feeler shall be used to make certain that the rubber gasket is correctly located.

3.4 MECHANICAL JOINTS

A. Mechanical joints shall be made in accordance with Appendix A of AWWA C111 and the manufacturer's instructions. Wire brush surfaces to be in contact with the gasket and thoroughly clean and lubricate the joint surfaces and rubber gasket with soapy water before assembly. Check that the gasket has been seated in fitting before placing flange against gasket. With bolts inserted and nuts finger-tight, tighten diametrically opposite nuts progressively and uniformly around joint with a torque wrench. Bolts shall all be tightened to the specified torque. When using pneumatic or electric impact wrenches to make up fittings, complete tightening using a torque wrench to the specified torque. Under no conditions shall extension wrenches or pipe over handle of ordinary ratchet wrench be used to secure greater leverage.

3.5 RESTRAINED JOINTS

A. Mechanical joint restraints shall be installed in full accordance with the manufacturer’s instructions. All bolt heads on Megalug restraints shall be tightened sufficiently so that they shear off to indicate the proper tightening torque was achieved.

B. Push-on joint restraints shall be installed in full accordance with the manufacturer's instructions where directed by the Engineer.

3.6 SLEEVE TYPE COUPLINGS

A. Couplings shall be installed where shown. Couplings shall not be assembled until adjoining push-on joints have been assembled. Clean pipe ends for a distance of 8 inches. Mark each end six inches from the end. Use soapy water as gasket lubricant. Slip follower and gasket over each pipe to the 6-inch marks. Place the middle ring on the pipe end until centered over joint. Insert other pipe end into middle ring and bring to the proper position in relationship to the pipe installation. Press gaskets and followers into middle ring flares. Check gaskets have been seated into middle ring flares correctly. With bolts inserted and nuts made finger-tight, tighten diametrically opposite nuts sequentially with a torque wrench to the specified torque as per manufacturer's recommendation. After installation, apply a heavy bitumastic coating to bolts and nuts.

3.7 CONNECTIONS TO WATER MAIN

A. The Contractor shall make all connections to the existing mains as indicated in the Contract Documents.

B. The Contractor shall develop a program for the construction and putting into service of the new Work subject to the approval of the Engineer. All Work involving cutting into and connecting to the existing water mains shall be planned so as to interfere with the operation of the existing facilities for the shortest possible time.

C. The Contractor shall have all preparatory Work done prior to making the connection and shall provide all labor, tools, material, and equipment required to do the Work in one continuous operation.

D. The Contractor shall have no claim for additional compensation, by reason of delay or inconvenience, for adapting his operations to the requirements of the Owner.

E. Under no circumstances shall any customer be without water for a period of more than 4 hours without prior written approval of the Owner. Should it appear that any customer will be without water for more than 4 hours, the Contractor shall install a temporary water service at no additional cost to the Owner.

F. The Owner does not guarantee a tight shut-off for existing local community water valves. The Contractor shall not submit a claim for damages due to delays in dewatering pipelines caused by water leaking through an existing closed valve, or having to dewater the excavation while making the connection. It is the Contractor's responsibility to provide the means to dewater the excavation while making the connection.

3.8 TESTING AND DISINFECTION

A. Prior to pressure and leakage tests, the piping shall be thoroughly flushed clean of all dirt, dust, oil, grease and other foreign materials. This work shall be done with care to avoid damage to lining and coatings.

B. The Contractor shall submit a plan on the method of testing and chlorinating the mains for review. The plan shall include all equipment proposed for use during the work, or the name of the qualified testing company, which will perform the work. Testing of the water main shall not begin until the Engineer has approved the Contractor's plan. All testing shall be done in the presence of the Engineer.

C. Testing of Water Main:

1. The Contractor, in accordance with ANSI/AWWA C600 specifications or latest revision thereof, will make all pressure and leakage tests to determine that the ductile iron pipe is structurally safe and free of excess leakage. The Contractor shall furnish all the equipment, materials and labor required for testing. The Contractor shall furnish, at his own expense, all the water needed for all water main testing.

2. Testing shall be done in sections of the main not to exceed a 3,000-foot maximum length. Valves shall be placed in the off position at the ends of the sections to be tested. The Contractor shall provide means to prevent water from entering other parts of the pipeline not subject to testing at all times. Contractor will ensure that air release valves and other venting devices are properly installed and placed in open position when filling pipe with water. Taps shall be installed at high points to release air in the water system.

3. After all entrapped air has been removed from the section; fill the main to the normal static pressure. The Contractor is allowed to let the main rest for up to 48 hours with static pressure. Using a special pressure pump, the Contractor shall raise the pressure to 150 pounds per square inch. The pump will then be shut off and separated from the test section by a globe valve. A fluid filled pressure gage, with a maximum reading of 250 psi, shall have been placed beyond the globe valve. The test section will then be monitored for a 2-hour period

4. This pressure shall be maintained, within 5 psi, for a minimum of 2 hours during which time the line checked for leaks by the Engineer. Based on an average test pressure of 150 psi, the measured rate of water leakage shall not exceed the following rates in the section under test:

$$L = \frac{12.25SD}{133{,}200}$$

Where: L = Allowable leakage, gallons per hour
S = Length of pipe section tested, feet

D = Nominal pipe diameter, inches

5. Should leakage exceed this rate, the Contractor shall immediately locate the leak or leaks and repair same at his expense. Pipe shall be flushed and chlorinated when leakage does not exceed above standard. Approval does not absolve the Contractor from his responsibility if leaks develop within the new main or water services (to curb box) later within the warranty period.

D. Chlorinating and Flushing:

1. The Contractor, in accordance with the latest edition of ANSI/AWWA 651 Standard for Disinfecting Water Mains, shall chlorinate and flush the new water main. Chlorinated water to be flushed from the pipeline shall be de-chlorinated as shown on detail drawings or as approved by the Engineer. It shall then be discharged to the nearest storm drain. Chlorinated water shall not be discharged to any natural water body.

2. Prior to chlorination, the Contractor shall properly flush the water mains. In general, flushing shall be performed at a flow rate required to achieve a minimum velocity of 2.5 feet per second, which is approximately 400 GPM in an 8-inch diameter main, 600 GPM in a 10-inch main, 900 GPM in a 12-inch main and 1,600 GPM in a 16-inch main. Flushing of the water main, at the above rates, for approximately 20-minutes per 1,000-foot section, will allow for three volume changes. This is a sufficient period of time for successfully cleaning the water main.

3. The Contractor shall chlorinate the water main until the main contains a solution containing 25 mg/L available chlorine. The valves shall then be closed and the chlorinated water allowed to sit in the mains for 24 hours. The main will then be checked to assure the chlorine residual shall be at least 10 mg/L. If less than 10 mg/L is measured, the Contractor shall flush and re-chlorinate the mains at no cost to the Owner. All valves and hydrants shall be operated to insure their proper disinfection. Valves shall be operated to prevent super chlorinated water from entering the existing distribution system. The Contractor shall then flush the mains until clear, clean water is being discharged.

4. Twenty-four hours after the main has been flushed of chlorinated water, bacteriological samples (total coliforms and heterotrophic plate count) shall be taken. Water samples shall be taken from corporation stops along the length of the water main as designated by the Engineer. A minimum of two (2) samples shall be taken on each street, or two per 3,000 feet of pipe, whichever is greater. Each sample shall be taken in duplicate, in sterile bottles and sent to a State approved private laboratory for analysis. The Contractor shall perform all necessary work including delivery of samples to a certified laboratory, and shall include the cost for sampling and analysis in his bid price. The results of the tests on these samples will determine the acceptance of the work and allow these new mains to be connected to the Town's system. The failure of any

sample to pass the laboratory tests shall require the Contractor to reflush and re-chlorinate the mains and resample and test the water until acceptable results are obtained, all at no additional cost to the Owner.

5. If, during construction, trench water has entered the main, or if in the opinion of the Owner's Engineer, excessive quantities of dirt or debris have entered the main, bacteriological samples shall be taken at 200-foot intervals and shall be identified as to location. Additional sample taps shall be installed and removed at the Contractor's expense.

6. Contractor shall note that work under this Contract shall not be considered complete until the satisfactory installation and testing of the water mains have been completed.

END OF SECTION 02616

SECTION 02622

POLYVINYL CHLORIDE (PVC) PRESSURE PIPE

PART 1 – GENERAL

1.1 SUMMARY OF WORK

A. Provide, install, and test C900 polyvinyl chloride pipe, pipe fittings (ductile-iron, See Section 02630) and specials, jointing and encasement materials, and accessories, of various sizes, classes, joints and types, and appurtenant work, complete in place, as indicated and specified.

B. Related Sections

1. Section 02200 – Earthwork

2. Section 02630 – Ductile Iron Pipe and Fittings for Sewer Force Main

1.2 REFERENCES

A. ASTM D2241 – Specification for Polyvinyl chloride (PVC) Plastic Pipe (SDR-PR).

B. ASTM F477 – Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe.

C. ASTM D2444 – Standard Test Method for Impact Resistance of Thermoplastic Pipe and Fittings by Means of a Tup (Falling Weight).

D. ASTM D2412 – Standard Test Method for External Loading Properties of Plastic Pipe by Parallel – Plate Loading.

E. ASTM D3139 – Standard Specifications for Joints for Plastic Pressure Pipes Using Flexible Elastomeric Seals.

F. ASTM D3212 – Specification for Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals.

G. ASTM D1869 – Standard Specification for Rubber Rings for Asbestos-Cement Pipe.

H. AWWA A21 – Ductile Iron Pipe and Fittings.

I. AWWA C900 – Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings, 4 in. through 60 in.

1.3 SUBMITTALS

A. Submit specifications and shop drawings for materials and equipment furnished under this Section.

B. Prior to first shipment of pipe, submit certified test reports that the pipe for this Contract was manufactured and tested in accordance with the ASTM Standards specified herein.

C. Prior to sewer force main testing, the Contractor shall submit a plan on the method of testing the pipe for review by the Engineer. The plan shall include all equipment proposed for use during the work, or the name of the qualified testing company which will perform the work.

1.4 QUALITY ASSURANCE

A. Each type of PVC pipe shall be from a single manufacturer.

B. Inspection of the pipe will also be made by the Owner after delivery. The pipe shall be subject to rejection at any time on account of failure to meet any of the Specification requirements. Pipe rejected after delivery shall be marked for identification and shall immediately be removed from the job site.

PART 2 – PRODUCTS

2.1 MATERIALS

A. PVC pipe shall be certified by the national sanitation foundation.

B. Pressure Pipe

1. Polyvinyl Chloride pressure pipe shall be of a manufacturer who can demonstrate at least 5-years of experience in the manufacture of polyvinyl chloride pipe for use in sewer collection systems. The pipe shall be "Blue Brute" C900 PVC Pipe as manufactured by JM Eagle, C900 PVC pipe by NAPCO Pipe & Fittings, C900 pipe by Northern Pipe Products, or approved equal.

2. Polyvinyl Chloride (PVC) pressure pipe shall be of the size indicated on the plans and shall conform to the requirements of the AWWA C900 Standards for PVC C900 DR 18 (PC 235 psi) Pressure Pipe for Sanitary Sewer with ductile iron pipe equivalent outside diameters and ASTM F1483 specifications. Joints shall use elastomeric gaskets and be in accordance with ASTM D3139. Gaskets shall conform to ASTM F477.

3. The standard laying length shall not exceed 20 feet. The minimum "pipe stiffness" (load divided by change in inside diameter in direction of load application) at 5% deflection shall be at least 46 psi for pipe tested in accordance with ASTM Specifications D2412.

4. Sewer Force Main Fittings shall be constructed of ductile iron per Section 02630. All fittings shall be restrained with restraint harnesses for C900 fittings.

5. Pipe shall be clearly marked on the outside indicating the name of the manufacturer, nominal diameter, and the ASTM or AWWA designation or both for the SDR 18 Polyvinyl Chloride Pressure Pipe.

6. Provide detectable aluminum foil plastic backed tape or detectable magnetic plastic tape manufactured specifically for warning and identification of buried piping. Tape shall be detectable by an electronic detection instrument. Provide tape in rolls, 2 inches minimum width, color coded for the utility involved with warning and identification imprinted in bold black letters continuously and repeatedly over entire tape length. Warning and identification shall be CAUTION BURIED SEWER PIPING BELOW or similar. Use permanent code and letter coloring unaffected by moisture and other substances contained in trench backfill material. Bury tape with the printed side up at a depth of 12 inches below the top surface of earth or the top surface of the subgrade under pavements.

7. Pipe restraints for buried PVC pressure fittings shall be as manufactured by EBAA Iron Inc, Series 2500 or approved equal. PVC restraints for valves shall be EBAA Iron, Inc. Series 2000PV or approved equal. Restraints for flange connections shall be EBAA Iron, Inc. Series 2100 or approved equal.

8. Polyethylene encasement (polywrap) shall conform to requirements of AWWA C105, latest edition. Virgin polyethylene shall conform to ANSI/ASTM D1248. Minimum nominal thickness shall be 8 mils. Polyethylene encasement shall be V-BIO Poly as manufactured by U.S. Pipe and Foundry Company, Trumball Manufacturing, Inc., or equal.

PART 3 – EXECUTION

3.1 HANDLING PIPE AND FITTINGS

A. Take care in loading, transporting, and unloading to prevent injury to the pipe. Do not drop pipe or fittings. Examine pipe and fittings before installing, and no piece shall be installed that is found to be defective.

B. If any defective pipe is discovered after it has been installed, remove and replace it with a sound pipe in a satisfactory manner. Thoroughly clean pipe and fittings before installing, keep clean until they are used in the work, and conform to the lines, grades and dimensions required when installed.

C. Pipe ends requiring cutting shall be cut square without damage to the remaining pipe. Bevel cut pipe ends 1/8 inch at approximately 30 degrees to provide proper assembly of the joint. Beveling can be done with a coarse file or portable grinder.

D. Support stored pipe from below at not more than 3 foot intervals to prevent deformation. Do not stack pipe higher than 6 feet. Store pipe and fittings in a manner which will keep them at ambient outdoor temperatures. Provide temporary shading as required to meet

this requirement. Simply covering of the pipe and fittings which allows temperature buildup when exposed to direct sunlight will not be permitted.

3.2 INSTALLATION

A. No single piece of pipe shall be laid unless it is generally straight. The centerline of the pipe shall not deviate from a straight line drawn between the centers of the openings at the ends of the pipe by more than 1/16 inch per foot of length. If a piece of pipe fails to meet this required check for straightness, it shall be rejected and removed from the site. Laying instructions of the manufacturer shall be explicitly followed.

B. Pipe shall be hoisted with mechanical equipment using cloth belt slung or continuous fiber rope which avoids scratching pipe. Chain or metallic slings are not allowed.

C. Install piping and fittings true to alignment and grade. If necessary, each length of pipe shall be cleaned out before installation.

D. Excavation, trenching and back filling procedures shall be in accordance with Section 02200.

E. Dense graded stone bedding for the pipe shall be in accordance with Section 02200.

F. Install PVC pipe on a bed of crushed stone with a minimum depth of 6 inches. The crushed stone shall completely encase the pipe and cover the pipe to a grade 12 inches over the top of the pipe for the entire width of the trench. Bell holes shall be made in crushed stone such that the pipe shall be uniformly supported throughout the entire length of the barrel section.

G. Deflections in Pipe Alignment

1. Wherever it is necessary to deflect pipe from a straight line, either in the vertical or horizontal plane, to avoid obstructions or where long-radius curves are permitted, the amount of deflection allowed shall not exceed that required for satisfactory making of the joint, and shall be approved by the Engineer.

2. Prior to deflecting the pipeline, the spigot of the pipeline should be marked flush with the bell end to assure that the spigot is not withdrawn excessively as the result of the deflection. After the pipe is deflected, an adequate depth of jointing material must remain on the side where the spigot is away from home and an adequate width of caulking space must remain on the opposite side of the pipe at the face of the bell.

3. The maximum deflection recommended by the manufacturer when using any pipe system must be observed when deflecting a pipeline.

4. In general, all radius curves called for on the Drawings or permitted at the time of construction are to be made using full lengths of pipe. The use of short

lengths of pipe and extra joints in order to make a smaller radius turn will not be allowed without the written approval of Engineer.

H. Unsuitable Laying Conditions

1. No pipe shall be laid in water, in an unsuitable trench or during unsuitable weather conditions.

I. All joint restraints, fittings and PVC pipe bells, shall be wrapped in polywrap and encased in concrete. Concrete encasement shall extend a minimum of 3-ft beyond the edge of the restraints, fittings and PVC pipe bells.

J. The restrained length from the center of fittings shall be at a minimum 60-ft (3 pipe bells).

3.3 TESTING

A. Prior to pressure and leakage tests, the piping shall be thoroughly flushed clean of all dirt, dust, oil, grease and other foreign materials. This work shall be done with care to avoid damage to the pipe.

B. The Contractor shall submit a plan on the method of testing the pipe for review. The plan shall include all equipment proposed for use during the work, or the name of the qualified testing company which will perform the work. Testing of the sewer force main shall not begin until the Contractor's plan has been approved by the Engineer. All testing shall be done in the presence of the Engineer.

C. Testing of Sewer Force Main:

1. Refer to Section 02570 – Sewers and Manholes for testing requirements.

END OF SECTION 02622

SECTION 02630

DUCTILE IRON PIPE AND FITTINGS
FOR SEWER FORCE MAIN

PART 1 – GENERAL

1.1 SUMMARY

A. Furnish all materials, equipment, labor and incidentals; provide for the installation and testing of all ductile iron pipe and fittings, as indicated and specified.

B. The materials covered by this specification are intended to be standard materials of proven ability as manufactured by reputable concerns. Materials shall be designed and constructed in accordance with the best practice of the industry and shall be installed in accordance with the manufacturer's recommendations. The specifications call attention to certain features but do not purport to cover all details entering into the construction of the materials.

1.2 RELATED SECTIONS

A. Drawings and general provisions of the Contract, and:

1. Section 02140 – Dewatering and Discharge

2. Section 02160 – Temporary Excavation Support Systems

3. Section 02200 – Earthwork

4. Section 02570 – Sewers, Manholes, and Appurtenances

1.3 SUBMITTALS

A. List of materials proposed and manufacturers' specifications and installation instructions.

B. Shop drawings for all material and structures prior to ordering materials, including pipe materials, connections, fittings and valves, and component construction, features, configuration, and dimensions.

C. American Iron and Steel (AIS) Certifications as required by Special Conditions – American Iron and Steel Provisions Section 00826.

1.4 DELIVERY, STORAGE & HANDLING

A. Products shall be shipped, stored and handled in a manner consistent with the written recommendations of the manufacturer and as to not to degrade quality, serviceability or appearance. All products delivered to the project site shall be

accompanied by test reports certifying that the pipe conforms to the ASTM specifications listed herein. Any unit found to be defective either before or after installation shall be removed from the project site and replaced with a sound unit.

B. If stored for more than two weeks, the materials shall receive all maintenance considerations required by the manufacturer for proper storage of the materials.

PART 2 – PRODUCTS

2.1 MATERIALS

A. Ductile iron pipe shall be that of a manufacturer who can demonstrate at least 5 years of successful experience in manufacturing ductile iron pipe. The pipe shall be equipped with push-on type, restrained joint, or mechanical joint, as required, and shall be made in the United States.

B. Ductile iron pipe shall conform to the latest edition of AWWA C150 and C151, Class 52. Ductile iron pipe shall be McWane, US Pipe, American Cast Iron Pipe or approved equal.

C. All pipe and fittings shall have a bituminous outside coating in accordance with AWWA C151 and C110, respectively, latest edition. All pipe and fittings shall have an inside coating of Protecto 401TM Ceramic epoxy as specified by Induron Protective Coatings.

D. Gaskets shall meet the material requirements of ANSI/AWWA C111 for mechanical joint gaskets.

E. Fittings shall be compact ductile iron Class 350 Mechanical Joint, conforming to ANSI Specification A21.53 (AWWA C153), latest edition. Fittings shall be suitable for use with restraints as specified hereinafter. Fittings shall be manufactured in the United States. Fittings shall be made of the same material and have the same lining and coating as the pipe specified above. All fittings shall be marked with the weight and shall have distinctly cast upon them the pressure rating, the manufacturer's identification, nominal diameter of openings and the number of degrees or fraction of the circle on all bends. Fittings shall be AWWA C153 Compact Fittings manufactured by Tyler Union, U.S. Pipe, American Cast Iron Pipe Company, or approved equal.

F. Joints for pipe and fittings shall be push-on or mechanical joints conforming to AWWA C111, latest edition.

G. Restraint joints shall be furnished for thrust restraint for installation on all fittings and valves, where indicated on the drawings, or where required by the Engineer. Restraints for mechanical joints shall be Series 2100 Megalug as manufactured by EBAA Iron, Alpha FC as manufactured by Romac Industries, or approved equal.

H. Concrete utilized for thrust blocks shall have a minimum compressive strength of 3,000 psi and conform to the specifications in Ssection 03300 – Concrete.

I. Connections within sewer force main manholes between SDR 18 PVC Pipe and Flanged Ductile Iron Pipe shall be made using a Sigmaflange Model SFA Adapter or approved equal. Iron and steel products shall conform to American Iron and Steel Requirements of Section 00826.

PART 3 – EXECUTION

3.1 HANDLING PIPE

A. The Contractor shall take care not to damage pipe by impact, bending, compression, or abrasion during handling, and installation. Joint ends of pipe shall be kept especially clean.

B. Pipe shall be stored above ground at a height no greater than 5 feet, and with even support for the pipe barrel.

C. Only nylon-protected slings shall be used for handling the pipe. No hooks, chains or bare cables will be permitted.

D. Gaskets shall be shipped in cartons and stored in a clean area, away from grease, oil, heat, direct sunlight and ozone producing electric motors.

3.2 LAYING DUCTILE IRON PIPE AND FITTINGS

A. The Contractor will be responsible for transporting materials to the job site as needed. Care shall be taken in loading, transporting and unloading to prevent injury to the pipe, lining or coatings. Pipe or fittings shall not be dropped. The engineer shall examine all pipes and fittings prior to installation. Any pipe or fittings found defective shall not be installed and immediately removed from the site. Any damage to pipe linings or coatings may be repaired as directed by the Engineer, or removed from the site. Handling and installation of pipe and fittings shall be in accordance with the manufacturer's instruction and as specified herein. Any materials damaged during loading, transporting or unloading shall be replaced at the Contractor's expense.

B. Jointing of ductile iron pipe and fittings shall be done in accordance with the printed recommendations of the manufacturer and as specified. All pipe and fittings shall be thoroughly cleaned before laying; shall be kept clean until they are used in the work; and when installed, shall conform to the lines and grades required. Special care is required in cleaning the ends of the pipe; wipe the outside of the spigot end with a clean rag prior to applying lubricant; brush clean the inside of the bell end, paying special attention to the rubber joint area, prior to installing the gasket and lubricant; and check inside the pipe for overall cleanliness.

C. Ductile iron pipe and fittings shall be installed in accordance with requirements of AWWA C600, latest edition, except as otherwise provided herein. The joint surfaces and the gasket shall be painted with a lubricant just prior to making up the joint. The spigot end shall then be gently pushed home into the bell. The position of the gasket shall be checked to insure that the joint has been properly made and is watertight. Care shall be taken not to exceed the manufacturer's recommended maximum deflection allowed for each joint. A firm, even bearing throughout the length of the pipe shall be constructed by tamping selected common fill along the sides of the pipe forming a cradle under the pipe. Tamping shall continue until the fill is 1-foot over the top of the pipe. Pipe installation in rock shall be constructed as shown on the drawings. (See Detail Sheet/Drawings). If any defective pipe is discovered after it has been installed, it shall be removed and replaced with a sound pipe in a satisfactory manner by the Contractor, at his/her own expense.

D. All pipe shall be sound and clean before laying. During pipe installation, care should be taken to protect the open end of the pipe. When installation is not in progress, including lunch time, the open ends of the pipe shall be closed with watertight plugs or other approved means. Good alignment shall be preserved during installation. Fittings, in addition to those shown on the Drawings, shall be provided, when required, for crossing utilities which are encountered during trench excavation. Solid sleeves shall be used only where approved by the Engineer.

E. When pipe cutting is required, cutting shall be done by machine, leaving a smooth cut at right angles to the axis of the pipe. Cut ends of pipe to be jointed with a bell shall be beveled to conform to the manufactured spigot end. Ceramic epoxy lining shall remain undamaged.

F. Existing Utilities: To the extent possible, the Contractor shall maintain a minimum 10 ft. lateral separation between the new water mains and existing sanitary sewers, unless otherwise directed by the Engineer.

G. The Contractor shall maintain an 18-inch clearance between the bottom of the water main and crown of the sanitary sewer. The engineer may direct this full length of main to be concrete encased when the 18-inch clearance is not possible, or when the water main is placed below the sanitary sewer.

H. Ductile iron pipe installed within 3 feet of gas lines shall be fully encased with polyethylene material. Polyethylene shall be 8-millimeters thick and comply with AWWA C105, latest edition.

I. Ductile iron pipe shall be wrapped in polyethylene encasement where pipe depth is at or below normal groundwater level.

3.3 PUSH-ON JOINTS

A. Push-on joints shall be made in accordance with the manufacturer's instructions. Pipe shall be laid with bell ends looking ahead. A rubber gasket shall be inserted in the groove of the bell end of the pipe, and the joint surfaces cleaned and lubricated.

Apply thin film of nontoxic gasket lubricant over inner surface of gasket in contact with spigot end. The plain end of the pipe being installed shall be aligned and inserted into the bell end of the pipe previously installed. It can then be pushed home with a jack or by other means. After joining the pipe, a metal feeler shall be used to make certain that the rubber gasket is correctly located.

3.4 MECHANICAL JOINTS

A. Mechanical joints shall be made in accordance with Appendix A of AWWA C111 and the manufacturer's instructions. Wire brush surfaces to be in contact with the gasket and thoroughly clean and lubricate the joint surfaces and rubber gasket with soapy water before assembly. Check that the gasket has been seated in fitting before placing flange against gasket. With bolts inserted and nuts finger-tight, tighten diametrically opposite nuts progressively and uniformly around joint with a torque wrench. Bolts shall all be tightened to the specified torque. When using pneumatic or electric impact wrenches to make up fittings, complete tightening using a torque wrench to the specified torque. Under no conditions shall extension wrenches or pipe over handle of ordinary ratchet wrench be used to secure greater leverage.

3.5 RESTRAINED JOINTS

A. Mechanical joint restraints shall be installed in full accordance with the manufacturer’s instructions. All bolt heads on restraints shall be tightened sufficiently so that they shear off to indicate the proper tightening torque was achieved.

B. Push-on joint restraints shall be installed in full accordance with the manufacturer’s instructions where directed by the Engineer

3.6 SLEEVE TYPE COUPLINGS

A. Couplings shall be installed where shown or as directed. Couplings shall not be assembled until adjoining push-on joints have been assembled. Clean pipe ends for a distance of 8 inches. Mark each end six inches from the end. Use soapy water as gasket lubricant. Slip follower and gasket over each pipe to the 6-inch marks. Place the middle ring on the pipe end until centered over joint. Insert other pipe end into middle ring and bring to the proper position in relationship to the pipe installation. Press gaskets and followers into middle ring flares. Check gaskets have been seated into middle ring flares correctly. With bolts inserted and nuts made finger-tight, tighten diametrically opposite nuts sequentially with a torque wrench to the specified torque as per manufacturer’s recommendation. After installation, apply a heavy bitumastic coating to bolts and nuts.

3.7 TESTING

A. Prior to pressure and leakage tests, the piping shall be thoroughly flushed clean of all dirt, dust, oil, grease and other foreign materials. This work shall be done with care to avoid damage to lining and coatings.

B. The Contractor shall submit a plan on the method of testing the sewer force main for review to the Engineer. The plan shall include all equipment proposed for use during the work, or the name of the qualified testing company, which will perform the work. Testing of the sewer force main shall not begin until the Engineer has approved the Contractor's plan. All testing shall be done in the presence of the Engineer.

C. Testing of Sewer Force Main: Refer to Section 02570 for testing requirements.

END OF SECTION 02630

SECTION 02640

FIRE HYDRANTS, VALVES, AND APPURTENANCES

PART 1 – GENERAL

1.1 SCOPE OF WORK

A. The Work covered under this section includes the furnishing of all plant, labor, equipment, appurtenances and materials, and in performing all operations in connection with installing and testing of the valves, hydrants, and appurtenances, at the locations indicated and/or as directed, complete in place in accordance with the Drawings and specifications.

B. Where existing gate boxes and hydrants are to be removed, the Contractor is responsible for disposal.

1.2 RELATED WORK

A. Section 02200 – Earthwork

B. Section 02212 – Rock Excavation

C. Section 02616 – Ductile Iron Pipe and Fittings for Water Main Systems

D. Section 02725 – Water Service Connection

1.3 SUBMITTALS

A. Shop Drawings: Submit the following in accordance with Section 01300 - Submittals:

1. Submit shop Drawings and descriptive literature, showing valve dimensions and other details for each type and class of valve to be furnished.

B. American Iron and Steel (AIS) Certifications as required by Special Conditions – American Iron and Steel Provisions Section 00826.

1.4 REFERENCE STANDARDS

A. American Water Works Association (AWWA)

1. AWWA C111 - Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.

2. AWWA C500 - Gate Valves for Water and Sewerage System.

3. AWWA C502 - Dry-Barrel Fire Hydrants

4. AWWA C504 - Standard for Rubber-Seated Butterfly Valves.

5. AWWA C509 – Standard for Resilient Seated Gate Valves for Water Supply Service

6. AWWA C515 – Standard for Reduced-Wall, Resilient Seated Gate Valves for Water Supply Service

B. Underwriters Laboratory (UL)

C. Where reference is made to one of the above standards, the revision in effect at the time of bid opening shall apply.

PART 2 – PRODUCTS

2.1 MATERIALS

A. RESILIENT WEDGE GATE VALVES

1. Resilient wedge gate valves shall be ductile iron body, resilient seated type meeting the latest edition of AWWA C509 or AWWA C515 with mechanical joint ends. The valves shall be designed for 250 psi working pressure and 400 psi test pressure. Valves shall have corrosion resistant fusion - bonded interior and exterior coatings.

2. Valves are to have O-ring seals and a stainless steel non-rising stem. Valves shall have a 2-inch square operating nut, and be Open Right (clockwise to open).

3. For standardization, gate valves shall be as manufactured by AVK, Mueller Co., Kennedy Valve, or approved equal.

4. Iron and steel products shall conform to American Iron and steel requirements of Section 00826.

B. VALVE BOXES

1. Valve boxes shall be cast iron, asphalt coated, sliding type, adjustable, together with cast iron covers with the word "WATER" cast in raised letters and a direction-to-open arrow plainly cast in relief on the top surface. A minimum 6-inch overlap is required between sliding sections. The inside diameter of the bottom section shall be at least 5-1/4-inches and shall have a belled base. The top section shall be at least 6-1/8-inches and have top flanges. The bottom section shall be at least 36-inches in length. The top section shall be at least 26-inches in length and have a plain bottom. No three piece combinations shall be acceptable. Valve boxes shall be manufactured in America only.

2. Iron and steel products shall conform to American Iron and steel requirements of Section 00826.

C. HYDRANTS

1. Hydrants shall have a 5-1/4-inch valve opened by turning the operating unit in the counter clockwise direction. The hydrant shall have one 4-1/2- inch steamer and two 2 1/2- inch hose connections. The hose and steamer connections shall have National Standard Thread. The operating nuts shall be pentagonal in shape, 1-1/2- inch from point to opposite flat and shall open right (clockwise). The hydrant shall be the hub or mechanical-joint type having a 6-inch pipe connection to an 8-inch or larger diameter main.

2. The hydrants shall have an oil reservoir to provide lubrication to all stem threads, bearing surfaces and O-rings each time the hydrant is operated.

3. The hydrants shall have mechanical joint shoes, 5'0" bury, 5-1/4-inch valve, and conform to AWWA Specification C-502. Hydrant shall be marked with an arrow and the word "open" to indicate the direction to turn the stem to open the hydrant. Hydrants shall open right.

4. Hydrant anchor tees shall be located at the main. Hydrant valve anchoring tees shall be mechanical joint, each having bell and plain end, with a split joint on the plain end. The gat valve will be secured directly to the tee by using the standard mechanical joint gasket and standards bolts.

5. The hydrant shall have a minimum working pressure of 200 psi. Hydrant design shall be of positive automatic drain type to prevent freezing.

6. The hydrants are to receive two coats of prime paint before shipment and once installed are to be cleaned and painted by the Contractor. Hydrants shall be painted in accordance with the Nantucket Water Department requirements. Hydrants shall be painted yellow.

7. Nozzle threads shall be National Standard Thread.

8. There shall be a breakaway flange at the ground level.

9. The upper and lower operating stems shall be stainless steel.

10. For standardization, hydrants shall be Mueller Co. Centurion Model A-423 VO 5.0 bury or equal.

11. Iron and steel products shall conform to American Iron and steel requirements of Section 00826.

D. TAPPING SLEEVE

1. Tapping sleeves shall be of the mechanical joint type. The valves shall be flanged by mechanical joint outlet with non-rising stem and designed for

vertical burial. Tapping valves shall be rated at 200 psi working pressure and shop tested at 300 psi. Bolts on bonnet and stuffing box shall be stainless steel (316 stainless steel), stuffing boxes shall be "O" ring type. The operating nut shall be 2 inches square. Gaskets shall cover the entire flange surface. Valves shall open left, (counter clockwise). The Town has standardized on American Darling 2800-C or an approved equal. Tapping sleeves shall be no greater than one-half of the diameter of the main being tapped.

PART 3 – EXECUTION

3.1 INSPECTION AND PREPARATION

A. All valves and appurtenances shall be installed in the location shown on the Drawings or where directed by the Engineer. Valves shall be true to alignment and rigidly supported. Any damaged items shall be replaced before they are installed.

B. During installation of all hydrants, valves and appurtenances, the Contractor shall verify that all the items are clean, free from defects in materials and Workmanship and functioning properly. Valves and other equipment which do not operate easily, or are otherwise defective, shall be repaired or replaced.

C. All valves shall be closed and kept closed until otherwise directed by the Engineer. All hydrants shall be covered with a burlap bag until put into service.

D. Care shall be taken to avoid freezing of water in valves or hydrants.

3.2 FIELD TESTS AND ADJUSTMENTS

A. Conduct a functional field test of each valve, including actuators and valve control equipment, if any, in the presence of the Engineer to demonstrate that each part and all components together function correctly. The Contractor shall provide all testing equipment.

3.3 MANUFACTURER'S SERVICE

A. The Contractor shall coordinate the services of a qualified representative of the tapping equipment and/or tapping valve supplier to provide on-site support and assistance during wet tapping operations of the existing water mains as indicated on the Drawings.

3.4 SHOP PAINTING VALVES AND APPURTENANCES

A. Interior and exterior surfaces of all valves which are not factory epoxy coated shall be given two coats of shop finish of an asphalt varnish conforming to the latest edition of AWWA C504 for Varnish Asphalt. The pipe connection openings shall be capped to prevent the entry of foreign matter prior to application.

3.5 INSTALLATION OF FIRE HYDRANTS

A. Furnish all labor, equipment and incidentals required for the installation of fire hydrants and valves as shown on the Drawings and/or as directed by the Engineer. The Engineer will request hydrant location staking from the Town with reasonable notice (minimum 3 days). Engineer will set two stakes on the road right-of-way (ROW) line, spaced equal distance on either side of the property corner or other location as determined by the Engineer. The ideal location for the hydrant would be just inside the ROW line, at the property corner (halfway between the two stakes). The hydrant should be entirely inside the ROW. Deviation to one side or the other from this property corner location should be kept to a minimum, and only when required due to obstruction or other undesirable field condition. Hydrants shall be installed as a complete unit, including 6-inch gate valve, where designated by the Contract Drawings with the consent of the Engineer. All hydrants shall stand plumb and shall have their nozzles parallel with, or at right angles to the curb, with the nozzle facing the curb. Hydrants shall be set to the established grade, with the centerline of the lowest nozzle 18-inches above the ground. The Hydrants shall be set upon a slab of concrete not less than 6-in. thick and 12-in. square.

B. Concrete thrust blocks shall be placed between the back of the hydrant inlet and undisturbed soil at the end of the trench. Minimum bearing area shall be 36 square inches. Felt roofing paper shall be placed around the hydrant elbow before placing concrete. CARE SHALL BE TAKEN TO INSURE THAT CONCRETE DOES NOT PLUG THE DRAIN PORTS.

C. Each hydrant shall be connected to the main with a 6-inch branch controlled by an independent 6-inch valve. The Contractor shall notify the Fire Department when a hydrant is taken out of service, for removal or replacement. When hydrants are removed from service, the pipe shall be cut below grade and the old hydrant delivered to the Nantucket Water Department by the Contractor. No hydrant shall be left out of service overnight.

D. When a dry-barrel hydrant is set in soil that is pervious, drainage shall be provided at the base of the hydrant by placing 2” crushed stone from the bottom of the trench to at least six (6) inches above the drain port opening in the hydrant and to a distance of one (1) foot around the elbow.

E. When a dry-barrel hydrant with a drain opening port is set in clay or other impervious soil, a drainage pit, two (2) feet x two (2) feet x two (2) feet, shall be excavated below each hydrant and filled with course gravel or crushed stone mixed with course sand under the elbow of the hydrant and to a level of six (6) inches above the drain port. Said installation will be to the detail shown on the Drawings.

F. Where existing hydrants are to be connected to a new or existing water main, no extras shall be paid for excavating the water main and preparing same for tapping, etc. Line items for wet taps, D.I. pipe, asphalt, and all other items shall be paid per the Table of Bid Prices.

G. Fire hydrants shall be painted in accordance with the Nantucket Water Department requirements.

3.6 FIELD TESTS AND ADJUSTMENTS

A. Conduct a functional field test of each valve, including actuators and valve control equipment, if any, in the presence of the Engineer to demonstrate that each part and all components together function correctly. The Contractor shall provide all testing equipment.

3.7 INSTALLATION OF BURIED VALVES AND VALVE BOXES

A. The Contractor shall furnish all necessary labor and equipment to excavate and expose the water main sufficiently to install valves and/or tapping valves as required by the Engineer.

B. Valves shall be cleaned and manually operated before installation. When tapping valves are installed, it is imperative that the shell cutting is removed and discarded. Valves shall be set on a firm foundation and supported by tamping pipe-bedding material under the sides of the valve. The valve box shall be supported during backfilling and maintained in vertical alignment with the top flush with the finished grade. Buried valves and valve boxes shall be set with the stem vertically aligned in the center of the valve box. The valve box shall be set so as not to transmit loads to the valve.

C. Where ductile iron tapping sleeves are used, the split end flanges shall be rotated off center of the flange body to insure the gasket seams are not aligned.

D. Tapping valves shall be thoroughly flushed after the tapping operation has been completed.

E. Before backfilling, all exposed portions of any bolts shall be coated with two coats of bituminous paint comparable to Bitumastic No. 50 by Koppers Co., Inc. or equal.

END OF SECTION 02640

SECTION 02700

ASBESTOS-CEMENT PIPE REMOVAL AND DISPOSAL

PART 1 – GENERAL

1.1 SCOPE OF WORK

A. Furnish all materials, equipment, labor and incidentals; provide for the removal and legal disposal; of all asbestos-cement (AC) containing material, as required.

B. Remove and legally dispose of all AC pipe in accordance with all local, state and federal regulations.

1.2 RELATED WORK

A. Section 01350 – Health and Safety Plan

B. Section 02200 – Earthwork

C. Appendix C – Asbestos Cement Forms and Regulations

1.3 SUBMITTALS

A. Contractor is required to submit a Health and Safety Plan specific to Asbestos-Pipe removal and disposal in addition to the Health and Safety Plan detailed in Section 01350. The plan shall detail the contractor's removal methods and asbestos handling, management, containment, and transportation procedures necessary to comply with reference standards detailed in section 1.6 below. Initial training certificates and current refresher and accreditation proof must be submitted for each person involved with the Asbestos Pipe removal. At a minimum, this should include the Massachusetts Water Works Association 8 Hour OSHA Class II Asbestos Training: Asbestos – Cement Pipe Worker Safety or equivalent.

B. Massachusetts DEP Asbestos Notification Form (ANF-001): Submit in accordance with Section 01300 - Submittals. Form ANF-001 is included in the appendices. Form shall be submitted to necessary local, state and federal agencies within the required notification period. Contractor is responsible for all fees associated with the form and notification procedures.

1.4 QUALITY ASSURANCE

A. Provide in accordance with Section 01400 and as specified.

1.5 STORAGE

A. Storage of removed asbestos-cement containing material is not permitted without prior MassDEP approval. With prior approval, storage of intact asbestos-cement pipe may be allowed for a limited time provided it is done so in secure, fenced, and locked area. Asbestos-cement pipe that has been properly wetted, sealed, and labeled, is permitted to be stored for up to 30 days at the site with prior approval from MassDEP.

1.6 REFERENCE STANDARDS

A. Massachusetts Division of Occupational Safety (MassDOS)

1. 453 CMR 6.00 – The Removal, Containment, or Encapsulation of Asbestos

B. Massachusetts Department of Environmental Protection (MassDEP)

2. 310 CMR 7.00 – Asbestos Regulations

3. 310 CMR 19.061 – Asbestos Disposal Regulations

4. 310 CMR 40.0000 – Massachusetts Contingency Plan waste site cleanup regulations

5. 310 CMR 4.00 – Timely Action and Fee Provisions

6. 310 CMR 5.00 – Administrative Penalties Regulations

1.7 CONTRACTOR RESPONSIBILITY

A. The Contractor shall assume full responsibility and liability for the compliance with all applicable Federal, State, and local regulations pertaining to work practices, hauling and disposal of asbestos contaminated materials, and protection of workers and visitors to the site, and persons occupying areas adjacent to the site

PART 2 – PRODUCTS

2.1 MATERIALS

A. When wrapping asbestos-cement pipe or when protecting soil from contamination, material shall be 6-mil polyethylene sheeting.

B. Amended water shall be water to which surfactant (wetting agent) has been added to increase the ability of the liquid to penetrate asbestos lined materials.

PART 3 – EXECUTION

3.1 HANDLING AND REMOVAL OF ASBESTOS PIPE

A. All handling and removal of asbestos pipe shall be conducted in accordance with the above reference standards.

B. The Contractor shall take care not to damage pipe by impact, bending, compression, or abrasion during uncovering, handling, and removal.

C. If pipe is intact and not broken, place 6 mil polyethylene sheeting under the asbestos cement pipe to prevent soil contamination.

D. Adequately wet the pipe with amended water before and during removal to prevent dust.

E. When pipe is intact, pipe shall be slid apart at the joints as to not cause the pipe to become friable or release asbestos fibers. Saw cutting shall not be permitted.

F. Pipe shall be wrapped in two (2) layers of 6 mile polyethylene sheeting and sealed with duct tape. Containers shall be labeled appropriately.

G. If the pipe is damaged or saw cutting is necessary, place 6 mil polyethylene sheeting under the asbestos cement pipe to prevent soil contamination. Saw cutting requires containment unless using HEPA exhausted and shrouded cutting equipment.

H. Pipe shall be sealed in leak-tight Containers. After the pipe has been properly sealed and labeled as described above, place pipe in lined roll-off containers.

I. Container shall be enclosed and locked, having proper labels and DOT placards as required.

3.2 TRANSPORT

A. All transport of asbestos containing waste material shall be conducted in accordance with the above reference standards and local, state, and federal regulations.

B. Prior to shipment of asbestos containing waste material, Engineer will review/approve vehicle placarding, waste shipment record and applicable transport requirements before transport vehicles will receive approval from Engineer to depart.

3.3 DISPOSAL

A. Disposal of asbestos containing waste material shall be conducted in accordance with the above reference standards and local, state, and federal regulations.

B. Refer to Section 02080 – Waste Material Abatement for disposal requirements.

C. All shipments must have complete waste shipment records. Receipt copies of all waste shipment records shall be submitted to Owner from the disposal facility within 30 days of transport off-site.

D. Dispose of all material at a landfill permitted to accept asbestos-containing waste material.

END OF SECTION 02700

SECTION 02721

STORM DRAINAGE SYSTEM

PART 1 - GENERAL

1.1 SUMMARY OF WORK

A. Provide all labor, materials, equipment and supervision necessary to complete the Work specified in this Section or shown on the Contract Drawings, or both, but not limited to the following:

1. Storm drainage piping, fittings, accessories and bedding.

2. Catch basins and catch basin frames and grates.

3. Gutter inlets and gutter inlet frames and grates.

4. Drain manholes and drain manhole frames and covers.

1.2 SUBMITTALS

A. Submit Shop Drawings and manufacturer's specifications and installation instructions for all pipe materials, precast concrete catch basins, gutter inlets, and drain manholes, manhole frames and covers, catch basin frames and grates, and gutter inlet frames and grates. Include component construction, features, configuration, and dimensions.

B. Each shipment of pipe, catch basins, gutter inlets, and manholes shall be accompanied with the manufacturer’s notarized certificate that the materials meet the specification requirements.

C. Pipe, manholes, connections, anchorage, and accessories as required for complete installation of stormwater system.

D. American Iron and Steel (AIS) Certifications as required by Special Conditions – American Iron and Steel Provisions Section 00826.

1.3 REFERENCES

A. American Society for Testing and Materials (ASTM):

1. C32 – Sewer and Manhole Brick (Made from Clay or Shale)

2. C76 - Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe. (Latest version)

3. C139 - Concrete Masonry units for Construction of Catch Basins and Manholes.

(Latest version)

4. C270 - Mortar for Unit Masonry. (Latest version)

5. C361 – Reinforced Concrete Low-Head Pressure Pipe. (Latest version)

6. C443 – Joints for Concrete Pipe and Manholes, Using Rubber Gaskets. (Latest version)

7. C478 - Precast Reinforced Concrete Manhole Sections. (Latest version)

8. C923 – Resilient Connectors between Reinforced Concrete Manhole Structures, Pipes and Laterals. (Latest version)

9. C990 – Joints for Concrete Pipe, Manholes, and Precast Box Sections Using Preformed Flexible Joint Sealants. (Latest version)

PART 2 - PRODUCTS

2.1 GENERAL

A. All materials shall conform to the latest version of the MassDOT Standard Specifications, as amended, and policies and technical guidance in DEP's Stormwater Management Standards and the Massachusetts Stormwater Handbook.

2.1 PIPE MATERIALS

A. Ductile iron (DI) pipe shall be equipped with push-on type, restrained joint, or mechanical joint, as required and conform to the latest edition of AWWA C150 and C151, Class 52. Pipe and fittings must be certified "lead free." Pipe shall be manufactured in the United States. Ductile iron pipe shall be double cement-lined, asphalt seal coated, ductile iron. All ductile iron pipe shall be furnished in 18 (eighteen) foot sections and shall be rated for a minimum operating pressure of 350 psi. All ductile iron pipe and fittings shall have a bituminous outside coating in accordance with AWWA C151 and C110, respectively, latest edition. Gaskets shall meet the material requirements of ANSI/AWWA C111 for mechanical joint gaskets. Provide serrated brass wedges for push-on joints to provide electrical continuity; two per joint for pipe 12-in. and smaller and four per joint for larger pipe.

B. DI Fittings shall be compact ductile iron Class 350 Mechanical Joint, conforming to ANSI Specification A21.53 (AWWA C153), latest edition. Fittings shall be suitable for use with restraints as specified hereinafter. Fittings shall be manufactured in the United States. Fittings shall be made of the same material and have the same lining and coating as the pipe specified above. All fittings shall be marked with the weight and shall have distinctly cast upon them the pressure rating, the manufacturer's identification, nominal diameter of openings and the number of degrees or fraction of the circle on all bends. Fittings shall be Tyler Union AWWA C153 Compact Fittings, or approved equal.

C. High Density Polyethylene (HDPE) Pipe. The pipe shall conform to MassDOT Section M5.03.10. Pipe shall be smooth interior wall and corrugated exterior wall, and be water-tight. Pipe shall be minimum 12-inch diameter. Ends shall be bell-and-spigot unless approved by the DPW for the specific application. Pipe shall comply with the requirements for test methods, dimensions and markings found in AASHTO Designations M252 and M294. Pipe shall support an HS-20 live load with a maximum deflection of 5% of the minimum pipe diameter. Pipe and fittings shall be made from virgin polyethylene compounds which conform to the applicable current edition of the AASHTO Material Specifications for cell classification as defined and described in ASTM D3350. Nominal sizes of 12- to 60-inch shall be either AASHTO Type 'S' or Type 'D.'

D. Reinforced Concrete Pipe: Pipe and flared ends shall conform to the AASHTO M170 for Standard Strength Reinforced Concrete Culvert Pipe for class III Pipe, Wall B. or ASTM C76 for Reinforced Concrete Culvert and Storm Drain Pipe. All pipe 24 inches in diameter or smaller shall be of the bell and spigot type. Pipes larger than 24 inches in diameter shall be tongue and groove or bell and spigot. A preformed flexible plastic sealing compound of Butyl Mastic Rope Sealer ” 1" size, "EZ Stick" as manufactured by Concrete Products supply or an approved equal shall be used for sealing water-tight joints.

E. Polypropylene (PP) Pipe: Pipe shall have a stiffness of 46 psi when tested in accordance with ASTM D2412. Pipe with 12” up to 30” ID shall have smooth interior wall and corrugated exterior wall, and be water-tight. Pipe from 30” to 60” ID shall have smooth interior wall and exterior wall with annular inner corrugations, and be water-tight to meet ASTM D3212. Pipe shall be minimum 12-inch diameter. Ends shall be bell-and-spigot unless approved by the DPW for the specific application. Pipe shall comply with the requirements for test methods, dimensions and markings found in AASHTO Designations M252 and M294. Pipe shall support an HS-20 live load with a maximum deflection of 5% of the minimum pipe diameter. Pipe and fittings shall be made from virgin polypropylene compounds which conform to the applicable current edition of the AASHTO Material Specifications as defined and described in ASTM D4101. Nominal sizes of 12- to 60-inch shall be either AASHTO Type 'S' or Type ’D.'

F. Polyvinyl Chloride (PVC) Pipe, SDR21 for Shallow Bury:

1. Shallow bury shall be defined as pipe with less than 2-feet of cover.

2. SDR 21 PVC Pipe for Shallow Bury shall be push-on joint, bell and spigot type with pressure rating of 200 psi. For sizes 1-1/2-inch to 12-inch diameter, drain pipe shall be SDR 21 PVC meeting the requirements of ASTM D-2241, with material per ASTM D-1784, Grade 1, Type 1. Joints to meet ASTM F477 and shall be tested to ASTM D-3139 standard.

3. Joints:

i. All joints are to be made water-tight.

ii. Pipe shall be jointed in strict accordance with the pipe manufacturer's instruction. Jointing of all pipe shall be done entirely in the trench.

iii. Lubricant for jointing of ball and spigot PVC pipe shall be applied as specified by the pipe manufacturer. Use only lubricant supplied by the pipe manufacturer.

iv. Ball and spigot PVC pipe shall be pushed home by hand or use of bar and clock. The use of power equipment such as a backhoe bucket is not recommended and shall only be used at the direction of the manufacturer.

v. To join field-cut pipe, pipe shall be cut square. The cut end of the pipe surface shall be properly beveled to the size and shape of a factory-finished beveled end. All sharp edges shall be rounded off.

G. Polyvinyl Chloride (PVC) Pipe, SDR35:

1. PVC drain pipe shall be push-on joint SDR 35 PVC meeting the requirements of ASTM D3034 for sizes 3-inch to 15-inch. For sizes greater than 15-inch, pipe shall comply with ASTM F679, latest record. Pipe color shall be in accordance with the uniform color code established by the APWA Utility Location and Coordination Council.

2. Fittings: Fittings, couplings and adaptors shall be manufactured by Romac Industries Inc., or approved equal.

3. Joints: PVC pipe shall have an integral wall bell and spigot push-on joint with elastomeric gaskets secured in place in the bell of the pipe. The bell shall consist of an integral wall section with a solid cross section elastomeric gasket, factory assembled, securely locked in place to prevent displacement during assembly. Elastomeric gaskets shall conform to ASTM D3212. Where petroleum contamination is known or suspected to be in the soil and/or groundwater, nitrile gaskets shall be required.

4. Spigot Pipe Ends: Spigot pipe ends shall be supplied with bevels from the manufacturer to ensure proper insertion. Each spigot end shall have an "assembly stripe" imprinted thereon to which the bell end of the mated pipe will extend upon proper joining of the two pipes.

5. Insulation: Extruded closed-cell rigid formed polystyrene, equal to "Styrofoam: HI-60" by Dow Chemical. Size is 2-inch thick by 4 feet wide.

H. General: Elbows, tees, reducing tees, wyes, couplings, increasers, crosses, transitions and end caps of same-type class of materials as piping unless otherwise indicated.

2.2 MANHOLES, CATCH BASINS AND GUTTER INLETS

A. The material to be used in the construction of storm drain manholes, catch basins, and gutter inlets shall conform to MassDOT Standard Specifications, the Drawings, and these specifications. Design depths as indicated on the Contract Drawings.

B. Manholes over 12 feet in depth shall have minimum of 5 feet inside diameter. When drop manholes are used the drop shall not be more than 3 ½ feet. Risers shall be brick, not concrete blocks. Risers shall be clay or shale brick, and shall conform to the requirements of AASHTO M 91, Grade MM or as specified in MassDOT M4.05

C. Precast Concrete Manholes: Precast Manholes shall be constructed of reinforced precast concrete monolithic base section, barrel section and dome section meeting the latest applicable requirements of ASTM C478 I and AASHTO M 199, or latest revision thereto. Special manholes shall also meet the requirements of 2016 Edition March 2016 Drainage Construction Standards 4-4 MassDOT Standard Specifications, section M4.02.14, Precast Units. After curing a minimum of 14 days, the outside surface of the tapered or cone section of precast cement concrete drainage structures shall be dried and cleaned. Tongue and groove sections between barrel sections shall be mortared or use butyl rubber sealants. Live load design shall be H-20 loading. A 26-inch opening will be cast in the top section to accept a standard cast iron frame and cover. Inside diameter shall be a minimum of 4 feet.

D. Precast Concrete Catch Basins: Precast Catch Basins shall conform to ASTM C478 and AASHTO M 199, or latest revision thereto. A 12-inch opening shall be left in center of the precast base section and filled with washed, screened gravel and left open except when the catch basin is placed in an area of high groundwater. Precast units shall have 2 weep holes built into the walls at floor level of new basins placed in areas above the seasonal high groundwater table. Each weep hole shall consist of 4-inch pipe or equivalent opening to carry water through the wall of the structure. The ends of the pipe shall be left flush with the wall of the structure and covered with ¼-inch mesh galvanized wire screen 23 gauge satisfactorily fastened against wall. The drain weep hole shall be excavated and backfilled with 2 cubic feet of 1 ½-inch washed stone. Live load design shall be H-20 loading. Catch basins which are limited by height shall be installed with a flat top slab, cast in place, designed for H-20 loading and cast iron frame cast in place.

E. Precast Concrete Leaching Catch Basins: Precast Leaching Catch Basins shall conform to ASTM C478 and AASHTO M 199, or latest revision thereto. Leaching Catch Basins shall be backfilled with 3/4" washed stone, 12" on all sides encased in filter fabric. Live load design shall be H-20 loading. Leaching Catch basins which are limited by height shall be installed with a flat top slab, cast in place, designed for H-20 loading and cast iron frame cast in place.

F. Precast Concrete Gutter Inlets: Precast Concrete Gutter Inlets shall conform to MassDOT Construction Standards, Drawing Number E.204.2.0, Live load design shall be H-20 loading. Gutter inlets shall be equipped with a standard 3-flange frame and standard cascade grate.

G. Concrete Compressive Strength: 4000 psi minimum. Type II cement.

H. Reinforcing Steel: ASTM A185, 0.12 sq. in./linear ft. and 0.12 sq. in. (both ways) base bottom. Iron and steel products shall conform to American Iron and Steel requirements of Section 00826.

I. Joints sealed with hydraulic cement conforming to ASTM C990.

J. Frames, Covers, and Grates: Cast Iron shall meet requirements of ASTM A888 “Grey Cast Iron, Cast Iron Class 20” and the American Iron and Steel requirements of Section 00826. All castings shall be clean and without blow holes, sand holes or defects of any kind. Cast iron frames and covers shall be clean of all rust, dirt, and scale. Grates shall have the following wording cast into the outside borders: “Dump No Waste” and “Drains to Waterway”. Text shall be bold capital letters, at least 1 inch high. Placement may be as per manufacturer.

K. Manhole Covers: Manhole frames and covers shall be at least Class 25 conforming to ASTM A48 "Standard Specification for Gray Iron Castings." Manhole frame shall have a clear opening of 24 inches and be a minimum of 8 inches in height (unless otherwise specified on the Drawings). The surface of the cover shall have a diamond pattern with the words "DRAIN" cast thereon for drainage manholes, as manufactured by East Jordan Iron Works (formerly LeBaron Foundry Co.) (EJIW) 2110Z/2111A, or equal. Per MassDOT Engineering Directive E-16-003, all manhole covers require a bolt-down assembly.

L. Catch Basin Grates (Low Point): Catch basin grates located at low points shall be 24-inch square grate, East Jordan Iron Works (formerly LeBaron Foundry Co.), LF248-2-4F. Single or dual catch basin grate shall consist of a 24-inch square grate LeBaron Foundry Co. L24SG1-000 or approved equal with a 4-inch minimum or 8-inch typical heavy duty frame (MassDOT Standard). Frames shall be set upon a full bed of mortar, and mortar shall be brought up alongside of frame to provide a water-tight joint. Per MassDOT Engineering Directive E-16-003, all catch basin grates require a bolt-down assembly.

M. Catch Basin Grates (Cascade): Catch basin cascade grates shall consist of a 24-inch square grate with an 8-inch heavy duty frame (MassDOT Standard) East Jordan Iron Works (formerly LeBaron Foundry Co.), L24SG18L-000 or a L24SG18R-000 (depending on water flow direction) or approved equal with an 8-inch frame. Frames shall be set upon a full bed of mortar, and mortar shall be brought up alongside of frame to provide a water tight joint. Water flowing from left to right requires a Right-Hand Grate. Water flowing from the right to left requires a Left-Hand Grate. Per MassDOT Engineering Directive E-16-003, all catch basin grates require a bolt-down assembly.

N. Catch Basin Hoods: Catch basin hoods shall protrude no more than 12 inches beyond the end of pipe into the structure. Acceptable hoods are Ground Water Rescue Inc. Eliminator, Best Management Practices Inc. Snout® or equal.

O. Granite Curb Inlets: Granite shall conform to MassDOT Standard Specifications Sections M9.04.0, M9.04.1, and M9.04.2. The back face for a distance of 3 inches down from the top shall have no projections greater than 1 inch. The front shall be straight split, free from drill holes, and shall have no projection greater than 1 inch or depression greater than 1/2 inch for a distance of 10 inches down from the top. For the remaining distance there shall be no depression or projection greater than 1 inch. The ends shall be squared with the top for the depth of the face finish. The granite curb inlet shall be 6 feet in length, plus or minus 1/2 inch from 17 to 19 inches in depth, 6 inches wide at the top and at least 6 inches wide at the bottom. The reveal shall be 10 inches. Curb inlets set on a radius of 160 feet or less shall be cut to that radius. The gutter mouth at least 3 inches in depth and at least 2 feet in length shall be cut in the front face of the stone. If there is no other curbing, or as applicable, transitional curbing shall be required on both sides of the inlet. The transitional curbing shall be 6 feet in length, with a height equal to the inlet and tapering to grade at the end.

2.3 MASONRY MATERIAL

A. Concrete Masonry Units: ASTM C139.

B. Brick: ASTM C32, Grade MS or ASTM C62, Grade SW.

C. Mortar: ASTM C270, Type II Cement.

2.4 PIPE BEDDING AND COVER MATERIALS

A. Bedding, Cover and Compaction Requirements: Fill Type as specified in Section 02200, and shown on the Details.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that the trench cut and excavation base is ready to receive Work and excavations, dimensions, and elevations are as indicated on Contract Drawings.

3.2 PREPARATION

A. Hand trim excavations to required elevations. Correct over excavation with processed gravel.

B. Remove large stones or other hard matter, which could damage piping, structures, or impede consistent backfilling or compaction.

3.3 BEDDING

A. Excavate for pipe trench or structure in accordance with Section 02200. Hand trim excavation for accurate placement of pipe and structures to elevations indicated on the Drawings.

B. Place bedding material at trench bottom, level materials in continuous layer not exceeding 12 inches compacted depth.

C. Maintain optimum moisture content of bedding material to attain required compaction density.

3.4 INSTALLATION - PIPE

A. Install pipe, fittings, and accessories in accordance with manufacturer's instructions. Seal joints watertight.

B. The minimum flow line depth for drainage pipes shall be 4 feet. The minimum cover over drainage pipes shall be 3 feet below the pavement slab or as specified by the type of pipe per manufacturer's specifications, whichever is greater. Where the clearance is less than 1 foot below the pavement, provide a design method to maintain the integrity of the pipe and right of way. For drainage pipe outside of the pavement, the minimum cover shall be 18 inches or as specified by the type of pipe, whichever is greater.

C. Drainage mains shall be located at least 5 feet horizontally from sewer mains. Locations with respect to water mains are described in the Water Standards portion of these Construction Standards. The distance shall be measured from inside edge of pipe. Drainage mains shall be laid to provide a vertical separation of at least 18 inches from either water or sewer lines. The minimum vertical separation is measured from outside of water or sewer main to outside of the storm drain main.

D. RCP Pipe

1. Pipe shall be carefully laid to the lines and grades as shown on the approved plans. The Contractor shall use laser beam aligning equipment.

2. See Section 4.3.1 for bedding material. The bottom of the trench shall be excavated to a flat grade 6 inches below the pipe invert for trenches in suitable earth and 12 inches below pipe invert for trenches in rock. When rock or ledge is encountered it shall be removed to such widths as will give a clearance of at least 12 inches on each side of the pipe or other structure and a sand cushion used. The width of trenches shall be sufficient to allow thorough compacting of the refill adjacent to the lower quarters of the pipe.

3. RCP Pipe Trenches shall meet MassDOT Standard Specifications Section 260 and MassDOT Construction and Traffic Standard Details Drawing 208.10.

4. Trenches at pipe joints shall be excavated as necessary to give ample room for properly making and inspecting the pipe joints. RCP pipe joints shall be cement mortared (as specified in MassDOT Section M4.02) carefully placed in the joints around its entire perimeter and mixed relatively dry, in the ratio of one part cement to two parts sand.

5. Pipe bedding material shall be carefully and lightly tamped under pipe to provide uniform support. Fill to a minimum depth of 12 inches above the top of the pipe. Material for backfilling the rest of the trench, except for sub base (top 15 inches) shall be suitable, approved, material. The compaction process shall be material placed in 12-inch lifts and thoroughly compacted by mechanical rammers, vibrators, or other methods to be approved (e.g., hydraulic plate compactors) to 90 percent Modified Proctor density in off-road or nonstructural areas and 95% in roadway or structural areas. Bucket compaction will not be accepted.

6. When laying pipe in groundwater, pipe material and method of installation shall be approved by the Town. Water must not be permitted to rise in the trench until all pipes have been securely bedded, jointed and observed and until backfilling has progressed to an elevation at least one foot above the top of the pipe. Temporary plugs shall be installed in open ends of pipe to prevent silt from washing into pipe during construction; and open ends of the pipe shall be closed with suitable plugs upon suspension of the Work for any reason.

E. HDPE Pipe

1. The requirements for laying of RCP pipe also apply to HDPE pipe with the following additional requirements.

2. Installation of HDPE pipe shall be in accordance with either AASHTO Section 30 or ASTM D2321 and as recommended by the manufacturer.

3. Because HDPE pipe will float in standing water, a dry trench shall be provided prior to laying the pipe. A qualified Engineer shall be consulted to determine dewatering methods.

4. Haunching large-diameter pipes (greater than 30 inches) shall be performed using maximum 8- inch lifts and compacted to 90 percent standard proctor density.

5. Water tight joints shall be used. Pipe shall be watertight according to the ASTM D3212. Joint design shall be bell-and-spigot with an elastomeric rubber gasket meeting ASTM F477.

F. PP Pipe

1. The requirements for laying of HDPE pipe also apply to PP pipe with the additional requirements that minimum cover in traffic areas through 48-inch ID pipe shall be one foot and minimum cover for 60-inch ID pipe shall be two feet.

G. PVC Pipe

1. PVC PIPE JOINTS

i. All joints shall be made watertight.

ii. Pipe shall be jointed in strict accordance with the pipe manufacturer's instruction. Jointing of all pipes shall be done entirely in the trench.

2. PVC Pipe

i. Lubricant for jointing of PVC pipe shall be applied as specified by the pipe manufacturer. Use only lubricant supplied by the supplied by the pipe manufacturer.

ii. PVC pipe shall be pushed home by hand or with use of a bar and block. The use of power equipment, such as a backhoe bucket, shall only be used at the direction of the manufacturer.

iii. The position of the gasket shall be checked to insure the joint has been properly made and is watertight. Care shall be taken not to exceed the manufacturer's recommended maximum deflection allowed for each joint.

iv. Field-cut pipe ends shall be cut square and the pipe surface beveled to the size and shape of a factory-finished beveled end. All sharp edges shall be rounded off.

3.5 INSTALLATION - CATCH BASINS AND DRAIN MANHOLES

A. Contractor shall excavate to a depth of 12 inches below the bottom of and all around the proposed manhole or catch basin base, compact and fine grade and install wash screened gravel as a subbase material. Pipes shall extend no more than 3 inches inside the interior wall and all openings around pipe entrances and lift holes shall be thoroughly grouted with non-shrink grout prior to back filling. Compaction process shall be the same manner as compaction around pipe.

B. The tops of frames and covers shall be set 1/8 inch below finish grade pavement in the street. Final grade locations for installations outside of the paved roadway shall be as shown on the Drawings.

C. All joints between the frame, grade rings, dome, barrels and base shall be set in place with non-shrink mortar. Inside the manhole, all joints where the sealing material is not flush with the inside wall shall be grouted with non-shrink mortar and finished by hand / wet-brushed.

D. Grade adjustments shall be made using either precast grade rings/risers or clay/shale bricks.

E. No backfilling of the structure in the excavation shall take place unless approved by the Town or Town's representative.

F. When ground water is encountered in manholes, ¾-inch to 1-inch washed stone shall be placed around structure to a distance of at least half-way up the barrel of the highest pipe.

G. When ground water is encountered in catch basins, ¾-inch to 1-inch washed stone shall be placed 2 feet all around structure to a distance of the high ground water elevation. The stone shall be placed against and over the end of the pipe opening to prevent entrance of the finer filling material. All catch basins that do not have a flat top slab designed for H-20 loading and cast iron frame cast in place shall be installed using blocks to make a square hole that will accept a frame and grate, and there shall be at least two full courses of brick for frame adjustment.

3.7 FIELD QUALITY CONTROL

A. Request inspection prior to and immediately after placing aggregate cover over pipe.

B. Compaction testing will be performed in accordance with Section 02200.

C. If tests indicate Work does not meet specified requirements, remove Work, replace and retest at no cost to the Owner.

3.8 PROTECTION

A. Protect pipe and aggregate cover from damage or displacement until backfilling operation is in progress.

END OF SECTION 02721

SECTION 02725

WATER SERVICE CONNECTIONS

PART 1 – GENERAL

1.1 SCOPE OF WORK

A. The Work covered under this Section of the Specification includes furnishing all plant, labor, equipment and incidentals required in tapping (regardless of size) and performing all operations necessary to provide new water services from the new water main to the property line, including corporation stops, curb stops and boxes, as shown on the Drawings or as directed by the Engineer. In general, a service shall be brought to each developed parcel of property along the water main route. Trench excavation and backfilling shall be done in accordance with all of the applicable sections of these Specifications.

B. Corporation stops shall be installed for connecting all service to the new water mains. The Contractor shall keep a record of the locations of all corporation stops installed and shall indicate on the record those corporation stops that have not been connected to service piping. A copy of this record shall be given to the Engineer at the completion of the Work. Polyethylene tubing (with tracer wire), curb stops and necessary adapters shall be used to make connections between new corporation stops and new and existing service piping. The Contractor shall be responsible for the removal and/or installation of curb stops in the locations directed by the Engineer.

C. All existing services shall be maintained until the new service connections have been fully installed, chlorinated and tested to the satisfaction of the Engineer. All service connections shall then be made to the mains as specified below. The Contractor shall connect each existing house service to the new service connections provided after the completed installation has been accepted by the Engineer. All abandoned services shall have ends crimped.

D. All service fittings, corporations and curb stops shall be provided with no lead in accordance with Section 1417 of the Safe Drinking Water Act and Section 9 of NSF Standard 61.

E. All existing water meter pits shall remain. Connections to existing services shall be made prior to the existing water meter pits, as indicated on the Drawings.

1.2 SUBMITTALS

A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.

B. Product Data: Submit manufacturer's technical product data and installation instructions for materials and products.

C. American Iron and Steel (AIS) Certifications as required by Special Conditions – American Iron and steel Provisions Section 00826.

1.3 REFERENCE STANDARDS

A. American Water Works Association (AWWA)

1. AWWA C800 - Underground Service Line Valves and Fittings.

B. American Society for Testing and Materials (ASTM)

1. ASTM D2737 – Standard Specification for Polyethylene (PE) Plastic Tubing

C. Where reference is made to one of the above standards, the revision in effect at the time of bid opening shall apply.

PART 2 – PRODUCTS

2.1 SERVICES

A. Unless otherwise specified, all pipe for services shall be blue polyethylene PE 4710, Class 250 tubing and shall conform to the provisions of AWWA specification C901 (latest version) and the following:

1. Copper Tube Size (CTS) – ASTM 2737, 200 psi, PE 3608 or PE 3710, SDR9

2. Iron Pipe Size (IPS) – ASTM 2239, 200 psi, PE 3608 or PE 3710, SIDR7

Plastic pipe shall be as manufactured by Silver Line Plastics, Driscoplex, Hydro-Flo or approved equal. Dimensional and performance characteristics shall conform to the requirements of AWWA C901. The use of HDPE pipe and tubing shall be for water services two (2) inches or under in diameter (4- inch and larger diameter water services shall use cement lined ductile iron water pipe). HDPE pipe shall be installed with enough slack to compensate for settlement and compaction and shall be laid on a bed of fine grained material. The tubing shall be suitable for use with standard industry brass compression fittings without special adapters. Stainless steel insert stiffeners shall be provided for use with all compression joint connections.

2.2 TRACER WIRE

A. Tracer wire shall be 12 gauge copper with a 30 mil polyethylene coated jacket.

2.3 CORPORATIONS, CURB STOPS AND SADDLES

A. Corporation stops shall be full port ball-type, constructed of UNS/CDA No. 89833 “no lead” alloy brass, meeting or exceeding the requirements of ANSI/AWWA C800 and ASTM B584 or latest revisions thereto for use with polyethylene service tubing. Valve inlets shall be AWWA thread (CC) and 1-inch and 2-inch outlet shall be compression

style for C.T.S.P.E. compression tubing, as manufactured by the Ford Meter Box Company, Model F1001-4, or approved equal.

B. Service saddles shall be required for all corporations on PVC piping and 2-inch in size on ductile iron water mains. Saddles shall be for use on Class 52 Ductile Iron pipe and shall have type 304 stainless steel straps. Saddle shall be ductile iron with alkyd enamel shop coated body, CC (AWWA) threads with Buna-N rubber gasket. Saddles shall be Ford style FC202, FC101 or approved equal. Iron and steel products shall conform to American Iron and steel requirements of Section 00826.

C. Curb stops shall be constructed of UNS/CDA No.C89833 "no lead" brass, meeting or exceeding the latest requirements of ANSI/AWWA C800 and ASTM B584 or latest revisions thereto for use with polyethylene service tubing. Valve shall be full port ball-type design. Joints shall be compression type for 1-inch and 2-inch C.T.S.P.E. tubing, as manufactured by the Ford Meter Box Company, Model B66-44M, or approved equal.

D. Curb boxes shall be a cast-iron 2-piece extension type, with a 2 hole Erie pattern cover, with a stationary rod to accommodate required bury depths. The cover shall have the word "WATER" cast in raised letters. Curb stop boxes shall be manufactured in America only. Iron and steel products shall conform to American Iron and steel requirements of Section 00826.

2.3 FITTINGS

A. Unless otherwise approved, only compression type fittings manufactured by Mueller Inc., or equal, shall be used.

B. Mueller brass tees shall be used to provide 1-inch services off of 2-inch polyethylene tubing.

C. Adapters required to allow connection to existing services shall be provided.

D. Fittings shall be no lead brass fittings (NL cast on the fitting body is required).

PART 3 – EXECUTION

3.1 INSTALLATION

A. After successful testing and chlorination, water services shall be installed as a "wet" tap as shown on the Drawings, specified, or directed by the Engineer. Exact locations of services shall be located in the field by the Engineer. All existing services shall be connected to the curb stop installed under this Contract. All services shall be installed to a minimum depth of 5'-0" unless specifically shown or directed otherwise by the Engineer.

B. Corporation stops. The tapping machine shall be rigidly fastened to the pipe. The length of travel of the tap should be so established that when the stop is inserted and

tightened with a 14-in wrench, not more than one to three threads will be exposed on the outside. When a wet tapping machine is used, the corporation stop shall be inserted with the machine while it is still in place. Stops shall be tightened only sufficiently to give watertightness and care must be constantly exercised not to overtighten them.

C. Saddle taps shall only be used for services larger than one inch or when transite (asbestos cement) pipe, PVC pipe, or HDPE pipe is encountered or under the direction of the Engineer.

D. Straight couplings. The Contractor shall install straight couplings to existing water mains of the sizes required in the locations designated by the Engineer in the field. The Contractor shall utilize the manufacturers recommended installation procedures while performing the Work. Care shall be taken to ensure a watertight connection.

E. Curb stops will, in most cases, be installed 1.5-ft from the curb line or pavement limit. The Contractor shall install the curb stops and boxes in a workmanlike manner as described herein and as directed by the Engineer and shall place compacted-screened gravel around and below the curb stop to permit ready draining of the pipe through the waste opening.

F. The boxes shall be set in a true vertical position and if they are within the limits of the roadway or within limits where the plowing of snow will take place in the winter, the tops of the boxes shall be set about 1/2-in below the top of the finished grade. In locations where these boxes are not likely to be disturbed, the tops shall be set flush with the adjoining ground.

G. Care shall be exercised in the placing and laying of water service tubing to be sure that the pipe does not have kinks or sharp bends and to assure against it being in contact with sharp stones or ledge which would cause damage to the pipe. Service shall be installed with a minimum 6 inches of sand bedding and 12 inches sand cover.

H. For plastic services, a No. 12 tracer wire shall be attached to the corporation stop and curb box, for later use in locating the services exact position. The wire shall be stripped at each end, connected to the corporation, looped around the service tubing approximately every 3-feet, and attached to the curb stop.

I. For existing service connections that are less than 1-inch, the change over to the new main shall occur at the new 1-inch tap (1" to 3/4"). If any extensions are required to reach the existing water service, they shall match diameter in kind, except be no less than 1-inch. Water service tubing as specified herein shall be used to make connections between new corporation stops and new curb stops at the property line. If the service connection is greater than 1-inch, the same size water service tubing connection shall be installed. The Contractor shall be responsible for the removal and/or installation of curb stops and boxes in the locations directed by the Engineer.

J. The transfer of water connections from the old services to the new services shall be performed as quickly as possible in order to minimize the time in which water service is disrupted.

K. Water service trenches shall be excavated and backfilled in accordance to the Drawing details and with Section 02200 – Earthwork.

END OF SECTION 02725

SECTION 02736

TEMPORARY WATER BYPASS

PART 1 – GENERAL

1.1 SUMMARY

A. This section includes the following:

1. Requirements to furnish, install, disinfect, maintain and remove temporary potable water bypass pipe, connections, laterals and services required to adequately serve water customers.

2. The work includes excavation and backfilling, constructing ramps and/or burying piping at driveways and other access ways, replacement of temporary and permanent pavement, and restoration of public and private property.

B. Related sections include the following:

1. Section 01300 – Submittals

2. Section 01850 –Traffic Management

3. Section 02200 – Earthwork

4. Section 02576 – Pavement Repair and Resurfacing

5. Section 02616 - Ductile Iron Pipe for Water Main Systems

6. Section 02640 – Hydrants, Valves, and Appurtenances

1.2 SYSTEM REQUIREMENTS

A. Design Requirements

1. Contractor shall note that the limits of bypass setup may extend beyond the Project Limits of Work.

2. Coordinate the temporary water bypass design presented in the Contract Documents with Contractor's proposed sequencing of construction. Any modifications to the temporary water bypass design must be based on the criteria established in this Section 02736 and must be submitted for review according to Section 01300 – Submittals. No temporary bypass work may proceed without the approval of the Engineer.

3. The Contractor is responsible for confirming the locations of all dead ends and all locations which require bypass piping. Extension of bypass

to feed services fed from dead ended pipe or pipe where flow is interrupted by a division gate shall be installed at no additional cost to the Owner.

4. The number of temporary hydrants to be installed within the bypass piping system shall be equal to or exceed the number of hydrants temporarily being taken out of service.

5. The Contractor shall confirm that temporary services are provided for the customers whose permanent service line is:

   a. Out of service due to the main pipe to which it is connected is being replaced.

   b. Out of service due to the main pipe to which it is connected is being served only by the main being rehabilitated or replaced, including dead end pipes and pipes ending at division gates.

   c. Out of service for any other reason in connection with Work under this contract.

6. The bypass pipe diameter shall not be less than the sizes indicated on the Drawings and in these Specifications. In no case shall pipe diameter be less than 2 inches. All temporary hydrants must be fed by either an in-service hydrant or a direct connection to an underground water main with 4-in. minimum diameter temporary bypass piping.

7. Water for the temporary connection shall be from Owner's nearest available hydrants remaining in service.

8. The Contractor shall coordinate all work with the Owner and alarm companies.

9. The Contractor shall not install connections to residences and businesses until after the Engineer has first conducted pressure and flow baseline testing at each residence and business
.

10. Pressure testing, disinfection and chlorination testing shall be performed as described in Sections 02675 and 02704.

11. The Contractor may be required to assist the Owner when the Owner turns water services on and off. All employees and agents of the Contractor who will be entering private property as part of the water service installations shall have criminal record information check performed in accordance with the Criminal Offender Record Information (CORI) Act. Only those employees and agents who have passed the CORI background check shall be allowed to enter private property. Worker identification cards will be issued by the Town of Nantucket and must be displayed when entering private property.

12. The Contractor's water bypass system design shall be submitted as a shop drawing and no work may proceed without the approval of said shop drawing by the Engineer.

B. Performance Requirements

1. The pipe and appurtenances utilized for temporary connections shall be suitable for potable water transmission and distribution, certified for use in accordance with ANSI/NSF 61, and be capable of withstanding a service pressure of 150 psi, unless otherwise authorized by the Engineer.

2. The Contractor shall have readily available sufficient additional quantity of bypass pipe, connections, lateral and service material of suitable sizes to replace or supplement the temporary facilities in the event these prove inadequate in any way.

1.3 SUBMITTALS

A. The Contractor shall submit the following, in accordance with Article 6.17 of the General Conditions and Section 01300 – Submittals, and obtain approval from the Engineer prior to start of construction:

1. Proposed layout plan if different from the design presented in the Contract Documents.

2. Schedule for installing, operating, pressure and leakage testing, disinfection, and connecting temporary services and hydrants.

3. Identification of locations requiring connections to existing backflow prevention devices.

4. List of materials with sizes for temporary bypass, connections and services..

1.4 QUALITY ASSURANCE

A. All Shop Drawings shall be approved prior to installing bypass pipelines, connections, services, and laterals across streets.

B. All Shop Drawings shall be approved prior to removing permanent customer services, laterals and water mains from service to allow connection to temporary system.

C. All laboratory results from disinfection testing shall be approved prior to activating feed from temporary water bypass to services and returning services to the new permanent water system from the temporary system.

D. The Owner reserves the right to inspect temporary bypass piping, valves, fittings, and hydrants prior to installation and to reject any parts of the temporary bypass system that are not new or "like new" materials or in any other way potentially

compromising the ability of the system to achieve pressure, leakage, and disinfection requirements. Metallic surfaces of any component of the system exposed to drinking water shall be free from scaling, rust, and tuberculation.

E. Safety

1. The proposed temporary connections shall be capable of preventing contamination of contiguous potable water distribution system and services.
2. The Contractor shall coordinate and cooperate with the Nantucket Water Department and the Nantucket Fire Department to maintain water distribution and fire protection capability.
3. The Contractor shall be responsible to ensure that all precautions have been taken for public safety considerations.
4. The Contractor's attention is directed to requirements within the Specifications regarding water supply for Contractor's operations.
5. The Contractor's attention is directed to requirements of Section 01850 - Traffic Management regarding traffic control.

1.5 SEQUENCE

A. The Contractor shall adhere to the sequence of activities following installation of the temporary water bypass as described in Section 02616 – Ductile Iron Pipe for Water Mains, except that the Contractor is not required to use a third-party subcontractor for leakage and pressure testing of the installed temporary bypass main, provided that leakage and pressure testing results meet the requirements of Section 02704 – Pipeline Pressure and Leakage Testing. Note however that the Contractor must use a third-party subcontractor for disinfection and sampling of the temporary bypass main.

PART 2 - PRODUCTS

2.1 MATERIALS

A. All pipes, fittings, hoses, connections, temporary hydrants, and valves shall be new or “like new” materials, suitable for potable water services shall be capable of supplying a service pressure of a minimum of 150 psi, unless specified otherwise, and have prior approval of the Engineer. All metallic surfaces shall be free from scaling, rust, and tuberculation.

B. Contractor shall provide Nantucket Water Department with all necessary tools to operate valves on the temporary water bypass system in case of emergencies.

PART 3 - EXECUTION

3.1 EXAMINATION

A. The Contractor shall review Contract Drawings, service tie cards, and other available information to become familiar with the existing water systems and shall be responsible for the adequate temporary feed of all service lines, including fire services.

3.2 PREPARATION

A. The Contractor shall obtain all street opening permits and trench opening permits required by the Town and, if applicable, by the State.

B. The Contractor shall notify the Owner, the Nantucket Water Department, and the Nantucket Fire Department at least three (3) working days in advance of connecting and disconnecting temporary and permanent facilities so that representatives of the Nantucket Water Department and Nantucket Fire Department may be present at installation or removal of permanent and temporary connections and to permit the Owner to inform customers and users as the Owner deems necessary.

3.3 INSTALLATION

A. The Contractor shall furnish, install, maintain and later remove devices necessary to ensure public safety as required and as approved.

B. Excavation and backfill shall be in accordance with Section 02200 – Earthwork.

C. Only the Owner is permitted to operate the Owner's valves, stops, and hydrants. If Owner's valves, stops, or hydrants require operation, the Contractor shall notify the Owner a minimum of three (3) working days in advance. The Contractor shall not operate the Owner's valves, stops and hydrants.

D. As soon as the temporary bypass water system has been put into service, only the Owner (Nantucket Water Department) shall operate the valves, stops, and hydrants on that system, following the conditions established in Paragraph 3.3C.

E. The Contractor shall obtain approval from the Engineer before installing temporary bypass, connections, laterals, and customer services across streets.

F. Water main laterals that are to remain in service shall be connected to the temporary bypass.

G. Work on existing water mains to be in accordance with Section 02616 – Ductile Iron Pipe for Water Main and Section 02640 –Hydrants and Valves

H. Bypass piping shall be looped at all times from two separate sources with adequate supply.

I. The bypass shall be laid out of the traveled way in a manner as to protect the bypass piping from damage and keep access clear for vehicular and pedestrian traffic.

J. Where bypass has received prior approval to cross streets and street intersections, the system must include valves on both sides and pipe should be laid in a trench with temporary pavement placed over it.

K. Where the bypass crosses driveways and similar access ways to properties, suitable ramp shall be constructed of cold patch to allow driving and passing over the pipe

except where the Engineer requires bypass to be laid in a trench with temporary pavement placed over it. All bypass 4 inches in diameter and larger shall be buried to a minimum depth of 3" of cover at crossings of driveways, handicap ramps and similar access ways.

L. Install shut-off valves on the bypass approximately every 400 feet.

M. Contractor shall schedule Work such that bypass is only in service between April 1 and November 1. Furthermore, the Contractor shall be responsible for keeping the bypass from freezing using only those measures that are approved by the Owner at no additional cost to the Owner.

N. If the bypass proves inadequate for the temporary service, the Contractor shall replace or supplement the bypass as appropriate to provide adequate temporary service, including replacement with a larger diameter bypass, as approved by the Engineer and at no additional cost to the Owner.

O. Contractor shall demonstrate that all valves are operational prior to activation and that there is an adequate supply of on-site replacement material readily available in case of emergencies.

3.4 HYDRANTS

A. The Contractor shall make attachments and connections to fire hydrants and fire protection systems to permit use of fire hydrants and fire protection systems for fire-fighting purposes.

B. The Contractor shall keep existing fire hydrants in service and make appropriate connections to the bypass or install and maintain temporary fire hydrants adjacent to each existing fire hydrant affected by work until the existing fire hydrants are restored to services. All hydrants temporarily out of service shall be bagged.

C. At locations where hydrants are out of service due to Work under this Contract, the Contractor shall provide temporary hydrants. A hydrant being used to feed temporary hydrants must be fed by a 4-inch bypass pipe including whip connections.

D. The Contractor shall provide each temporary fire hydrant with individual valve control.

E. The existing hydrants to which the bypass is connected for the temporary water supply shall be flushed satisfactorily prior to making connections to prevent stagnant or discolored water from entering bypass. A separate valved connection from the steamer/pumper nozzle (4") must be supplied for fire service.

3.5 TEMPORARY SERVICE CONNECTIONS

A. The Contractor shall furnish, install, maintain and later remove the temporary service connections from the bypass to each building and service requiring temporary connection when the existing permanent main is taken out of service for replacement.

B. Refer to Paragraph 3.3 of this Section 02736 for general installation requirements.

C. Temporary service connections shall be of equal or larger size than the permanent service connections.

D. The Contractor shall coordinate temporary bypass installation activities with the Owner and Engineer, especially for the following activities that are only to be undertaken in the presence of the Owner and Engineer:

1. The Contractor shall install and maintain pressure regulators for temporary services where necessary.

2. The Contractor shall install and remove temporary service connections and back-clean permanent services.

3. The Contractor shall install temporary service connections at the sill cock or other convenient and reasonable point.

E. The Contractor shall coordinate and cooperate with the Nantucket Water Department and the Nantucket Fire Department to assure the minimum disturbance to the property owner's fire protection system and other special and automated use.

F. Contractor shall furnish temporary "wye" fittings for use at sill cocks to accommodate uses such as garden hoses.

G. Temporary water services and appurtenances shall be clearly marked by the manufacturer as suitable for potable water use.

H. Temporary and permanent service connections to existing backflow prevention devices must be coordinated in advance with the Owner.

1. The Contractor shall install the service connection from the temporary bypass main directly to the buried service, allowing continued use of the existing backflow prevention device during temporary water bypass operation.

2. The Contractor shall remove the temporary service at the buried service connection and provide a connection from that buried service to the new water main after the new main has been put into service.

3.6 OPERATION AND MAINTENANCE OF SYSTEM

A. Operation

1. After the temporary bypass system has been successfully tested and disinfected, the system will become part of the Owner's water system until it is removed from service and the new permanent system has been placed into operation. Operation of all valves and hydrants on the active temporary bypass system shall be solely by Nantucket Water Department and subject to the notification requirement in Paragraph 3.3.C of this section.

B. Maintenance

1. Maintenance of the temporary bypass system shall be the sole responsibility of the Contractor. This includes the prompt repair of any breaks or leakage observed during installation, testing, disinfection, and service.

2. Contact the Nantucket Water Department immediately whenever maintenance is required on the system. Note that only the Nantucket Water Department may operate any valve or hydrant on the system.

3.7 RESTORATION

A. After water mains are returned to service, the Contractor shall remove all temporary facilities not required for remaining work, and restore and clean up affected areas.

B. Pavement restoration to be in accordance with Section 02576 – Pavement Repair and Resurfacing.

END OF SECTION

SECTION 02750

ABANDONMENT OF EXISTING PIPE

PART 1 – GENERAL

1.1 SUMMARY OF WORK

A. Section Includes

1. Requirements for abandoning in place existing pipelines, as indicated on the Drawings and as specified herein.

2. Requirements for installing low-density cellular concrete (LDCC) in abandoned-in-place pipes, as indicated on the Drawings and as specified herein.

B. Related Sections

1. Section 01300 – Submittals

2. Section 01350 – Health and Safety Plan

3. Section 02700 – Asbestos-Cement Pipe Removal and Disposal

4. Section 02080 – Soil and Waste Management

5. Section 02140 – Dewatering and Discharge

6. Section 02200 – Earthwork

7. Section 02576 – Pavement Repair and Resurfacing

8. Section 03300 – Cast-In-Place Concrete

1.2 REFERENCES

A. American Society for Testing and Materials (ASTM)

1. C144, Standard Specification for Aggregate for Masonry Mortar.

2. C150, Standard Specification for Portland Cement.

3. C207, Standard Specification for Hydrated Lime for Masonry Purposes.

4. C495, Standard Test Method for Compressive Strength of Lightweight Insulating Concrete.

5. C796, Standard Test Method for Foaming Agents for Use in Producing Cellular Concrete Using Preformed Foam.

6. C869, Standard Specification for Foaming Agents Used in Making Preformed Foam for Cellular Concrete.

B. Guide for Cast-in-Place Low Density Cellular Concrete

1. 523.1R-06 Guide for Cast-in-Place Low Density Cellular Concrete

C. Massachusetts Department of Environmental Protection

1. Asbestos Cement Pipe Guidance Document and Conditional Enforcement Discretion, dated June 2011, amended May 22, 2015.

1.3 DEFINITIONS

A. Refer to Sections 02700 Asbestos-Cement Pipe Removal and Disposal and 02080 Soil and Waste Management.

1.4 SYSTEM DESCRIPTION

A. Abandon pipe in locations shown on Drawings, including installation of plugs and injection of LDCC as described herein. This includes batching, mixing, and placing LDCC of the appropriate density as indicated herein or as directed by the Engineer. A trained LDCC installer shall furnish labor, material, equipment, and supervision for the installation of the LDCC.

1.5 QUALITY ASSURANCE

A. The certified applicator shall be regularly engaged in the placement of lightweight fill of a similar nature.

B. Use skilled labor that is thoroughly trained, experienced, and familiar with the specified requirements and the methods for proper performance of this Work.

C. The LDCC installer shall be approved in writing by the manufacturer of the Foam Liquid Concentrate concrete additive and regularly engaged in the placement of cellular concrete.

1.6 SUBMITTALS

A. At least 15 days prior to the commencement of abandonment activities, submit three (3) copies of a detailed plan describing the proposed approach to abandoning in place each pipeline, including information identified in Paragraphs B through E at a minimum:

B. LDCC injection

1. Manufacturer’s specifications and other engineering data to demonstrate compliance with the specified requirements.

a. Catalog cut sheets

b. For mix design, documentation demonstrating the approximate compressive strength at 28 days for a specific cast density. If such documentation is unavailable or deemed insufficient by the Engineer, provide a trial batch, minimum of one cubic yard, produced and placed at an approved location to demonstrate the ability to pump the material and the material's characteristics after curing. The trial batch shall be produced with the equipment, materials, and methods intended for construction. The trial batch will be evaluated and tested by the Contractor and Engineer via split samples for as-cast density and compressive strength according to the sampling and testing requirements specified herein.

c. References from two recent similar pipe abandonment projects, including name of municipality or company; name, title; address, telephone number, and email of contact person; date of work done; and description of the work completed (distances material was pumped, type of pipe, diameter, age, etc.).

2. Technical information for equipment and operational procedures, including proposed distances material will be pumped. Provide information documenting where similar pumping methods and distances have been undertaken for pipe filling operations.

3. Projected injection rate of LDCC, injection pressures, and method of controlling injection pressure.

4. Description of bulkhead and vent installation.

5. Proposed approach using video inspection or other means to identify connections, voids, and obstructions in pipelines to be filled with LDCC. Provide documentation demonstrating where the proposed approach has been used on other projects successfully.

6. Measures to be taken to handle, store, test, and dispose of all materials to be removed from the Site during the execution of the Work. Refer to Sections 01350 – Health and Safety Plan, 02700 – Asbestos-Cement Pipe Removal and Disposal, and 02080 – Soil and Waste Management for health and safety and materials handling requirements.

7. Schedule of activities.

8. Traffic management plan.

C. Asbestos-cement Pipework

1. Refer to Section 02700 – Asbestos-Cement Pipe Removal and Disposal for all work associated with asbestos-cement pipe and asbestos-containing waste.

Provide submittals described in that section for all asbestos-cement pipe abandonment, including but not limited to qualifications of personnel, the Asbestos Notification Form (ANF), and project-specific Non-Traditional Asbestos Work Plans.

D. Product data for proposed plugs and clamps.

E. Design information for LDCC, including but not limited to the following:

1. Manufacturer's specifications, catalog cut sheets, and other engineering data to demonstrate compliance with the specified requirements.

2. References from two recent similar pipe abandonment projects, including name of municipality or company; name, title; address, telephone number, and email of contact person; date of work done; and description of the work completed (distances material was pumped, type of pipe, diameter, age, etc.).

3. Unconfined compressive strength, including at least three (3) acceptable strength tests.

F. Submit daily injection reports describing the work performed during the execution of injection of fill material in abandoned pipelines, including the following at a minimum:

1. Date.

2. Length of pipeline filled.

3. Calculations of the amount of pipeline filled and remaining void space.

4. Materials removed from the Site.

5. Test results of materials and soil removed from the Site.

6. Locations at which materials and soil are stored or disposed, including waste shipment records (when applicable).

PART 2 – PRODUCTS

2.1 PLUGS

A. General

1. Plugs shall meet the following thickness requirements:

Pipe Diameter	Thickness of Plug Concrete	Brick & Mortar
8 inches or smaller	12-inch	Not permitted
8 to 15 inches	12-inch	8-inch
15 to 30 inches	24-inch	16-inch
Greater than 30 inches	36-inch	24-inch

2. For non-circular pipes, the largest cross-sectional dimension shall govern in determining the thickness of the plug.

3. Bricks with more than one layer of thickness shall be interlocked.

4. Mechanical plugs will not be allowed.

B. Brick

1. Sound, hard, and uniformly burned brick, regular and uniform in shape and size, of compact texture, and satisfactory to the Engineer.

2. In accordance with ASTM C32, Red Sewer Brick Only Grade SS.

3. In accordance with AASHTO M91-42, Red Sewer Brick Only Grade SS.

C. Mortar for Brickwork

1. Composed of Portland cement, hydrated lime, and sand in which the volume of sand shall not exceed three times the sum of the volume of potable water, cement, and lime.

2. The proportions of cement and lime shall be 1:1/2.

3. Cement shall be Type II Portland cement in accordance with ASTM C150.

4. Hydrated lime shall be Type S conforming to the ASTM C207.

5. Hydrated lime shall be "Mortaseal" manufactured by U.S. Gypsum, "4X Hydrate" manufactured by the New England Lime Company, or approved equal.

6. The sand shall conform to ASTM C144.

2.2 EQUIPMENT

A. Materials

1. The specialized batching, mixing, and placing equipment shall be automated and certified for the purpose by the manufacturer of the cellular concrete material.

2. Ready-mix drum-delivered cellular concrete, or mixing using bagged cement is not permitted

2.3 LOW-DENSITY CELLULAR CONCRETE (LDCC)

A. Materials

1. Foam Liquid Concentrate shall be supplied by Aerix Industries or equal and shall comply with the standard specifications of ASTM C 869 when tested in accordance with provisions of ASTM C 796.

2. Cement: The Portland cement shall comply with ASTM C 150.

3. Other supplemental cementitious material such as fly ash may be used when approved by the Engineer. Supplementary cementitious materials shall be tested prior to the start of the project for compatibility with the foaming agent and must conform to ASTM C618

4. Admixtures: Admixtures for accelerating, water reducing, and other specific properties may be used when specifically approved by the Engineer. Admixtures shall be tested prior to the start of the Project for compatibility with the foaming agent.

5. Water: Use water that is potable and free from deleterious amounts of alkali, acid, and organic materials, which would adversely affect the setting or strength of the LDCC.

B. Properties

Lightweight Cellular Concrete Classes. The minimum cast density of the LDCC shall be 30 pounds per cubic foot and shall have a minimum compressive strength according to ASTM C796 and ASTM C495 of 120 psi at 28 days.

PART 3 – EXECUTION

3.1 ASBESTOS-CEMENT PIPE

A. Cutting, handling, and removal of any asbestos-cement pipe shall be as specified in Section 02700 – Asbestos-Cement Pipe Removal and Disposal.

3.2 CUTTING AND CAPPING OF MAINS

A. Abandoned water mains shall not be cut, plugged, or abandoned until after replacement water main has been constructed, tested, and brought into service to all

services previously connected to the abandoned main.

B. Install plug and concrete thrust block and make cut at the pipe to be filled.

C. After the pipe to be abandoned has been cut and capped, check for other sources feeding the abandoned pipe. Notify the Owner immediately if other sources are found. Cut and cap other sources after notification to the Owner.

D. Plug or cap ends or opening in the abandoned pipe. Pipes 8 inches in diameter or smaller shall be plugged with a precast concrete plug. After plugging or capping, install concrete or chemical grout sealant around the cap or plug and over the pipe to prevent groundwater from penetrating into the pipe.

E. Provide fill and vent connections at the ends of each segment to be filled.

F. Identify location of the exposed pipe on Record Documents, including GIS coordinates, elevation, and distances from features such as buildings, monuments, manhole covers, and valve box covers.

G. Backfill as specified in Section 02200 – Earthwork.

H. Replace pavement as specified in Section 02576 – Pavement Repair and Resurfacing and as shown on the Drawings.

3.3 PREPARATION FOR ABANDONMENT USING LDCC

A. Remove water in the abandoned pipeline section prior to filling. Dispose of water as specified in Sections 02080 – Soil and Waste Management and Section 02140 – Dewatering and Discharge.

B. Confirm that the interior of each segment to be filled with LDCC is free of openings and obstructions. Provide a copy of all video recordings to the Engineer and Owner for review in advance of inserting LDCC in any pipeline segment.

C. Submit mix design reports for LDCC according to Paragraph 1.6 of this section and Section 1300 - Submittals. Notify the Owner at least 24 hours in advance of inserting LDCC in any pipeline segment.

D. Contractor shall clearly demonstrate prior to filling that the equipment proposed for use in filling will not damage adjacent underground utilities and structures. Contractor shall also identify the pressures at which the equipment will be operated to preserve the structural integrity of the abandoned pipeline and adjacent new or existing utilities and structures.

3.4 WEATHER CONDITIONS

A. Avoid freezing before the initial set of LDCC occurs.

B. Do not place at air temperatures lower than 35 degrees Fahrenheit or when freezing

conditions are expected in less than 24 hours.

C. The temperature of the lightweight cellular concrete at point of discharge shall be a minimum of 45 °F (7 °C) and a maximum of 95 °F (35 °C).

D. Avoid freezing before the initial set of LDCC occurs.

E. If these conditions cannot be met, consult manufacturer of foam concentrate admixture to determine precautions necessary to assure acceptable installation.

3.5 MIXING AND CONVEYING

A. Use job site proportioning, mixing, and placing equipment required by the manufacturer of foam liquid concentrate to meet the planned placement of LDCC in the pipe segment(s) to be filled.

B. Mix the materials according to the mix design and convey promptly to point of final placement.

C. Avoid excess handling of LDCC according to industry standards.

3.6 QUALITY CONTROL SAMPLING AND TESTING

A. During placement of the initial batches, check the density and adjust the mix as required to obtain the specified cast density at the point of placement per ASTM C495.

3.7 RESTORATION AND SITE CLEANUP

A. The following shall be completed at the end of each pipe-segment filling operation:

1. Confirm that each end of the segment is completely plugged.

2. Remove pipe-filling connections that are above ground surface to 18 inches below finish grade in roadway and 6 inches below unpaved areas.

3. Backfill all excavated areas as described in Section 02200 – Earthwork.

4. Provide temporary and final paving according to Section 02576 – Pavement Repair and Resurfacing or landscaping as described in Section 02920 – Topsoil and Section 02945 - Turf, whichever is applicable, and as shown on the Drawings.

5. Collect, store, transport, and dispose of excess LDCC material and other debris as specified in Section 02080 – Soil and Waste Management. Asbestos-cement material shall be handled as specified in Section 02700 – Asbestos-Cement Pipe Removal and Disposal.

END OF SECTION

SECTION 02901

MISCELLANEOUS WORK AND CLEANUP

PART 1 – GENERAL

1.1 SCOPE OF WORK

A. Furnish all labor, materials, equipment and incidentals required to do the miscellaneous work not specified in other sections but obviously necessary for the proper completion of the work as shown on the Drawings.

B. When applicable the Contractor shall perform the work in accordance with other sections of this Specification. When no applicable specification exists the Contractor shall perform the work in accordance with the best modern practice and/or as directed by the Engineer.

C. The work of this Section includes, but is not limited to, the following:

1. Crossing and relocating existing utilities.

2. Cleaning up.

3. Incidental work.

4. Protection and/or removal and reinstallation of existing signs, lampposts, fence posts, fencing and mailboxes.

5. Protection and bracing of utility poles.

6. Raking and re-seeding of grassed areas disturbed during construction and/or dewatering activities, including silt basin/dewatering activity areas. Loam and seed placed on the utility trench area will be paid under the Restoration of Growth Item in the Bid Form.

7. Restoration of private property to pre-construction condition

PART 2 – PRODUCTS

2.1 MATERIALS

A. Materials required for this Section shall be the same quality of materials that are to be restored. Where possible, the Contractor may re-use existing materials that are removed.

PART 3 – EXECUTION

3.1 CROSSING AND RELOCATING EXISTING UTILITIES

A. This Item includes any extra work required in crossing culverts, water courses, including brooks and drainage ditches, storm drains, gas mains, water mains, electric, telephone, gas and water services and other utilities. This work shall include but is not limited to the following: bracing, hand excavation and backfill (except screened gravel) and any other work required for crossing the utility or obstruction not included for payment in other items of this specification. Notification of Utility Companies shall be required prior to work being done, as specified in Section 01046 – Control of Work.

B. In locations where existing utilities cannot be crossed without interfering with the construction of the work as shown on the Drawings, the Contractor shall remove and relocate the utility as directed by the Engineer or cooperate with the Utility Companies concerned if they relocate their own utility.

C. At pipe crossings and where designated by the Engineer, the Contractor shall furnish and place screened gravel bedding so that the existing utility or pipe is firmly supported for its entire exposed length. The bedding shall extend to the mid-diameter of the pipe crossed. Payment for screened gravel at pipe crossings will be made according to the unit price bid established in the Bid Form.

3.2 CLEANING UP

A. The Contractor shall remove all construction material, excess excavation, buildings, equipment and other debris remaining on the job as a result of construction operations and shall restore the site of the work to a neat and orderly condition. Any materials, and sand or concrete materials shall be cleaned out of the manholes and catch basins. Haybales and siltfence as well as any silt and debris retained by same shall be removed upon approval from the Engineer and Conservation Commission.

3.3 INCIDENTAL WORK

A. Do all incidental work not otherwise specified, but obviously necessary to the proper completion of the Contract as specified and as shown on the Drawings.

3.4 RESTORATION AND REPLACEMENT OF SIGNS, LAMPPOSTS, FENCE POSTS, FENCING AND MAILBOXES

A. Existing signs, lamp posts, fence posts, fencing and mailboxes which may be damaged by the Contractor or removed by the Contractor during the course of construction shall be reinstalled in a vertical position at the same location from which they were removed. Damaged items shall be replaced with an item equal to or better than the damaged items. A concrete anchor shall be provided as necessary, at no additional cost, to ensure a rigid alignment. Care shall be exercised in the reinstallation of all items to prevent damage to the new construction.

3.5 PROTECTION AND BRACING OF UTILITY POLES

A. The Contractor shall be responsible for making all arrangements with the proper utility companies for the bracing and protection of all utility poles that may be damaged or endangered by the Contractors operations. Work under this item shall include the

related removal and reinstallation of guy wires, or support poles whether shown on the Drawings or not.

3.6 RAKING AND RE-SEEDING

A. Grass and landscaped areas disturbed by the Contractor shall be raked and replenished with loam if required. Place topsoil to a minimum depth of 4 inches for areas disturbed by Contractor's construction operations. Spread evenly and grade to elevations and slopes shown. Hand rake areas inaccessible to machine grading. Use all available on-site stockpiled topsoil and supplement with off-site topsoil as required.

B. Areas shall be re-seeded as directed by the Engineer. Seed mixture shall be fresh, clean, new crop seed. Grass shall be of the previous year's crop and in no case shall the weed seed content exceed 0.25% by weight. The seed shall be furnished and delivered in new, clean, sealed and properly labeled containers. All seed shall comply with State and Federal seed laws. Submit manufacturer's Certificate of Compliance. Seed that has become wet, moldy or otherwise damaged shall not be accepted.

END OF SECTION 02901

SECTION 02920

TOPSOIL

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplemental Conditions, Division 0 and Division 1 Specification Sections, apply to this section. Related Sections include the following:

1. Section 02200 – Earthwork

2. Section 02945 – Turf

1.2 SUMMARY OF WORK

A. The work of this section consists of manufacturing, delivering, and placing 6" of topsoil on prepared subgrade areas disturbed by construction. Topsoil, as available, may be stripped, screened, stockpiled and tested for reuse. Topsoil requirements in excess of available on-site will be imported. Both sources will be placed in compliance with this section.

1.3 SUBMITTALS

A. In accordance with Section 01300 - Submittals. Submit soil analysis report for imported topsoil from the State University Agricultural Extension Service or other approved soil testing laboratory. Report shall cover soil textural classification (percentages of sand, silt, and clay) and include additive recommendations for lawn areas. Field methods of analysis are acceptable, but laboratory report is preferred.

1.4 PRODUCT HANDLING

A. Do not deliver topsoil in frozen, wet, or muddy condition.

PART 2 - MATERIALS

2.1 IMPORTED TOPSOIL

A. Friable loam, typical of fertile local topsoil; free-from pure clay, weeds, noxious weed seeds, sod, clods and stones larger than 1 inch, toxic substances, litter, or other deleterious material; having a pH between 5.5 and 7.0. Soluble salts shall not exceed 4 milli-mhos per centimeter.

B. Loam borrow shall conform to MassDOT Standard Spec. M1.05.0 or shall be the product of a commercial sand and gravel processing facility. It shall be uncontaminated by saltwater, foreign matter, or substances harmful to plant growth. The acidity range of the Loam Borrow shall be pH 5.5 to 7.0.

C. Soil Texture: 20 to 40% fines (silt and clay fraction passing the 200 sieve) and 60 to 80% Sand and gravel. The maximum particle size shall be 1-inch.

D. Organic Content: 5 to 10%

E. Additives: As required by soil analysis of Topsoil for lawn areas.

PART 3 - EXECUTION

3.1 PLACING TOPSOIL

A. Scarify compacted subgrade to a 2-inch depth to bond topsoil to subsoil. Place topsoil to a minimum depth of 6 inches for outside disturbed areas as shown on the Drawings. Spread evenly and grade to elevations and slopes shown. Hand rake areas inaccessible to machine grading. Use all available on-site stockpiled topsoil and supplement with off-site topsoil as required, including amendments.

END OF SECTION 02920

SECTION 02945

TURF

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplemental Conditions, Division 0 and Division 1 Specification Sections, apply to this section. Related Sections include the following:

1. Section 02920 – Topsoil

B. Examine all Contract Documents and all other Sections of the Specifications for requirements therein affecting the work of this trade.

1.2 SUMMARY OF WORK

A. The work of this Section consists of providing all labor, equipment, materials, incidental work, and construction methods necessary to perform all lawn installation and fine grading work and related items as indicated on the Contract Documents and/or as specified in this Section and includes, but is not necessarily limited to, the following:

1. Seeding

2. Maintenance and protection

1.3 SUBMITTALS

A. At least 90 days prior to the first day of the seeding season described in this Section, submit to the Engineer proof of certification of Foreman or Crew Leader as Massachusetts Certified Landscape Professional or Massachusetts Certified Horticulturist in accordance with QUALITY ASSURANCE paragraph of this Section.

B. Submit proof of landscape contractor's experience to the Engineer in accordance with QUALITY ASSURANCE paragraph of this Section.

C. At least 30 days prior to intended use, the Contractor shall provide the following samples and submittals for approval in conformance with the requirements of Section 01300 - Submittals. Do not order materials until Engineer's approval of samples, certifications or test results has been obtained. Delivered materials shall closely match the approved samples. Acceptance shall not constitute final acceptance. The Engineer reserves the right to reject on or after delivery any material that does not meet these Specifications. Seed shall be approved by the Owner and the Engineer prior to installation,

1. Material Sampling and Testing of Loam Borrow from On-Site or Off-Site Sources shall be specified, performed and paid for under Division 2 Section 02920 - Topsoil (Outside Disturbed Areas), of this Specification.

2. Fertilizer:

   a. Submit product literature of seeding fertilizer and certificates showing composition and analysis.
   b. Submit the purchasing receipt showing the total quantity purchased for the project prior to installation.

3. Seed: Submit a manufacturer's Certificate of Compliance to the Specifications with each shipment of each type of seed. These certificates shall include the guaranteed percentages of purity, weed content and germination of the seed, and also the net weight and date of shipment. No seed may be sown until the Contractor has submitted the certificates.

4. Hydroseeding: Prior to the start of hydroseeding, submit a certified statement for approval as to the number of pounds of materials to be used per 100 gallons of water.

5. Wood Cellulose Fiber Mulch: Submit electronic PDF of manufacturer's literature and one material sample.

6. Limestone: Submit supplier's certification that the limestone being supplied conforms to these Specifications.

7. All additives needed to amend a specific soil in order to meet these specifications.

D. Maintenance Instructions: At the time of Acceptance, the Contractor shall submit complete maintenance instructions for turf care for the Owner's use. The instructions shall be reviewed for approval by the Engineer as a pre-condition for Acceptance.

1.4 EXAMINATION OF CONDITIONS

A. All areas to be improved shall be inspected by the Contractor before starting work and any defects such as incorrect grading, or drainage problems shall be reported to the Engineer prior to beginning this work. The commencement of work by the Contractor shall indicate his acceptance of the areas to be improved, and he shall assume full responsibility for the work of this Section.

B. The Contractor shall be solely responsible for judging the full extent of work requirements involved.

1.5 QUALITY ASSURANCE

A. Qualification of Landscape Contractor: The work shall be performed by a landscape contracting firm which has successfully installed work of a similar quality, schedule requirement, and construction detailing with a minimum of five years experience. Proof of this experience shall be submitted per SUBMITTALS paragraph of this Section.

B. Qualification of Foreman or Crew Leader: All work of seeding shall be supervised by a foreman or crew leader who is a certified landscape professional or a certified horticulturist.

1. Landscape professional shall be a Massachusetts Certified Landscape Professional certified by the Associated Landscape Contractors of Massachusetts.

2. Horticulturist shall be a Massachusetts Certified Horticulturist as certified by the Massachusetts Nursery and Landscape Association.

3. Certification shall be current. Proof of certification shall be submitted per SUBMITTALS paragraph of this Section.

C. The ratio of laborers to certified landscape professionals or certified horticulturist shall not exceed twelve to one. Certified Landscape Professional or Certified Horticulturist shall be on the project site throughout the day to day performance of the work described in this Section.

PART 2 - PRODUCTS

2.1 LOAM

A. Loam borrow shall be specified, provided, installed, and paid for under Section 02920 - Topsoil, of this Specification.

2.2 SOIL ADDITIVES

A. Soil additives shall be as specified under Section 02920 – Topsoil, except for additional applications of fertilizer that shall be as specified under this Section, based upon recommendations from soil analysis and testing as specified.

2.3 SEED

A. Seed mixture shall be fresh, clean, new crop seed. Grass shall be of the previous year's crop and in no case shall the weed seed content exceed 1% by weight. The seed shall be furnished and delivered in the proportion specified below in new, clean, sealed and properly labeled containers. All seed shall comply with State and Federal seed laws. Submit manufacturer's Certificates of Compliance. Seed that has become wet, moldy or otherwise damaged shall not be acceptable. Seed containing endophyte must be kept cool and dry at all times; do not stockpile in the sun.

1. Seed Mixture Composition for disturbed areas:

Common Name	Proportion By Weight	Germination Minimum	Purity Minimum
Red Fescue	60%	85%	95%
Kentucky Bluegrass	20%	85%	95%
Red Top	20%	90%	95%

a. All grass varieties shall be within the top 50 percent of varieties tested in National Turfgrass Evaluation Program, or currently recommended as low maintenance varieties by University of Massachusetts or the University of Rhode Island.

b. Seeding rate shall be 6 pounds per 1,000 square feet.

B. Seed may be mixed by an approved method on the site or may be mixed by a dealer. If the seed is mixed on the site, each variety shall be delivered in the original containers that shall bear the dealer's guaranteed analysis. If seed is mixed by a dealer then the Contractor shall furnish the Engineer the dealer's guaranteed statement of the composition of the mixture.

2.4 FERTILIZERS

A. Fertilizer shall be a commercial product complying with the State and United States fertilizer laws. Deliver to the site in the original unopened containers that shall bear the manufacturer's certificate of compliance covering analysis. Fertilizer shall contain not less than the percentages of weight of ingredients as recommended by the soil analysis specified under Section 02920.

2.5 LIMESTONE

A. Ground limestone for adjustment of loam borrow pH shall contain not less than 85 percent of total carbonates and shall be ground to such fineness that 40 percent will pass through 100 mesh sieve and 95 percent will pass through a 20 mesh sieve. Contractor shall be aware of loam borrow pH and the amount of lime needed to adjust pH to specification in accordance with testing lab recommendations.

2.6 WOOD CELLULOSE FIBER MULCH

A. Mulch to cover hydroseeded areas with slopes less than 3 to 1 shall be fiber processed from whole wood chips and clean recycled newsprint in a 1:1 proportion manufactured specifically for standard hydraulic mulching equipment. Fiber shall not be produced from recycled material such as sawdust, paper, or cardboard.

B. Moisture content shall not exceed 10 percent, plus or minus 3 percent as defined by the

pulp and paper industry standards. Fiber shall have a water holding capacity of not less than 900 grams water per 100 grams fiber.

C. The mulch shall be of such character that the fiber will be dispersed into a uniform slurry when mixed with water. It shall be nontoxic to plant life or animal life.

D. The mulch shall contain a non-petroleum based organic tackifier and a green dye to allow for easy visual metering during application but shall be non-injurious to plant growth.

2.7 HERBICIDES, CHEMICALS AND INSECTICIDES

A. Provide chemicals and insecticides as needed for fungus or pest control. All chemicals and insecticides shall be approved by the Massachusetts Department of Food and Agriculture for the intended uses and application rates.

B. Provide post-emergent crab grass control throughout the maintenance period to ensure a germinated and mown lawn free of crab grass.

2.8 WATER

A. The Contractor may use water provided by the Town upon request and approval of the DPW, if available. The Contractor shall responsible to furnish his own supply of water to the site at no additional cost to the Owner. If Town water is not available, the Contractor shall be responsible to furnish adequate supplies at his own cost. All work injured or damaged due to the lack of water or use of too much water, shall be the Contractor's responsibility to correct. Water shall be free from impurities injurious to vegetation. The Contractor's use of Town water shall be at his own risk.

PART 3 - EXECUTION

3.1 FILLING AND COMPACTION

A. Filling and compaction of loam shall be as specified under Section 02920 - Topsoil.

3.2 FINE GRADING

A. Fine grading shall be specified, performed and paid for under the work of the Division 2 Sections Earthwork and Topsoil, of this Specification.

3.3 SEEDING

A. Contractor shall obtain Engineer's written approval of fine grading and bed preparation before doing any seeding.

B. Limit of proposed grading shall be limit of seeding unless otherwise indicated on the Contract Documents. All lawn areas disturbed outside the limit of seeding shall be

prepared and seeded as specified herein at no additional cost.

C. The season for seeding shall be from April 1 to May 31 and from August 15 to September 30. The actual planting of seed shall be done, however, only during periods within this season which are normal for such work as determined by weather conditions and by accepted practice in this locality. To prevent loss of soil via water and wind erosion and to prevent the flow of sediment, fertilizer, and pesticides onto roadways, sidewalks, and into catch basins, seed loam areas within 5 Days of spreading the loam.

D. Seed only when the bed is in a friable condition, not muddy or hard.

E. Seeding of Disturbed areas shall be by Hydroseeding Method specified as follows:

1. Prior to the start of work, furnish a certified statement as to the number of pounds of materials to be used per 100 gallons of water. This statement shall also specify the number of square feet of hydroseeding that can be covered with the quantity of solution in the hydroseeder.

2. Hydroseed with wood cellulose fiber mulch at a rate as designated above in Part 2 – PRODUCTS.

3. For the hydroseeding process, a mobile tank with a capacity of at least 500 gallons shall be filled with water and the mixture noted above in the specified proportions. The resulting slurry shall be thoroughly mixed by means of positive agitation in the tank. Apply the slurry by a centrifugal pump using the hose application techniques from the mobile tank. Only hose application shall be permitted. At no time shall the mobile tank or tank truck be allowed onto the prepared hydroseed beds. The hose shall be equipped with a nozzle of a proper design to ensure even distribution of the hydroseeding slurry over the area to be hydroseeded and shall be operated by a person thoroughly familiar with this type of seeding operation.

4. Contractor shall obtain Engineer's written approval of fine grading and bed preparation before doing any hydroseeding.

5. Limit of work shall be limit of hydroseeding unless otherwise indicated on the Contract Documents. All lawn areas disturbed outside the limit of hydroseeding shall be hydroseeded.

6. Seed only when the bed is in a friable condition, not muddy or hard. Construction methods shall conform to hydraulic method requirements specified in the Standard Specification.

7. Hydroseeding shall be a two-step process.

a. Step one shall consist of spreading 100 percent of the required seed uniformly over the prepared loam bed so that the seed comes into direct

contact with the soil. To mark the progress of the hydroseeding operation the Contractor may add 10 percent of the wood cellulose fiber mulch to the slurry.

b. Step two shall consist of a separate application of wood cellulose fiber mulch immediately following the first step of hydroseeding noted above. Apply the wood cellulose fiber mulch at a rate of 2,000 pounds per acre.

3.4 TURF MAINTENANCE

A. Maintenance shall begin immediately after any area is seeded or sodded and shall continue for a 60 day active growing period for seeded areas or until Final Acceptance, whichever is longer following the completion of all lawn construction work, and until final acceptance of the project. In the event that seeding operations are completed too late in the fall for adequate germination and growth of grass, then maintenance shall continue into the following Spring for the minimum 60 Day period and including the One (1) Year Maintenance Period.

B. Maintenance shall include re-seeding, two (2) mowings, watering, weeding, fertilizing a minimum of two times in addition to the fertilizer incorporated by harrowing into the spread loam, and resetting and straightening of protective barriers. Lawn work maintenance shall also include chemical treatments as required for fungus and/or pest control.

C. During the maintenance period, any decline in the condition of turf areas shall require immediate action to identify potential problems and to undertake corrective measures.

D. Watering shall be done in a manner that will provide uniform coverage, prevent erosion due to application of excessive quantities over small areas, and prevent damage to the finished surface by the watering equipment.

1. The Contractor shall provide all labor and arrange for all watering necessary to establish an acceptable lawn. In the absence of adequate rainfall, watering shall be performed daily or as often as necessary to maintain moist soil to a depth of at least two (2) inches for seeded areas and four (4) inches for sodded areas. At no time shall a tank truck be allowed on the reseeded/re-sodded beds.

2. Watering shall be done in a manner that will provide uniform coverage, prevent erosion due to application of excessive quantities over small areas, and prevent damage to the finished surface by the watering equipment. The Contractor shall furnish sufficient watering equipment to apply water to the required soil depths each 8-hour period.

E. After the grass in seeded areas has germinated, reseed all areas and parts of areas that fail to show a uniform stand of grass. Reseed such areas and parts of areas repeatedly until all areas are covered with a satisfactory growth of grass with no less than 20 grass shoots per square inch and 2880 grass shoots per square foot. Reseeding together with

necessary grading, fertilizing, and trimming shall be done at the Contractor's expense.

F. Mowing and Edging:

1. The Contractor shall keep lawn areas mowed until Acceptance of the contract by cutting to a height of two (2) inches when growth reaches three (3) inches or as directed by the Engineer.

2. At each mowing, all edges of walks, drives, plant beds and other border conditions shall be edge trimmed by hand or machine to produce straight and uniform edge conditions.

3. Remove and discard from paved areas only clippings and debris generated by each mowing and edging operation legally off-site. Engineer, if practical and aesthetic, may allow sweeping (not blowing) clippings back into grass. Mowers shall be equipped with mulching blades. Do not remove from grass areas any clippings that have been generated by mowing operations. Do not mow grass when wet.

G. Fertilizing for seeded lawns: The first application of fertilizer is specified, provided, performed, and paid for under Section 02920 - Topsoil. A second application of fertilizer shall be applied to seeded areas at the time of the first mowing and shall be performed under this Division 2 Section, Turf. This second application shall be applied at a rate that ensures that one-half pound of nitrogen is applied per 1,000 square feet. Phosphorus and potassium shall be applied proportionally in accordance with the recommendations of the soil tests and the quantities previously integrated into the soil during the first application. A third application of nitrogen fertilizer shall be applied to seeded areas approximately two months after the second application. This third application shall correspond to the following application rates dependent upon the month of application.

1. May 1-15: Apply 1.0 pound of nitrogen per 1,000 square feet.

2. June 15-30: Apply 1.0 pound of nitrogen per 1,000 square feet.

3. August 15 through September 15: Apply 1.0 pound of nitrogen per 1,000 square feet.

4. November 1-15: Apply 1.5 pounds of nitrogen per 1,000 square feet.

**Nitrogen fertilizer shall be composed of 50 percent slowly soluble or slow release nitrogen fertilizer.

3.5 APPLYING LIMESTONE

A. The Contractor shall return to the site at the beginning of the next seeding season as specified above and spread limestone across all lawn areas installed under this

Contract. Limestone shall be spread at rates determined by the soil tests specified.

3.6 ACCEPTANCE

A. Following the minimum required maintenance periods for lawn construction, the Contractor shall request the Engineer in writing for a formal inspection of the completed work. Request for inspection shall be received by the Engineer at least 10 days before anticipated date of inspection.

B. Acceptance Requirements:

1. At the end of the maintenance period, seeded areas shall have a close stand of grass as defined above with no weeds present and no bare spots greater than 3 inches in diameter over greater than 5 percent of the overall seeded area. At least 90 percent of the grass established shall be permanent grass species. If seeded areas are deficient, the Contractor's responsibility for maintenance of all seeded areas shall be extended until deficiencies are corrected. Seeded areas to be corrected shall be prepared and reseeded in accordance with the requirements of this Section.

C. Furnish full and complete written instructions for maintenance of the lawns to the Owner at the time of acceptance in conformance with Submittals requirements.

D. Engineer's inspection shall determine whether maintenance shall continue in any part.

3.7 CLEAN UP

A. Absolutely no debris may be left on the site. Excavated material shall be removed as directed. Repair any damage to site or structures to restore them to their original condition, as directed by the Engineer, at no cost to the Owner.

END OF SECTION 02945

DIVISION 3

CONCRETE

INDEX

Section	Title	Page
03300	Concrete	03300-1

SECTION 03300

CONCRETE

PART 1 - GENERAL

1.1 GENERAL PROVISIONS

A. Drawings and general provisions of the Contract, including General and Supplemental Conditions, Division 0 and Division 1 Specification Sections, apply to this section.

1.2 DESCRIPTION OF WORK

A. Work Included: Provide labor, materials, and equipment necessary to complete the work of this section, including, but not limited to the following:

1. Cast-in-place concrete.

2. Mix designs or use of bagged manufactured grouts and repair mortars and concrete

3. Application of proprietary bonding agents prior to placement of CIP concrete or repair mortars

4. Reinforcing and placement of same

B. Related Work: The following items are not included in this section and will be performed under the designated section:

1. Division 2 Site Construction.

2. Items furnished under other sections and installed under this section include, but are not limited to: items embedded in concrete, including anchors, sleeves, and other miscellaneous metals.

C. References

1. The following standards form a part of these specifications.

2. Where reference is made to one the following standards, the revisions and latest copy in effect at the time of bid opening shall apply.

American Concrete Institute (ACI)

ACI 301	Structural Concrete for Buildings
ACI 302	Recommended Practice for Concrete Floor and Slab Construction
ACI 304	Recommended Practice for Measuring, Mixing, Transporting and Placing Concrete

ACI 304.2R	Placing Concrete by Pumping Methods
ACI 305	Recommended Practice for Hot Weather Concreting
ACI 306	Recommended Practice for Cold Weather Concreting
ACI 318	Building Code Requirements for Reinforced Concrete
ACI 350	Environmental Engineering Structures

American Society for Testing and Materials (ASTM)

ASTM C31	Making and Curing Concrete Test Specimen
ASTM C33	Concrete Aggregates
ASTM C39	Compressive Strength of Cylindrical Concrete Specimens
ASTM C42	Obtaining and Testing Drilled Cores and Sawed Beams of Concrete
ASTM C87	Effect of Organic Impurities in Fine Aggregate on Strength of Mortar
ASTM C94	Ready-Mixed Concrete
ASTM C143	Standard Method for Slumps of Portland Cement Concrete
ASTM C150	Portland Cement
ASTM C171	Sheet Materials for Curing Concrete
ASTM C231	Air Content of Freshly Mixed Concrete by the Pressure Method
ASTM C260	Air-Entraining Admixtures for Concrete
ASTM C309	Liquid Membrane-Forming Compounds for Curing Concrete
ASTM C494	Chemical Admixtures for Concrete
ASTM D412	Vulcanized Rubber and Thermoplastic Rubbers and Termoplastic Elastomers - Tension
ASTM D4397	Polyethylene Sheeting for Construction, Industrial, and gricultural Applications

Corps of Engineers (COE)

COE CRD C572 Specifications for Polyvinylchloride Waterstop

1.3 SUBMITTALS

A. Contractor shall submit design mixtures for concrete, product data for all additives, and product data for concrete accessories.

B. American Iron and Steel (AIS) Certifications as required by Special Conditions – American Iron and Steel Provisions Section 00826.

1.4 QUALITY ASSURANCE

A. Codes and Standards: Comply with provisions of following codes, specifications, and standards, except where more stringent requirements are shown or specified:

1. Massachusetts State Building Code (MSBC), Seventh Edition
2. American Concrete Institute (ACI):
   a. ACI 117 Standard Specifications for Tolerances for Concrete Construction and Materials
   b. ACI 211 Standard Practice for Selecting Proportions for Normal,

Heavyweight, and Mass Concrete

c. ACI 212 Chemical Admixtures for Concrete
d. ACI 221 Guide for Use of Normal Weight Aggregates in Concrete
e. ACI 301 Specifications for Structural Concrete for Buildings
f. ACI 302 Guide for Concrete Floor and Slab Construction
g. ACI 304 Guide for Measuring, Mixing, Transporting and Placing Concrete
h. ACI 305 Hot Weather Concreting
i. ACI 306 Cold Weather Concreting
j. ACI 308 Standard Practice for Curing Concrete
k. ACI 315 Details and Detailing of Concrete Reinforcement
l. ACI 318 Building Code Requirements for Reinforced Concrete
m. ACI 347 Guide to Formwork for Concrete
n. ACI 350 Environmental Engineering Structures

3. American Society for Testing and Materials (ASTM):
   a. ASTM A615 Deformed and Plain Billet – Steel Bars for Concrete Reinforcement
   c. ASTM A706 Low Alloy Steel Deformed Bars for Concrete Reinforcement
   d. ASTM C31 Fabrication and Curing of Concrete Test Specimens.
   e. ASTM C33 Concrete Aggregates
   f. ASTM C39 Compressive Strength of Cylindrical Concrete Specimens
   g. ASTM C94 Ready-Mixed Concrete
   h. ASTM C143 Standard Method for Slumps of Portland Cement Concrete
   i. ASTM C150 Portland Cement
   j. ASTM C171 Sheet Materials for Curing Concrete
   k. ASTM C172 Sampling Freshly Mixed Concrete
   l. ASTM C231 Air Content of Freshly Mixed Concrete by the Pressure Method
   m. ASTM C260 Air-Entraining Admixtures for Concrete
   n. ASTM C309 Liquid Membrane-Forming Compounds for Curing Concrete
   o. ASTM D412 Vulcanized Rubber and Thermoplastic Rubbers and Thermoplastic Elastomers – Tension
   p. ASTM C494 Chemical Admixtures for Concrete
   q. ASTM D4397 Specification for Polyethylene Sheeting for Construction, Industrial and Agricultural Applications

4. National Ready-Mixed Concrete Association
   a. NRMCA CPMB 100 Concrete Plant Standards

1.5 DELIVERY, STORAGE AND HANDLING

A. Supply labor, materials, and equipment to the Project at such intervals to ensure

uninterrupted progress of the work.

B. Deliver, store and handle materials to eliminate contamination, segregation, damage and deformation. Store materials off the ground on wood dunnage of sufficient height to prevent surface water from coming into contact with stored materials. Materials shall be stored in such a way as to be protected from the elements with waterproof coverings, positioned to provide drainage, and be ventilated to avoid condensation.

C. Materials that would be damaged by contact with water or sunlight shall be stored in a closed, protective environment.

D. Do not deliver concrete to the Project until ready for concrete placement with the exception of pre-blended bagged mixes which shall not be opened and prepared until forms and other such supportive construction and work has been readied for placement. General Contractor shall note the mix time limits for either cast-in-place or pre-blended preparations and arrange for delivery accordingly.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Concrete:

1. Portland Cement:

a. The cement shall be an approved brand of American manufactured Portland Cement, Type I or II conforming to ASTM Cl50. The brand name and type of cement proposed for use shall be submitted to the Engineer for review immediately following award of contract. Only one color of cement shall be used throughout the project unless otherwise approved.

b. When the use of Portland cement Type IIIA (high early strength – air entrained) is permitted the same strength requirements shall apply, but the indicated strengths shall be attained in 7 days instead of 28 days.

2. Concrete conforming to the requirements listed below shall be used where indicated on the drawings. Unless otherwise indicated, concrete used as fill under foundations, and elsewhere approved by the Engineer, may be the 4,000 psi mix.

B. Mixes

1. Development and testing of mix designs shall be by an independent testing laboratory acceptable to the Engineer engaged by and at the expense of the Contractor.

2. It is the sole responsibility of the General Contractor to provide concrete with the strength, durability, placeability, workability, consistency and finishing

characteristics required by the Contract Documents. Review and acceptance of mix design submissions by the Engineer shall not relieve the General Contractor of their sole responsibility.

2.2 CURING MATERIALS:

A. Curing compound shall be a curing/hardener compound such as Acurion by AntiHydro, Sikaguard Cure/Hard by Sika, Super Diamond Clear by Euclid or approved equal. Liquid membrane-forming curing compound shall comply with the requirements of ASTM C309 Type 1-D (clear or translucent with fugitive dye) and shall contain no wax, paraffin, or oil.

1. Subject to compliance with requirements, products which may be incorporated in the work, include the following:

   a. "Masterseal" by Master Builders
   b. "Ecocure" by Euclid Chemical Co.
   c. "L&M Cure" by L & M Const. Chemical Co. or approved equal.

2. Curing paper shall be a fiber-reinforced laminated Kraft bituminous product, polyethylene firm or white burlap-polyethylene sheeting, all conforming to the requirements of ASTM Cl7l.

TABLE 03300-1

Concrete Placement	Total Air Measured at Discharge from Truck (Percent)
All concrete	4-6

3. Slump of the concrete as measured by ASTM C143, shall be as shown in Table 03300-2. If Plasticizer is used, the slump indicated shall be that measured before Plasticizer is added. Plasticized concrete shall have a slump ranging from seven to ten inches.

TABLE 03300-2

Portion of Structure	Slump (inches) Recommended	Range
Pavement and slabs on ground	2	1-3
Plain footings, slabs, pads and curbs	2-3	1-4
Foundation Walls and Footings	3-4	2-5

4. Proportion admixtures according to the manufacturer's recommendations. Two or more admixtures specified may be used in the same mix provided that the admixtures in combination retain full efficiency and have no deleterious effect on the concrete or on the properties of each other.

B. Aggregates:

1. Except as otherwise noted, aggregates shall conform to the requirements of ASTM C33.

2. Fine aggregate shall consist of washed inert natural sand conforming to the requirements of ASTM C33.

3. Coarse aggregate shall consist of well-graded crushed stone or washed gravel conforming to the requirements of ASTM C33. Size numbers for the concrete mixes shall be as shown in Table 03300-3.

TABLE 03300-3

Description	Maximum Coarse Aggregate	Size Number (ASTM C33 Table 2)
24-in thick or less	¾-in	67
Peastone mix	3/8-in	8

4. All aggregates shall be from a single source throughout the Project. Aggregates shall not contain any substance that may be deleteriously reactive with the alkaline portion in the cement.

C. Water:

1. Water shall be potable. Water for curing shall not contain any substance injurious to concrete, or which causes staining.

D. Admixtures:

1. Admixtures shall be free of chlorides and alkalis (except for those attributable to water). When it is required to use more than one admixture in a concrete mix, the admixtures shall be from the same manufacturer. Admixtures shall be compatible with the concrete mix including other admixtures.

   a. Air entraining agent shall be in accordance with ASTM C260. Proportioning and mixing shall be in accordance with manufacturer's recommendations.
      1) Subject to compliance with requirements, products which may be incorporated in the work include the following:
         - "Sika AER" by Sika Corp.
         - "MB-VR or MB-AE" by Master Builders
         - "Darex AEA" or "Daravair" by W. R. Grace or approved equal.
   b. Water reducing agent shall be a mid-range water reducer meeting ASTM C494, Type A, and contain no more than .05% chloride ions.

Proportioning and mixing shall be in accordance with manufacturer's recommendations.

1) Subject to compliance with requirements, products that may be incorporated in the work include the following:
   - "Plastocrete 161" by Sika Chemical Corp.
   - "Pozzolith Normal" by Master Builders
   - "WRDA" by W. R. Grace or approved equal.

c. Superplasticizer agent shall be in accordance with ASTM C494, Type D and contain no more than 0.05% chloride ions. Product may be plant added or field added based on the best application considering distance, temperature and time. The treated concrete shall be capable of maintaining plastic state for two hours or longer depending on application. Proportioning and mixing shall be in accordance with manufacturer's recommendations.

1) Subject to compliance with requirements, products that may be incorporated in the work include the following:
   - "Sikament 300" by Sika Chemical Corp.
   - "Rheobuild" by Master Builders
   - "WRDA 19" or "Duracem" by W. R. Grace or approved equal.

2. Admixtures causing retarded or accelerated setting of concrete shall not be used without written approval. When allowed, the admixtures shall be retarding or accelerating water reducing or high range water reducing admixtures.

3. Prohibited admixtures: Calcium chloride, thiocynanates, and admixtures containing more than 0.05% chloride ions are not permitted.

4. Fly Ash: ASTM C618

F. Form Materials:

1. Forms for exterior and interior surfaces which will be exposed to view after the work is completed, whether such surfaces are painted or unpainted, shall be new plywood stock, steel, tempered masonite, or other materials which will provide smooth concrete surfaces without subsequent surface plastering. Plastic or plastic-faced forms shall not be used, except with prior approval.

2. Form release agent shall be a non-staining, non-yellowing, non-toxic liquid free from kerosene and resins of the type recommended by the manufacturer of the forming system being used.

3. For securing forms where surfaces will be exposed in the finished work, use tie screws with removable plastic cones. No metal shall be closer than 2" from the finished concrete surface, unless otherwise indicated on the drawings.

4. Unless otherwise noted on the drawings, all exposed edges of concrete elements either from a casting operation or demolition to open a concrete slab, shall have

a ¾" chamfer.

5. Where steel adjacent to vertical faces of forms cannot be otherwise secured, concrete bricks or mortar doughnuts shall be used to prevent steel from lying too close to the finish vertical faces of the concrete.

G. Reinforcing Materials:

1. Reinforcing Steel: ASTM A615, Grade 60

2. Reinforcing Steel to be welded: ASTM A706, Grade 60

3. Iron and steel products shall conform to American Iron and steel requirements of Section 00826.

4. Welded Wire Mesh: ASTM A185; supplied in sheets.

5. Supports for Reinforcement:

a. Provide support bars, spreader bars, precast concrete blocks, bolsters, chairs, side form spacers, tie wire and other accessories necessary to secure the reinforcing and welded wire mesh accurately in position in accordance with CRSI "Placing Reinforcing Bars".
b. Tie Wire shall be 16-gauge minimum, black, soft-annealed wire.
c. Bar Support Class:
1) Use CRSI Class 1 bar supports in all concrete exposed to moisture.
2) Use CRSI Class 2 Type A bar supports in all interior concrete where the legs of the support will be in contact with an exposed-to-view concrete surface.
3) CRSI Class 3 bar supports may only be used where CRSI Class 1 and CRSI Class 2 are not required.
4) For slabs-on-grade, use precast concrete blocks or bar supports with sand plates or horizontal runners where base material will not support chair legs.

H. Concrete, Hardener, and Sealer:

1. Clear, waterborne, membrane-forming curing compound shall comply with ASTM C309, Type 1, Class B. Compound shall not reduce the adhesion of any material to be applied to the concrete. Coordinate the use and application of this compound with the use and application of the penetrating liquid hardener and sealer compound.

2. Moisture-retaining cover shall be polyethylene-coated burlap conforming to ASTM C171.

3. Concrete, hardener, and sealer shall be provided by the same manufacturer with

certification that all components are compatible with one another.

I. Adhesive Anchor System:

1. Adhesive anchor system shall be EPCON Ceramic 6 by ITW Ramset/Red Head, HIT RE 500 epoxy adhesive by Hilti, Quik-Set FIPS by Fischer or approved equal.

J. Grout:

1. Grout shall be mixed in the proportions of 1 part Portland Cement (ASTM C150, Type I or Type III) to 2 parts clean, uniformly graded natural sand (ASTM C404, Size No. 2), by volume. Only sufficient water shall be used to enable grout to barely hold its shape when squeezed into a ball in the hand. Aggregate used for grout mixes shall conform to the requirements of the reference specification for concrete. Prior approval shall be obtained for the use of proprietary grouts, and the instructions of the Manufacturer shall be followed in their use.

2. Non-metallic, non-shrink grout shall be pre-mixed, non-metallic, non-corrosive, non-staining product containing selected silica sands, Portland cement, shrinkage compensation agents, plasticizing and water reducing agents, complying with CRD-C621 with a minimum ultimate compressive strength of 5,000 psi at the end of 28 days as determined by ASTM C1019.

a. Subject to compliance with requirements, products that may be incorporated in the work include the following non-metallic grouts:
(1) "Set Grout" by Master Builders
(2) "Crystex" by L & M Const. Chemical Co.
(3) "Five Star Grout by U.S. Grout or approved equal.

K. Bonding Agents:

1. Prior to casting any cast-in-place concrete or pre-blend, all contact surfaces shall be coated with a bonding agent. Acceptable products:
a. Armatec by Sika
b. Sto Bonding and Anti-Corrosion Agent CR246 by Sto Concrete Restoration Division
c. BARRAFER A by Degussa

2. Bonders shall provide corrosion inhibitors and a minimum open-form of at least 24 hours or greater.

2.3 MECHANICAL REINFORCING BAR SPLICER

A. No mechanical reinforcing bar splicer hardware will be required for this work, however, should it be necessary by found site conditions, the splicer shall be a full tension and compression device which provides structural continuity between reinforcing bars. It shall develop a minimum of 125% specified yield strength of the reinforcing bar.

Acceptable manufacturers:

1. Barlock

2. OS Splice Clip by Splice Sleeve North America (small bars to #6)

3. Bar-Grip Couplers by BarSplice

2.4 REINFORCEMENT FABRICATION

A. Reinforcement shall be fabricated, cut to length, bent, radial pre-fabricated, hooked, marked, bundled and tagged in accordance with CRSI"s "Placing Reinforcing Bars". Tolerances in fabrication shall be in accordance with CRSI's "Placing Reinforcing Bars".

2.5 CONTROLLED DENSITY FILL

A. Controlled Density Fill (CDF) material is flowable, self-consolidating, rigid setting, low density material that substitute for compacted gravel for backfills, fills and structural fills. There are two main categories for CDF's, excavatable and non-excavatable with a subcategory of flowable and very flowable. It shall be a mixture of Portland cement, flyash, sand and water designed to provide strengths within the range specified.

The categories of CDF's are:

Type 1	Very Flowable (Non-Excavatable)
Type 1E	Very Flowable (Excavatable)
Type 2	Flowable (Non Excavatable)
Type 2E	Flowable (Excavatable)

B. Provide type 2E that can be excavatable by hand tools and small equipment. Type 2E CDF shall have the following ingredients:

Portland Cement	AASHTO M 85
Fly Ash	AASHTO M295 Class F
Sand	M4.02.02
Air entrained admixture	M4.02.05

PART 3 - EXECUTION

3.1 GENERAL

A. Under no circumstances shall concrete or grout be employed in the work if it has set or partially set before time of placement. No retempering of concrete or grout will be permitted.

B. The batching, mixing, transporting, placing and curing of concrete shall be subject to inspection at all times. The Contractor shall advise the Engineer of his readiness to proceed at least six working hours prior to each concrete placement. The Engineer will inspect the preparations for concreting including the preparation of previously placed

concrete, the reinforcing and the alignment, cleanliness and tightness of formwork. No placement shall be made without inspection and acceptance.

C. Concrete mix showing either poor cohesion or poor coating of the coarse aggregate with paste shall be remixed. If this does not correct the condition, the concrete shall be rejected. If the slump is within the allowable limit, but excessive bleeding, poor workability, or poor finishability are observed, changes in the concrete mix shall be obtained only by adjusting one or more of the following:

1. The gradation of aggregate
2. The proportion of fine and coarse aggregate.
3. The percentage of entrained air, within the allowable limits.

D. Furnish a delivery ticket for ready mixed concrete as each truck arrives. Each ticket shall provide a printed record of the weight of cement and each aggregate as batched individually. Clearly indicate the weight of fine and coarse aggregate, cement and water in each batch, the quantity delivered, the time any wage is added and the numerical sequence of the delivery. Show the time of day batched and time of discharge from the truck. Indicate the number of revolutions of transit mix trucks.

3.2 FIELD QUALITY CONTROL

A. Verify site conditions.

B. Verify requirements for concrete cover over reinforcement.

C. Verify that anchors, seats, plates, reinforcement and other items to be cast into concrete are accurately placed, positioned securely, and will not cause hardship in placing concrete.

3.3 PREPARATION

A. Before placing concrete or pre-blended bagged concrete or grout, forms and the space to be occupied by the concrete shall be thoroughly cleaned, and reinforcing steel and embedded metal shall be free from dirt, oil, mill scale, loose rust, paint or other material which would tend to reduce the bond.

B. Before placing concrete or pre-blended bagged concrete or grout, ensure that all concrete surfaces have been coated with an approved bonder.

C. Removals and demolition of the existing concrete slab must be done with care using impact hammers of no greater than 15 and 30 pounds as so defined within the contract drawing general notes. Hydrodemolition is acceptable for removal of the existing concrete and requires at a minimum, dams around the limit of the work, and that all cement and slurry debris be removed from the prepared surfaces before the slurry has a chance to harden. Any waste liquid that will not be recycled and disposed of to the drain system shall be removed off the project site by the contractor at his expense.

D. Cutting of mild reinforcing bars found within the demolition area will be considered on an individual basis if an as-built cutting drawing were submitted for approval by the contractor. This drawing must be a to-scale clearly dimensioned document indicating what reinforcing bars need to be removed or cut. Do no cutting of such bars until approval is gained.

E. When joining fresh concrete to concrete which has attained full set, the latter shall be cleaned by chipping and washing off all debris and laitance. It then shall be moistened prior to placing new concrete or as so noted within the preparation specification of the bonder in use.

F. Grout:

1. It is the intent of this work that any items set within existing cast-in-place concrete be done so with non-shrink grouts. All surfaces to receive grout, be they the result of core drilling or impact hammer, shall be clean and sound; free of ice, frost, dirt, grease, oil, curing compounds, laitance and paints, and free of all loose material or foreign matter which may affect the placement of the bonder.

2. Roughen all surfaces, even those created by core drilling, by chipping, sand blasting, or other mechanical means to ensure bond of the grout to the concrete. Remove loose or broken concrete. Irregular voids or projecting coarse aggregate need not be removed if they are sound, free of laitance and firmly embedded into the parent concrete. Compressed air to clean off any surface that will be bonded to must be done so with equipment that will deliver oil-free air.

3. Concrete surfaces shall be washed clean and then kept moist for at least 24 hours prior to the placement of cementations or cement grout or as modified by the bonder preparation specification.

4. Construct grout forms or other leak proof containment as required. Forms shall be lined or coated with release agents recommenced by the grout manufacturer. Forms shall be of adequate strength, securely anchored in place, and shored to resist the forces imposed by the grout and it placement.

3.4 PLACING FORMS

A. The General Contractor shall set and maintain formwork and provide the necessary finishing operations to ensure that the final concrete lines are within the tolerances listed in ACI 117 and as follows:

1. The offset between adjacent pieces of formwork facing material shall not exceed: Class C.

2. Provide floor finish tolerances as measured in accordance with ASTM E1155 Standard Test Method for Determining Floor Flatness and Levelness Using the F-Number System (Inch-Pound units).

3. Provide floor flatness and levelness tolerances as recommended by the finish floor manufacturers. In areas with more than one finish floor type or system, the most restrictive manufacturer's recommendation shall govern the entire area.

4. Default Criteria: Where no finish floor is specified or where the finish floor manufacturer does not recommend flatness and/or levelness tolerance criteria, provide the following as a minimum:

a.	Test Area:	Flatness (FF) 30 Levelness (FL) 20
b.	Minimum Local:	Flatness (FF) 15 Levelness (FL) 10

The FL levelness tolerance does not apply to slabs placed on un-shored form surfaces and/or shored form surfaces after the removal of shores. FL levelness tolerance does not apply to cambered or inclined surfaces and shall be measured with 72 hours after slab concrete placement.

B. The General Contractor shall place and secure the reinforcing bars and welded wire mesh such that the final position of the reinforcing bars and the welded wire mesh in the concrete is within the limits set forth in ACI 117, CRSI's "Placing Reinforcing Bars", and as specified in Section 3.5.

C. Verify that all formwork completely encloses concrete to be poured and is securely braced prior to concrete placement. Remove ice, excess water, dirt and other foreign materials from form.

3.5 PLACING REINFORCEMENT

A. Comply with CRSI's "Placing Reinforcing Bars" for details and methods of reinforcement placement and supports, and as herein specified.

B. Clean reinforcement of loose rust and mill scale, concrete splatter, water, ice, dirt and other debris that reduces or destroys the bond with concrete.

C. Accurately position, support and secure reinforcement against displacement by construction and concrete placement operations. Locate and support reinforcement by support bars, spreader bars, chairs, bolsters, precast concrete blocks, side form spacers, tie wire and other accessories necessary to secure the reinforcement accurately in position.

D. Place all reinforcement to obtain minimum coverage in accordance with ACI 318 "Building Code Requirements for Reinforced Concrete and Commentary – Section 7.7" and the Contract Documents. Set wire ties so ends are directed into concrete, not toward exposed concrete surfaces.

E. Where continuous reinforcing bars are called for, indicated or required, they shall be run continuously around corners, standard hooks art discontinuous ends and spliced only

where absolutely necessary. Splices in adjacent bars shall be staggered. Lap and development lengths for concrete reinforcing shall be in accordance with the schedules or details included in the Structural Contract Drawings.

F. Lace end and edge splices in welded wire mesh with tie wire at each crossbar. Stagger end and edge laps in adjacent pieces. All lap lengths for welded wire mesh shall be 8 inches minimum measured from the first crossbar.

G. Drill holes for epoxy anchored dowels into existing concrete. Mix, transport and place epoxy grout in accordance with the manufacturer's instructions and install dowels.

3.8 MIXING AND TRANSPORTATION

A. Ready-mixed concrete, if employed, shall be batched, mixed and transported in accordance with ASTM C94, except as otherwise specified. Truck mixers, agitators, and non-agitating units shall comply with National Ready-Mix Concrete Association (NRMCA) and Truck Mixer Manufacturers' Bureau (TMMB). Ready-mix plant equipment and facilities shall be certified in accordance with NMRCA QC 3. Site-mixed concrete shall be mixed in accordance with ACI 301. On-site plant shall conform to the MRMCA CPMB 100.

B. No water from the truck system or elsewhere shall be added after the initial introduction of mixing water for the batch except when on arrival at the jobsite, the slump of the concrete is less than that specified. Water added to bring the slump within the specified range should not change the total water in the concrete to a point that the approved water-cement ratio is exceeded. The drum shall be turned an additional 30 revolutions, or more, if necessary, until the added water is uniformly mixed into the concrete. Water shall not be added to the batch at any later time.

C. Ready-mix or transit-mixed concrete shall be transported to the site in watertight agitator or mixer trucks loaded not in excess of rated capacities for the respective conditions as stated on the nameplate. Discharge at the site shall be within 1-1/2 hours after cement was first introduced into the mix. Central mixed concrete shall be plant-mixed a minimum of 1-1/2 minutes per batch and then shall be truck-mixed or agitated a minimum of 8 minutes. Agitation shall begin immediately after the pre-mixed concrete is placed in the truck and shall continue without interruption until discharge. Transit-mixed concrete shall be mixed at mixing speed for at least 10 minutes immediately after charging the truck, followed by agitation without interruption until discharged.

D. All central plant and rolling stock equipment and methods shall conform to the latest Truck Mixer and Agitator Standards of the Truck Mixer Manufacturers' Bureau of the National Ready-Mixed Concrete Association, as well as ACI 304 and ASTM C94.

E. Attention is called to the importance of dispatching trucks from the batching plant so that they shall arrive at the site of the work just before the concrete is required, thus avoiding excessive mixing of concrete while waiting or delays in placing successive layers of concrete in the forms.

F. Concrete shall be discharged within 1-1/2 hours after introduction of the cement to the aggregates, except that when the concrete temperature exceeds 85 degrees F, this time shall be reduced to 45 minutes. Concrete shall be placed within 15 minutes after it has been discharged from the truck.

G. Temperature and Mixing Time Control:

1. In cold weather, maintain the as-mixed temperature of the concrete and concrete temperatures at the time of placement in the forms as indicated in Table 03300-4.

2. If water or aggregate has been heated, combine water with aggregate in the mixer before cement is added. Do not add cement to mixtures of water and aggregate when the temperature of the mixture is greater than 90 degrees F.

3. In hot weather, cool ingredients before mixing to maintain temperature of the concrete below the maximum placing temperature of 90 degrees F. Should conditions warrant, well-crushed ice may be substituted for all or part of the mixing water.

4. The maximum time interval between the addition of mixing water and/or cement to the batch, and the placing of concrete in the forms shall not exceed the following:

TABLE 03300-4

AIR OR CONCRETE TEMPERATURE (WHICHEVER IS HIGHER)	MAXIMUM TIME
80 degrees F to 90 degrees F	45 minutes
70 degrees F to 79 degrees F	60 minutes
40 degrees F to 69 degrees F	90 minutes

If an approved mid or high range water reducer (plasticizer) is used to produce plasticized concrete, the maximum time interval shall not exceed 90 minutes or other appropriate time such that workability and Contractor's ability to properly place the concrete will not be adversely compromised.

H. Pre-blended Concrete and Grout:

1. Mix products in strict compliance with the manufacturer's recommendations and these Specifications.

2. Have sufficient manpower and equipment available for rapid and continuous mixing. Keep all necessary tools and materials ready and close at hand.

3. Place no concrete or grout without having a bonder applied to all surfaces and rebar. Vibration or rodding shall be used at the edges and adjacent to all frames. Hand finishing with a float may be required along the edge of the placement or on small areas of repair. Final finishing to be per requirements of the intended floor finish.

3.9 PLACING CONCRETE

A. No concrete shall be placed by pumping methods without the prior submission of a pumping mix and written approval. Should the Contractor be allowed to place concrete by pumping methods, procedures, mix design of concrete, and all other precautions shall be in accordance with ACI 304.2R and as approved by the Engineer.

B. Pumps: Concrete may be conveyed by positive displacement pumps when approved. The concrete mix shall be designed for pumping. The pump shall be the piston or squeeze pressure type. The pipeline shall be steel pipe or heavy-duty flexible hose. The inside diameter of the pipe shall be at least three times the maximum size of the coarse aggregate. The distance to be pumped shall not exceed the limits recommended by the pump manufacturer. The concrete shall be supplied to the pump continuously. When pumping is completed, the concrete remaining in the pipeline shall be ejected without contaminating the concrete in place. After each operation, the equipment shall be thoroughly cleaned, and flushing water shall be wasted outside the forms.

C. Deposit concrete as near its final position as possible to avoid segregation due to rehandling or flowing. Should any segregation occur, the concrete should be remixed before it is placed.

D. "Cold Joints" are to be avoided, but if they occur, they are to be treated as bonded construction joints.

E. Concrete shall be deposited continuously in layers of such thickness that no concrete will be deposited on concrete that has hardened sufficiently to cause the formation of seams and planes of weakness within the section. If a section cannot be placed continuously, construction joints may be located at points as provided for in the drawings or approved by the Engineer.

F. Concrete Placing During Cold Weather:

1. For this Specification, cold weather is defined as a period when for more than three successive days, the average daily outdoor temperature drops below 40 degrees F. The average daily temperature shall be calculated as the average of the highest and the lowest temperature during the period from midnight to midnight.

2. Concrete placed during cold weather shall be batched, delivered, placed, cured and protected to compliance with the recommendations of ACI 306R and the additional requirements of this section.

3. All details of Contractor's handling and protecting of concrete during freezing weather shall be subject to approval. All procedures shall be in accordance with provisions of ACI 306. Cold weather concreting shall not begin until the work plan is acceptable to the Engineer.

4. Concrete shall not be placed on frozen material or material containing ice shall be used. Materials for concrete shall be heated when concrete is mixed, placed, or cured when the mean daily temperature is below 40ºF. or is expected to fall to below 40ºF., within 72 hours, and the concrete after placing shall be protected by covering, heat, or both. No accelerant shall be used to prevent freezing.

5. The temperature of concrete surfaces shall not be permitted to drop below 50ºF. for at least 7 days after placement of the concrete.

G. Concrete placing During Hot Weather:

1. For this Specification, hot weather is defined as any combination of high air temperatures, and low relative humidity. This is interior work and wind concerns are not valid for this work, that is, ACI 305R is not applicable.

2. The Contractor shall make every effort to minimize delays, which will result in excessive mixing of the concrete after arrival on the job.

3. During periods of excessively hot weather (90°F or above) ingredients in the concrete shall be cooled insofar as possible and cold mixing water shall be used to maintain the temperature of the concrete at permissible levels all in accordance with the provisions of ACI 305. Any concrete with a temperature above 90ºF when ready for placement will not be acceptable, and will be rejected. Temperature records shall be maintained throughout the period of hot weather giving air temperature, general weather conditions (calm, windy, clear, cloudy, etc.) and relative humidity. The record shall include checks on temperature of concrete as delivered and after placing in forms. Data should be correlated with the progress of the work so that conditions surrounding the construction of any part of the structure can be ascertained.

H. Keep permanent temperature records showing date and outside temperature during all concreting operations. Thermometer readings shall be taken at start of work in morning, at noon, and again late in afternoon. Locations of concrete placed during such periods shall likewise be recorded, in such manner as to show any effect temperatures may have had on construction. Copies of temperature record shall be distributed daily to the Engineer.

3.10 COMPACTING

A. Concrete during and immediately after depositing shall be thoroughly compacted by means of suitable tools. Internal type mechanical vibrators shall be employed to produce the required quality of finish. Vibration shall be done by experienced operators under close supervision and shall be carried on long enough to produce homogeneity and optimum consolidation without permitting segregation of the solid constituents or "pumping" or migration of air. All vibrators shall be supplemented by proper wooden spade puddling adjacent to forms to remove included bubbles and honeycomb. This is essential for the top lifts of walls. All vibrators shall run at a minimum of 7,000 to at least 10,000 rpm and be of adequate capacity. At least one vibrator shall be used for

every 10 cu. yd. of concrete per hour. In addition, one spare vibrator in operating condition shall be on the site.

B. Do not use vibrators to transport concrete within forms. Insert vibrators and withdraw at points from 18-in to 30-in apart. At each insertion, vibrate sufficiently to consolidate concrete, generally from five to 15 seconds. Do not over vibrate to segregate.

C. Pipes and embedded metals:

1. Special care shall be taken to bring the concrete into solid contact with pipes and iron work embedded in the walls and floors, particularly underneath and around all pipes where a head of water exists, making watertight joints.

2. In general, such embedded items are not shown on the Structural design drawings. Design drawings of the other trades shall be consulted for their location and details.

3. Anchor bolt location, size and details shall be verified with the equipment manufacturer's certified drawings before installation.

4. Anchor bolts; sleeves and similar embedded items will be provided, delivered to the site under other Sections of the specification, for installation under this Section.

5. In bolting miscellaneous items to concrete after the concrete has set, drilled-in epoxy bolts of an approved pattern and type shall be used. The Contractor shall submit for approval, the types of epoxy anchor bolts. Expansion bolts shall not be used unless they are approved.

3.11 CURING

A. Immediately after placement, concrete shall be protected from premature drying extremes in temperatures, rapid temperature change, mechanical injury and injury from rain and flowing water. All materials and equipment needed for adequate curing and protection shall be available and at the placement prior to placing concrete. No fire or excessive heat shall be permitted near or in direct contact with the concrete at any time. Curing shall be accomplished by any of the following methods or combination thereof, as approved. Concrete curing shall be performed as specified in ACI 30l and as stated herein. All curing procedures shall have prior approval.

B. Pre-blended, bagged concrete and grout mixes shall be cured per manufacturer’s specifications

C. Concrete shall be cured by one of the following procedures immediately after completion of placement and finishing:

1. Ponding or continuous sprinkling. Moist curing: concrete to be moist cured shall be maintained continuously wet for the entire curing period. If water or curing

materials used stains or discolors concrete surfaces that are to be permanently exposed, the concrete surfaces shall be cleaned. When wooden forms are left in place during curing, they shall be kept wet at all times. If the forms are removed before the end of the curing period, curing shall be carried out as on unformed surfaces, using suitable materials. Horizontal surfaces shall be cured by ponding, by covering with a 2-inch minimum thickness of continuously saturated polyethylene-coated burlap or saturated burlap.

2. Application of absorptive mats or fabric kept continuously wet. Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width with sides and end lapped at least 3" and sealed by waterproof tape or adhesive. Immediately repair any holes or tears during curing period using cover material and waterproof tape.

3. Application of waterproof sheet materials conforming to ASTM Cl7l. Not permitted for slabs.

4. Application of curing compounds conforming to ASTM C309, if it can be demonstrated that the compound is applicable and that it will not prevent bonding of the subsequent finish to be received. Compound shall be placed at a rate of 200 square feet per gallon, in two applications perpendicular to each other. Not permitted for slabs.

5. Curing procedure shall be continued for at least 7 days.

    a. Moisture loss from surface placed against metal or wood forms shall be minimized by keeping forms wet until removal.
    b. Curing shall be continued for at least 7 days. When forms are removed during the curing period, surfaces shall be cured by spraying or by the use of a curing compound as previously specified.
    c. Surfaces shall be protected from traffic or damage until surfaces have hardened sufficiently. If necessary, 1/2-inch thick plywood sheets shall be used to protect the exposed surface.

3.12 REMOVAL OF FORMS

A. Removal of forms shall take place in accordance with ACI 347, Section 3.6. Except as otherwise specifically authorized, forms shall not be removed until the concrete has attained a 50 percent strength level. Pre-blended, bagged mixes shall have forms removed per recommendation of the manufacturer.

3.13 EPOXY ADHESIVE

A. Epoxy adhesive shall comply with ASTM C881, two-component material suitable for use on dry or damp surfaces. Provide material "Type", "Grade", and "Class" to suit project requirements. Subject to compliance with requirements, products, which may be incorporated in the work, include the following:

1. "HIT RE 500" by HILTI

2. "Sikadur Hi-Mod" by Sika Chemical Corp.

3. "Euco Epoxy 452 or 620" by Euclid Chemical Co. or approved equal.

3.14 PATCHING

A. As soon as the forms have been stripped and the concrete surfaces exposed fins and other projections shall be removed, recesses left by the removal of form ties shall be filled, and surface defects which do not impair structural strength shall be repaired. Clean all exposed concrete surfaces and adjoining work stained by leakage of concrete.

B. Defective concrete and honeycombed areas shall be chipped down reasonably square and at least one-inch deep to sound concrete by means of hand chisels or light (15 lb) pneumatic chipping hammers. Irregular voids or surface stones need not be removed if they are sound, free of laitance, and firmly imbedded in the parent concrete. If honeycomb exists around reinforcement, chip to provide a clear space at least 3/4-inch wide all around the steel. For areas less than 1-1/2 inches deep, the patch may be made following the procedure for filling form tie holes, described in the subsection below, using adequately dry (non-trowelable) mixtures to avoid sagging. Thicker repairs will require build-up in 1-inch layers on successive days. Unless otherwise indicated, thicker repairs shall be made with Vertipatch mortar mixture blended with Acryl-Set, both by Master Builders, Inc., Cleveland, Ohio, or approved equal.

3.15 FINISHING OF FORMED SURFACES

A. Concrete shall not be stripped of supportive forms and shores shall not be removed before the concrete has been cured and attained required strength.

B. Care shall be exercised to prevent damaging edges or obliterating the lines of chamfers, rustications or corners when removing the forms or doing any other work adjacent thereto.

C. Clean all exposed concrete surfaces and adjoining work stained by leakage of concrete.

D. Off-Form Finish – For concrete not exposed to view - Fins and other projections shall be removed, dull sharp edges, and tie cones and defects filled.

3.16 FAILURE TO MEET REQUIREMENTS

A. The Engineer shall have the right to reject concrete represented by low strength tests or to agree to further testing of the concrete. Rejected concrete shall be promptly removed and replaced with concrete conforming to the specification. The decision as to whether substandard concrete is to be accepted, rejected, or additional tests shall be conducted shall be final. All direct and indirect costs associated with further curing and testing of the concrete shall be at the Contractor's expense.

B. If the Engineer agrees to consider further curing and/or testing of the concrete before making a final decision, the Contractor shall submit a detailed plan, including proposed criteria for acceptance of the concrete. The plan may include additional curing of the concrete, drilling and testing of cores, load testing of the structure, or a combination.

C. If additional curing is permitted before further inspection and testing, the Contractor shall provide any necessary materials and labor to further cure the suspect concrete.

D. If drilling and testing of cores is permitted, the Contractor shall be responsible for obtaining the cores, including provision of ladders, scaffolding, and such incidental equipment as may be required. If additional curing is permitted, cores shall be drilled after the curing period, and shall be in accordance with ASTM Methods C39 and C42. The Contractor shall repair all core holes.

E. The burden of proof, including, but not limited to the work of cutting and testing the cores, inspection, evaluation, repair of the holes, or removal and replacement of the concrete in question, and all associated costs, shall be at the expense of the Contractor.

F. If the suspect concrete still fails to meet specification requirements, the Engineer shall have the right to reject the concrete, have it removed and replaced, in accordance with paragraph 5 above, or to require mechanical strengthening of the concrete to satisfy project requirements. The Contractor shall submit a removal and replacement plan for review.

END OF SECTION 03300

APPENDIX A

Geotechnical Memorandum

ENVIRONMENTAL PARTNERS

GEOTECHNICAL MEMORANDUM

Date: December 17, 2020

To Town of Nantucket, Massachusetts

From Ziad F. Kary, P.E. – Environmental Partners

CC Francesca J. Barilla, E.I.T. – Environmental Partners
File

Subject **Sea Street Pump Station Force Main No.3**
Geotechnical Investigation and Construction Recommendations

This memorandum presents the findings of the Subsurface Exploration Program, including boring logs and construction recommendations, for the Sea Street Pump Station Force Main No.3 project in Nantucket, Massachusetts.

Site Location and Description

The project site is located on Nantucket Island and consists of a new force main installation spanning 3.4 miles between the Sea Street Pump Station (SSPS) on Sea Street and the Surfside Wastewater Treatment Facility (SSWWTF) at the end of South Shore Road. Wastewater is transported from the SSPS to the SSWWTF via one of two sewer force mains: a 20-inch ductile iron (DI) force main installed in 1981, or a 20-inch cast iron (CI) force main, originally installed in the late 1920's and later slip-lined with a 16-inch polyethylene (PE) liner pipe installed in 1983-1984.

The Town of Nantucket is proposing to construct a new sewer force main, SSPS Force Main No.3, which will connect the SSPS to the SSWWTF. This will allow the Town to abandon the existing 16-inch force main and assess and rehabilitate the existing 20-inch DI force main which will be then used as a secondary backup to the new force main. The Proposed Force Main Alignment's lengths on associated streets are included in Table 1, below.

Table 1: Proposed Force Main Alignment – Streets and Lengths

Street	Length (ft)
Sea Street	275
Step Lane	288
Centre Street	407
Lily Street	1,180
Liberty Street	890
Winter Street	313
Pine Street	1,730
Silver Street	190
Pleasant Street	366
Atlantic Avenue	880
Surfside Road	5,888
South Shore Road	5,609
Total	**18,016**

Ground surface elevations at the test boring locations were determined via GPS survey conducted by Environmental Partners in October/November of 2020 and are based on the North American Vertical Datum of 1988 (NAVD 1988). A Map Book depicting the locations of the test borings (auger borings, geoprobes, and monitoring wells) is included as Attachment A. Coordinates and surface elevations of the test borings are included within the table provided as Attachment B.

Regional Geology

The site is located in the Avalon Belt Geologic Province. USGS defines the Avalon Belt Geologic Province as: "Localized in eastern Massachusetts, Rhode Island, and coastal Connecticut. Principally Precambrian Z granite and granitic gneiss and metasedimentary rocks of Precambrian Z to Ordovician age. Intruded by Ordovician to Devonian granites. Cretaceous sediments and thick areas of Quaternary glacial sediments occur in southern coastal areas." According to USGS, the site is located entirely within the USGS Nantucket Quadrangle. The Surficial Geologic Map of the Nantucket Quadrangle indicates the SSPS Force Main No.3 project will encounter predominantly coarse deposits and some artificial fill during excavation. These types of postglacial and glacial stratified deposits are defined below.

Artificial Fill (Postglacial Deposit) – Earth materials and manmade materials that have been artificially emplaced, primarily in highway and railroad embankments, and in dams; may also include landfills, urban development areas, and filled coastal wetlands.

Coarse Deposits (Glacial Stratified Deposit) – Consist of gravel deposits, sand and gravel deposits, and sand deposits. Gravel deposits are composed of at least 50 percent gravel-size clasts; cobbles and boulders predominate; minor amounts of sand occur within gravel beds, and sand comprises a few separate layers. Gravel layers generally are poorly sorted, and bedding commonly is distorted and faulted due to post depositional collapse related to melting of ice. Sand and gravel deposits occur as mixtures of gravel and sand within individual layers and as layers of sand alternating with layers of gravel.

Surface Conditions

The SSPS Force Main No.3 will follow the route detailed in Table 1, as selected based on the Alternative Force Main Alignments Assessment dated October 2020. For the majority of its length, the force main will be installed within the limits of the paved roadway. In accordance with the 25% Design Drawings prepared by EP, the force main is proposed to be installed within the bike path on Surfside Road for a portion of its alignment (Approximately 1,950 linear feet). This will limit traffic disruption on Surfside Road and minimize restoration costs provided that the proposed alignment does not conflict with other utilities. If the bike path does not provide a viable option, the alignment may be shifted within the roadway. Roadway widths along the SSPS Force Main No.3 Alignment range from approximately 11.5 feet (Step Lane) to 21.6 feet (Pleasant Street). The Surfside Road Bike Path is approximately 8 feet in width. The topography along the alignment varies, with 6 relative high points and 5 relative low points. Elevations along the route range from the lowest point on Sea Street (El. 5.00) to the highest point on Pine Street (El. 49.00). Roadway slopes along the route range from 0% to 12.8%.

Subsurface Exploration Procedures

Auger Borings, Geoprobes, and Monitoring Wells

The Subsurface Exploration Program for the SSPS Force Main No.3 project began on October 19, 2020. Environmental Partners retained the services of Crawford Drilling Services to perform thirty (30) days of soil borings along the proposed force main alignment. During this time, Crawford installed 20 auger borings, 101 geoprobe borings, and 3 monitoring wells. All drilling work was observed by EP staff. A Map Book depicting the auger boring, geoprobe, and monitoring well locations is included as Attachment A. Soil Boring Logs are included as Attachment C. As shown, EP did not perform borings on Surfside Road between Sparks Avenue and Miacomet Avenue. Borings completed by Weston and Sampson for the Surfside Road Area Sewer Improvements project in this area were used to supplement EP's borings. The boring layout plan and boring logs completed by Weston and Sampson along Surfside Road are included as Attachment E. Sampling procedures and installation methods used to advance the various borings are described below.

Auger Borings – Auger borings were installed with a Mobile B-53 with mounted truck drill rig equipment using augers. Standard penetration tests were performed in the borings in conjunction with split-barrel sampling. The standard penetration value (N) is defined as the number of blows of a 140-pound hammer, falling thirty inches, required to advance the split spoon sampler one foot into the soil (ASTM D-1586). The sampler is lowered to the bottom of the drill hole and the number of blows is recorded for each of the three successive increments of six inch penetration. The "N" value is obtained by adding the second and third incremental numbers together. The results of the standard penetration test indicate the relative density and comparative consistency of the soils, and thereby provide a basis for estimating relative strength and compressibility of the soil profile components. Soil samples were obtained in general accordance with ASTM D-1587 (Thin-Walled Tube Sampling of Soils) using a standard split-spoon sampler. A split-spoon sampler is a 2- inch O.D. tube that is driven into the soil to be sampled that can be split open lengthwise for easy removal and visual inspection of the soil obtained.

Monitoring Wells – Monitoring wells were also installed with a Mobile B-53 with mounted truck drill rig equipment using augers. Similar to the auger borings, standard penetration tests were performed in the monitoring wells in conjunction with split-barrel sampling.

Geoprobe Borings – Geoprobe borings were installed using a mobile Geoprobe® drilling rig. This hydraulically powered drilling rig uses static force and dynamic percussion force of an attached soil probing hammer to advance small diameter sampling tools. The rig rearranges particles in the subsurface by application of weight and percussion and produces no cuttings in the process. Two-inch plastic geoprobe liners were advanced at each boring in intervals of 5 vertical feet until the depth of the force main as indicated on the 25% Design Drawings was reached. Following advancement of the plastic geoprobe liners, the liners were lifted from the hole, cut open, and representative soil samples were obtained by EP.

All test borings were advanced to predetermined depths ranging from 12’ to 25’ as indicated within the table provided as Attachment B.

Soil Classification

Samples obtained during the drilling operations were observed and visually classified in the field in general accordance with ASTM D2488, which is based on the Unified Soil Classification System. Representative portions of the samples were collected in sample jars and select samples were sent out to the laboratory for further examination and verification of field classifications. Boring logs indicating depth of borings, N values, penetration and recovery depths, water levels, and soil descriptions are included as Attachment C of this report.

Asphalt

A varying depth surface asphalt layer was encountered during advancement of the test borings. Information regarding asphalt thickness and the sub-asphalt layer for each respective street along the SSPS Force Main No.3 Alignment is provided in Table 2, below.

Table 2: Asphalt Thickness and Sub-Asphalt Layer

Street	Asphalt Thickness	Subbase Layer
Sea Street	3" – 6"	Crushed asphalt, brick fragments, silty sand
Step Lane	3" – 5"	Crushed asphalt, sand, silty sand
Centre Street	3" – 4.5"	Cobblestone, sand, silty sand
Lily Street	2.5" – 5"	Crushed asphalt, sand, silty sand, silt
Liberty Street	1" – 8"	Crushed asphalt, brick fragments, sand, silty sand, silt, sandy silt, rock fragments
Winter Street	2" – 6"	Crushed asphalt, silty sand, sandy silt, rock fragments
Pine Street	1" – 5"	Crushed asphalt, brick fragments, cobblestone, sand, silty sand, silt, rock fragments
Silver Street	3"	Crushed asphalt, silty sand, rock fragments
Pleasant Street	4" – 6"	Crushed asphalt, brick fragments, sand, silty sand, coal fragments
Atlantic Avenue	2" – 3"	Crushed asphalt, brick fragments, sand, silty sand
Surfside Road Bike Path	2" – 6"	Crushed asphalt, sand, silty sand
South Shore Road	1" – 13"	Crushed asphalt, sand, silty sand, rock fragments

Fill

The fill encountered in the borings and monitoring wells below the subbase layer was predominantly sand, silty sand, sandy silt, and clayey silt with trace amounts of gravel.

Samples collected from the fill material were submitted to the laboratory for gradation analysis. The gradation analysis shows that the soil samples consisted of poorly graded sand (SP), poorly graded sand with silt (SP-SM), sandy silt (ML), silty sand (SM), sandy clay (CL), clayey sand (SC), and well-graded sand with silt (SW-SM). Gradation analysis of the recovered samples showed gravel percentages ranging from 0% to 11.2% and percent fines ranging from 0.9% to 75.0%. Field and laboratory observation of the material indicate that the majority of the soils within the limit of work are non-plastic. However, soils from borings B-23, B-24, and B-25 on Lily Street were visually and manually classified to be plastic. Further discussion of the soil sampling and results is provided in the Laboratory Testing section of this report.

Bedrock was not encountered in any of the 124 auger borings, geoprobes, or monitoring wells. We generally assume that the soil conditions between the test borings are fairly represented by the borings. However, variations between borings may become apparent during excavation and construction activities.

Laboratory Testing

During the subsurface investigation, EP collected soil samples at selective intervals throughout the borings for visual classification. Laboratory tests were carried out on 33 selected soil samples to acquire necessary information with regards to the physical and mechanical properties of the soil layers. All phases of the laboratory testing program were performed in general accordance with the

applicable ASTM Specifications by Thielsch Engineering in Braintree, MA. The following tests were conducted on the soil samples:

- Grain Size Distribution Tests (ASTM D6913 and ASTM D1140)
- Classification (ASTM D2487)
- Atterberg Limits (ASTM D4318)

The laboratory testing program for this project consisted of 33 grain size distributions and classifications. Information on the 33 selected soil samples including street location, boring number, sample number, sample depth, and testing performed is included within Table 3, below.

Table 3: Soil Samples Selected for Laboratory Analysis

Street	Boring #	Sample #	Depth (ft)	ASTM D6913 & ASTM D1140	ASTM D2487	ASTM 4318
Sea Street	B-1/MW-1	S2	5′ – 7′	X	X	X
Sea Street	B-1/MW-1	S3	10′ – 12′	X	X	X
Lily Street	B-21	S2	5′ – 7′	X	X	X
Lily Street	B-22	S2	5′ – 7′	X	X	X
Lily Street	B-23	S2	5′ – 10′	X	X	X
Lily Street	B-24	S2	5′ – 10′	X	X	X
Lily Street	B-25/MW-2	S2	5′ – 10′	X	X	X
Liberty Street	B-30	S2	5′ – 10′	X	X	X
Winter Street	B-38	S2	5′ – 10′	X	X	X
Pine Street	B-44	S2	5′ – 10′	X	X	X
Pine Street	B-52	S2	5′ – 10′	X	X	X
Silver Street	B-61/MW-3	S2	5′ – 10′	X	X	X
Silver Street	B-61/MW-3	S3	10′ – 15′	X	X	X
Surfside Road	B-76	S2	5′ – 10′	X	X	X
Surfside Road	B-79	S2	5′ – 10′	X	X	X
Surfside Road	B-82	S2	5′ – 10′	X	X	X
Surfside Road	B-84	S2	5′ – 10′	X	X	X
Surfside Road	B-86	S2	5′ – 10′	X	X	X
Surfside Road	B-88	S2	5′ – 10′	X	X	X
Surfside Road	B-90	S2	5′ – 10′	X	X	X
Surfside Road	B-92	S2	5′ – 10′	X	X	X
Surfside Road	B-94	S2	5′ – 10′	X	X	X
Surfside Road	B-98	S2	5′ – 10′	X	X	X
S. Shore Road	B-100	S2	5′ – 10′	X	X	X
S. Shore Road	B-104	S2	5′ – 10′	X	X	X
S. Shore Road	B-107	S2	5′ – 10′	X	X	X
S. Shore Road	B-110	S2	5′ – 10′	X	X	X
S. Shore Road	B-114	S2	5′ – 10′	X	X	X
S. Shore Road	B-118	S2	5′ – 10′	X	X	X
S. Shore Road	B-122	S2	5′ – 10′	X	X	X

Street	Boring #	Sample #	Depth (ft)	ASTM D6913 & ASTM D1140	ASTM D2487	ASTM 4318
S. Shore Road	B-125	S2	5' – 10'	X	X	X
S. Shore Road	B-129	S2	5' – 10'	X	X	X
S. Shore Road	B-132	S2	5' – 10'	X	X	X

A summary of the laboratory test results is presented in Attachment D of this report. The samples collected will be stored for 30 days from the date of issue of this report, and then disposed of unless otherwise instructed in writing by the client.

Water Level Measurements

Upon completion of the boreholes, Borings B-1, B-25, and B-61 were converted into monitoring wells. All three monitoring wells (B-1/MW-1, B-25/MW-2, and B-61/MW-3) were constructed of 2" PVC and have a 10' long PVC screen. #2 Sand was used to pack the .010 slot well screen and sand with cuttings was used to backfill the riser. 6" x 10" steel road boxes with concrete pads were installed to secure the monitoring wells.

Environmental Partners measured the groundwater level in the three monitoring wells following drilling to assess the extent and need for dewatering during construction. The groundwater measurements are summarized as follows:

- B-1/MW-1, located directly in front of the Sea Street Pump Station on Sea Street, had an approximate groundwater elevation of 1.11' during the time of drilling. The proposed sewer force main in this area lies below the groundwater table at an invert elevation of approximately -3.2' and is tidally influenced based on recent work performed at the Sea Street Pump Station. Extensive dewatering effort will likely be required in this area to achieve a dry trench and workable conditions based on measured groundwater elevations and EP's experience during the Emergency Sewer Force Main Assessment project.

- B-25/MW-2, located near the intersection of Lily Street and Liberty Street, had an approximate groundwater elevation of 12.7' during the time of drilling. Field observations indicate this groundwater is perched above the underlying clayey silt layer. The proposed sewer force main in this area lies below the perched groundwater table at an invert elevation of approximately 8.9'. Dewatering will likely be required in this area to achieve workable conditions within the perched groundwater table.

- B-61/MW-3, located near the intersection of Silver Street and Pleasant Street, had an approximate groundwater elevation of 6.8' during the time of drilling. The proposed sewer force main in this area lies above the groundwater table at an invert elevation of approximately 18.1'. Dewatering will likely not be required in this location or its surrounding areas based on measured groundwater elevations and field observations in the abutting auger and geoprobe borings.

It should be noted that subsurface groundwater levels can fluctuate with time, tidal influence, amount of precipitation, snowmelt, and seasonal variations. It is possible that subsurface groundwater levels could be significantly different than those which were observed during the time the borings were performed.

Construction Recommendations

Pipeline Construction

The proposed force main will primarily be installed by conventional open cut excavation. Based on the information obtained from the subsurface exploration program, it is our opinion that the underlying soils are suitable to support the force main and its associated features. Should localized conditions such as loose, soft soils, wet zones, organics or any unsuitable material be encountered during the installation of the pipeline, the pipe and manhole foundations should be inspected by the engineer prior to placing bedding for the pipe and manholes.

Support of Excavation

Cover over the SSPS Force Main No.3 is expected to vary between 2.5 feet and 14 feet and will generally follow the slope of the existing roadway topography. Depths of excavation are therefore expected to range between 5.5 feet and 17 feet below grade. Excavated material is expected to mainly consist of sand, silty sand, sandy silt, and clayey silt with trace amounts of gravel. Although variations may be present in the field, results of test boring and monitoring well drilling indicate it is unlikely that bedrock will be encountered during excavation for the new sewer force main.

Based on the depth of excavation, an engineered earth support system will be required to provide stable working conditions. The excavation support system shall be designed to resist lateral earth pressures and must meet all Occupational Safety and Health Administration (OSHA) requirements. The support system for the excavation shall also be designed to be left in place if required. A support system consisting of soldier piles and lagging or internally braced sheet piles may be used for this project. The use of sheet piles will be quicker to install and will provide cutoff in the fill, and silt layers to help control ground water and surface water flow into the excavation. Steel sheeting would need to be installed a minimum of 2 feet below the lowest level of excavation. The Contractor shall retain a Massachusetts Registered Professional Engineer to design a functioning excavation and support system. The design shall be submitted for review prior to construction.

Dewatering

Surface water and groundwater shall be controlled such that excavation and installation of the new sewer force main is made in-the-dry. Based on groundwater data measurements, EP anticipates that significant trench dewatering efforts will be necessary towards the beginning of the force main alignment on Sea Street. Trench dewatering techniques may include installation of physical barriers such as sand bags, diversion trenching, open sump pumping, deep well systems, vacuum wellpoint systems, or a combination of these techniques. We anticipate that dewatering operations will require frac tanks or secondary containment before final discharge. All water discharged from temporary dewatering and drainage systems shall be disposed of in accordance with sedimentation and control plans and methods approved by the Town. Sanitary sewer systems or private on-site septic systems shall not be used to dispose of drainage. The Contractor is expected to retain a

Massachusetts Registered Professional Engineer to design an appropriate dewatering system suited to handle groundwater conditions across the site.

Geotechnical Instrumentation and Monitoring

Excavation and dewatering required for installation of the sewer force main and relocated water, sewer, and drain utilities will take place in close proximity to building foundations due to the narrow roadway widths along the force main alignment. EP recommends that all residential buildings along the alignment between the Sea Street Pump Station and the intersection of Atlantic Avenue and Sparks Avenue be equipped with settlement monitoring points and/or crack gauges to monitor lateral movement. Horizontal and vertical movement of any point on adjacent structures shall be monitored throughout construction and shall not exceed 0.25 inches. Exact locations of the settlement monitoring points and crack gauges will be determined in the field during construction based on depth and width of excavation and the building's proximity to the excavation. Assuming all buildings within 50 feet from the excavation will require monitoring, approximately 184 monitoring points will be required along the force main alignment.

Additionally, EP recommends pre and post construction surveys be conducted for each property within the limit of work between Sea Street and Atlantic Avenue. Surveys shall include photographs and video to record the conditions of all buildings, basements, surface features such as decks, patios, and walls, and other features pre and post construction.

Horizontal Directional Drilling

During the Alternative Force Main Alignments Assessment, EP assumed that the first 550 linear feet of force main stemming from the Sea Street Pump Station to the end of Step Lane would be installed via horizontal directional drilling. Advancement of the project design indicates that the existing water and gravity sewer infrastructure on these streets will be replaced via open cut installation under the project's scope. Consequently, installation of the force main via horizontal directional drilling on Sea Street and Step Lane would not minimize surface restoration requirements. Due to replacement of existing water and sewer infrastructure along these streets and the concern of drilling fluid entering surrounding basements during drilling operations (as expressed during EP's coordination with Henniker Directional Drilling, LLC), EP abandoned horizontal directional drilling as a viable method of installation along Sea Street and Step Lane.

Other Construction Considerations

Bedding for the sewer force main and below structures should be crushed stone. All fill placed beneath areas designated to be paved should be processed gravel or structural fill. Structural fill is defined as well graded natural sand and gravel with a maximum particle size of four inches and no more than 10 percent passing the No. 200 sieve. Structural fill should be placed in 6 to 8-inch loose lifts and compacted to 95% if the Modified Proctor Maximum Dry Density (ASTM D1557) for the specific material being used as indicated in Table 4, below. The intent of this recommendation is to reduce the potential for consolidation and settlement.

Table 4: Structural Fill Placement Guidelines

Area	Degree of Compaction Based on ASTM D1557
Below Structures	95%
Utility Trenches within Roadway	95%
Grade-raise fill placed within 1 foot of the base of the pavement	95%
Other Landscaped Areas	92%

Processed Gravel for pavement sub-base shall be hard, durable stone of proper size and gradation and coarse sand, unfrozen and substantially free from vegetation, roots, loam and other organic matter, clay, snow, frozen particles and other fine harmful substances. Processed gravel shall be graded within the limits included in Table 5, below.

Table 5: Processed Gravel Gradation Requirements

Sieve Designation	Percentage Passing
3-in	100
1-1/2 in	70 to 100
1/4-in	50 to 85
No.4	30 to 60
No.200	0 to 10

Crushed stone shall consist of durable crushed rock or durable crushed gravel stone, free from ice and snow, sand, clay, loam, or other deleterious or organic material. The crushed stone shall be uniformly blended and shall conform to the gradation requirements outlined in Table 6, below. All crushed stone shall be washed.

Table 6: Crushed Stone Gradation Requirements

Sieve Designation	Percentage Passing	
	3/4-inch Stone	1/2-inch Stone
1-in	75-100	-
3/4-in	0-5	-
5/8-in	-	100
1/2-in	-	85-100
3/8-in	-	15-45
No.4	-	0-15
No.8	-	0-5

Work between Sea Street and Pine Street will most likely require rebuilding the roadway and sidewalks to allow for the installation of the force main and replace or upgrades the other utilities. Sidewalk restoration will require removing and resetting the granite curbing, brick pavers, and bedding material for the sidewalks. All restoration work including granite curb reveals shall be coordinated with the Nantucket Public Works Department. All materials will be specified in the contract documents.

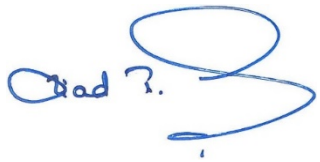
Laboratory testing should be performed on the fill materials to determine the appropriate moisture density relationship of the fill being placed. All finished and disturbed ground surfaces should be adequately prepared to reduce erosion.

Attachments

Attachment A – Subsurface Exploration Map Book
Attachment B – Boring Details
Attachment C – Boring Logs
Attachment D – Laboratory Analysis
Attachment E – Weston and Sampson Boring Plan and Logs

Limitations

This report has been prepared in accordance with generally accepted geotechnical engineering practices and it is intended to be used to assist in design of the Sea Street Pump Station Force Main No.3 project located in Nantucket, MA. The findings and recommendations contained in this report are based on site conditions encountered during the subsurface exploration. These opinions were arrived at in accordance with accepted engineering procedures at this time. Conclusions and additions made from this data by others are their responsibilities. Should the location of the proposed pipes and structures change, or if the soil conditions become notably different during construction from those described herein, Environmental Partners Group, Inc. should be notified immediately. Should potentially hazardous materials be encountered at the site during excavation, an environmental investigation should be performed immediately.

Prepared by: 

Ziad F. Kary, P.E.
Senior Principal
Environmental Partners Group, Inc.

ATTACHMENT A

Subsurface Exploration Map Book

B-1/MW-1
B-2
B-3
B-4
B-5
B-6
B-7

Legend

Boring Type

- Auger Boring
- Geoprobe
- Monitoring Well
- Force Main Alignment
- Town Line



1 inch = 61.7 feet

ENVIRONMENTAL PARTNERS

GEOTECHNICAL PLAN
SSPS FORCE MAIN NO.3
PAGE 1 OF 22

N
W E
S

B-12
B-11
B-10
B-9
B-8
B-7
B-6

Legend

Boring Type

- Auger Boring
- Geoprobe
- Monitoring Well
- Force Main Alignment
- Town Line



1 inch = 61.7 feet

N
W E
S

ENVIRONMENTAL PARTNERS

GEOTECHNICAL PLAN
SSPS FORCE MAIN NO.3
PAGE 2 OF 22

B-21
B-22
B-25/MW-2
B-23
B-26
B-28

Legend

Boring Type

- Auger Boring
- Geoprobe
- Monitoring Well
- Force Main Alignment
- Town Line



1 inch = 61.7 feet

ENVIRONMENTAL PARTNERS

GEOTECHNICAL PLAN
SSPS FORCE MAIN NO.3
PAGE 3 OF 22

N
W E
S

B-28
B-24
B-29
B-30
B-32
B-36
B-35
B-34
B-33
B-27

Legend

Boring Type

- Auger Boring
- Geoprobe
- Monitoring Well
- Force Main Alignment
- Town Line



1 inch = 61.7 feet

ENVIRONMENTAL PARTNERS

GEOTECHNICAL PLAN
SSPS FORCE MAIN NO.3
PAGE 4 OF 22

N
W E
S

B-36
B-37
B-99
B-31
B-38
B-39
MAIN STREET
B-40
B-41
5
B-42
B-43
B-44

Legend

Boring Type

- Auger Boring
- Geoprobe
- Monitoring Well
- Force Main Alignment
- Town Line



1 inch = 61.7 feet

ENVIRONMENTAL PARTNERS

GEOTECHNICAL PLAN
SSPS FORCE MAIN NO.3
PAGE 5 OF 22

N
W
E
S

B-44
B-45
B-46
B-47
B-48
B-49
B-50
B-51
B-52
B-55

Legend

Boring Type

- Auger Boring
- Geoprobe
- Monitoring Well
- Force Main Alignment
- Town Line



1 inch = 61.7 feet

ENVIRONMENTAL PARTNERS

GEOTECHNICAL PLAN
SSPS FORCE MAIN NO.3
PAGE 6 OF 22

N
W E
S

B-52
B-55
B-57
B-54
B-53
B-56
B-61/MW-3
B-58
B-60
B-63
B-64
B-66
B-62
B-59
B-65

Legend

Boring Type

- Auger Boring
- Geoprobe
- Monitoring Well
- Force Main Alignment
- Town Line



1 inch = 61.7 feet

ENVIRONMENTAL PARTNERS

GEOTECHNICAL PLAN
SSPS FORCE MAIN NO.3
PAGE 7 OF 22

N
W E
S

B-65
B-67
B-68
B-69
B-70
B-71
B-72
PROSPECT STREET
ATLANTIC AVENUE

Legend

Boring Type

- Auger Boring
- Geoprobe
- Monitoring Well
- Force Main Alignment
- Town Line



1 inch = 61.7 feet

ENVIRONMENTAL PARTNERS

GEOTECHNICAL PLAN
SSPS FORCE MAIN NO.3
PAGE 8 OF 22

N
W E
S





ENVIRONMENTAL PARTNERS

GEOTECHNICAL PLAN
SSPS FORCE MAIN NO.3
PAGE 9 OF 22

1 inch = 61.7 feet

N
W E
S





1 inch = 61.7 feet

ENVIRONMENTAL PARTNERS

GEOTECHNICAL PLAN
SSPS FORCE MAIN NO.3
PAGE 10 OF 22

N
W E
S

Legend

Boring Type

- Auger Boring
- Geoprobe
- Monitoring Well
- Force Main Alignment
- Town Line



1 inch = 61.7 feet

ENVIRONMENTAL PARTNERS

GEOTECHNICAL PLAN
SSPS FORCE MAIN NO.3
PAGE 11 OF 22

N
W E
S

Legend

Boring Type

- Auger Boring
- Geoprobe
- Monitoring Well
- Force Main Alignment
- Town Line



1 inch = 61.7 feet

ENVIRONMENTAL PARTNERS

GEOTECHNICAL PLAN
SSPS FORCE MAIN NO.3
PAGE 12 OF 22

N
W E
S

B-73
B-74
B-75
B-76
B-79
B-77
B-78
B-80
B-83

Legend

Boring Type

- Auger Boring
- Geoprobe
- Monitoring Well
- Force Main Alignment
- Town Line



1 inch = 61.7 feet

ENVIRONMENTAL PARTNERS

GEOTECHNICAL PLAN
SSPS FORCE MAIN NO.3

N
W E
S

B-83
B-81
B-82
B-84
B-85
B-86
B-87
B-88
14
B-89
B-90
B-9

Legend

Boring Type

- Auger Boring
- Geoprobe
- Monitoring Well
- Force Main Alignment
- Town Line



1 inch = 61.7 feet

ENVIRONMENTAL PARTNERS

GEOTECHNICAL PLAN
SSPS FORCE MAIN NO.3

N
W E
S

B-91
B-92
B-93
B-94
B-95
B-96
B-97
B-101
B-116
B-100
B-98

Legend

Boring Type

- Auger Boring
- Geoprobe
- Monitoring Well
- Force Main Alignment
- Town Line



ENVIRONMENTAL PARTNERS

1 inch = 61.7 feet

GEOTECHNICAL PLAN
SSPS FORCE MAIN NO.3
PAGE 15 OF 22

N
W E
S

B-98
B-102
B-103
B-104
B-105
B-106
B-107
B-108

Legend

Boring Type

- Auger Boring
- Geoprobe
- Monitoring Well
- Force Main Alignment
- Town Line



1 inch = 61.7 feet

ENVIRONMENTAL PARTNERS

GEOTECHNICAL PLAN
SSPS FORCE MAIN NO.3
PAGE 16 OF 22

N
W E
S

B-108
B-109
B-110
B-111
B-112
B-113
17

Legend

Boring Type

- Auger Boring
- Geoprobe
- Monitoring Well
- Force Main Alignment
- Town Line



1 inch = 61.7 feet

ENVIRONMENTAL PARTNERS

GEOTECHNICAL PLAN
SSPS FORCE MAIN NO.3
PAGE 17 OF 22

N
W E
S

B-113
B-114
B-117
B-118
B-119
18

Legend

Boring Type

- Auger Boring
- Geoprobe
- Monitoring Well
- Force Main Alignment
- Town Line



1 inch = 61.7 feet

ENVIRONMENTAL PARTNERS

GEOTECHNICAL PLAN
SSPS FORCE MAIN NO.3
PAGE 18 OF 22

N
W E
S

B-119

B-120

B-121

B-124

B-123

B-125

19

Legend

Boring Type

- Auger Boring
- Geoprobe
- Monitoring Well
- Force Main Alignment
- Town Line



1 inch = 61.7 feet

ENVIRONMENTAL PARTNERS

GEOTECHNICAL PLAN
SSPS FORCE MAIN NO.3
PAGE 19 OF 22

N
W E
S

B-125
B-122
B-126
B-129
B-127
B-128

Legend

Boring Type

- Auger Boring
- Geoprobe
- Monitoring Well
- Force Main Alignment
- Town Line



1 inch = 61.7 feet

ENVIRONMENTAL PARTNERS

GEOTECHNICAL PLAN
SSPS FORCE MAIN NO.3

N
W E
S

B-128

MW- N11

B-130

B-131

21

Legend

Boring Type

- Auger Boring
- Geoprobe
- Monitoring Well
- Force Main Alignment
- Town Line



ENVIRONMENTAL PARTNERS

1 inch = 61.7 feet

N

W E

S

GEOTECHNICAL PLAN
SSPS FORCE MAIN NO.3
PAGE 21 OF 22

B-132

22

Legend

Boring Type

- Auger Boring
- Geoprobe
- Monitoring Well
- Force Main Alignment
- Town Line



1 inch = 61.7 feet

ENVIRONMENTAL PARTNERS

GEOTECHNICAL PLAN
SSPS FORCE MAIN NO.3
PAGE 22 OF 22

N
W E
S

ATTACHMENT B

Boring Details

Appendix B - Boring Details

Boring ID	Latitude	Longitude	Surface Elevation	Installed Depth (ft)
B-1/MW-1	41.2866598	-70.0993473	4.64	12
B-2	41.2865719	-70.0996936	5.11	14
B-3	41.2864899	-70.0999673	6.32	14
B-4	41.2864120	-70.1001912	7.07	14
B-5	41.2863007	-70.1004787	15.47	17
B-6	41.2862130	-70.1008042	24.48	17
B-7	41.2861577	-70.1011101	26.18	17
B-8	41.2862289	-70.1013138	27.17	17
B-9	41.2864703	-70.1014466	27.29	17
B-10	41.2866500	-70.1016535	24.76	17
B-11	41.2867850	-70.1018998	19.79	17
B-12	41.2868862	-70.1021287	15.34	17
B-21	41.2850235	-70.1036759	16.49	17
B-22	41.2849219	-70.1037379	16.97	17
B-23	41.2846308	-70.1038940	17.51	20
B-24	41.2844385	-70.1039762	17.09	15
B-25/MW-2	41.2842586	-70.1040666	16.78	15
B-26	41.2839801	-70.1041442	18.03	15
B-27	41.2837070	-70.1039570	20.06	15
B-28	41.2835190	-70.1037858	21.21	15
B-29	41.2833508	-70.1037137	22.34	15
B-30	41.2831364	-70.1036012	24.66	15
B-31	41.2827597	-70.1033910	32.00	15
B-32	41.2827867	-70.1032477	31.05	15
B-33	41.2828258	-70.1029353	29.60	15
B-34	41.2828569	-70.1026544	28.13	15
B-35	41.2828868	-70.1023967	26.83	15
B-36	41.2829071	-70.1021025	26.27	15
B-37	41.2827028	-70.1019877	27.09	25
B-38	41.2824741	-70.1018332	28.26	15
B-39	0.0000000	0.0000000	0.00	15
B-40	41.2821111	-70.1014508	30.82	15
B-41	41.2819127	-70.1013223	32.10	15
B-42	41.2816797	-70.1011662	34.53	15
B-43	41.2814747	-70.1010481	36.99	15
B-44	41.2812765	-70.1010749	39.23	15
B-45	41.2810231	-70.1010252	42.57	15
B-46	41.2807443	-70.1010211	44.73	15
B-47	41.2805204	-70.1010043	46.49	15
B-48	41.2803009	-70.1010771	48.25	15
B-49	41.2801489	-70.1008804	48.50	17

Boring ID	Latitude	Longitude	Surface Elevation	Installed Depth (ft)
B-50	41.2799375	-70.1006773	46.27	15
B-51	41.2797746	-70.1004311	43.11	15
B-52	41.2795679	-70.1001171	39.34	15
B-53	0.0000000	0.0000000	0.00	15
B-54	41.2792993	-70.0997094	35.71	15
B-55	41.2791485	-70.0995790	34.07	15
B-56	41.2789681	-70.0993113	32.75	15
B-57	41.2788181	-70.0990925	31.57	15
B-58	0.0000000	0.0000000	0.00	15
B-59	41.2784860	-70.0986595	29.99	15
B-60	41.2782848	-70.0986604	25.94	17
B-61/MW-3	41.2781815	-70.0990035	26.09	20
B-62	41.2780319	-70.0992349	28.35	15
B-63	41.2778625	-70.0990913	30.13	15
B-64	41.2776990	-70.0989624	32.08	15
B-65	41.2774555	-70.0987803	34.48	15
B-66	41.2773298	-70.0986830	35.36	15
B-67	41.2770105	-70.0985612	39.51	15
B-68	41.2768443	-70.0985985	41.63	15
B-69	41.2765714	-70.0986633	41.86	15
B-70	41.2763432	-70.0987150	40.33	15
B-71	41.2756171	-70.0988827	36.29	15
B-72	41.2753730	-70.0989406	35.57	15
B-73	41.2749358	-70.0990429	36.34	15
B-74	41.2650382	-70.1005440	21.93	15
B-75	41.2648246	-70.1004977	21.83	15
B-76	41.2645913	-70.1004494	21.94	15
B-77	41.2643885	-70.1004046	22.54	15
B-79	41.2638545	-70.1002828	27.51	15
B-78	41.2641062	-70.1003475	24.44	15
B-80	41.2636405	-70.1002245	30.08	15
B-81	41.2634319	-70.1001622	31.63	15
B-83	41.2630052	-70.0999963	35.76	15
B-82	41.2632488	-70.1000959	33.43	15
B-84	41.2627690	-70.0998738	36.96	15
B-85	41.2625670	-70.0997582	37.26	15
B-86	41.2623511	-70.0996392	37.79	15
B-87	41.2620693	-70.0994827	37.82	15
B-88	41.2618871	-70.0993783	37.51	15
B-89	41.2616332	-70.0992401	36.47	15
B-90	41.2614559	-70.0991458	35.77	15
B-91	41.2612365	-70.0990155	35.59	15
B-92	41.2609281	-70.0988374	34.90	15

Boring ID	Latitude	Longitude	Surface Elevation	Installed Depth (ft)
B-93	41.2607734	-70.0987590	34.59	15
B-94	41.2603592	-70.0984615	34.56	15
B-95	41.2601790	-70.0982961	33.89	17
B-96	41.2599707	-70.0980987	33.01	20
B-97	41.2597821	-70.0979175	32.24	15
B-98	41.2596157	-70.0977545	32.04	15
B-99	41.2594078	-70.0975536	31.52	15
B-100	41.2592415	-70.0975714	30.41	15
B-101	41.2590253	-70.0977050	30.48	15
B-102	41.2587571	-70.0978440	30.75	15
B-103	41.2584921	-70.0979783	30.93	15
B-104	41.2583274	-70.0980537	31.13	15
B-105	41.2581247	-70.0981570	31.14	15
B-106	41.2579338	-70.0982482	30.77	15
B-107	41.2574740	-70.0984818	30.45	15
B-108	41.2570025	-70.0987133	30.28	15
B-109	41.2565437	-70.0989458	30.45	15
B-110	41.2560173	-70.0992076	30.49	15
B-111	41.2556300	-70.0994064	30.10	15
B-112	41.2552229	-70.0996174	29.46	15
B-113	41.2547475	-70.0998661	28.92	17
B-114	41.2543130	-70.1001033	28.45	15
B-115	41.2536415	-70.1004660	27.39	20
B-116	41.2532139	-70.1006839	26.50	15
B-117	41.2527539	-70.1009330	26.26	15
B-118	41.2523097	-70.1011718	26.95	15
B-119	41.2518622	-70.1014155	26.31	15
B-120	41.2514356	-70.1016455	25.69	15
B-121	41.2509818	-70.1018824	24.84	15
B-122	41.2505624	-70.1020965	24.08	15
B-123	41.2501355	-70.1023175	24.19	15
B-124	41.2496745	-70.1025751	23.57	15
B-125	41.2492260	-70.1027825	22.90	15
B-126	41.2487704	-70.1030193	22.41	15
B-127	41.2483838	-70.1032175	21.84	15
B-128	41.2478754	-70.1034755	20.97	15
B-129	41.2474231	-70.1037071	20.67	15
B-130	41.2469996	-70.1039301	20.59	17
B-131	41.2463868	-70.1042356	19.55	15
B-132	41.2448545	-70.1045634	20.46	15

ATTACHMENT C

Boring Logs

BORING LOG

Project: Sea Street Pump Station Force Main No. 3

Location: Nantucket, MA

Client: Town of Nantucket

Driller: Crawford Drilling Services

Drilling Methods: Auger

Weather:

Performed By: SJG Date: 10/19/20

Checked By: ZFK Date: 12/16/20

Sea Street Pump Station Force Main No. 3

SEE SITE PLAN

Boring Locus Map

Boring No.: **B-1/MW-1**

Location: See Plan

Approx. Ground Elevation: 4.63'

Approx. Groundwater Elevation: 1.11'

Date/Time of GW EL. 10/19/20 16:40

Datum: NAVD88

Project No. 360-2001

Depth (feet)	*Sample No.*	*Blows per 6-inch*	*SPT Value*	*Pen./ Rec.*	*Soil Description*		*Stratum Change Depth (feet)*	*Note No.*
1 2	S1	Auger 7" 6 7 9		24"/16"	3" Pavement 4" Black road base 9" fill 7" Brown/tan fill, silty SAND, dry			
3 4 5								
6 7	S2	1 2 5 7		24"/14"	2" Brown, poorly graded SAND with silt, wet 3" Peat, wet 9" Grey, poorly graded SAND with silt, wet	SP-SM		
8 9 10								
11 12	S3	2 3 3 3		24"/24"	24" Brown, poorly graded SAND, with trace silt and gravel, wet	SP		
13 14 15								
16 17								
18 19 20								
21 22								

NOTES:

Well set @ 12' bgs

10-slot screen 12'-2' bgs

TOC = 0.3' bgs

TD = 1.9' + 0.3' = 12.2' bgs

GW = 3.22' + 0.3' = 3.52' bgs @ 1640

LEGEND

S - Split Spoon Sample	O/A - Sample Collected Off the Augers
UT - Undisturbed Tube Sample	
Trace - Approximately 0 to 10%	Some - Approximately 20 to 35%
Little - Approximately 10 to 20%	And - Approximately 35 to 50%
0-4 Coarse Soil N Value - Very Loose	11-30 Coarse Soil N Value - Medium Dense
5-10 Coarse Soil N Value - Loose	31-50 Coarse Soil N Value - Dense
0-2 Fine Soil N Value - Very Soft	4-8 Fine Soil N Value - Medium Stiff
2-4 Fine Soil N Value - Soft	8-15 Fine Soil N Value - Stiff

BORING LOG

Project: Sea Street Pump Station Force Main No. 3

Location: Nantucket, MA

Client: Town of Nantucket

Driller: Crawford Drilling Services

Drilling Methods: Auger

Weather:

Performed By: SJG Date: 10/19/20

Checked By: ZFK Date: 12/16/20

Sea Street Pump Station Force Main No. 3

SEE SITE PLAN

Boring Locus Map

Boring No.: **B-2**

Location: See Plan

Approx. Ground Elevation:

Approx. Groundwater Elevation:

Date/Time of GW EL.

Datum: NAVD88

Project No. 360-2001

Depth (feet)	*Sample No.*	*Blows per 6-inch*	*SPT Value*	*Pen./ Rec.*	*Soil Description*		*Stratum Change Depth (feet)*	*Note No.*
1 2	S1	Auger 6 7 9		24"/17"	6' Asphalt 5" Black fill 1" Brick 11" Brown, fine to med silty SAND, dry			
3 4 5								
6 7	S2	1 WOH 1 WOH		24"/21"	14" Brown, fine to med silty SAND with trace gravel, wood fragment, wet 7" Peat			
8 9 10								
11 12	S3	2 3 2 4		24"/24"	Brown, poorly graded SAND with trace silt and gravel, wet			
13 14	S4	5 6 6 7		24"/23"	18" Brown, poorly graded SAND with trace silt and gravel, wet 7" orange poorly graded SAND with trace silt and gravel, wet			
15 16 17								
18 19 20								
21 22								

NOTES:

continuous sampling from 10'-14' to prevent collapse,

hole collapsed after removing spoon @ 14'

LEGEND

S - Split Spoon Sample	O/A - Sample Collected Off the Augers
UT - Undisturbed Tube Sample	
Trace - Approximately 0 to 10%	Some - Approximately 20 to 35%
Little - Approximately 10 to 20%	And - Approximately 35 to 50%
0-4 Coarse Soil N Value - Very Loose	11-30 Coarse Soil N Value - Medium Dense
5-10 Coarse Soil N Value - Loose	31-50 Coarse Soil N Value - Dense
0-2 Fine Soil N Value - Very Soft	4-8 Fine Soil N Value - Medium Stiff
2-4 Fine Soil N Value - Soft	8-15 Fine Soil N Value - Stiff

BORING LOG

Project: Sea Street Pump Station Force Main No. 3

Location: Nantucket, MA

Client: Town of Nantucket

Driller: Crawford Drilling Services

Drilling Methods: Auger

Weather:

Performed By: SJG Date: 10/19/20

Checked By: ZFK Date: 12/16/20

Sea Street Pump Station Force Main No. 3

SEE SITE PLAN

Boring Locus Map

Boring No.: **B-3**

Location: See Plan

Approx. Ground Elevation: 6.32'

Approx. Groundwater Elevation: 3.27'

Date/Time of GW EL. 10/19/20 16:25

Datum: NAVD88

Project No. 360-2001

Depth (feet)	*Sample No.*	*Blows per 6-inch*	*SPT Value*	*Pen./ Rec.*	*Soil Description*		*Stratum Change Depth (feet)*	*Note No.*
1 2	S1	5 5 5 5		24"/18"	6' Asphalt 12" fill 6" Brown, fine silty SAND, dry			
3 4 5								
6 7	S2			24"/16"	Brown, fine SAND, moist, with trace silt and gravel			
8 9 10								
11 12	S3			24"/16"	Grey, fine to med SAND with trace silt, wet			
13 14	S4			24"/24"	Brown, fine to med SAND with trace silt, wet			
15 16 17								
18 19 20								
21 22								

NOTES:

GW measured @ 3.05 in Augers @ 1625

LEGEND

S - Split Spoon Sample O/A - Sample Collected Off the Augers

UT - Undisturbed Tube Sample

Trace - Approximately 0 to 10% Some - Approximately 20 to 35%

Little - Approximately 10 to 20% And - Approximately 35 to 50%

0-4 Coarse Soil N Value - Very Loose 11-30 Coarse Soil N Value - Medium Dense

5-10 Coarse Soil N Value - Loose 31-50 Coarse Soil N Value - Dense

0-2 Fine Soil N Value - Very Soft 4-8 Fine Soil N Value - Medium Stiff

2-4 Fine Soil N Value - Soft 8-15 Fine Soil N Value - Stiff

BORING LOG

Project: Sea Street Pump Station Force Main No. 3

Location: Nantucket, MA

Client: Town of Nantucket

Driller: Crawford Drilling Services

Drilling Methods: Auger

Weather: sunny 60 degrees

Performed By: SJG Date: 10/20/20

Checked By: ZFK Date: 12/16/20

Sea Street Pump Station Force Main No. 3

SEE SITE PLAN

Boring Locus Map

Boring No.: **B-4**

Location: See Plan

Approx. Ground Elevation:

Approx. Groundwater Elevation:

Date/Time of GW EL.

Datum: NAVD88

Project No. 360-2001

Depth (feet)	*Sample No.*	*Blows per 6-inch*	*SPT Value*	*Pen./ Rec.*	*Soil Description*		*Stratum Change Depth (feet)*	*Note No.*
1 2	S1	Auger 5 8 7		24"/16"	10" fill 6" ton, fine silty SAND, dry			
3 4 5								
6 7	S2	1 1 2 5		24"/19"	Brown, fine to med SAND with layers containing some silt, dry			
8 9 10								
11 12	S3	4 4 4 4		24"/16"	Tan, poorly graded SAND with trace gravel and silt, wet			
13 14	S4	4 3 4 6		24"/16"	orange, poorly graded SAND with trace gravel, wet			
15 16 17								
18 19 20								
21 22								

NOTES:

DTW measured in Augers = 5.15' @ 0850

LEGEND

S - Split Spoon Sample	O/A - Sample Collected Off the Augers
UT - Undisturbed Tube Sample	
Trace - Approximately 0 to 10%	Some - Approximately 20 to 35%
Little - Approximately 10 to 20%	And - Approximately 35 to 50%
0-4 Coarse Soil N Value - Very Loose	11-30 Coarse Soil N Value - Medium Dense
5-10 Coarse Soil N Value - Loose	31-50 Coarse Soil N Value - Dense
0-2 Fine Soil N Value - Very Soft	4-8 Fine Soil N Value - Medium Stiff
2-4 Fine Soil N Value - Soft	8-15 Fine Soil N Value - Stiff

BORING LOG

Project: Sea Street Pump Station Force Main No. 3

Location: Nantucket, MA

Client: Town of Nantucket

Driller: Crawford Drilling Services

Drilling Methods: Auger

Weather: overcast 60s

Performed By: SJG Date: 10/20/20

Checked By: ZFK Date: 12/16/20

Sea Street Pump Station Force Main No. 3

SEE SITE PLAN

Boring Locus Map

Boring No.: **B-5**

Location: See Plan

Approx. Ground Elevation: 15.49

Approx. Groundwater Elevation: ~0.49'

Date/Time of GW EL. 10/20/20 10:45

Datum: NAVD88

Project No. 360-2001

Depth (feet)	*Sample No.*	*Blows per 6-inch*	*SPT Value*	*Pen./ Rec.*	*Soil Description*		*Stratum Change Depth (feet)*	*Note No.*
1 2	S1	Auger 3 5 2		24"/16"	3" Asphalt 6" filt 10" tan, fine SAND with trace silt			
3 4 5								
6 7	S2	2 3 7 9		24"/19"	10" Brown, sandy SILT, dry 9" Brown, fine to med SAND with trace silt, dry			
8 9 10								
11 12	S3	1 2 5 6		24"/16"	Grey, clayey SILT, dry			
13 14 15								
16 17	S4	5 8 11 13		24"/22"	4" Grey, CLAYEY SILT, moist 9" Brown, poorly graded SAND, wet 9" Brown, silty SAND, wet			
18 19 20								
21 22								

NOTES:

GW below clayey silt @ approx 15' below grade

LEGEND

S - Split Spoon Sample	O/A - Sample Collected Off the Augers
UT - Undisturbed Tube Sample	
Trace - Approximately 0 to 10%	Some - Approximately 20 to 35%
Little - Approximately 10 to 20%	And - Approximately 35 to 50%
0-4 Coarse Soil N Value - Very Loose	11-30 Coarse Soil N Value - Medium Dense
5-10 Coarse Soil N Value - Loose	31-50 Coarse Soil N Value - Dense
0-2 Fine Soil N Value - Very Soft	4-8 Fine Soil N Value - Medium Stiff
2-4 Fine Soil N Value - Soft	8-15 Fine Soil N Value - Stiff

BORING LOG

Project: Sea Street Pump Station Force Main No. 3

Location: Nantucket, MA

Client: Town of Nantucket

Driller: Crawford Drilling Services

Drilling Methods: Auger

Weather: overcast 60s

Performed By: SJG Date: 10/20/20

Checked By: ZFK Date: 12/16/20

Sea Street Pump Station Force Main No. 3

SEE SITE PLAN

Boring Locus Map

Boring No.: **B-6**

Location: See Plan

Approx. Ground Elevation: 24.47'

Approx. Groundwater Elevation:

Date/Time of GW EL.

Datum: NAVD88

Project No. 360-2001

Depth (feet)	*Sample No.*	*Blows per 6-inch*	*SPT Value*	*Pen./ Rec.*	*Soil Description*		*Stratum Change Depth (feet)*	*Note No.*
1 2	S1	Auger 2 2 4		24"/13"	3" Asphalt 9" Fill consisting of crushed asphaly and silty SAND, dry 4" Brown, silty SAND, dry			
3 4 5								
6 7	S2	2 6 6 5		24"/15"	7" tan, fine to med SAND, dry 8" brown, sandy SILT, with trace gravel, dry			
8 9 10								
11 12	S3	2 5 6 6		24"/24"	Brown/orange clayey SILT with iron staining, dry			
13 14 15								
16 17	S4	5 7 6 7		24"/15"	Tan poorly graded SAND, dry			
18 19 20								
21 22								

NOTES:

GW not encountered

LEGEND

S - Split Spoon Sample O/A - Sample Collected Off the Augers

UT - Undisturbed Tube Sample

Trace - Approximately 0 to 10% Some - Approximately 20 to 35%

Little - Approximately 10 to 20% And - Approximately 35 to 50%

0-4 Coarse Soil N Value - Very Loose 11-30 Coarse Soil N Value - Medium Dense

5-10 Coarse Soil N Value - Loose 31-50 Coarse Soil N Value - Dense

0-2 Fine Soil N Value - Very Soft 4-8 Fine Soil N Value - Medium Stiff

2-4 Fine Soil N Value - Soft 8-15 Fine Soil N Value - Stiff

BORING LOG

Project: Sea Street Pump Station Force Main No. 3

Location: Nantucket, MA
Client: Town of Nantucket
Driller: Crawford Drilling Services
Drilling Methods: Auger

Weather: overcast 60
Performed By: SJG Date: 10/20/20
Checked By: ZFK Date: 12/16/20

Sea Street Pump Station Force Main No. 3

SEE SITE PLAN

Boring Locus Map

Boring No.: **B-7**
Location: See Plan
Approx. Ground Elevation: 26.18'

Approx. Groundwater Elevation: 13.15'
Date/Time of GW EL. 10/20/20 15:15
Datum: NAVD88
Project No. 360-2001

Depth (feet)	*Sample No.*	*Blows per 6-inch*	*SPT Value*	*Pen./ Rec.*	*Soil Description*		*Stratum Change Depth (feet)*	*Note No.*
1 2	S1	Auger 4 6 5		24"/16"	5" Asphalt 7" Fill 9" Brown, silty SAND, dry			
3 4 5								
6 7	S2	1 1 1 1		24"/20"	14" Brown/orange silty SAND, dry 6" Brown, sandy SILT, m			
8 9 10								
11 12	S3	2 5 13 15		24"/20"	12" Brown, sandy SILT 8" Orange, fine SAND, dry			
13 14 15								
16 17	S4	2 3 4 5		24"/24"	24" Brown, poorly graded SAND, wet			
18 19 20								
21 22								

NOTES:

Groundwater measured @ 13.03' bgs in auger @ 1515

LEGEND

S - Split Spoon Sample
UT - Undisturbed Tube Sample
O/A - Sample Collected Off the Augers

Trace - Approximately 0 to 10%
Little - Approximately 10 to 20%
Some - Approximately 20 to 35%
And - Approximately 35 to 50%

0-4 Coarse Soil N Value - Very Loose
5-10 Coarse Soil N Value - Loose
11-30 Coarse Soil N Value - Medium Dense
31-50 Coarse Soil N Value - Dense

0-2 Fine Soil N Value - Very Soft
2-4 Fine Soil N Value - Soft
4-8 Fine Soil N Value - Medium Stiff
8-15 Fine Soil N Value - Stiff

BORING LOG

Project: Sea Street Pump Station Force Main No. 3

Location: Nantucket, MA
Client: Town of Nantucket
Driller: Crawford Drilling Services
Drilling Methods: Auger

Weather: overcast 60s
Performed By: SJG Date: 10/21/20
Checked By: ZFK Date: 12/16/20

Sea Street Pump Station Force Main No. 3

SEE SITE PLAN

Boring Locus Map

Boring No.: **B-8**
Location: See Plan
Approx. Ground Elevation: 27.17'

Approx. Groundwater Elevation:
Date/Time of GW EL.
Datum: NAVD88
Project No. 360-2001

Depth (feet)	*Sample No.*	*Blows per 6-inch*	*SPT Value*	*Pen./ Rec.*	*Soil Description*		*Stratum Change Depth (feet)*	*Note No.*
1 2	S1	Auger 7 9 12		24"/18"	4" Asphalt 18" Brown/black fill consisting of silty SAND, dry			
3 4 5								
6 7	S2	3 2 4 3		24"/19"	6" brown, silty SAND, dry 13" tan, fine SAND, dry			
8 9 10								
11 12	S3	2 3 3 3		24"/13"	8" tan, fine SAND, dry 5" Brown/orange fine silty SAND, dry			
13 14 15								
16 17	S4	2 2 4 3		24"/21"	Tan, fine SAND, dry			
18 19 20								
21 22								

NOTES:

No groundwater in augers @ 11:50

LEGEND

S - Split Spoon Sample	O/A - Sample Collected Off the Augers
UT - Undisturbed Tube Sample	
Trace - Approximately 0 to 10%	Some - Approximately 20 to 35%
Little - Approximately 10 to 20%	And - Approximately 35 to 50%
0-4 Coarse Soil N Value - Very Loose	11-30 Coarse Soil N Value - Medium Dense
5-10 Coarse Soil N Value - Loose	31-50 Coarse Soil N Value - Dense
0-2 Fine Soil N Value - Very Soft	4-8 Fine Soil N Value - Medium Stiff
2-4 Fine Soil N Value - Soft	8-15 Fine Soil N Value - Stiff

BORING LOG

Project: Sea Street Pump Station Force Main No. 3

Location: Nantucket, MA
Client: Town of Nantucket
Driller: Crawford Drilling Services
Drilling Methods: Auger

Weather: overcast 60s
Performed By: SJG Date: 10/21/20
Checked By: ZFK Date: 12/16/20

Sea Street Pump Station Force Main No. 3

SEE SITE PLAN

Boring Locus Map

Boring No.: **B-9**
Location: See Plan
Approx. Ground Elevation: 27.3'

Approx. Groundwater Elevation:
Date/Time of GW EL. 10/21/20 13:00
Datum: NAVD88
Project No. 360-2001

Depth (feet)	*Sample No.*	*Blows per 6-inch*	*SPT Value*	*Pen./ Rec.*	*Soil Description*		*Stratum Change Depth (feet)*	*Note No.*
1 2	S1	Auger 4 4 4		24"/19"	3" Black asphalt fill 15" Brown, silty SAND, dry			
3 4 5								
6 7	S2	2 5 6 6		24"/24"	Brown SILT with layers of oxidation and fine sand, dry			
8 9 10								
11 12	S3	2 2 3 4		24"/12"	7" Brown, poorly graded SAND with trace gravel, dry 5" Brown/orange fine SAND, dry			
13 14 15								
16 17	S4	2 4 5 6		24"/19"	19" tan, fine SAND, dry			
18 19 20								
21 22								

NOTES:

No groundwater in augers @ 1300

LEGEND

S - Split Spoon Sample	O/A - Sample Collected Off the Augers
UT - Undisturbed Tube Sample	
Trace - Approximately 0 to 10%	Some - Approximately 20 to 35%
Little - Approximately 10 to 20%	And - Approximately 35 to 50%
0-4 Coarse Soil N Value - Very Loose	11-30 Coarse Soil N Value - Medium Dense
5-10 Coarse Soil N Value - Loose	31-50 Coarse Soil N Value - Dense
0-2 Fine Soil N Value - Very Soft	4-8 Fine Soil N Value - Medium Stiff
2-4 Fine Soil N Value - Soft	8-15 Fine Soil N Value - Stiff

BORING LOG

Project: Sea Street Pump Station Force Main No. 3

Location: Nantucket, MA

Client: Town of Nantucket

Driller: Crawford Drilling Services

Drilling Methods: Auger

Weather: sunny 60 degrees

Performed By: SJG Date: 10/21/20

Checked By: ZFK Date: 12/16/20

Sea Street Pump Station Force Main No. 3

SEE SITE PLAN

Boring Locus Map

Boring No.: **B-10**

Location: See Plan

Approx. Ground Elevation: 24.77'

Approx. Groundwater Elevation:

Date/Time of GW EL. 10/21/20 14:00

Datum: NAVD88

Project No. 360-2001

Depth (feet)	*Sample No.*	*Blows per 6-inch*	*SPT Value*	*Pen./ Rec.*	*Soil Description*		*Stratum Change Depth (feet)*	*Note No.*
1 2	S1	Auger 3 4 5		24"/19"	9" Fill, black silty SAND, dry 10" Brown, silty SAND, dry			
3 4 5								
6 7	S2	1 1 2 1		24"/15"	Tan, fine SAND, dry with oxidized layer on top			
8 9 10								
11 12	S3	WOH WOH 1 1		24"/17"	Tan, fine SAND, dry			
13 14 15								
16 17	S4	2 4 4 5		24"/19"	Tan, fine SAND, dry			
18 19 20								
21 22								

NOTES:

No groundwater in augers @ 1400

LEGEND

S - Split Spoon Sample O/A - Sample Collected Off the Augers

UT - Undisturbed Tube Sample

Trace - Approximately 0 to 10% Some - Approximately 20 to 35%

Little - Approximately 10 to 20% And - Approximately 35 to 50%

0-4 Coarse Soil N Value - Very Loose 11-30 Coarse Soil N Value - Medium Dense

5-10 Coarse Soil N Value - Loose 31-50 Coarse Soil N Value - Dense

0-2 Fine Soil N Value - Very Soft 4-8 Fine Soil N Value - Medium Stiff

2-4 Fine Soil N Value - Soft 8-15 Fine Soil N Value - Stiff

BORING LOG

Project: Sea Street Pump Station Force Main No. 3

Location: Nantucket, MA
Client: Town of Nantucket
Driller: Crawford Drilling Services
Drilling Methods: Auger

Weather: Sunny 60s
Performed By: SJG Date: 10/21/20
Checked By: ZFK Date: 12/16/20

Sea Street Pump Station Force Main No. 3

SEE SITE PLAN

Boring Locus Map

Boring No.: **B-11**
Location: See Plan
Approx. Ground Elevation: 19.78'

Approx. Groundwater Elevation:
Date/Time of GW EL.
Datum: NAVD88
Project No. 360-2001

Depth (feet)	*Sample No.*	*Blows per 6-inch*	*SPT Value*	*Pen./ Rec.*	*Soil Description*		*Stratum Change Depth (feet)*	*Note No.*
1 2	S1	Auger 3 6 7		24"/19"	3" Asphalt 5" Cobblestone road Brown, silty SAND, dry, fill black			
3 4 5								
6 7	S2	1 1 2 1		24"/21"	10" Grey, silty CLAY, dry 2" Grey, silty SAND, wet 9" Grey, silty CLAY, dry			
8 9 10								
11 12	S3	2 4 5 6		24"/14"	Tan, fine SAND, dry			
13 14 15								
16 17	S4	2 4 6 5		24"/16"	8" Tan, fine SAND, dry 8" Brown/orange fine to med SAND, dry			
18 19 20								
21 22								

NOTES:

~5" thick cobble road under 3" of asphalt

No GW in augers

LEGEND

S - Split Spoon Sample
O/A - Sample Collected Off the Augers
UT - Undisturbed Tube Sample

Trace - Approximately 0 to 10%
Some - Approximately 20 to 35%
Little - Approximately 10 to 20%
And - Approximately 35 to 50%

0-4 Coarse Soil N Value - Very Loose
11-30 Coarse Soil N Value - Medium Dense
5-10 Coarse Soil N Value - Loose
31-50 Coarse Soil N Value - Dense

0-2 Fine Soil N Value - Very Soft
4-8 Fine Soil N Value - Medium Stiff
2-4 Fine Soil N Value - Soft
8-15 Fine Soil N Value - Stiff

BORING LOG

Project: Sea Street Pump Station Force Main No. 3

Location: Nantucket, MA

Client: Town of Nantucket

Driller: Crawford Drilling Services

Drilling Methods: Auger

Weather: Sunny 60s

Performed By: SJG Date: 10/22/20

Checked By: ZFK Date: 12/16/20

Sea Street Pump Station Force Main No. 3

SEE SITE PLAN

Boring Locus Map

Boring No.: **B-12**

Location: See Plan

Approx. Ground Elevation: 15.35'

Approx. Groundwater Elevation: 1.83'

Date/Time of GW EL. 10/22/20 8:40

Datum: NAVD88

Project No. 360-2001

Depth (feet)	*Sample No.*	*Blows per 6-inch*	*SPT Value*	*Pen./ Rec.*	*Soil Description*		*Stratum Change Depth (feet)*	*Note No.*
1	S1	Auger 3			4.5" Asphalt 4" Cobblestones			
2		9 9			12" Brown/black silty SAND fill, dry 6" tan, fine SAND, dry			
3								
4								
5								
6	S2	2 4			Tan, fine to medium SAND with trace gravel			
7		5 6						
8								
9								
10								
11	S3	3 2		24"/16"	3" Brown, silty SAND, dry 3" Brown, poorly graded SAND with gravel, wet			
12		1 4			10" Tan to grey clayey SILT, dry			
13								
14								
15								
16	S4			24"/16"	Grey, clayey SILT, dry			
17								
18								
19								
20								
21								
22								

NOTES:

Groundwater in augers @ 13.52' @ 0840

LEGEND

S - Split Spoon Sample	O/A - Sample Collected Off the Augers
UT - Undisturbed Tube Sample	
Trace - Approximately 0 to 10%	Some - Approximately 20 to 35%
Little - Approximately 10 to 20%	And - Approximately 35 to 50%
0-4 Coarse Soil N Value - Very Loose	11-30 Coarse Soil N Value - Medium Dense
5-10 Coarse Soil N Value - Loose	31-50 Coarse Soil N Value - Dense
0-2 Fine Soil N Value - Very Soft	4-8 Fine Soil N Value - Medium Stiff
2-4 Fine Soil N Value - Soft	8-15 Fine Soil N Value - Stiff

BORING LOG

Project: Sea Street Pump Station Force Main No. 3

Location: Nantucket, MA
Client: Town of Nantucket
Driller: Crawford Drilling Services
Drilling Methods: Auger

Weather: Sunny 60s
Performed By: SJG Date: 10/22/20
Checked By: ZFK Date: 12/16/20

Sea Street Pump Station Force Main No. 3

SEE SITE PLAN

Boring Locus Map

Boring No.: **B-21**
Location: See Plan
Approx. Ground Elevation: 16.5'

Approx. Groundwater Elevation: 2.3'
Date/Time of GW EL. 10/22/20 15:30
Datum: NAVD88
Project No. 360-2001

Depth (feet)	*Sample No.*	*Blows per 6-inch*	*SPT Value*	*Pen./ Rec.*	*Soil Description*		*Stratum Change Depth (feet)*	*Note No.*
1 2	S1	Auger 3 5 5		24"/19"	3.5" Asphalt 4" crushed asphalt fill 10" Brown, silty SAND, dry 5" Tan, fine SAND, dry			
3 4 5								
6 7	S2	3 5 5 6		24"/21"	Tan, poorly graded SAND, dry	SP		
8 9 10								
11 12	S3	WOH 2 2 4		24"/24"	Grey, clayey SILT, dry			
13 14 15								
16 17	S4	1 2 4 5		24"/24"	4" Grey, clayey SILT, wet 11" brown, poorly graded SAND with gravel, wet			
18 19 20								
21 22								

NOTES:

Groundwater measured @ 14.2' in augers at 15:30

LEGEND

S - Split Spoon Sample
UT - Undisturbed Tube Sample
O/A - Sample Collected Off the Augers

Trace - Approximately 0 to 10%
Little - Approximately 10 to 20%
Some - Approximately 20 to 35%
And - Approximately 35 to 50%

0-4 Coarse Soil N Value - Very Loose
5-10 Coarse Soil N Value - Loose
11-30 Coarse Soil N Value - Medium Dense
31-50 Coarse Soil N Value - Dense

0-2 Fine Soil N Value - Very Soft
2-4 Fine Soil N Value - Soft
4-8 Fine Soil N Value - Medium Stiff
8-15 Fine Soil N Value - Stiff

BORING LOG

Project: Sea Street Pump Station Force Main No. 3

Location: Nantucket, MA
Client: Town of Nantucket
Driller: Crawford Drilling Services
Drilling Methods: Auger

Weather: Sunny 60s
Performed By: SJG Date: 10/22/20
Checked By: ZFK Date: 12/16/20

Sea Street Pump Station Force Main No. 3

SEE SITE PLAN

Boring Locus Map

Boring No.: **B-22**
Location: See Plan
Approx. Ground Elevation: 16.96'

Approx. Groundwater Elevation:
Date/Time of GW EL. 10/22/20 16:30
Datum: NAVD88
Project No. 360-2001

Depth (feet)	*Sample No.*	*Blows per 6-inch*	*SPT Value*	*Pen./ Rec.*	*Soil Description*		*Stratum Change Depth (feet)*	*Note No.*
1 2	S1	4 5 5		24"/9"	2.5" Asphalt Black to brown silty SAND with trace gravel, dry			
3 4 5								
6 7	S2	4 6 6 8		24"/20"	Brown to Tan, silty SAND, dry	SM		
8 9 10								
11 12	S3	WOH 1 2 3		24"/14"	Grey, clayey SILT with a sand seam, dry except for sand seam			
13 14 15								
16 17	S4	2 3 4 6		24"/24"	Grey, clayey SILT, dry			
18 19 20								
21 22								

NOTES:

GW not observed in bottom of boring @ 1630

LEGEND

S - Split Spoon Sample
O/A - Sample Collected Off the Augers
UT - Undisturbed Tube Sample

Trace - Approximately 0 to 10%
Some - Approximately 20 to 35%
Little - Approximately 10 to 20%
And - Approximately 35 to 50%

0-4 Coarse Soil N Value - Very Loose
11-30 Coarse Soil N Value - Medium Dense
5-10 Coarse Soil N Value - Loose
31-50 Coarse Soil N Value - Dense

0-2 Fine Soil N Value - Very Soft
4-8 Fine Soil N Value - Medium Stiff
2-4 Fine Soil N Value - Soft
8-15 Fine Soil N Value - Stiff

BORING LOG

Project: Sea Street Pump Station Force Main No. 3

Location: Nantucket, MA

Client: Town of Nantucket

Driller: Crawford Drilling Services

Drilling Methods: Geoprobe

Weather:

Performed By: SJG Date: 10/26/20

Checked By: ZFK Date: 12/16/20

Sea Street Pump Station Force Main No. 3

SEE SITE PLAN

Boring Locus Map

Boring No.: **B-23**

Location: See Plan

Approx. Ground Elevation:

Approx. Groundwater Elevation:

Date/Time of GW EL.

Datum: NAVD88

Project No. 360-2001

Depth (feet)	*Sample No.*	*Blows per 6-inch*	*SPT Value*	*Pen./ Rec.*	*Soil Description*		*Stratum Change Depth (feet)*	*Note No.*
1 2 3 4 5	S1			60"/46"	5" Asphalt 5" fill, crushed asphalt 18" Brown, silty SAND with gravel, dry 6" Tan, fine SAND with gravel, dry 12" Brown, SILT, dry			
6 7 8 9 10	S2			60"/24"	6" Brown, CLAY with sand, dry 18" Grey, CLAY with sand, dry	CL		
11 12 13 14 15	S3			60"/51"	51" Grey, clayey SILT, dry			
16 17 18 19 20	S4			60"/60"	60" Grey, clayey SILT, dry			

NOTES:

No GW in hole to 20' below grade @ 09:00

LEGEND

S - Split Spoon Sample	O/A - Sample Collected Off the Augers
UT - Undisturbed Tube Sample	
Trace - Approximately 0 to 10%	Some - Approximately 20 to 35%
Little - Approximately 10 to 20%	And - Approximately 35 to 50%
0-4 Coarse Soil N Value - Very Loose	11-30 Coarse Soil N Value - Medium Dense
5-10 Coarse Soil N Value - Loose	31-50 Coarse Soil N Value - Dense
0-2 Fine Soil N Value - Very Soft	4-8 Fine Soil N Value - Medium Stiff
2-4 Fine Soil N Value - Soft	8-15 Fine Soil N Value - Stiff

BORING LOG

Project: Sea Street Pump Station Force Main No. 3

Location: Nantucket, MA

Client: Town of Nantucket

Driller: Crawford Drilling Services

Drilling Methods: Geoprobe

Weather: Overcast 50s

Performed By: SJG Date: 10/26/20

Checked By: ZFK Date: 12/16/20

Sea Street Pump Station Force Main No. 3

SEE SITE PLAN

Boring Locus Map

Boring No.: **B-24**

Location: See Plan

Approx. Ground Elevation:

Approx. Groundwater Elevation:

Date/Time of GW EL.

Datum: NAVD88

Project No. 360-2001

Depth (feet)	*Sample No.*	*Blows per 6-inch*	*SPT Value*	*Pen./ Rec.*	*Soil Description*		*Stratum Change Depth (feet)*	*Note No.*
1 2 3 4 5	S1			60"/41"	5" Asphalt 4" fill, crushed asphalt 20" Brown, silty SAND with gravel, dry 3" Tan, fine SAND with gravel, dry 9" Brown, silty SAND, dry			
6 7 8 9 10	S2			60"/49"	6" Brown, sandy CLAY, dry 6" Brown, sandy CLAY Seam 14" Brown, sandy CLAY, dry 1" Brown/orange sandy CLAY Seam 20" Grey, sandy CLAY, dry	CL		
11 12 13 14 15	S3			60"/33"	1" Grey, clayey SILT, dry 2" Brown, fine silty SAND Seam, moist 30" Grey, clayey SILT, dry			
16 17 18 19 20								

NOTES:

No GW observed to 15' at 10:30

LEGEND

S - Split Spoon Sample	O/A - Sample Collected Off the Augers
UT - Undisturbed Tube Sample	
Trace - Approximately 0 to 10%	Some - Approximately 20 to 35%
Little - Approximately 10 to 20%	And - Approximately 35 to 50%
0-4 Coarse Soil N Value - Very Loose	11-30 Coarse Soil N Value - Medium Dense
5-10 Coarse Soil N Value - Loose	31-50 Coarse Soil N Value - Dense
0-2 Fine Soil N Value - Very Soft	4-8 Fine Soil N Value - Medium Stiff
2-4 Fine Soil N Value - Soft	8-15 Fine Soil N Value - Stiff

BORING LOG

Project: Sea Street Pump Station Force Main No. 3

Location: Nantucket, MA

Client: Town of Nantucket

Driller: Crawford Drilling Services

Drilling Methods: Geoprobe

Weather: Overcast 50s

Performed By: SJG Date: 10/26/20

Checked By: ZFK Date: 12/16/20

Sea Street Pump Station Force Main No. 3

SEE SITE PLAN

Boring Locus Map

Boring No.: **B-25/MW-2**

Location: See Plan

Approx. Ground Elevation:

Approx. Groundwater Elevation:

Date/Time of GW EL.

Datum: NAVD88

Project No. 360-2001

Depth (feet)	*Sample No.*	*Blows per 6-inch*	*SPT Value*	*Pen./ Rec.*	*Soil Description*		*Stratum Change Depth (feet)*	*Note No.*
1 2 3 4 5	S1			60"/42"	4" Asphalt 5" fill (crushed asphalt) 8" Dark brown, fine silty SAND with gravel, dry 25" brown to tan, fine SAND with trace silt, wet			
6 7 8 9 10	S2			60"/60"	18" Brown clayey SAND, wet 42" Brown to grey, clayey SAND, dry	SC		
11 12 13 14 15	S3			60"/53"	53" Grey, clayey SILT, dry			
16 17 18 19 20					At 1710 From PVC PVC recessed Below Grade DTW = 3.07 + 0.4 = 3.47' TD = 9.6 + 0.4 = 10.10'			

NOTES:

GW perched above clay layer

8' of screen - 10 slot PVC

2' of PVC riser

0-6" = road box

6"-1' = granular bentonite

1'-10' = #1 sand

LEGEND

S - Split Spoon Sample	O/A - Sample Collected Off the Augers
UT - Undisturbed Tube Sample	
Trace - Approximately 0 to 10%	Some - Approximately 20 to 35%
Little - Approximately 10 to 20%	And - Approximately 35 to 50%
0-4 Coarse Soil N Value - Very Loose	11-30 Coarse Soil N Value - Medium Dense
5-10 Coarse Soil N Value - Loose	31-50 Coarse Soil N Value - Dense
0-2 Fine Soil N Value - Very Soft	4-8 Fine Soil N Value - Medium Stiff
2-4 Fine Soil N Value - Soft	8-15 Fine Soil N Value - Stiff

BORING LOG

Project: Sea Street Pump Station Force Main No. 3

Location: Nantucket, MA
Client: Town of Nantucket
Driller: Crawford Drilling Services
Drilling Methods: Geoprobe

Weather: Overcast 50s
Performed By: SJG Date: 10/26/20
do Date: 12/16/20

Sea Street Pump Station Force Main No. 3

SEE SITE PLAN

Boring Locus Map

Boring No.: **B-26**
Location: See Plan
Approx. Ground Elevation: 18.03'

Approx. Groundwater Elevation: ~13-14'
Date/Time of GW EL.
Datum: NAVD88
Project No. 360-2001

Depth (feet)	*Sample No.*	*Blows per 6-inch*	*SPT Value*	*Pen./ Rec.*	*Soil Description*		*Stratum Change Depth (feet)*	*Note No.*
1 2 3 4 5	S1			60"/27"	4" Asphalt 10" fill (crushed asphalt, silty SAND) 6" Brown, silty SAND, dry 7" Brown, sandy SILT, dry			
6 7 8 9 10	S2			60"/43"	2" Brown med to fine SAND with trace gravel, wet 41" grey, clayey SILT, dry			
11 12 13 14 15	S3			60"/50"	50" Grey, clayey SILT, dry			
16 17 18 19 20								

NOTES:

GW believed to be ~4'-5' below grade above silt layer

LEGEND

S - Split Spoon Sample	O/A - Sample Collected Off the Augers
UT - Undisturbed Tube Sample	
Trace - Approximately 0 to 10%	Some - Approximately 20 to 35%
Little - Approximately 10 to 20%	And - Approximately 35 to 50%
0-4 Coarse Soil N Value - Very Loose	11-30 Coarse Soil N Value - Medium Dense
5-10 Coarse Soil N Value - Loose	31-50 Coarse Soil N Value - Dense
0-2 Fine Soil N Value - Very Soft	4-8 Fine Soil N Value - Medium Stiff
2-4 Fine Soil N Value - Soft	8-15 Fine Soil N Value - Stiff

BORING LOG

Project: Sea Street Pump Station Force Main No. 3

Location: Nantucket, MA
Client: Town of Nantucket
Driller: Crawford Drilling Services
Drilling Methods: Geoprobe

Weather: Overcast 50s
Performed By: SJG Date: 10/26/20
Checked By: ZFK Date: 12/16/20

Sea Street Pump Station Force Main No. 3

SEE SITE PLAN

Boring Locus Map

Boring No.: **B-27**
Location: See Plan
Approx. Ground Elevation: 20.06'

Approx. Groundwater Elevation: ~16.06'
Date/Time of GW EL.
Datum: NAVD88
Project No. 360-2001

Depth (feet)	*Sample No.*	*Blows per 6-inch*	*SPT Value*	*Pen./ Rec.*	*Soil Description*		*Stratum Change Depth (feet)*	*Note No.*
1 2 3 4 5	S1			60"/17"	1" Asphalt 11" crushed asphalt fill 3" rock fragments 2" Brown, fine silty SAND, wet			
6 7 8 9 10	S2			60"/49"	Grey, sandy SILT with trace gravel			
11 12 13 14 15	S3			60"/58"	14" grey sandy SILT, dry 20" grey, fine silty SAND, dry 24" grey, clayey SILT, dry			
16 17 18 19 20								

NOTES:

Boring collapsed 4' after completion. GW believed to be at approx. 4' below grade on top of tight dry silt.

LEGEND

S - Split Spoon Sample	O/A - Sample Collected Off the Augers
UT - Undisturbed Tube Sample	
Trace - Approximately 0 to 10%	Some - Approximately 20 to 35%
Little - Approximately 10 to 20%	And - Approximately 35 to 50%
0-4 Coarse Soil N Value - Very Loose	11-30 Coarse Soil N Value - Medium Dense
5-10 Coarse Soil N Value - Loose	31-50 Coarse Soil N Value - Dense
0-2 Fine Soil N Value - Very Soft	4-8 Fine Soil N Value - Medium Stiff
2-4 Fine Soil N Value - Soft	8-15 Fine Soil N Value - Stiff

BORING LOG

Project: Sea Street Pump Station Force Main No. 3

Location: Nantucket, MA

Client: Town of Nantucket

Driller: Crawford Drilling Services

Drilling Methods: Geoprobe

Weather: Raining, 50s

Performed By: SJG Date: 10/27/20

Checked By: ZFK Date: 12/16/20

Sea Street Pump Station Force Main No. 3

SEE SITE PLAN

Boring Locus Map

Boring No.: **B-28**

Location: See Plan

Approx. Ground Elevation: 21.21'

Approx. Groundwater Elevation: 9.21'

Date/Time of GW EL.

Datum: NAVD88

Project No. 360-2001

Depth (feet)	*Sample No.*	*Blows per 6-inch*	*SPT Value*	*Pen./ Rec.*	*Soil Description*		*Stratum Change Depth (feet)*	*Note No.*
1 2 3 4 5	S1			60"/24"	2x2" layers of asphalt with 3" crushed asphalt between 10" Brown, poorly graded silty SAND with gravel, dry 7" Grey, sandy SILT, dry			
6 7 8 9 10	S2			60"/32"	Grey, clayey SILT, dry			
11 12 13 14 15	S3			60"/60"	Grey sandy SILT, wet @ 12'			
16 17 18 19 20								

NOTES:

GW @ 12' below grade

LEGEND

S - Split Spoon Sample	O/A - Sample Collected Off the Augers
UT - Undisturbed Tube Sample	
Trace - Approximately 0 to 10%	Some - Approximately 20 to 35%
Little - Approximately 10 to 20%	And - Approximately 35 to 50%
0-4 Coarse Soil N Value - Very Loose	11-30 Coarse Soil N Value - Medium Dense
5-10 Coarse Soil N Value - Loose	31-50 Coarse Soil N Value - Dense
0-2 Fine Soil N Value - Very Soft	4-8 Fine Soil N Value - Medium Stiff
2-4 Fine Soil N Value - Soft	8-15 Fine Soil N Value - Stiff

BORING LOG

Project: Sea Street Pump Station Force Main No. 3

Location: Nantucket, MA

Client: Town of Nantucket

Driller: Crawford Drilling Services

Drilling Methods: Geoprobe

Weather: Cloudy, 60s

Performed By: SJG Date: 10/27/20

Checked By: ZFK Date: 12/16/20

Sea Street Pump Station Force Main No. 3

SEE SITE PLAN

Boring Locus Map

Boring No.: **B-29**

Location: See Plan

Approx. Ground Elevation: 22.34'

Approx. Groundwater Elevation:

Date/Time of GW EL.

Datum: NAVD88

Project No. 360-2001

Depth (feet)	*Sample No.*	*Blows per 6-inch*	*SPT Value*	*Pen./ Rec.*	*Soil Description*		*Stratum Change Depth (feet)*	*Note No.*
1 2 3 4 5	S1			60"/44"	2" Asphalt 6" Crushed asphalt fill 7" Brown, silty SAND with gravel and root, moist 10" Brown/orange silty SAND with gravel, moist 19" Tan, sandy SILT with oxidation stains, dry			
6 7 8 9 10	S2			60"/50"	Grey, clayey SILT, dry			
11 12 13 14 15	S3			60"/48"	Grey, clayey SILT, wet			
16 17 18 19 20								

NOTES:

GW measured @ 2' in the hole, may be perched

LEGEND

S - Split Spoon Sample	O/A - Sample Collected Off the Augers
UT - Undisturbed Tube Sample	
Trace - Approximately 0 to 10%	Some - Approximately 20 to 35%
Little - Approximately 10 to 20%	And - Approximately 35 to 50%
0-4 Coarse Soil N Value - Very Loose	11-30 Coarse Soil N Value - Medium Dense
5-10 Coarse Soil N Value - Loose	31-50 Coarse Soil N Value - Dense
0-2 Fine Soil N Value - Very Soft	4-8 Fine Soil N Value - Medium Stiff
2-4 Fine Soil N Value - Soft	8-15 Fine Soil N Value - Stiff

BORING LOG

Project: Sea Street Pump Station Force Main No. 3

Location: Nantucket, MA

Client: Town of Nantucket

Driller: Crawford Drilling Services

Drilling Methods: Geoprobe

Weather: Cloudy, 60s

Performed By: SJG Date: 10/27/20

Checked By: ZFK Date: 12/16/20

Sea Street Pump Station Force Main No. 3

SEE SITE PLAN

Boring Locus Map

Boring No.: **B-30**

Location: See Plan

Approx. Ground Elevation:

Approx. Groundwater Elevation:

Date/Time of GW EL.

Datum: NAVD88

Project No. 360-2001

Depth (feet)	*Sample No.*	*Blows per 6-inch*	*SPT Value*	*Pen./ Rec.*	*Soil Description*		*Stratum Change Depth (feet)*	*Note No.*
1 2 3 4 5	S1			60"/31"	2" Asphalt 10" fill (Crushed asphalt and rock) 6" Brown, silty SAND, dry 13" tan/orange sandy SILT with oxidation, dry			
6 7 8 9 10	S2			60"/36"	Tan/orange sandy SILT with several 1"-2" sand seams, wet			
11 12 13 14 15	S3			60"/60"	Grey, clayey SILT, dry			
16 17 18 19 20								

NOTES:

GW not observed

LEGEND

S - Split Spoon Sample	O/A - Sample Collected Off the Augers
UT - Undisturbed Tube Sample	
Trace - Approximately 0 to 10%	Some - Approximately 20 to 35%
Little - Approximately 10 to 20%	And - Approximately 35 to 50%
0-4 Coarse Soil N Value - Very Loose	11-30 Coarse Soil N Value - Medium Dense
5-10 Coarse Soil N Value - Loose	31-50 Coarse Soil N Value - Dense
0-2 Fine Soil N Value - Very Soft	4-8 Fine Soil N Value - Medium Stiff
2-4 Fine Soil N Value - Soft	8-15 Fine Soil N Value - Stiff

BORING LOG

Project: Sea Street Pump Station Force Main No. 3

Location: Nantucket, MA

Client: Town of Nantucket

Driller: Crawford Drilling Services

Drilling Methods: Geoprobe

Weather: Cloudy, 50s

Performed By: SJG Date: 10/27/20

Checked By: ZFK Date: 12/16/20

Sea Street Pump Station Force Main No. 3

SEE SITE PLAN

Boring Locus Map

Boring No.: **B-31**

Location: See Plan

Approx. Ground Elevation:

Approx. Groundwater Elevation:

Date/Time of GW EL.

Datum: NAVD88

Project No. 360-2001

Depth (feet)	*Sample No.*	*Blows per 6-inch*	*SPT Value*	*Pen./ Rec.*	*Soil Description*		*Stratum Change Depth (feet)*	*Note No.*
1 2 3 4 5	S1			60"/48"	8" Asphalt 3" fill (Crushed asphalt) 6" Brown, fine SAND with gravel, moist 31" tan/orange SILT with several 1"-2" sand seams and oxidation present, moist			
6 7 8 9 10	S2			60"/30"	15" brown/orange SILT with oxidation 15" tan to brown fine SAND with clearly defined layers			
11 12 13 14 15	S3			60"/34"	Tan, fine to medium SAND with trace gravel, dry			
16 17 18 19 20								

NOTES:

Groundwater was not observed in the bore hole @ 11:30

LEGEND

S - Split Spoon Sample	O/A - Sample Collected Off the Augers
UT - Undisturbed Tube Sample	
Trace - Approximately 0 to 10%	Some - Approximately 20 to 35%
Little - Approximately 10 to 20%	And - Approximately 35 to 50%
0-4 Coarse Soil N Value - Very Loose	11-30 Coarse Soil N Value - Medium Dense
5-10 Coarse Soil N Value - Loose	31-50 Coarse Soil N Value - Dense
0-2 Fine Soil N Value - Very Soft	4-8 Fine Soil N Value - Medium Stiff
2-4 Fine Soil N Value - Soft	8-15 Fine Soil N Value - Stiff

BORING LOG

Project: Sea Street Pump Station Force Main No. 3

Location: Nantucket, MA

Client: Town of Nantucket

Driller: Crawford Drilling Services

Drilling Methods: Geoprobe

Weather: Sunny 60s

Performed By: SJG Date: 10/27/20

Checked By: ZFK Date: 12/16/20

Sea Street Pump Station Force Main No. 3

SEE SITE PLAN

Boring Locus Map

Boring No.: **B-32**

Location: See Plan

Approx. Ground Elevation:

Approx. Groundwater Elevation:

Date/Time of GW EL.

Datum: NAVD88

Project No. 360-2001

Depth (feet)	*Sample No.*	*Blows per 6-inch*	*SPT Value*	*Pen./ Rec.*	*Soil Description*		*Stratum Change Depth (feet)*	*Note No.*
1 2 3 4 5	S1			60"/47"	2" Asphalt 7" fill (Crushed asphalt) 38" Brown/orange sandy SILT with oxidation layers, dry			
6 7 8 9 10	S2			60"/27"	4" Brown/orange sandy SILT, dry 23" Tan, fine to medium SAND, dry			
11 12 13 14 15	S3			60"/38"	Tan, fine to medium SAND with trace gravel, dry			
16 17 18 19 20								

NOTES:

GW was not observed

LEGEND

S - Split Spoon Sample	O/A - Sample Collected Off the Augers
UT - Undisturbed Tube Sample	
Trace - Approximately 0 to 10%	Some - Approximately 20 to 35%
Little - Approximately 10 to 20%	And - Approximately 35 to 50%
0-4 Coarse Soil N Value - Very Loose	11-30 Coarse Soil N Value - Medium Dense
5-10 Coarse Soil N Value - Loose	31-50 Coarse Soil N Value - Dense
0-2 Fine Soil N Value - Very Soft	4-8 Fine Soil N Value - Medium Stiff
2-4 Fine Soil N Value - Soft	8-15 Fine Soil N Value - Stiff

BORING LOG

Project: Sea Street Pump Station Force Main No. 3

Location: Nantucket, MA

Client: Town of Nantucket

Driller: Crawford Drilling Services

Drilling Methods: Geoprobe

Weather: Sunny 60s

Performed By: SJG Date: 10/27/20

Checked By: ZFK Date: 12/16/20

Sea Street Pump Station Force Main No. 3

SEE SITE PLAN

Boring Locus Map

Boring No.: **B-33**

Location: See Plan

Approx. Ground Elevation:

Approx. Groundwater Elevation:

Date/Time of GW EL.

Datum: NAVD88

Project No. 360-2001

Depth (feet)	*Sample No.*	*Blows per 6-inch*	*SPT Value*	*Pen./ Rec.*	*Soil Description*		*Stratum Change Depth (feet)*	*Note No.*
1 2 3 4 5	S1			60"/42"	2" Asphalt 7" fill (Crushed asphalt + rock) 20" Brown/orange SILT with oxidized layers, dry 13" Brown, fine to med SAND, dry			
6 7 8 9 10	S2			60"/32"	Brown to tan, poorly sorted SAND with trace gravel, dry			
11 12 13 14 15	S3			60"/36"	Tan, fine to medium SAND with trace gravel, dry			
16 17 18 19 20								

NOTES:

GW was not encountered @ 13:55

LEGEND

S - Split Spoon Sample	O/A - Sample Collected Off the Augers
UT - Undisturbed Tube Sample	
Trace - Approximately 0 to 10%	Some - Approximately 20 to 35%
Little - Approximately 10 to 20%	And - Approximately 35 to 50%
0-4 Coarse Soil N Value - Very Loose	11-30 Coarse Soil N Value - Medium Dense
5-10 Coarse Soil N Value - Loose	31-50 Coarse Soil N Value - Dense
0-2 Fine Soil N Value - Very Soft	4-8 Fine Soil N Value - Medium Stiff
2-4 Fine Soil N Value - Soft	8-15 Fine Soil N Value - Stiff

BORING LOG

Project: Sea Street Pump Station Force Main No. 3

Location: Nantucket, MA

Client: Town of Nantucket

Driller: Crawford Drilling Services

Drilling Methods: Geoprobe

Weather:

Performed By: SJG Date: 10/27/20

Checked By: ZFK Date: 12/16/20

Sea Street Pump Station Force Main No. 3

SEE SITE PLAN

Boring Locus Map

Boring No.: **B-34**

Location: See Plan

Approx. Ground Elevation:

Approx. Groundwater Elevation:

Date/Time of GW EL.

Datum: NAVD88

Project No. 360-2001

Depth (feet)	*Sample No.*	*Blows per 6-inch*	*SPT Value*	*Pen./ Rec.*	*Soil Description*		*Stratum Change Depth (feet)*	*Note No.*
1 2 3 4 5	S1			60"/39"	2" Asphalt 7" fill (Crushed asphalt + gravel) 30" Brown to tan fine to med SAND with trace gravel, dry			
6 7 8 9 10	S2			60"/29"	Tan, poorly graded SAND with trace gravel, dry			
11 12 13 14 15	S3			60"/44"	Tan, fine to medium SAND with trace gravel, dry			
16 17 18 19 20								

NOTES:

GW was not encountered @ 14:30

LEGEND

S - Split Spoon Sample	O/A - Sample Collected Off the Augers
UT - Undisturbed Tube Sample	
Trace - Approximately 0 to 10%	Some - Approximately 20 to 35%
Little - Approximately 10 to 20%	And - Approximately 35 to 50%
0-4 Coarse Soil N Value - Very Loose	11-30 Coarse Soil N Value - Medium Dense
5-10 Coarse Soil N Value - Loose	31-50 Coarse Soil N Value - Dense
0-2 Fine Soil N Value - Very Soft	4-8 Fine Soil N Value - Medium Stiff
2-4 Fine Soil N Value - Soft	8-15 Fine Soil N Value - Stiff

BORING LOG

Project: Sea Street Pump Station Force Main No. 3

Location: Nantucket, MA

Client: Town of Nantucket

Driller: Crawford Drilling Services

Drilling Methods: Geoprobe

Weather: Sunny 60s

Performed By: SJG Date: 10/27/20

Checked By: ZFK Date: 12/16/20

Sea Street Pump Station Force Main No. 3

SEE SITE PLAN

Boring Locus Map

Boring No.: **B-35**

Location: See Plan

Approx. Ground Elevation:

Approx. Groundwater Elevation:

Date/Time of GW EL.

Datum: NAVD88

Project No. 360-2001

Depth (feet)	*Sample No.*	*Blows per 6-inch*	*SPT Value*	*Pen./ Rec.*	*Soil Description*		*Stratum Change Depth (feet)*	*Note No.*
1 2 3 4 5	S1			60"/47"	2" Asphalt 5" fill (Crushed asphalt) 40" Brown, fine to med silty SAND with trace gravel, dry			
6 7 8 9 10	S2			60"/34"	Brown/tan poorly graded SAND, dry			
11 12 13 14 15	S3			60"/40"	Tan, fine to medium SAND, dry			
16 17 18 19 20								

NOTES:

GW was not encountered @ 15:00

LEGEND

S - Split Spoon Sample	O/A - Sample Collected Off the Augers
UT - Undisturbed Tube Sample	
Trace - Approximately 0 to 10%	Some - Approximately 20 to 35%
Little - Approximately 10 to 20%	And - Approximately 35 to 50%
0-4 Coarse Soil N Value - Very Loose	11-30 Coarse Soil N Value - Medium Dense
5-10 Coarse Soil N Value - Loose	31-50 Coarse Soil N Value - Dense
0-2 Fine Soil N Value - Very Soft	4-8 Fine Soil N Value - Medium Stiff
2-4 Fine Soil N Value - Soft	8-15 Fine Soil N Value - Stiff

BORING LOG

Project: Sea Street Pump Station Force Main No. 3

Location: Nantucket, MA

Client: Town of Nantucket

Driller: Crawford Drilling Services

Drilling Methods: Geoprobe

Weather:

Performed By: SJG Date:

Checked By: ZFK Date: 12/16/20

Sea Street Pump Station Force Main No. 3

SEE SITE PLAN

Boring Locus Map

Boring No.: **B-36**

Location: See Plan

Approx. Ground Elevation:

Approx. Groundwater Elevation:

Date/Time of GW EL.

Datum: NAVD88

Project No. 360-2001

Depth (feet)	*Sample No.*	*Blows per 6-inch*	*SPT Value*	*Pen./ Rec.*	*Soil Description*		*Stratum Change Depth (feet)*	*Note No.*
1 2 3 4 5	S1			60"/45"	5" Asphalt 7" fill (Crushed asphalt) 10" Brown, silty SAND, dry (likely fill) 1" redish SAND, not natural, dry 8" brick, unknown origin 1" pinkish SAND, not natural, dry 13" Brown, fine to medium silty SAND with trace gravel, dry			
6 7 8 9 10	S2			60"/35"	Brown, poorly graded SAND, with trace silt and gravel, dry			
11 12 13 14 15	S3			60"/34"	Tan to Brown poorly graded SAND with trace gravel, dry			
16 17 18 19 20								

NOTES:

Hole appears to have a void approx 2'-3' that may be abandoned utility

LEGEND

S - Split Spoon Sample	O/A - Sample Collected Off the Augers
UT - Undisturbed Tube Sample	
Trace - Approximately 0 to 10%	Some - Approximately 20 to 35%
Little - Approximately 10 to 20%	And - Approximately 35 to 50%
0-4 Coarse Soil N Value - Very Loose	11-30 Coarse Soil N Value - Medium Dense
5-10 Coarse Soil N Value - Loose	31-50 Coarse Soil N Value - Dense
0-2 Fine Soil N Value - Very Soft	4-8 Fine Soil N Value - Medium Stiff
2-4 Fine Soil N Value - Soft	8-15 Fine Soil N Value - Stiff

BORING LOG

Project: Sea Street Pump Station Force Main No. 3

Location: Nantucket, MA

Client: Town of Nantucket

Driller: Crawford Drilling Services

Drilling Methods: Geoprobe

Weather: Sunny 60s

Performed By: SJG Date: 10/27/20

Checked By: ZFK Date: 12/16/20

Sea Street Pump Station Force Main No. 3

SEE SITE PLAN

Boring Locus Map

Boring No.: **B-37**

Location: See Plan

Approx. Ground Elevation: 27.09'

Approx. Groundwater Elevation: ~2.09'

Date/Time of GW EL. 10/27/20 16:40

Datum: NAVD88

Project No. 360-2001

Depth (feet)	*Sample No.*	*Blows per 6-inch*	*SPT Value*	*Pen./ Rec.*	*Soil Description*		*Stratum Change Depth (feet)*	*Note No.*
1 2 3 4 5	S1			60"/34"	3" Asphalt 9" Brown, fine silty SAND with trace gravel, dry 14" Dark Brown, poorly graded silty SAND 8" Dark Brown, sandy SILT, with gravel, dry			
6 7 8 9 10	S2			60"/34"	Tan, fine SAND, dry			
11 12 13 14 15	S3			60"/36"	Tan, fine SAND, dry			
16 17 18 19 20	S4			60"/29"	1" grey SILT, moist 5" grey, silty SAND, moist 1" red rust layer 22" Brown, fine silty SAND, dry			
21 22 23 24 25	S5			60"/24"	Brown, poorly graded SAND, moist			

NOTES:

GW observed in the tip, approx 25' below grade @ 1640

LEGEND

S - Split Spoon Sample	O/A - Sample Collected Off the Augers
UT - Undisturbed Tube Sample	
Trace - Approximately 0 to 10%	Some - Approximately 20 to 35%
Little - Approximately 10 to 20%	And - Approximately 35 to 50%
0-4 Coarse Soil N Value - Very Loose	11-30 Coarse Soil N Value - Medium Dense
5-10 Coarse Soil N Value - Loose	31-50 Coarse Soil N Value - Dense
0-2 Fine Soil N Value - Very Soft	4-8 Fine Soil N Value - Medium Stiff
2-4 Fine Soil N Value - Soft	8-15 Fine Soil N Value - Stiff

BORING LOG

Project: Sea Street Pump Station Force Main No. 3

Location: Nantucket, MA

Client: Town of Nantucket

Driller: Crawford Drilling Services

Drilling Methods: Geoprobe

Weather: Rain, 50s

Performed By: SJG Date: 10/28/20

Checked By: ZFK Date: 12/16/20

Sea Street Pump Station Force Main No. 3

SEE SITE PLAN

Boring Locus Map

Boring No.: **B-38**

Location: See Plan

Approx. Ground Elevation:

Approx. Groundwater Elevation:

Date/Time of GW EL.

Datum: NAVD88

Project No. 360-2001

Depth (feet)	*Sample No.*	*Blows per 6-inch*	*SPT Value*	*Pen./ Rec.*	*Soil Description*		*Stratum Change Depth (feet)*	*Note No.*
1 2 3 4 5	S1			60"/35"	2" Asphalt 2" fill (rock fragments) 31" Brown, silty SAND with gravel, dry			
6 7 8 9 10	S2			60"/32"	Tan, poorly graded SAND, dry	SP		
11 12 13 14 15	S3			60"/40"	Tan, poorly graded SAND with trace gravel, dry			
16 17 18 19 20								

NOTES:

GW was not encountered

LEGEND

S - Split Spoon Sample	O/A - Sample Collected Off the Augers
UT - Undisturbed Tube Sample	
Trace - Approximately 0 to 10%	Some - Approximately 20 to 35%
Little - Approximately 10 to 20%	And - Approximately 35 to 50%
0-4 Coarse Soil N Value - Very Loose	11-30 Coarse Soil N Value - Medium Dense
5-10 Coarse Soil N Value - Loose	31-50 Coarse Soil N Value - Dense
0-2 Fine Soil N Value - Very Soft	4-8 Fine Soil N Value - Medium Stiff
2-4 Fine Soil N Value - Soft	8-15 Fine Soil N Value - Stiff

BORING LOG

Project: Sea Street Pump Station Force Main No. 3

Location: Nantucket, MA

Client: Town of Nantucket

Driller: Crawford Drilling Services

Drilling Methods: Geoprobe

Weather: Rain, 50s

Performed By: SJG Date: 10/28/20

Checked By: ZFK Date: 12/16/20

Sea Street Pump Station Force Main No. 3

SEE SITE PLAN

Boring Locus Map

Boring No.: **B-39**

Location: See Plan

Approx. Ground Elevation:

Approx. Groundwater Elevation:

Date/Time of GW EL.

Datum: NAVD88

Project No. 360-2001

Depth (feet)	*Sample No.*	*Blows per 6-inch*	*SPT Value*	*Pen./ Rec.*	*Soil Description*		*Stratum Change Depth (feet)*	*Note No.*
1 2 3 4 5	S1			60"/39"	6" Asphalt 7" base fill (crushed asphalt + rock) 26" Brown, silty SAND with trace gravel, dry			
6 7 8 9 10	S2			60"/20"	Tan, poorly graded SAND, dry			
11 12 13 14 15	S3			60"/38"	Tan, fine SAND, dry			
16 17 18 19 20								

NOTES:

LEGEND

S - Split Spoon Sample	O/A - Sample Collected Off the Augers
UT - Undisturbed Tube Sample	
Trace - Approximately 0 to 10%	Some - Approximately 20 to 35%
Little - Approximately 10 to 20%	And - Approximately 35 to 50%
0-4 Coarse Soil N Value - Very Loose	11-30 Coarse Soil N Value - Medium Dense
5-10 Coarse Soil N Value - Loose	31-50 Coarse Soil N Value - Dense
0-2 Fine Soil N Value - Very Soft	4-8 Fine Soil N Value - Medium Stiff
2-4 Fine Soil N Value - Soft	8-15 Fine Soil N Value - Stiff

BORING LOG

Project: Sea Street Pump Station Force Main No. 3

Location: Nantucket, MA

Client: Town of Nantucket

Driller: Crawford Drilling Services

Drilling Methods: Geoprobe

Weather: Rain, 50s

Performed By: SJG Date: 10/28/20

Checked By: ZFK Date: 12/16/20

Sea Street Pump Station Force Main No. 3

SEE SITE PLAN

Boring Locus Map

Boring No.: **B-40**

Location: See Plan

Approx. Ground Elevation:

Approx. Groundwater Elevation:

Date/Time of GW EL.

Datum: NAVD88

Project No. 360-2001

Depth (feet)	*Sample No.*	*Blows per 6-inch*	*SPT Value*	*Pen./ Rec.*	*Soil Description*		*Stratum Change Depth (feet)*	*Note No.*
1 2 3 4 5	S1			60"/40"	3" Asphalt 3" fill (crushed asphalt) 28" Brown, silty SAND with gravel, dry 6" orange, poorly graded SAND with gravel, dry			
6 7 8 9 10	S2			60"/25"	Tan, poorly graded SAND with trace gravel, dry			
11 12 13 14 15	S3			60"/28"	10" Tan/orange SILT 18" tan, poorly graded SAND, dry			
16 17 18 19 20								

NOTES:

LEGEND

S - Split Spoon Sample	O/A - Sample Collected Off the Augers
UT - Undisturbed Tube Sample	
Trace - Approximately 0 to 10%	Some - Approximately 20 to 35%
Little - Approximately 10 to 20%	And - Approximately 35 to 50%
0-4 Coarse Soil N Value - Very Loose	11-30 Coarse Soil N Value - Medium Dense
5-10 Coarse Soil N Value - Loose	31-50 Coarse Soil N Value - Dense
0-2 Fine Soil N Value - Very Soft	4-8 Fine Soil N Value - Medium Stiff
2-4 Fine Soil N Value - Soft	8-15 Fine Soil N Value - Stiff

BORING LOG

Project: Sea Street Pump Station Force Main No. 3

Location: Nantucket, MA

Client: Town of Nantucket

Driller: Crawford Drilling Services

Drilling Methods: Geoprobe

Weather: Rain, 50s

Performed By: SJG Date: 10/28/20

Checked By: ZFK Date: 12/16/20

Sea Street Pump Station Force Main No. 3

SEE SITE PLAN

Boring Locus Map

Boring No.: **B-41**

Location: See Plan

Approx. Ground Elevation:

Approx. Groundwater Elevation:

Date/Time of GW EL.

Datum: NAVD88

Project No. 360-2001

Depth (feet)	*Sample No.*	*Blows per 6-inch*	*SPT Value*	*Pen./ Rec.*	*Soil Description*		*Stratum Change Depth (feet)*	*Note No.*
1 2 3 4 5	S1			60"/42"	3" Asphalt 4" fill 35" Brown, poorly graded silty SAND, dry			
6 7 8 9 10	S2			60"/30"	Brown, poorly graded SAND with trace silt			
11 12 13 14 15	S3			60"/43"	Brown, poorly graded SAND Layers of SILT and very fine SAND			
16 17 18 19 20								

NOTES:

GW was not encountered

LEGEND

S - Split Spoon Sample	O/A - Sample Collected Off the Augers
UT - Undisturbed Tube Sample	
Trace - Approximately 0 to 10%	Some - Approximately 20 to 35%
Little - Approximately 10 to 20%	And - Approximately 35 to 50%
0-4 Coarse Soil N Value - Very Loose	11-30 Coarse Soil N Value - Medium Dense
5-10 Coarse Soil N Value - Loose	31-50 Coarse Soil N Value - Dense
0-2 Fine Soil N Value - Very Soft	4-8 Fine Soil N Value - Medium Stiff
2-4 Fine Soil N Value - Soft	8-15 Fine Soil N Value - Stiff

BORING LOG

Project: Sea Street Pump Station Force Main No. 3

Location: Nantucket, MA

Client: Town of Nantucket

Driller: Crawford Drilling Services

Drilling Methods: Geoprobe

Weather:

Performed By: SJG Date:

Checked By: ZFK Date: 12/16/20

Sea Street Pump Station Force Main No. 3

SEE SITE PLAN

Boring Locus Map

Boring No.: **B-42**

Location: See Plan

Approx. Ground Elevation:

Approx. Groundwater Elevation:

Date/Time of GW EL.

Datum: NAVD88

Project No. 360-2001

Depth (feet)	*Sample No.*	*Blows per 6-inch*	*SPT Value*	*Pen./ Rec.*	*Soil Description*		*Stratum Change Depth (feet)*	*Note No.*
1 2 3 4 5	S1			60"/45"	5" Asphalt 2" fill 9" Brown, silty SAND, dry 2" rock 20" Brown, silty SAND, dry 7" Brown, SILT, dry			
6 7 8 9 10	S2			60"/43"	Brown silty SAND, dry			
11 12 13 14 15	S3			60"/35"	Brown silty SAND, dry			
16 17 18 19 20								

NOTES:

LEGEND

S - Split Spoon Sample	O/A - Sample Collected Off the Augers
UT - Undisturbed Tube Sample	
Trace - Approximately 0 to 10%	Some - Approximately 20 to 35%
Little - Approximately 10 to 20%	And - Approximately 35 to 50%
0-4 Coarse Soil N Value - Very Loose	11-30 Coarse Soil N Value - Medium Dense
5-10 Coarse Soil N Value - Loose	31-50 Coarse Soil N Value - Dense
0-2 Fine Soil N Value - Very Soft	4-8 Fine Soil N Value - Medium Stiff
2-4 Fine Soil N Value - Soft	8-15 Fine Soil N Value - Stiff

BORING LOG

Project: Sea Street Pump Station Force Main No. 3

Location: Nantucket, MA

Client: Town of Nantucket

Driller: Crawford Drilling Services

Drilling Methods: Geoprobe

Weather: Rain, 50s

Performed By: SJG Date: 10/28/20

Checked By: ZFK Date: 12/16/20

Sea Street Pump Station Force Main No. 3

SEE SITE PLAN

Boring Locus Map

Boring No.: **B-43**

Location: See Plan

Approx. Ground Elevation:

Approx. Groundwater Elevation:

Date/Time of GW EL.

Datum: NAVD88

Project No. 360-2001

Depth (feet)	*Sample No.*	*Blows per 6-inch*	*SPT Value*	*Pen./ Rec.*	*Soil Description*		*Stratum Change Depth (feet)*	*Note No.*
1 2 3 4 5	S1			60"/43"	3" Asphalt 4" fill 36" Brown, silty SAND with gravel			
6 7 8 9 10	S2			60"/28"	Brown, fine silty SAND, dry			
11 12 13 14 15	S3			60"/40"	Brown, fine silty SAND, dry			
16 17 18 19 20								

NOTES:

LEGEND

S - Split Spoon Sample	O/A - Sample Collected Off the Augers
UT - Undisturbed Tube Sample	
Trace - Approximately 0 to 10%	Some - Approximately 20 to 35%
Little - Approximately 10 to 20%	And - Approximately 35 to 50%
0-4 Coarse Soil N Value - Very Loose	11-30 Coarse Soil N Value - Medium Dense
5-10 Coarse Soil N Value - Loose	31-50 Coarse Soil N Value - Dense
0-2 Fine Soil N Value - Very Soft	4-8 Fine Soil N Value - Medium Stiff
2-4 Fine Soil N Value - Soft	8-15 Fine Soil N Value - Stiff

BORING LOG

Project: Sea Street Pump Station Force Main No. 3

Location: Nantucket, MA

Client: Town of Nantucket

Driller: Crawford Drilling Services

Drilling Methods: Geoprobe

Weather:

Performed By: SJG Date:

Checked By: ZFK Date: 12/16/20

Sea Street Pump Station Force Main No. 3

SEE SITE PLAN

Boring Locus Map

Boring No.: **B-44**

Location: See Plan

Approx. Ground Elevation:

Approx. Groundwater Elevation:

Date/Time of GW EL.

Datum: NAVD88

Project No. 360-2001

Depth (feet)	*Sample No.*	*Blows per 6-inch*	*SPT Value*	*Pen./ Rec.*	*Soil Description*		*Stratum Change Depth (feet)*	*Note No.*
1 2 3 4 5	S1			60"/42"	Brown 21" Fine SAND with trace ailt and gravel (cannot read clearly)			
6 7 8 9 10	S2			60"/24"	21" Tan, poorly graded SAND	SP		
11 12 13 14 15	S3			60"/24"	Tan, fine to med SAND, dry			
16 17 18 19 20								

NOTES:

LEGEND

S - Split Spoon Sample	O/A - Sample Collected Off the Augers
UT - Undisturbed Tube Sample	
Trace - Approximately 0 to 10%	Some - Approximately 20 to 35%
Little - Approximately 10 to 20%	And - Approximately 35 to 50%
0-4 Coarse Soil N Value - Very Loose	11-30 Coarse Soil N Value - Medium Dense
5-10 Coarse Soil N Value - Loose	31-50 Coarse Soil N Value - Dense
0-2 Fine Soil N Value - Very Soft	4-8 Fine Soil N Value - Medium Stiff
2-4 Fine Soil N Value - Soft	8-15 Fine Soil N Value - Stiff

BORING LOG

Project: Sea Street Pump Station Force Main No. 3

Location: Nantucket, MA

Client: Town of Nantucket

Driller: Crawford Drilling Services

Drilling Methods: Geoprobe

Weather: Rain, 60s

Performed By: SJG Date: 10/28/20

Checked By: ZFK Date: 12/16/20

Sea Street Pump Station Force Main No. 3

SEE SITE PLAN

Boring Locus Map

Boring No.: **B-45**

Location: See Plan

Approx. Ground Elevation:

Approx. Groundwater Elevation:

Date/Time of GW EL.

Datum: NAVD88

Project No. 360-2001

Depth (feet)	*Sample No.*	*Blows per 6-inch*	*SPT Value*	*Pen./ Rec.*	*Soil Description*		*Stratum Change Depth (feet)*	*Note No.*
1 2 3 4 5	S1			60"/46"	3" Asphalt 8" fill (crushed asphalt + brick) 25" Brown 10" Tan, poorly graded SAND, dry			
6 7 8 9 10	S2			60"/33"	Brown to tan fine silty SAND, dry			
11 12 13 14 15	S3			60"/28"	Tan, fine silty SAND, dry (tough to read; I think it says 28)			
16 17 18 19 20								

NOTES:

LEGEND

S - Split Spoon Sample	O/A - Sample Collected Off the Augers
UT - Undisturbed Tube Sample	
Trace - Approximately 0 to 10%	Some - Approximately 20 to 35%
Little - Approximately 10 to 20%	And - Approximately 35 to 50%
0-4 Coarse Soil N Value - Very Loose	11-30 Coarse Soil N Value - Medium Dense
5-10 Coarse Soil N Value - Loose	31-50 Coarse Soil N Value - Dense
0-2 Fine Soil N Value - Very Soft	4-8 Fine Soil N Value - Medium Stiff
2-4 Fine Soil N Value - Soft	8-15 Fine Soil N Value - Stiff

BORING LOG

Project: Sea Street Pump Station Force Main No. 3

Location: Nantucket, MA

Client: Town of Nantucket

Driller: Crawford Drilling Services

Drilling Methods: Geoprobe

Weather: Rain, 50s

Performed By: SJG Date: 10/28/20

Checked By: ZFK Date: 12/16/20

Sea Street Pump Station Force Main No. 3

SEE SITE PLAN

Boring Locus Map

Boring No.: **B-46**

Location: See Plan

Approx. Ground Elevation:

Approx. Groundwater Elevation:

Date/Time of GW EL.

Datum: NAVD88

Project No. 360-2001

Depth (feet)	*Sample No.*	*Blows per 6-inch*	*SPT Value*	*Pen./ Rec.*	*Soil Description*		*Stratum Change Depth (feet)*	*Note No.*
1 2 3 4 5	S1			60"/43"	5" Asphalt 9" fill (crushed asphalt + silty SAND) 28" Brown, silty SAND with trace gravel 10" Tan, poorly graded SAND, dry (tough to read; I think it says 43)			
6 7 8 9 10	S2			60"/29"	Brown, poorly graded SAND with a 3" layer of silt			
11 12 13 14 15	S3			60"/36"	20" Brown, SILT, dry 16" Brown, fine silty SAND, dry			
16 17 18 19 20								

NOTES:

No GW

LEGEND

S - Split Spoon Sample	O/A - Sample Collected Off the Augers
UT - Undisturbed Tube Sample	
Trace - Approximately 0 to 10%	Some - Approximately 20 to 35%
Little - Approximately 10 to 20%	And - Approximately 35 to 50%
0-4 Coarse Soil N Value - Very Loose	11-30 Coarse Soil N Value - Medium Dense
5-10 Coarse Soil N Value - Loose	31-50 Coarse Soil N Value - Dense
0-2 Fine Soil N Value - Very Soft	4-8 Fine Soil N Value - Medium Stiff
2-4 Fine Soil N Value - Soft	8-15 Fine Soil N Value - Stiff

BORING LOG

Project: Sea Street Pump Station Force Main No. 3

Location: Nantucket, MA

Client: Town of Nantucket

Driller: Crawford Drilling Services

Drilling Methods: Geoprobe

Weather: Sunny, 40s

Performed By: SJG Date: 11/2/20

Checked By: ZFK Date: 12/16/20

Sea Street Pump Station Force Main No. 3

SEE SITE PLAN

Boring Locus Map

Boring No.: **B-47**

Location: See Plan

Approx. Ground Elevation:

Approx. Groundwater Elevation:

Date/Time of GW EL.

Datum: NAVD88

Project No. 360-2001

Depth (feet)	*Sample No.*	*Blows per 6-inch*	*SPT Value*	*Pen./ Rec.*	*Soil Description*		*Stratum Change Depth (feet)*	*Note No.*
1 2 3 4 5	S1			60"/48"	4" Asphalt 6" fill (crushed asphalt/silty SAND) 22" Brown/orange poorly graded SAND with gravel, dry 16" Brown, silty SAND, dry			
6 7 8 9 10	S2			60"/44"	14" Tan, poorly graded SAND with trace gravel, dry 8" Brown, silty SAND, dry 22" Brown, fine to med SAND with trace silt and gravel, dry			
11 12 13 14 15	S3			60"/36"	Tan, fine to med SAND with trace silt and gravel, dry			
16 17 18 19 20								

NOTES:

No GW

LEGEND

S - Split Spoon Sample	O/A - Sample Collected Off the Augers
UT - Undisturbed Tube Sample	
Trace - Approximately 0 to 10%	Some - Approximately 20 to 35%
Little - Approximately 10 to 20%	And - Approximately 35 to 50%
0-4 Coarse Soil N Value - Very Loose	11-30 Coarse Soil N Value - Medium Dense
5-10 Coarse Soil N Value - Loose	31-50 Coarse Soil N Value - Dense
0-2 Fine Soil N Value - Very Soft	4-8 Fine Soil N Value - Medium Stiff
2-4 Fine Soil N Value - Soft	8-15 Fine Soil N Value - Stiff

BORING LOG

Project: Sea Street Pump Station Force Main No. 3

Location: Nantucket, MA

Client: Town of Nantucket

Driller: Crawford Drilling Services

Drilling Methods: Geoprobe

Weather: Sunny, 50s

Performed By: SJG Date: 11/2/20

Checked By: ZFK Date: 12/16/20

Sea Street Pump Station Force Main No. 3

SEE SITE PLAN

Boring Locus Map

Boring No.: **B-48**

Location: See Plan

Approx. Ground Elevation:

Approx. Groundwater Elevation:

Date/Time of GW EL.

Datum: NAVD88

Project No. 360-2001

Depth (feet)	*Sample No.*	*Blows per 6-inch*	*SPT Value*	*Pen./ Rec.*	*Soil Description*		*Stratum Change Depth (feet)*	*Note No.*
1 2 3 4 5	S1			60"/50"	4" Asphalt 6" fill (crushed asphalt and stone) 40" Dark Brown to Brown fine to med SAND with trace silt and gravel, dry			
6 7 8 9 10	S2			60"/45"	Brown, fine to med SAND with trace SILT and gravel, dry			
11 12 13 14 15	S3			60"/30"	Tan, fine to med SAND with trace silt and course sand, dry			
16 17 18 19 20								

NOTES:

GW not encountered

LEGEND

S - Split Spoon Sample	O/A - Sample Collected Off the Augers
UT - Undisturbed Tube Sample	
Trace - Approximately 0 to 10%	Some - Approximately 20 to 35%
Little - Approximately 10 to 20%	And - Approximately 35 to 50%
0-4 Coarse Soil N Value - Very Loose	11-30 Coarse Soil N Value - Medium Dense
5-10 Coarse Soil N Value - Loose	31-50 Coarse Soil N Value - Dense
0-2 Fine Soil N Value - Very Soft	4-8 Fine Soil N Value - Medium Stiff
2-4 Fine Soil N Value - Soft	8-15 Fine Soil N Value - Stiff

BORING LOG

Project: Sea Street Pump Station Force Main No. 3

Location: Nantucket, MA

Client: Town of Nantucket

Driller: Crawford Drilling Services

Drilling Methods: Auger

Weather: Sunny 50s

Performed By: SJG Date: 11/2/20

Checked By: ZFK Date: 12/16/20

Sea Street Pump Station Force Main No. 3

SEE SITE PLAN

Boring Locus Map

Boring No.: **B-49**

Location: See Plan

Approx. Ground Elevation:

Approx. Groundwater Elevation:

Date/Time of GW EL.

Datum: NAVD88

Project No. 360-2001

Depth (feet)	*Sample No.*	*Blows per 6-inch*	*SPT Value*	*Pen./ Rec.*	*Soil Description*		*Stratum Change Depth (feet)*	*Note No.*
1 2	S1	4 8 10 15		24"/16"	7" Dark Brown sandy LOAM, dry 2" rock fragment 7" Brown, fine to med SAND, dry			
3 4 5								
6 7	S2	2 2 4 4		24"/13"	Tan, fine to med SAND, with trace gravel, dry			
8 9 10								
11 12	S3	2 3 3 3		24"/14"	Tan, fine to med SAND with trace gravel, dry			
13 14 15								
16 17	S4	3 5 8 10		24"/15"	Tan, fine SAND, dry Some orange layers present			
18 19 20								
21 22								

NOTES:

GW not encountered

LEGEND

S - Split Spoon Sample

UT - Undisturbed Tube Sample

O/A - Sample Collected Off the Augers

Trace - Approximately 0 to 10%

Little - Approximately 10 to 20%

Some - Approximately 20 to 35%

And - Approximately 35 to 50%

0-4 Coarse Soil N Value - Very Loose

5-10 Coarse Soil N Value - Loose

11-30 Coarse Soil N Value - Medium Dense

31-50 Coarse Soil N Value - Dense

0-2 Fine Soil N Value - Very Soft

2-4 Fine Soil N Value - Soft

4-8 Fine Soil N Value - Medium Stiff

8-15 Fine Soil N Value - Stiff

BORING LOG

Project: Sea Street Pump Station Force Main No. 3

Location: Nantucket, MA

Client: Town of Nantucket

Driller: Crawford Drilling Services

Drilling Methods: Geoprobe

Weather: Sunny, 40s

Performed By: SJG Date: 11/2/20

Checked By: ZFK Date: 12/16/20

Sea Street Pump Station Force Main No. 3

SEE SITE PLAN

Boring Locus Map

Boring No.: **B-50**

Location: See Plan

Approx. Ground Elevation:

Approx. Groundwater Elevation:

Date/Time of GW EL.

Datum: NAVD88

Project No. 360-2001

Depth (feet)	*Sample No.*	*Blows per 6-inch*	*SPT Value*	*Pen./ Rec.*	*Soil Description*		*Stratum Change Depth (feet)*	*Note No.*
1 2 3 4 5	S1			60"/34"	2" Asphalt 7" fill (crushed asphalt, silty SAND, rock) 25" Brown, fine to med SAND with trace silt, dry			
6 7 8 9 10	S2			60"/33"	Brown, fine to med SAND with trace SILT and gravel, dry			
11 12 13 14 15	S3			60"/33"	3" Tan, fine SAND with trace silt, dry 30" Brown, fine silty SAND with trace gravel, dry			
16 17 18 19 20								

NOTES:

LEGEND

S - Split Spoon Sample	O/A - Sample Collected Off the Augers
UT - Undisturbed Tube Sample	
Trace - Approximately 0 to 10%	Some - Approximately 20 to 35%
Little - Approximately 10 to 20%	And - Approximately 35 to 50%
0-4 Coarse Soil N Value - Very Loose	11-30 Coarse Soil N Value - Medium Dense
5-10 Coarse Soil N Value - Loose	31-50 Coarse Soil N Value - Dense
0-2 Fine Soil N Value - Very Soft	4-8 Fine Soil N Value - Medium Stiff
2-4 Fine Soil N Value - Soft	8-15 Fine Soil N Value - Stiff

BORING LOG

Project: Sea Street Pump Station Force Main No. 3

Location: Nantucket, MA

Client: Town of Nantucket

Driller: Crawford Drilling Services

Drilling Methods: Geoprobe

Weather: Sunny, 40s

Performed By: SJG Date: 11/2/20

Checked By: ZFK Date: 12/16/20

Sea Street Pump Station Force Main No. 3

SEE SITE PLAN

Boring Locus Map

Boring No.: **B-51**

Location: See Plan

Approx. Ground Elevation:

Approx. Groundwater Elevation:

Date/Time of GW EL.

Datum: NAVD88

Project No. 360-2001

Depth (feet)	*Sample No.*	*Blows per 6-inch*	*SPT Value*	*Pen./ Rec.*	*Soil Description*		*Stratum Change Depth (feet)*	*Note No.*
1 2 3 4 5	S1			60"/34"	2" Asphalt 6" fill (rock fragments, silty SAND) 12" Brown, poorly graded silty SAND with trace gravel, dry 14" orange silty SAND with trace gravel, dry			
6 7 8 9 10	S2			60"/38"	8" Orange silty SAND, dry 30" Brown, silty SAND, dry			
11 12 13 14 15	S3			60"/32"	Brown, silty SAND, dry			
16 17 18 19 20								

NOTES:

Cobblestone layers observed under pavement

GW not encountered

LEGEND

S - Split Spoon Sample	O/A - Sample Collected Off the Augers
UT - Undisturbed Tube Sample	
Trace - Approximately 0 to 10%	Some - Approximately 20 to 35%
Little - Approximately 10 to 20%	And - Approximately 35 to 50%
0-4 Coarse Soil N Value - Very Loose	11-30 Coarse Soil N Value - Medium Dense
5-10 Coarse Soil N Value - Loose	31-50 Coarse Soil N Value - Dense
0-2 Fine Soil N Value - Very Soft	4-8 Fine Soil N Value - Medium Stiff
2-4 Fine Soil N Value - Soft	8-15 Fine Soil N Value - Stiff

BORING LOG

Project: Sea Street Pump Station Force Main No. 3

Location: Nantucket, MA

Client: Town of Nantucket

Driller: Crawford Drilling Services

Drilling Methods: Geoprobe

Weather: Sunny, 40s

Performed By: SJG Date: 11/2/20

Checked By: ZFK Date: 12/16/20

Sea Street Pump Station Force Main No. 3

SEE SITE PLAN

Boring Locus Map

Boring No.: **B-52**

Location: See Plan

Approx. Ground Elevation:

Approx. Groundwater Elevation:

Date/Time of GW EL.

Datum: NAVD88

Project No. 360-2001

Depth (feet)	*Sample No.*	*Blows per 6-inch*	*SPT Value*	*Pen./ Rec.*	*Soil Description*		*Stratum Change Depth (feet)*	*Note No.*
1 2 3 4 5	S1			60"/41"	2" Asphalt 5" fill (crushed asphalt and silty SAND) 34" Brown, silty SAND, dry	SM		
6 7 8 9 10	S2			60"/37"	Brown, fine SAND with trace silt and gravel, dry			
11 12 13 14 15	S3			60"/33"	Brown, silty SAND, moist at the bottom			
16 17 18 19 20								

NOTES:

LEGEND

S - Split Spoon Sample	O/A - Sample Collected Off the Augers
UT - Undisturbed Tube Sample	
Trace - Approximately 0 to 10%	Some - Approximately 20 to 35%
Little - Approximately 10 to 20%	And - Approximately 35 to 50%
0-4 Coarse Soil N Value - Very Loose	11-30 Coarse Soil N Value - Medium Dense
5-10 Coarse Soil N Value - Loose	31-50 Coarse Soil N Value - Dense
0-2 Fine Soil N Value - Very Soft	4-8 Fine Soil N Value - Medium Stiff
2-4 Fine Soil N Value - Soft	8-15 Fine Soil N Value - Stiff

BORING LOG

Project: Sea Street Pump Station Force Main No. 3

Location: Nantucket, MA

Client: Town of Nantucket

Driller: Crawford Drilling Services

Drilling Methods: Auger

Weather: Rain 40s

Performed By: SJG Date: 11/2/20

Checked By: ZFK Date: 12/16/20

Sea Street Pump Station Force Main No. 3

SEE SITE PLAN

Boring Locus Map

Boring No.: **B-53**

Location: See Plan

Approx. Ground Elevation:

Approx. Groundwater Elevation:

Date/Time of GW EL.

Datum: NAVD88

Project No. 360-2001

Depth (feet)	*Sample No.*	*Blows per 6-inch*	*SPT Value*	*Pen./ Rec.*	*Soil Description*		*Stratum Change Depth (feet)*	*Note No.*
1 2 3 4 5	S1			60"/38"	1" Asphalt 5" cobblestone layer 32" Brown, silty SAND with trace gravel, dry			
6 7 8 9 10	S2			60"/32"	Brown, silty SAND with trace gravel, dry			
11 12 13 14 15	S3			60"/22"	Tan, poorly graded SAND, dry			
16 17 18 19 20								

NOTES:

Layer of cobblestones below

LEGEND

S - Split Spoon Sample	O/A - Sample Collected Off the Augers
UT - Undisturbed Tube Sample	
Trace - Approximately 0 to 10%	Some - Approximately 20 to 35%
Little - Approximately 10 to 20%	And - Approximately 35 to 50%
0-4 Coarse Soil N Value - Very Loose	11-30 Coarse Soil N Value - Medium Dense
5-10 Coarse Soil N Value - Loose	31-50 Coarse Soil N Value - Dense
0-2 Fine Soil N Value - Very Soft	4-8 Fine Soil N Value - Medium Stiff
2-4 Fine Soil N Value - Soft	8-15 Fine Soil N Value - Stiff

BORING LOG

Project: Sea Street Pump Station Force Main No. 3

Location: Nantucket, MA

Client: Town of Nantucket

Driller: Crawford Drilling Services

Drilling Methods: Geoprobe

Weather: Cloudy 40s

Performed By: SJG Date: 11/3/20

Checked By: ZFK Date: 12/16/20

Sea Street Pump Station Force Main No. 3

SEE SITE PLAN

Boring Locus Map

Boring No.: **B-54**

Location: See Plan

Approx. Ground Elevation:

Approx. Groundwater Elevation:

Date/Time of GW EL.

Datum: NAVD88

Project No. 360-2001

Depth (feet)	*Sample No.*	*Blows per 6-inch*	*SPT Value*	*Pen./ Rec.*	*Soil Description*		*Stratum Change Depth (feet)*	*Note No.*
1 2 3 4 5	S1			60"/31"	2" Asphalt 5" fill (crushed asphalt & rock) 24" Brown, fine to med silty SAND, dry			
6 7 8 9 10	S2			60"/38"	18" Brown, silty SAND, dry 20" Brown, poorly graded SAND with trace gravel, dry			
11 12 13 14 15	S3			60"/29"	Brown, fine to med SAND with trace coarse sand, dry			
16 17 18 19 20								

NOTES:

Possible cobbles under asphalt

LEGEND

S - Split Spoon Sample	O/A - Sample Collected Off the Augers
UT - Undisturbed Tube Sample	
Trace - Approximately 0 to 10%	Some - Approximately 20 to 35%
Little - Approximately 10 to 20%	And - Approximately 35 to 50%
0-4 Coarse Soil N Value - Very Loose	11-30 Coarse Soil N Value - Medium Dense
5-10 Coarse Soil N Value - Loose	31-50 Coarse Soil N Value - Dense
0-2 Fine Soil N Value - Very Soft	4-8 Fine Soil N Value - Medium Stiff
2-4 Fine Soil N Value - Soft	8-15 Fine Soil N Value - Stiff

BORING LOG

Project: Sea Street Pump Station Force Main No. 3

Location: Nantucket, MA

Client: Town of Nantucket

Driller: Crawford Drilling Services

Drilling Methods: Geoprobe

Weather: Cloudy 40s

Performed By: SJG Date: 11/3/20

Checked By: ZFK Date: 12/16/20

Sea Street Pump Station Force Main No. 3

SEE SITE PLAN

Boring Locus Map

Boring No.: **B-55**

Location: See Plan

Approx. Ground Elevation:

Approx. Groundwater Elevation:

Date/Time of GW EL.

Datum: NAVD88

Project No. 360-2001

Depth (feet)	*Sample No.*	*Blows per 6-inch*	*SPT Value*	*Pen./ Rec.*	*Soil Description*		*Stratum Change Depth (feet)*	*Note No.*
1 2 3 4 5	S1			60"/45"	4" Asphalt 6" cobble layer 6" Brown, poorly graded SAND 29" Brown, silty SAND with trace gravel			
6 7 8 9 10	S2			60"/42"	Brown, fine to med SAND with trace gravel, dry			
11 12 13 14 15	S3			60"/26"	Tan, poorly graded SAND, dry			
16 17 18 19 20								

NOTES:

Cobble layer present

LEGEND

S - Split Spoon Sample O/A - Sample Collected Off the Augers

UT - Undisturbed Tube Sample

Trace - Approximately 0 to 10% Some - Approximately 20 to 35%

Little - Approximately 10 to 20% And - Approximately 35 to 50%

0-4 Coarse Soil N Value - Very Loose 11-30 Coarse Soil N Value - Medium Dense

5-10 Coarse Soil N Value - Loose 31-50 Coarse Soil N Value - Dense

0-2 Fine Soil N Value - Very Soft 4-8 Fine Soil N Value - Medium Stiff

2-4 Fine Soil N Value - Soft 8-15 Fine Soil N Value - Stiff

BORING LOG

Project: Sea Street Pump Station Force Main No. 3

Location: Nantucket, MA

Client: Town of Nantucket

Driller: Crawford Drilling Services

Drilling Methods: Geoprobe

Weather: Cloudy 40s

Performed By: SJG Date: 11/2/20

Checked By: ZFK Date: 12/16/20

Sea Street Pump Station Force Main No. 3

SEE SITE PLAN

Boring Locus Map

Boring No.: **B-56**

Location: See Plan

Approx. Ground Elevation:

Approx. Groundwater Elevation:

Date/Time of GW EL.

Datum: NAVD88

Project No. 360-2001

Depth (feet)	*Sample No.*	*Blows per 6-inch*	*SPT Value*	*Pen./ Rec.*	*Soil Description*		*Stratum Change Depth (feet)*	*Note No.*
1 2 3 4 5	S1			60"/42"	2" Asphalt 10" fill 13" Brown/orange poorly graded SAND with trace silt and gravel, dry 17" Brown, fine SAND, dry			
6 7 8 9 10	S2			60"/35"	Tan, poorly graded SAND, dry			
11 12 13 14 15	S3			60"/24"	Tan,			
16 17 18 19 20								

NOTES:

GW not encountered

LEGEND

S - Split Spoon Sample	O/A - Sample Collected Off the Augers
UT - Undisturbed Tube Sample	
Trace - Approximately 0 to 10%	Some - Approximately 20 to 35%
Little - Approximately 10 to 20%	And - Approximately 35 to 50%
0-4 Coarse Soil N Value - Very Loose	11-30 Coarse Soil N Value - Medium Dense
5-10 Coarse Soil N Value - Loose	31-50 Coarse Soil N Value - Dense
0-2 Fine Soil N Value - Very Soft	4-8 Fine Soil N Value - Medium Stiff
2-4 Fine Soil N Value - Soft	8-15 Fine Soil N Value - Stiff

BORING LOG

Project: Sea Street Pump Station Force Main No. 3

Location: Nantucket, MA

Client: Town of Nantucket

Driller: Crawford Drilling Services

Drilling Methods: Geoprobe

Weather: Sunny 40s

Performed By: SJG Date: 11/2/20

Checked By: ZFK Date: 12/16/20

Sea Street Pump Station Force Main No. 3

SEE SITE PLAN

Boring Locus Map

Boring No.: **B-57**

Location: See Plan

Approx. Ground Elevation:

Approx. Groundwater Elevation:

Date/Time of GW EL.

Datum: NAVD88

Project No. 360-2001

Depth (feet)	*Sample No.*	*Blows per 6-inch*	*SPT Value*	*Pen./ Rec.*	*Soil Description*		*Stratum Change Depth (feet)*	*Note No.*
1 2 3 4 5	S1			60"/20"	3" Asphalt 4" fill 13" Brown, fine to med SAND with trace silt, dry			
6 7 8 9 10	S2			60"/26"	Brown, poorly graded SAND, dry			
11 12 13 14 15	S3			60"/30"	Brown, poorly graded SAND, dry			
16 17 18 19 20								

NOTES:

LEGEND

S - Split Spoon Sample	O/A - Sample Collected Off the Augers
UT - Undisturbed Tube Sample	
Trace - Approximately 0 to 10%	Some - Approximately 20 to 35%
Little - Approximately 10 to 20%	And - Approximately 35 to 50%
0-4 Coarse Soil N Value - Very Loose	11-30 Coarse Soil N Value - Medium Dense
5-10 Coarse Soil N Value - Loose	31-50 Coarse Soil N Value - Dense
0-2 Fine Soil N Value - Very Soft	4-8 Fine Soil N Value - Medium Stiff
2-4 Fine Soil N Value - Soft	8-15 Fine Soil N Value - Stiff

BORING LOG

Project: Sea Street Pump Station Force Main No. 3

Location: Nantucket, MA

Client: Town of Nantucket

Driller: Crawford Drilling Services

Drilling Methods: Geoprobe

Weather: Sunny 40s

Performed By: SJG Date: 11/2/20

Checked By: ZFK Date: 12/16/20

Sea Street Pump Station Force Main No. 3

SEE SITE PLAN

Boring Locus Map

Boring No.: **B-58**

Location: See Plan

Approx. Ground Elevation:

Approx. Groundwater Elevation:

Date/Time of GW EL.

Datum: NAVD88

Project No. 360-2001

Depth (feet)	*Sample No.*	*Blows per 6-inch*	*SPT Value*	*Pen./ Rec.*	*Soil Description*		*Stratum Change Depth (feet)*	*Note No.*
1 2 3 4 5	S1			60"/46"	3" Asphalt 3" fill 10" Brown, silty SAND with trace gravel, dry 30" Orange/Brown silty SAND, dry			
6 7 8 9 10	S2			60"/45"	35" Brown, fine SAND with trace silt and gravel, dry 10 " Tan, silty SAND, dry			
11 12 13 14 15	S3			60"/31"	Tan, silty SAND, dry			
16 17 18 19 20								

NOTES:

LEGEND

S - Split Spoon Sample	O/A - Sample Collected Off the Augers
UT - Undisturbed Tube Sample	
Trace - Approximately 0 to 10%	Some - Approximately 20 to 35%
Little - Approximately 10 to 20%	And - Approximately 35 to 50%
0-4 Coarse Soil N Value - Very Loose	11-30 Coarse Soil N Value - Medium Dense
5-10 Coarse Soil N Value - Loose	31-50 Coarse Soil N Value - Dense
0-2 Fine Soil N Value - Very Soft	4-8 Fine Soil N Value - Medium Stiff
2-4 Fine Soil N Value - Soft	8-15 Fine Soil N Value - Stiff

BORING LOG

Project: Sea Street Pump Station Force Main No. 3

Location: Nantucket, MA

Client: Town of Nantucket

Driller: Crawford Drilling Services

Drilling Methods: Auger

Weather: Sunny 40s

Performed By: SJG Date: 11/2/20

Checked By: ZFK Date: 12/16/20

Sea Street Pump Station Force Main No. 3

SEE SITE PLAN

Boring Locus Map

Boring No.: **B-59**

Location: See Plan

Approx. Ground Elevation:

Approx. Groundwater Elevation:

Date/Time of GW EL.

Datum: NAVD88

Project No. 360-2001

Depth (feet)	*Sample No.*	*Blows per 6-inch*	*SPT Value*	*Pen./ Rec.*	*Soil Description*		*Stratum Change Depth (feet)*	*Note No.*
1 2 3 4 5	S1			60"/42"	3" Asphalt 3" Fill 36" Brown, poorly graded SAND, dry			
6 7 8 9 10	S2			60"/41"	8" Brown, poorly graded SAND, dry 6" Brown, fine silty SAND, dry 27" Tan, poorly graded SAND, dry			
11 12 13 14 15	S3			60"/28"	Tan, poorly graded SAND, dry			
16 17 18 19 20								

NOTES:

LEGEND

S - Split Spoon Sample	O/A - Sample Collected Off the Augers
UT - Undisturbed Tube Sample	
Trace - Approximately 0 to 10%	Some - Approximately 20 to 35%
Little - Approximately 10 to 20%	And - Approximately 35 to 50%
0-4 Coarse Soil N Value - Very Loose	11-30 Coarse Soil N Value - Medium Dense
5-10 Coarse Soil N Value - Loose	31-50 Coarse Soil N Value - Dense
0-2 Fine Soil N Value - Very Soft	4-8 Fine Soil N Value - Medium Stiff
2-4 Fine Soil N Value - Soft	8-15 Fine Soil N Value - Stiff

BORING LOG

Project: Sea Street Pump Station Force Main No. 3

Location: Nantucket, MA
Client: Town of Nantucket
Driller: Crawford Drilling Services
Drilling Methods: Auger

Weather: Sunny 40s
Performed By: SJG Date: 11/3/20
Checked By: ZFK Date: 12/16/20

Sea Street Pump Station Force Main No. 3

SEE SITE PLAN

Boring Locus Map

Boring No.: **B-60**
Location: See Plan
Approx. Ground Elevation:

Approx. Groundwater Elevation:
Date/Time of GW EL.
Datum: NAVD88
Project No. 360-2001

Depth (feet)	*Sample No.*	*Blows per 6-inch*	*SPT Value*	*Pen./ Rec.*	*Soil Description*		*Stratum Change Depth (feet)*	*Note No.*
1 2	S1	Auger 3 4 6		24"/22"	3" Asphalt 19" Fill (Brown, silty SAND with rock fragments), dry			
3 4 5								
6 7	S2	2 4 3 5		24"/13"	Brown poorly graded SAND with trace silt and gravel, dry			
8 9 10								
11 12	S3	3 3 4 3		24"/17"	11" Tan, poorly graded SAND with trace silt and gravel, dry			
13 14 15								
16 17	S4	3 4 6 7		24"/22"	Brown, silty SAND, dry			
18 19 20								
21 22								

NOTES:

GW not encountered

LEGEND

S - Split Spoon Sample
O/A - Sample Collected Off the Augers
UT - Undisturbed Tube Sample

Trace - Approximately 0 to 10%
Some - Approximately 20 to 35%
Little - Approximately 10 to 20%
And - Approximately 35 to 50%

0-4 Coarse Soil N Value - Very Loose
11-30 Coarse Soil N Value - Medium Dense
5-10 Coarse Soil N Value - Loose
31-50 Coarse Soil N Value - Dense

0-2 Fine Soil N Value - Very Soft
4-8 Fine Soil N Value - Medium Stiff
2-4 Fine Soil N Value - Soft
8-15 Fine Soil N Value - Stiff

BORING LOG

Project: Sea Street Pump Station Force Main No. 3

Location: Nantucket, MA

Client: Town of Nantucket

Driller: Crawford Drilling Services

Drilling Methods: Geoprobe

Weather: Sunny 40s

Performed By: SJG Date: 11/3/20

Checked By: ZFK Date: 12/16/20

Sea Street Pump Station Force Main No. 3

SEE SITE PLAN

Boring Locus Map

Boring No.: **B-61/MW-4**

Location: See Plan

Approx. Ground Elevation: 26.09'

Approx. Groundwater Elevation: 6.69'

Date/Time of GW EL. 11/3/20 14:18

Datum: NAVD88

Project No. 360-2001

Depth (feet)	*Sample No.*	*Blows per 6-inch*	*SPT Value*	*Pen./ Rec.*	*Soil Description*		*Stratum Change Depth (feet)*	*Note No.*
1 2 3 4 5	S1			60"/	Asphalt 28" Fill (crushed asphalt and Brown/Black silty sand, asphalt layer at 22" below grade) 16" Brown, silty SAND, dry			
6 7 8 9 10	S2			60"/48"	Brown, silty SAND, dry	SM		
11 12 13 14 15	S3			60"/44"	Brown, silty SAND, dry	SM		
16 17 18 19 20	S4			60"/38"	Brown, silty SAND, dry to wet at approx 18' below grade			

NOTES:

No soil sample 20'-25'

GW @ approx 19.4' below grade in well @ 14:18

Grade to top of PVC = 0.35'

TD of well = 24.7' + 0.35' = 25.05'

DTW = 19.05' + 0.35' = 19.4'

LEGEND

S - Split Spoon Sample	O/A - Sample Collected Off the Augers
UT - Undisturbed Tube Sample	
Trace - Approximately 0 to 10%	Some - Approximately 20 to 35%
Little - Approximately 10 to 20%	And - Approximately 35 to 50%
0-4 Coarse Soil N Value - Very Loose	11-30 Coarse Soil N Value - Medium Dense
5-10 Coarse Soil N Value - Loose	31-50 Coarse Soil N Value - Dense
0-2 Fine Soil N Value - Very Soft	4-8 Fine Soil N Value - Medium Stiff
2-4 Fine Soil N Value - Soft	8-15 Fine Soil N Value - Stiff

BORING LOG

Project: Sea Street Pump Station Force Main No. 3

Location: Nantucket, MA

Client: Town of Nantucket

Driller: Crawford Drilling Services

Drilling Methods: Geoprobe

Weather: Sunny 40s

Performed By: SJG Date: 11/3/20

Checked By: ZFK Date: 12/16/20

Sea Street Pump Station Force Main No. 3

SEE SITE PLAN

Boring Locus Map

Boring No.: **B-62**

Location: See Plan

Approx. Ground Elevation:

Approx. Groundwater Elevation:

Date/Time of GW EL.

Datum: NAVD88

Project No. 360-2001

Depth (feet)	*Sample No.*	*Blows per 6-inch*	*SPT Value*	*Pen./ Rec.*	*Soil Description*		*Stratum Change Depth (feet)*	*Note No.*
1 2 3 4 5	S1			60"/43"	6" Asphalt 7" Fill (crushed asphalt, brick, silty sand) 30" Brown to tan poorly graded SAND with trace gravel, dry			
6 7 8 9 10	S2			60"/41"	Tan, poorly graded SAND with trace gravel, dry			
11 12 13 14 15	S3			60"/25"	Tan, poorly graded SAND with trace gravel, dry			
16 17 18 19 20								

NOTES:

LEGEND

S - Split Spoon Sample	O/A - Sample Collected Off the Augers
UT - Undisturbed Tube Sample	
Trace - Approximately 0 to 10%	Some - Approximately 20 to 35%
Little - Approximately 10 to 20%	And - Approximately 35 to 50%
0-4 Coarse Soil N Value - Very Loose	11-30 Coarse Soil N Value - Medium Dense
5-10 Coarse Soil N Value - Loose	31-50 Coarse Soil N Value - Dense
0-2 Fine Soil N Value - Very Soft	4-8 Fine Soil N Value - Medium Stiff
2-4 Fine Soil N Value - Soft	8-15 Fine Soil N Value - Stiff

BORING LOG

Project: Sea Street Pump Station Force Main No. 3

Location: Nantucket, MA

Client: Town of Nantucket

Driller: Crawford Drilling Services

Drilling Methods: Geoprobe

Weather: Sunny 60s

Performed By: SJG Date: 11/3/20

Checked By: ZFK Date: 12/16/20

Sea Street Pump Station Force Main No. 3

SEE SITE PLAN

Boring Locus Map

Boring No.: **B-63**

Location: See Plan

Approx. Ground Elevation:

Approx. Groundwater Elevation:

Date/Time of GW EL.

Datum: NAVD88

Project No. 360-2001

Depth (feet)	*Sample No.*	*Blows per 6-inch*	*SPT Value*	*Pen./ Rec.*	*Soil Description*		*Stratum Change Depth (feet)*	*Note No.*
1 2 3 4 5	S1			60"/37"	6" Asphalt 11" Fill (crushed asphalt, brick, silty SAND) 20" Brown, silty SAND, dry			
6 7 8 9 10	S2			60"/45"	Brown, silty SAND, dry			
11 12 13 14 15	S3			60"/25"	14" Brown/orange fine to med SAND with trace gravel, dry 2" Brown, clayey SILT, dry 9" Tan, poorly graded SAND, dry			
16 17 18 19 20								

NOTES:

LEGEND

S - Split Spoon Sample	O/A - Sample Collected Off the Augers
UT - Undisturbed Tube Sample	
Trace - Approximately 0 to 10%	Some - Approximately 20 to 35%
Little - Approximately 10 to 20%	And - Approximately 35 to 50%
0-4 Coarse Soil N Value - Very Loose	11-30 Coarse Soil N Value - Medium Dense
5-10 Coarse Soil N Value - Loose	31-50 Coarse Soil N Value - Dense
0-2 Fine Soil N Value - Very Soft	4-8 Fine Soil N Value - Medium Stiff
2-4 Fine Soil N Value - Soft	8-15 Fine Soil N Value - Stiff

BORING LOG

Project: Sea Street Pump Station Force Main No. 3

Location: Nantucket, MA

Client: Town of Nantucket

Driller: Crawford Drilling Services

Drilling Methods: Geoprobe

Weather: Sunny 60s

Performed By: SJG Date: 11/3/20

Checked By: ZFK Date: 12/16/20

Sea Street Pump Station Force Main No. 3

SEE SITE PLAN

Boring Locus Map

Boring No.: **B-64**

Location: See Plan

Approx. Ground Elevation:

Approx. Groundwater Elevation:

Date/Time of GW EL.

Datum: NAVD88

Project No. 360-2001

Depth (feet)	*Sample No.*	*Blows per 6-inch*	*SPT Value*	*Pen./ Rec.*	*Soil Description*		*Stratum Change Depth (feet)*	*Note No.*
1 2 3 4 5	S1			60"/42"	6" Asphalt 11" Fill (crushed asphalt and brick) 25" Brown, silty SAND with what appears to be pieces of coal mixed			
6 7 8 9 10	S2			60"/35"	Brown,fine to med SAND with trace silt and gravel, dry			
11 12 13 14 15	S3			60"/22"	Tan, poorly graded SAND, dry			
16 17 18 19 20								

NOTES:

GW not encountered

LEGEND

S - Split Spoon Sample	O/A - Sample Collected Off the Augers
UT - Undisturbed Tube Sample	
Trace - Approximately 0 to 10%	Some - Approximately 20 to 35%
Little - Approximately 10 to 20%	And - Approximately 35 to 50%
0-4 Coarse Soil N Value - Very Loose	11-30 Coarse Soil N Value - Medium Dense
5-10 Coarse Soil N Value - Loose	31-50 Coarse Soil N Value - Dense
0-2 Fine Soil N Value - Very Soft	4-8 Fine Soil N Value - Medium Stiff
2-4 Fine Soil N Value - Soft	8-15 Fine Soil N Value - Stiff

BORING LOG

Project: Sea Street Pump Station Force Main No. 3

Location: Nantucket, MA

Client: Town of Nantucket

Driller: Crawford Drilling Services

Drilling Methods: Geoprobe

Weather: Sunny 40s

Performed By: SJG Date: 11/3/20

Checked By: ZFK Date: 12/16/20

Sea Street Pump Station Force Main No. 3

SEE SITE PLAN

Boring Locus Map

Boring No.: **B-65**

Location: See Plan

Approx. Ground Elevation:

Approx. Groundwater Elevation:

Date/Time of GW EL.

Datum: NAVD88

Project No. 360-2001

Depth (feet)	*Sample No.*	*Blows per 6-inch*	*SPT Value*	*Pen./ Rec.*	*Soil Description*		*Stratum Change Depth (feet)*	*Note No.*
1 2 3 4 5	S1			60"/31"	4" Asphalt 21" Fill 6" Brown, poorly sorted SAND			
6 7 8 9 10	S2			60"/27"	Tan,fine to med SAND with trace gravel, dry			
11 12 13 14 15	S3			60"/23"	Tan, poorly graded SAND, dry			
16 17 18 19 20								

NOTES:

LEGEND

S - Split Spoon Sample	O/A - Sample Collected Off the Augers
UT - Undisturbed Tube Sample	
Trace - Approximately 0 to 10%	Some - Approximately 20 to 35%
Little - Approximately 10 to 20%	And - Approximately 35 to 50%
0-4 Coarse Soil N Value - Very Loose	11-30 Coarse Soil N Value - Medium Dense
5-10 Coarse Soil N Value - Loose	31-50 Coarse Soil N Value - Dense
0-2 Fine Soil N Value - Very Soft	4-8 Fine Soil N Value - Medium Stiff
2-4 Fine Soil N Value - Soft	8-15 Fine Soil N Value - Stiff

BORING LOG

Project: Sea Street Pump Station Force Main No. 3

Location: Nantucket, MA

Client: Town of Nantucket

Driller: Crawford Drilling Services

Drilling Methods: Geoprobe

Weather: Sunny 40s

Performed By: SJG Date: 11/3/20

Checked By: ZFK Date: 12/16/20

Sea Street Pump Station Force Main No. 3

SEE SITE PLAN

Boring Locus Map

Boring No.: **B-66**

Location: See Plan

Approx. Ground Elevation:

Approx. Groundwater Elevation:

Date/Time of GW EL.

Datum: NAVD88

Project No. 360-2001

Depth (feet)	*Sample No.*	*Blows per 6-inch*	*SPT Value*	*Pen./ Rec.*	*Soil Description*		*Stratum Change Depth (feet)*	*Note No.*
1 2 3 4 5	S1			60"/48"	4" Asphalt 21" Fill (crushed asphalt + brick, silty sand, possible old road @ 2' below grade) 23" Brown, poorly graded SAND with trace silt and gravel, dry			
6 7 8 9 10	S2			60"/45"	5" orange, poorly graded SAND, dry 40" Tan, poorly graded SAND with trace gravel, dry			
11 12 13 14 15	S3			60"/28"	Tan, poorly graded SAND with trace gravel, dry			
16 17 18 19 20								

NOTES:

LEGEND

S - Split Spoon Sample	O/A - Sample Collected Off the Augers
UT - Undisturbed Tube Sample	
Trace - Approximately 0 to 10%	Some - Approximately 20 to 35%
Little - Approximately 10 to 20%	And - Approximately 35 to 50%
0-4 Coarse Soil N Value - Very Loose	11-30 Coarse Soil N Value - Medium Dense
5-10 Coarse Soil N Value - Loose	31-50 Coarse Soil N Value - Dense
0-2 Fine Soil N Value - Very Soft	4-8 Fine Soil N Value - Medium Stiff
2-4 Fine Soil N Value - Soft	8-15 Fine Soil N Value - Stiff

BORING LOG

Project: Sea Street Pump Station Force Main No. 3

Location: Nantucket, MA

Client: Town of Nantucket

Driller: Crawford Drilling Services

Drilling Methods: Geoprobe

Weather: Sunny 40s

Performed By: SJG Date: 11/4/20

Checked By: ZFK Date: 12/16/20

Sea Street Pump Station Force Main No. 3

SEE SITE PLAN

Boring Locus Map

Boring No.: **B-67**

Location: See Plan

Approx. Ground Elevation:

Approx. Groundwater Elevation:

Date/Time of GW EL.

Datum: NAVD88

Project No. 360-2001

Depth (feet)	*Sample No.*	*Blows per 6-inch*	*SPT Value*	*Pen./ Rec.*	*Soil Description*		*Stratum Change Depth (feet)*	*Note No.*
1 2 3 4 5	S1			60"/45"	3" Asphalt 8" Fill (crushed asphalt, brick, silty SAND) 34" Brown to tan, poorly graded SAND with trace silt, dry			
6 7 8 9 10	S2			60"/41"	5" Brown, poorly graded SAND, dry 5" Brown SILT, dry 31" Brown to tan, fine to med SAND with trace gravel, dry			
11 12 13 14 15	S3			60"/12"	12" Tan, fine to med SAND with trace gravel, dry			
16 17 18 19 20								

NOTES:

GW not observed

LEGEND

S - Split Spoon Sample	O/A - Sample Collected Off the Augers
UT - Undisturbed Tube Sample	
Trace - Approximately 0 to 10%	Some - Approximately 20 to 35%
Little - Approximately 10 to 20%	And - Approximately 35 to 50%
0-4 Coarse Soil N Value - Very Loose	11-30 Coarse Soil N Value - Medium Dense
5-10 Coarse Soil N Value - Loose	31-50 Coarse Soil N Value - Dense
0-2 Fine Soil N Value - Very Soft	4-8 Fine Soil N Value - Medium Stiff
2-4 Fine Soil N Value - Soft	8-15 Fine Soil N Value - Stiff

BORING LOG

Project: Sea Street Pump Station Force Main No. 3

Location: Nantucket, MA

Client: Town of Nantucket

Driller: Crawford Drilling Services

Drilling Methods: Geoprobe

Weather: Sunny 40s

Performed By: SJG Date: 11/4/20

Checked By: ZFK Date: 12/16/20

Sea Street Pump Station Force Main No. 3

SEE SITE PLAN

Boring Locus Map

Boring No.: **B-68**

Location: See Plan

Approx. Ground Elevation:

Approx. Groundwater Elevation:

Date/Time of GW EL.

Datum: NAVD88

Project No. 360-2001

Depth (feet)	*Sample No.*	*Blows per 6-inch*	*SPT Value*	*Pen./ Rec.*	*Soil Description*		*Stratum Change Depth (feet)*	*Note No.*
1 2 3 4 5	S1			60"/39"	2" Asphalt 10" Fill 27" Brown, fine to med SAND, dry			
6 7 8 9 10	S2			60"/39"	Tan, fine to med SAND with trace silt and gravel, dry			
11 12 13 14 15	S3			60"/36"	Tan, poorly graded SAND, dry			
16 17 18 19 20								

NOTES:

LEGEND

S - Split Spoon Sample	O/A - Sample Collected Off the Augers
UT - Undisturbed Tube Sample	
Trace - Approximately 0 to 10%	Some - Approximately 20 to 35%
Little - Approximately 10 to 20%	And - Approximately 35 to 50%
0-4 Coarse Soil N Value - Very Loose	11-30 Coarse Soil N Value - Medium Dense
5-10 Coarse Soil N Value - Loose	31-50 Coarse Soil N Value - Dense
0-2 Fine Soil N Value - Very Soft	4-8 Fine Soil N Value - Medium Stiff
2-4 Fine Soil N Value - Soft	8-15 Fine Soil N Value - Stiff

BORING LOG

Project: Sea Street Pump Station Force Main No. 3

Location: Nantucket, MA

Client: Town of Nantucket

Driller: Crawford Drilling Services

Drilling Methods: Geoprobe

Weather: Sunny 40s

Performed By: SJG Date: 11/4/20

Checked By: ZFK Date: 12/16/20

Sea Street Pump Station Force Main No. 3

SEE SITE PLAN

Boring Locus Map

Boring No.: **B-69**

Location: See Plan

Approx. Ground Elevation:

Approx. Groundwater Elevation:

Date/Time of GW EL.

Datum: NAVD88

Project No. 360-2001

Depth (feet)	*Sample No.*	*Blows per 6-inch*	*SPT Value*	*Pen./ Rec.*	*Soil Description*		*Stratum Change Depth (feet)*	*Note No.*
1 2 3 4 5	S1			60"/42"	3" Asphalt 8" Fill 31" Brown, fine to med SAND with trace silt			
6 7 8 9 10	S2			60"/47"	Brown-tan poorly graded SAND with trace gravel, dry			
11 12 13 14 15	S3			60"/47"	Tan, poorly graded SAND, dry			
16 17 18 19 20								

NOTES:

GW not observed

LEGEND

S - Split Spoon Sample	O/A - Sample Collected Off the Augers
UT - Undisturbed Tube Sample	
Trace - Approximately 0 to 10%	Some - Approximately 20 to 35%
Little - Approximately 10 to 20%	And - Approximately 35 to 50%
0-4 Coarse Soil N Value - Very Loose	11-30 Coarse Soil N Value - Medium Dense
5-10 Coarse Soil N Value - Loose	31-50 Coarse Soil N Value - Dense
0-2 Fine Soil N Value - Very Soft	4-8 Fine Soil N Value - Medium Stiff
2-4 Fine Soil N Value - Soft	8-15 Fine Soil N Value - Stiff

BORING LOG

Project: Sea Street Pump Station Force Main No. 3

Location: Nantucket, MA

Client: Town of Nantucket

Driller: Crawford Drilling Services

Drilling Methods: Geoprobe

Weather: Sunny 40s

Performed By: SJG Date: 11/4/20

Checked By: ZFK Date: 12/16/20

Sea Street Pump Station Force Main No. 3

SEE SITE PLAN

Boring Locus Map

Boring No.: **B-70**

Location: See Plan

Approx. Ground Elevation:

Approx. Groundwater Elevation:

Date/Time of GW EL.

Datum: NAVD88

Project No. 360-2001

Depth (feet)	*Sample No.*	*Blows per 6-inch*	*SPT Value*	*Pen./ Rec.*	*Soil Description*		*Stratum Change Depth (feet)*	*Note No.*
1 2 3 4 5	S1			60"/41"	2" Asphalt 7" Fill 32" Brown, fine to med SAND with trace silt and gravel, dry			
6 7 8 9 10	S2			60"/36"	Brown-tan poorly graded SAND with trace gravel, dry			
11 12 13 14 15	S3			60"/36"	Tan, fine to med SAND with trace gravel, dry			
16 17 18 19 20								

NOTES:

GW not observed

LEGEND

S - Split Spoon Sample	O/A - Sample Collected Off the Augers
UT - Undisturbed Tube Sample	
Trace - Approximately 0 to 10%	Some - Approximately 20 to 35%
Little - Approximately 10 to 20%	And - Approximately 35 to 50%
0-4 Coarse Soil N Value - Very Loose	11-30 Coarse Soil N Value - Medium Dense
5-10 Coarse Soil N Value - Loose	31-50 Coarse Soil N Value - Dense
0-2 Fine Soil N Value - Very Soft	4-8 Fine Soil N Value - Medium Stiff
2-4 Fine Soil N Value - Soft	8-15 Fine Soil N Value - Stiff

BORING LOG

Project: Sea Street Pump Station Force Main No. 3

Location: Nantucket, MA

Client: Town of Nantucket

Driller: Crawford Drilling Services

Drilling Methods: Geoprobe

Weather: Sunny 40s

Performed By: SJG Date: 11/4/20

Checked By: ZFK Date: 12/16/20

Sea Street Pump Station Force Main No. 3

SEE SITE PLAN

Boring Locus Map

Boring No.: **B-71**

Location: See Plan

Approx. Ground Elevation:

Approx. Groundwater Elevation:

Date/Time of GW EL.

Datum: NAVD88

Project No. 360-2001

Depth (feet)	*Sample No.*	*Blows per 6-inch*	*SPT Value*	*Pen./ Rec.*	*Soil Description*		*Stratum Change Depth (feet)*	*Note No.*
1 2 3 4 5	S1			60"/	3" Asphalt 6" Fill 36" Brown, fine to med SAND with trace silt and gravel, dry			
6 7 8 9 10	S2			60"/42"	Brown, poorly graded SAND with trace gravel, dry			
11 12 13 14 15	S3			60"/36"	Tan, poorly graded SAND with trace gravel, dry			
16 17 18 19 20								

NOTES:

LEGEND

S - Split Spoon Sample	O/A - Sample Collected Off the Augers
UT - Undisturbed Tube Sample	
Trace - Approximately 0 to 10%	Some - Approximately 20 to 35%
Little - Approximately 10 to 20%	And - Approximately 35 to 50%
0-4 Coarse Soil N Value - Very Loose	11-30 Coarse Soil N Value - Medium Dense
5-10 Coarse Soil N Value - Loose	31-50 Coarse Soil N Value - Dense
0-2 Fine Soil N Value - Very Soft	4-8 Fine Soil N Value - Medium Stiff
2-4 Fine Soil N Value - Soft	8-15 Fine Soil N Value - Stiff

BORING LOG

Project: Sea Street Pump Station Force Main No. 3

Location: Nantucket, MA

Client: Town of Nantucket

Driller: Crawford Drilling Services

Drilling Methods: Geoprobe

Weather: Sunny 40s

Performed By: SJG Date: 11/4/20

Checked By: ZFK Date: 12/16/20

Sea Street Pump Station Force Main No. 3

SEE SITE PLAN

Boring Locus Map

Boring No.: **B-72**

Location: See Plan

Approx. Ground Elevation:

Approx. Groundwater Elevation:

Date/Time of GW EL.

Datum: NAVD88

Project No. 360-2001

Depth (feet)	*Sample No.*	*Blows per 6-inch*	*SPT Value*	*Pen./ Rec.*	*Soil Description*		*Stratum Change Depth (feet)*	*Note No.*
1 2 3 4 5	S1			60"/53"	3" Asphalt 18" Fill 32" Brown, silty SAND with trace gravel, dry			
6 7 8 9 10	S2			60"/43"	Brown, fine to med SAND, with trace silt and gravel, dry			
11 12 13 14 15	S3			60"/38"	Tan, poorly graded SAND, dry			
16 17 18 19 20								

NOTES:

GW not observed

LEGEND

S - Split Spoon Sample	O/A - Sample Collected Off the Augers
UT - Undisturbed Tube Sample	
Trace - Approximately 0 to 10%	Some - Approximately 20 to 35%
Little - Approximately 10 to 20%	And - Approximately 35 to 50%
0-4 Coarse Soil N Value - Very Loose	11-30 Coarse Soil N Value - Medium Dense
5-10 Coarse Soil N Value - Loose	31-50 Coarse Soil N Value - Dense
0-2 Fine Soil N Value - Very Soft	4-8 Fine Soil N Value - Medium Stiff
2-4 Fine Soil N Value - Soft	8-15 Fine Soil N Value - Stiff

BORING LOG

Project: Sea Street Pump Station Force Main No. 3

Location: Nantucket, MA

Client: Town of Nantucket

Driller: Crawford Drilling Services

Drilling Methods: Geoprobe

Weather: Sunny 40s

Performed By: SJG Date: 11/4/20

Checked By: ZFK Date: 12/16/20

Sea Street Pump Station Force Main No. 3

SEE SITE PLAN

Boring Locus Map

Boring No.: **B-73**

Location: See Plan

Approx. Ground Elevation:

Approx. Groundwater Elevation:

Date/Time of GW EL.

Datum: NAVD88

Project No. 360-2001

Depth (feet)	*Sample No.*	*Blows per 6-inch*	*SPT Value*	*Pen./ Rec.*	*Soil Description*		*Stratum Change Depth (feet)*	*Note No.*
1 2 3 4 5	S1			60"/45"	3" Asphalt 7" Fill 35" Brown to tan, poorly graded SAND with trace gravel, dry			
6 7 8 9 10	S2			60"/35"	Tan, poorly graded SAND with trace gravel, dry			
11 12 13 14 15	S3			60"/32"	Tan, poorly graded SAND, with trace gravel, dry			
16 17 18 19 20								

NOTES:

GW not observed

LEGEND

S - Split Spoon Sample	O/A - Sample Collected Off the Augers
UT - Undisturbed Tube Sample	
Trace - Approximately 0 to 10%	Some - Approximately 20 to 35%
Little - Approximately 10 to 20%	And - Approximately 35 to 50%
0-4 Coarse Soil N Value - Very Loose	11-30 Coarse Soil N Value - Medium Dense
5-10 Coarse Soil N Value - Loose	31-50 Coarse Soil N Value - Dense
0-2 Fine Soil N Value - Very Soft	4-8 Fine Soil N Value - Medium Stiff
2-4 Fine Soil N Value - Soft	8-15 Fine Soil N Value - Stiff

BORING LOG

Project: Sea Street Pump Station Force Main No. 3

Location: Nantucket, MA
Client: Town of Nantucket
Driller: Crawford Drilling Services
Drilling Methods: Geoprobe

Weather: Sunny 40s
Performed By: SJG Date: 11/4/20
Checked By: ZFK Date: 12/16/20

Sea Street Pump Station Force Main No. 3

SEE SITE PLAN

Boring Locus Map

Boring No.: **B-74**
Location: See Plan
Approx. Ground Elevation:

Approx. Groundwater Elevation:
Date/Time of GW EL.
Datum: NAVD88
Project No. 360-2001

Depth (feet)	*Sample No.*	*Blows per 6-inch*	*SPT Value*	*Pen./ Rec.*	*Soil Description*		*Stratum Change Depth (feet)*	*Note No.*
1 2 3 4 5	S1			60"/44"	5" Asphalt 39" Brown, poorly graded SAND with trace silt and gravel, dry			
6 7 8 9 10	S2			60"/30"	"As above" with several small cobble fragments			
11 12 13 14 15	S3			60"/41"	"As above"			
16 17 18 19 20								

NOTES:

GW not encountered

LEGEND

S - Split Spoon Sample	O/A - Sample Collected Off the Augers
UT - Undisturbed Tube Sample	
Trace - Approximately 0 to 10%	Some - Approximately 20 to 35%
Little - Approximately 10 to 20%	And - Approximately 35 to 50%
0-4 Coarse Soil N Value - Very Loose	11-30 Coarse Soil N Value - Medium Dense
5-10 Coarse Soil N Value - Loose	31-50 Coarse Soil N Value - Dense
0-2 Fine Soil N Value - Very Soft	4-8 Fine Soil N Value - Medium Stiff
2-4 Fine Soil N Value - Soft	8-15 Fine Soil N Value - Stiff

BORING LOG

Project: Sea Street Pump Station Force Main No. 3

Location: Nantucket, MA

Client: Town of Nantucket

Driller: Crawford Drilling Services

Drilling Methods: Geoprobe

Weather: Sunny 40s

Performed By: SJG Date: 11/4/20

Checked By: ZFK Date: 12/16/20

Sea Street Pump Station Force Main No. 3

SEE SITE PLAN

Boring Locus Map

Boring No.: **B-75**

Location: See Plan

Approx. Ground Elevation:

Approx. Groundwater Elevation:

Date/Time of GW EL.

Datum: NAVD88

Project No. 360-2001

Depth (feet)	*Sample No.*	*Blows per 6-inch*	*SPT Value*	*Pen./ Rec.*	*Soil Description*		*Stratum Change Depth (feet)*	*Note No.*
1 2 3 4 5	S1			60"/43"	2" Asphalt 3" Fill 22" Brown, fine to med SAND with trace silt and gravel, dry 11" tan, poorly graded SAND, dry 8" Brown, silty SAND, dry			
6 7 8 9 10	S2			60"/34"	15" tan, poorly graded SAND with trace gravel, dry 2" Dark brown silty SAND, dry 4" Tan, poorly graded SAND, dry 13" Dark brown silty SAND, dry			
11 12 13 14 15	S3			60"/45"	Tan, poorly graded SAND with trace gravel, dry			
16 17 18 19 20								

NOTES:

LEGEND

S - Split Spoon Sample	O/A - Sample Collected Off the Augers
UT - Undisturbed Tube Sample	
Trace - Approximately 0 to 10%	Some - Approximately 20 to 35%
Little - Approximately 10 to 20%	And - Approximately 35 to 50%
0-4 Coarse Soil N Value - Very Loose	11-30 Coarse Soil N Value - Medium Dense
5-10 Coarse Soil N Value - Loose	31-50 Coarse Soil N Value - Dense
0-2 Fine Soil N Value - Very Soft	4-8 Fine Soil N Value - Medium Stiff
2-4 Fine Soil N Value - Soft	8-15 Fine Soil N Value - Stiff

BORING LOG

Project: Sea Street Pump Station Force Main No. 3

Location: Nantucket, MA

Client: Town of Nantucket

Driller: Crawford Drilling Services

Drilling Methods: Geoprobe

Weather: Sunny 40s

Performed By: SJG Date: 11/4/20

Checked By: ZFK Date: 12/16/20

Sea Street Pump Station Force Main No. 3

SEE SITE PLAN

Boring Locus Map

Boring No.: **B-76**

Location: See Plan

Approx. Ground Elevation:

Approx. Groundwater Elevation:

Date/Time of GW EL.

Datum: NAVD88

Project No. 360-2001

Depth (feet)	*Sample No.*	*Blows per 6-inch*	*SPT Value*	*Pen./ Rec.*	*Soil Description*		*Stratum Change Depth (feet)*	*Note No.*
1 2 3 4 5	S1			60"/42"	2" Asphalt 3" Fill 37" Brown, silty SAND, dry			
6 7 8 9 10	S2			60"/40"	7" Brown, poorly graded SAND, dry 20" Tan, poorly graded SAND with trace gravel, dry 4" Asphalt?? @ 7' 9" Brown, poorly graded SAND, dry	SP		
11 12 13 14 15	S3			60"/31"	Dark brown, poorly graded silty SAND, dry			
16 17 18 19 20								

NOTES:

LEGEND

S - Split Spoon Sample O/A - Sample Collected Off the Augers

UT - Undisturbed Tube Sample

Trace - Approximately 0 to 10% Some - Approximately 20 to 35%

Little - Approximately 10 to 20% And - Approximately 35 to 50%

0-4 Coarse Soil N Value - Very Loose 11-30 Coarse Soil N Value - Medium Dense

5-10 Coarse Soil N Value - Loose 31-50 Coarse Soil N Value - Dense

0-2 Fine Soil N Value - Very Soft 4-8 Fine Soil N Value - Medium Stiff

2-4 Fine Soil N Value - Soft 8-15 Fine Soil N Value - Stiff

BORING LOG

Project: Sea Street Pump Station Force Main No. 3

Location: Nantucket, MA

Client: Town of Nantucket

Driller: Crawford Drilling Services

Drilling Methods: Geoprobe

Weather: Sunny 60s

Performed By: SJG Date: 11/5/20

Checked By: ZFK Date: 12/16/20

Sea Street Pump Station Force Main No. 3

SEE SITE PLAN

Boring Locus Map

Boring No.: **B-77**

Location: See Plan

Approx. Ground Elevation:

Approx. Groundwater Elevation:

Date/Time of GW EL.

Datum: NAVD88

Project No. 360-2001

Depth (feet)	*Sample No.*	*Blows per 6-inch*	*SPT Value*	*Pen./ Rec.*	*Soil Description*		*Stratum Change Depth (feet)*	*Note No.*
1 2 3 4 5	S1			60"/39"	4" Asphalt 11" Brown, silty SAND, dry 4" Old asphalt layer 11" Brown, silty SAND, with trace gravel, dry 9" Tan, fine to med SAND with trace gravel, dry			
6 7 8 9 10	S2			60"/33"	6" Tan, fine to med SAND, dry 9" Brown, silty SAND, dry 18" Brown, poorly graded SAND, dry			
11 12 13 14 15	S3			60"/35"	Brown, fine to med SAND with trace silt, dry			
16 17 18 19 20								

NOTES:

Old asphalt layer approx 1.5' below grade

GW not observed

LEGEND

S - Split Spoon Sample	O/A - Sample Collected Off the Augers
UT - Undisturbed Tube Sample	
Trace - Approximately 0 to 10%	Some - Approximately 20 to 35%
Little - Approximately 10 to 20%	And - Approximately 35 to 50%
0-4 Coarse Soil N Value - Very Loose	11-30 Coarse Soil N Value - Medium Dense
5-10 Coarse Soil N Value - Loose	31-50 Coarse Soil N Value - Dense
0-2 Fine Soil N Value - Very Soft	4-8 Fine Soil N Value - Medium Stiff
2-4 Fine Soil N Value - Soft	8-15 Fine Soil N Value - Stiff

BORING LOG

Project: Sea Street Pump Station Force Main No. 3

Location: Nantucket, MA

Client: Town of Nantucket

Driller: Crawford Drilling Services

Drilling Methods: Geoprobe

Weather: Sunny 60s

Performed By: SJG Date: 11/5/20

Checked By: ZFK Date: 12/16/20

Sea Street Pump Station Force Main No. 3

SEE SITE PLAN

Boring Locus Map

Boring No.: **B-78**

Location: See Plan

Approx. Ground Elevation:

Approx. Groundwater Elevation:

Date/Time of GW EL.

Datum: NAVD88

Project No. 360-2001

Depth (feet)	*Sample No.*	*Blows per 6-inch*	*SPT Value*	*Pen./ Rec.*	*Soil Description*		*Stratum Change Depth (feet)*	*Note No.*
1 2 3 4 5	S1			60"/50"	5" Asphalt 3" Fill 24" Brown, silty SAND, dry 18" Brown, silty SAND with trace gravel, dry			
6 7 8 9 10	S2			60"/30"	Tan, poorly graded SAND with trace gravel, dry			
11 12 13 14 15	S3			60"/45"	Tan, poorly graded SAND with trace gravel, dry			
16 17 18 19 20								

NOTES:

GW not observed

LEGEND

S - Split Spoon Sample	O/A - Sample Collected Off the Augers
UT - Undisturbed Tube Sample	
Trace - Approximately 0 to 10%	Some - Approximately 20 to 35%
Little - Approximately 10 to 20%	And - Approximately 35 to 50%
0-4 Coarse Soil N Value - Very Loose	11-30 Coarse Soil N Value - Medium Dense
5-10 Coarse Soil N Value - Loose	31-50 Coarse Soil N Value - Dense
0-2 Fine Soil N Value - Very Soft	4-8 Fine Soil N Value - Medium Stiff
2-4 Fine Soil N Value - Soft	8-15 Fine Soil N Value - Stiff

BORING LOG

Project: Sea Street Pump Station Force Main No. 3

Location: Nantucket, MA

Client: Town of Nantucket

Driller: Crawford Drilling Services

Drilling Methods: Geoprobe

Weather: Sunny 60s

Performed By: SJG Date: 11/5/20

Checked By: ZFK Date: 12/16/20

Sea Street Pump Station Force Main No. 3

SEE SITE PLAN

Boring Locus Map

Boring No.: **B-79**

Location: See Plan

Approx. Ground Elevation:

Approx. Groundwater Elevation:

Date/Time of GW EL.

Datum: NAVD88

Project No. 360-2001

Depth (feet)	*Sample No.*	*Blows per 6-inch*	*SPT Value*	*Pen./ Rec.*	*Soil Description*		*Stratum Change Depth (feet)*	*Note No.*
1 2 3 4 5	S1			60"/41"	4" Asphalt 2" Fill 10" Brown, silty SAND, dry 8" Tan, fine to med SAND, dry 4" Brown, silty SAND, dry 12" tan, fine to med SAND with trace gravel, dry			
6 7 8 9 10	S2			60"/50"	Tan, poorly graded SAND with trace gravel, dry	SP		
11 12 13 14 15	S3			60"/42"	Tan, poorly graded SAND with trace gravel, dry			
16 17 18 19 20								

NOTES:

LEGEND

S - Split Spoon Sample	O/A - Sample Collected Off the Augers
UT - Undisturbed Tube Sample	
Trace - Approximately 0 to 10%	Some - Approximately 20 to 35%
Little - Approximately 10 to 20%	And - Approximately 35 to 50%
0-4 Coarse Soil N Value - Very Loose	11-30 Coarse Soil N Value - Medium Dense
5-10 Coarse Soil N Value - Loose	31-50 Coarse Soil N Value - Dense
0-2 Fine Soil N Value - Very Soft	4-8 Fine Soil N Value - Medium Stiff
2-4 Fine Soil N Value - Soft	8-15 Fine Soil N Value - Stiff

BORING LOG

Project: Sea Street Pump Station Force Main No. 3

Location: Nantucket, MA

Client: Town of Nantucket

Driller: Crawford Drilling Services

Drilling Methods: Geoprobe

Weather: Sunny 60

Performed By: SJG Date: 11/5/20

Checked By: ZFK Date: 12/16/20

Sea Street Pump Station Force Main No. 3

SEE SITE PLAN

Boring Locus Map

Boring No.: **B-80**

Location: See Plan

Approx. Ground Elevation:

Approx. Groundwater Elevation:

Date/Time of GW EL.

Datum: NAVD88

Project No. 360-2001

Depth (feet)	*Sample No.*	*Blows per 6-inch*	*SPT Value*	*Pen./ Rec.*	*Soil Description*		*Stratum Change Depth (feet)*	*Note No.*
1 2 3 4 5	S1			60"/37"	6" Asphalt 31" Brown, poorly graded SAND with trace silt and gravel, dry Telephone line clipped in boring, notified utility @ 1150			
6 7 8 9 10	S2			60"/45"	35" Tan, fine to med SAND with trace gravel, dry 10" Brown, poorly graded SAND with trace gravel			
11 12 13 14 15	S3			60"/44"	Tan, poorly graded SAND with trace gravel, dry			
16 17 18 19 20								

NOTES:

GW not observed

LEGEND

S - Split Spoon Sample	O/A - Sample Collected Off the Augers
UT - Undisturbed Tube Sample	
Trace - Approximately 0 to 10%	Some - Approximately 20 to 35%
Little - Approximately 10 to 20%	And - Approximately 35 to 50%
0-4 Coarse Soil N Value - Very Loose	11-30 Coarse Soil N Value - Medium Dense
5-10 Coarse Soil N Value - Loose	31-50 Coarse Soil N Value - Dense
0-2 Fine Soil N Value - Very Soft	4-8 Fine Soil N Value - Medium Stiff
2-4 Fine Soil N Value - Soft	8-15 Fine Soil N Value - Stiff

BORING LOG

Project: Sea Street Pump Station Force Main No. 3

Location: Nantucket, MA

Client: Town of Nantucket

Driller: Crawford Drilling Services

Drilling Methods: Geoprobe

Weather: Sunny 60

Performed By: SJG Date: 11/5/20

Checked By: ZFK Date: 12/16/20

Sea Street Pump Station Force Main No. 3

SEE SITE PLAN

Boring Locus Map

Boring No.: **B-81**

Location: See Plan

Approx. Ground Elevation:

Approx. Groundwater Elevation:

Date/Time of GW EL.

Datum: NAVD88

Project No. 360-2001

Depth (feet)	*Sample No.*	*Blows per 6-inch*	*SPT Value*	*Pen./ Rec.*	*Soil Description*		*Stratum Change Depth (feet)*	*Note No.*
1 2 3 4 5	S1			60"/46"	6" Asphalt 40" Brown, poorly graded SAND with trace gravel, dry			
6 7 8 9 10	S2			60"/48"	Brown, poorly graded SAND with trace gravel, dry			
11 12 13 14 15	S3			60"/38"	Tan, poorly graded SAND with trace gravel, dry			
16 17 18 19 20								

NOTES:

GW not observed

LEGEND

S - Split Spoon Sample	O/A - Sample Collected Off the Augers
UT - Undisturbed Tube Sample	
Trace - Approximately 0 to 10%	Some - Approximately 20 to 35%
Little - Approximately 10 to 20%	And - Approximately 35 to 50%
0-4 Coarse Soil N Value - Very Loose	11-30 Coarse Soil N Value - Medium Dense
5-10 Coarse Soil N Value - Loose	31-50 Coarse Soil N Value - Dense
0-2 Fine Soil N Value - Very Soft	4-8 Fine Soil N Value - Medium Stiff
2-4 Fine Soil N Value - Soft	8-15 Fine Soil N Value - Stiff

BORING LOG

Project: Sea Street Pump Station Force Main No. 3

Location: Nantucket, MA

Client: Town of Nantucket

Driller: Crawford Drilling Services

Drilling Methods: Geoprobe

Weather: Sunny 60s

Performed By: SJG Date: 11/5/20

Checked By: ZFK Date: 12/16/20

Sea Street Pump Station Force Main No. 3

SEE SITE PLAN

Boring Locus Map

Boring No.: **B-82**

Location: See Plan

Approx. Ground Elevation:

Approx. Groundwater Elevation:

Date/Time of GW EL.

Datum: NAVD88

Project No. 360-2001

Depth (feet)	*Sample No.*	*Blows per 6-inch*	*SPT Value*	*Pen./ Rec.*	*Soil Description*		*Stratum Change Depth (feet)*	*Note No.*
1 2 3 4 5	S1			60"/46"	6" Asphalt 4" fill (Brown, silty SAND) 36" Tan to brown, fine to med SAND with trace silt and gravel, dry			
6 7 8 9 10	S2			60"/45"	Tan, poorly graded SAND, dry	SP		
11 12 13 14 15	S3			60"/40"	Tan, poorly graded SAND with trace gravel, dry			
16 17 18 19 20								

NOTES:

GW not observed

LEGEND

S - Split Spoon Sample O/A - Sample Collected Off the Augers

UT - Undisturbed Tube Sample

Trace - Approximately 0 to 10% Some - Approximately 20 to 35%

Little - Approximately 10 to 20% And - Approximately 35 to 50%

0-4 Coarse Soil N Value - Very Loose 11-30 Coarse Soil N Value - Medium Dense

5-10 Coarse Soil N Value - Loose 31-50 Coarse Soil N Value - Dense

0-2 Fine Soil N Value - Very Soft 4-8 Fine Soil N Value - Medium Stiff

2-4 Fine Soil N Value - Soft 8-15 Fine Soil N Value - Stiff

BORING LOG

Project: Sea Street Pump Station Force Main No. 3

Location: Nantucket, MA

Client: Town of Nantucket

Driller: Crawford Drilling Services

Drilling Methods: Geoprobe

Weather: Sunny 60

Performed By: SJG Date: 11/5/20

Checked By: ZFK Date: 12/16/20

Sea Street Pump Station Force Main No. 3

SEE SITE PLAN

Boring Locus Map

Boring No.: **B-83**

Location: See Plan

Approx. Ground Elevation:

Approx. Groundwater Elevation:

Date/Time of GW EL.

Datum: NAVD88

Project No. 360-2001

Depth (feet)	*Sample No.*	*Blows per 6-inch*	*SPT Value*	*Pen./ Rec.*	*Soil Description*		*Stratum Change Depth (feet)*	*Note No.*
1 2 3 4 5	S1			60"/52"	6" Asphalt 46" Brown, fine to med SAND with trace SILT and gravel, dry			
6 7 8 9 10	S2			60"/53"	Brown to tan, poorly graded SAND with trace gravel, dry			
11 12 13 14 15	S3			60"/40"	Tan, poorly graded SAND with trace gravel, dry			
16 17 18 19 20								

NOTES:

GW not observed

LEGEND

S - Split Spoon Sample	O/A - Sample Collected Off the Augers
UT - Undisturbed Tube Sample	
Trace - Approximately 0 to 10%	Some - Approximately 20 to 35%
Little - Approximately 10 to 20%	And - Approximately 35 to 50%
0-4 Coarse Soil N Value - Very Loose	11-30 Coarse Soil N Value - Medium Dense
5-10 Coarse Soil N Value - Loose	31-50 Coarse Soil N Value - Dense
0-2 Fine Soil N Value - Very Soft	4-8 Fine Soil N Value - Medium Stiff
2-4 Fine Soil N Value - Soft	8-15 Fine Soil N Value - Stiff

BORING LOG

Project: Sea Street Pump Station Force Main No. 3

Location: Nantucket, MA

Client: Town of Nantucket

Driller: Crawford Drilling Services

Drilling Methods: Geoprobe

Weather: Sunny 60s

Performed By: SJG Date: 11/5/20

Checked By: ZFK Date: 12/16/20

Sea Street Pump Station Force Main No. 3

SEE SITE PLAN

Boring Locus Map

Boring No.: **B-84**

Location: See Plan

Approx. Ground Elevation:

Approx. Groundwater Elevation:

Date/Time of GW EL.

Datum: NAVD88

Project No. 360-2001

Depth (feet)	*Sample No.*	*Blows per 6-inch*	*SPT Value*	*Pen./ Rec.*	*Soil Description*		*Stratum Change Depth (feet)*	*Note No.*
1 2 3 4 5	S1			60"/46"	2" Asphalt 4" Fill 3" Brown silty SAND, dry 10" Tan fine to med SAND, with trace gravel, dry 27" Brown, silty SAND, dry			
6 7 8 9 10	S2			60"/49"	39" Brown, poorly graded SAND, dry 10" Brown poorly graded SAND	SP		
11 12 13 14 15	S3			60"/46"	Tan, poorly graded SAND, dry			
16 17 18 19 20								

NOTES:

GW not observed

LEGEND

S - Split Spoon Sample	O/A - Sample Collected Off the Augers
UT - Undisturbed Tube Sample	
Trace - Approximately 0 to 10%	Some - Approximately 20 to 35%
Little - Approximately 10 to 20%	And - Approximately 35 to 50%
0-4 Coarse Soil N Value - Very Loose	11-30 Coarse Soil N Value - Medium Dense
5-10 Coarse Soil N Value - Loose	31-50 Coarse Soil N Value - Dense
0-2 Fine Soil N Value - Very Soft	4-8 Fine Soil N Value - Medium Stiff
2-4 Fine Soil N Value - Soft	8-15 Fine Soil N Value - Stiff

BORING LOG

Project: Sea Street Pump Station Force Main No. 3

Location: Nantucket, MA

Client: Town of Nantucket

Driller: Crawford Drilling Services

Drilling Methods: Geoprobe

Weather: Sunny 40s

Performed By: SJG Date: 11/5/20

Checked By: ZFK Date: 12/16/20

Sea Street Pump Station Force Main No. 3

SEE SITE PLAN

Boring Locus Map

Boring No.: **B-85**

Location: See Plan

Approx. Ground Elevation:

Approx. Groundwater Elevation:

Date/Time of GW EL.

Datum: NAVD88

Project No. 360-2001

Depth (feet)	*Sample No.*	*Blows per 6-inch*	*SPT Value*	*Pen./ Rec.*	*Soil Description*		*Stratum Change Depth (feet)*	*Note No.*
1 2 3 4 5	S1			60"/45"	5" Asphalt 12" Brown silty SAND, dry 3" Old asphalt layer 25" Brown, silty SAND with trace gravel, dry			
6 7 8 9 10	S2			60"/44"	Brown, poorly graded SAND with trace silt and gravel, dry			
11 12 13 14 15	S3			60"/43"	Brown to tan poorly graded SAND with trace gravel			
16 17 18 19 20								

NOTES:

GW not observed

LEGEND

S - Split Spoon Sample	O/A - Sample Collected Off the Augers
UT - Undisturbed Tube Sample	
Trace - Approximately 0 to 10%	Some - Approximately 20 to 35%
Little - Approximately 10 to 20%	And - Approximately 35 to 50%
0-4 Coarse Soil N Value - Very Loose	11-30 Coarse Soil N Value - Medium Dense
5-10 Coarse Soil N Value - Loose	31-50 Coarse Soil N Value - Dense
0-2 Fine Soil N Value - Very Soft	4-8 Fine Soil N Value - Medium Stiff
2-4 Fine Soil N Value - Soft	8-15 Fine Soil N Value - Stiff

BORING LOG

Project: Sea Street Pump Station Force Main No. 3

Location: Nantucket, MA

Client: Town of Nantucket

Driller: Crawford Drilling Services

Drilling Methods: Geoprobe

Weather: Sunny 60s

Performed By: SJG Date: 11/5/20

Checked By: ZFK Date: 12/16/20

Sea Street Pump Station Force Main No. 3

SEE SITE PLAN

Boring Locus Map

Boring No.: **B-86**

Location: See Plan

Approx. Ground Elevation:

Approx. Groundwater Elevation:

Date/Time of GW EL.

Datum: NAVD88

Project No. 360-2001

Depth (feet)	*Sample No.*	*Blows per 6-inch*	*SPT Value*	*Pen./ Rec.*	*Soil Description*		*Stratum Change Depth (feet)*	*Note No.*
1 2 3 4 5	S1			60"/44"	2" Asphalt 3" fill 10" Brown, silty SAND, dry 29" Brown, poorly graded SAND with trace gravel			
6 7 8 9 10	S2			60"/40"	Brown, poorly graded SAND with silt, dry	SP-SM		
11 12 13 14 15	S3			60"/44"	Brown to tan poorly graded SAND with trace gravel, dry			
16 17 18 19 20								

NOTES:

GW not observed

LEGEND

S - Split Spoon Sample	O/A - Sample Collected Off the Augers
UT - Undisturbed Tube Sample	
Trace - Approximately 0 to 10%	Some - Approximately 20 to 35%
Little - Approximately 10 to 20%	And - Approximately 35 to 50%
0-4 Coarse Soil N Value - Very Loose	11-30 Coarse Soil N Value - Medium Dense
5-10 Coarse Soil N Value - Loose	31-50 Coarse Soil N Value - Dense
0-2 Fine Soil N Value - Very Soft	4-8 Fine Soil N Value - Medium Stiff
2-4 Fine Soil N Value - Soft	8-15 Fine Soil N Value - Stiff

BORING LOG

Project: Sea Street Pump Station Force Main No. 3

Location: Nantucket, MA

Client: Town of Nantucket

Driller: Crawford Drilling Services

Drilling Methods: Geoprobe

Weather: Sunny 60

Performed By: SJG Date: 11/5/20

Checked By: ZFK Date: 12/16/20

Sea Street Pump Station Force Main No. 3

SEE SITE PLAN

Boring Locus Map

Boring No.: **B-87**

Location: See Plan

Approx. Ground Elevation:

Approx. Groundwater Elevation:

Date/Time of GW EL.

Datum: NAVD88

Project No. 360-2001

Depth (feet)	*Sample No.*	*Blows per 6-inch*	*SPT Value*	*Pen./ Rec.*	*Soil Description*		*Stratum Change Depth (feet)*	*Note No.*
1 2 3 4 5	S1			60"/46"	3" Asphalt 3" Second asphalt layer 10" Brown, silty SAND, dry 22" Brown, fine to med SAND with trace gravel, dry 8" Brown, silty SAND, dry			
6 7 8 9 10	S2			60"/47"	7" Brown, silty SAND with trace gravel, dry 31" Tan, poorly graded SAND with trace gravel, dry 9" Brown, silty SAND, dry			
11 12 13 14 15	S3			60"/44"	Tan, poorly graded SAND with trace gravel, dry			
16 17 18 19 20								

NOTES:

GW not observed

LEGEND

S - Split Spoon Sample	O/A - Sample Collected Off the Augers
UT - Undisturbed Tube Sample	
Trace - Approximately 0 to 10%	Some - Approximately 20 to 35%
Little - Approximately 10 to 20%	And - Approximately 35 to 50%
0-4 Coarse Soil N Value - Very Loose	11-30 Coarse Soil N Value - Medium Dense
5-10 Coarse Soil N Value - Loose	31-50 Coarse Soil N Value - Dense
0-2 Fine Soil N Value - Very Soft	4-8 Fine Soil N Value - Medium Stiff
2-4 Fine Soil N Value - Soft	8-15 Fine Soil N Value - Stiff

BORING LOG

Project: Sea Street Pump Station Force Main No. 3

Location: Nantucket, MA

Client: Town of Nantucket

Driller: Crawford Drilling Services

Drilling Methods: Geoprobe

Weather: Sunny 60s

Performed By: SJG Date: 11/6/20

Checked By: ZFK Date: 12/16/20

Sea Street Pump Station Force Main No. 3

SEE SITE PLAN

Boring Locus Map

Boring No.: **B-88**

Location: See Plan

Approx. Ground Elevation:

Approx. Groundwater Elevation:

Date/Time of GW EL.

Datum: NAVD88

Project No. 360-2001

Depth (feet)	*Sample No.*	*Blows per 6-inch*	*SPT Value*	*Pen./ Rec.*	*Soil Description*		*Stratum Change Depth (feet)*	*Note No.*
1 2 3 4 5	S1			60"/49"	5" Asphalt 44" Dark brown to light brown silty SAND, dry			
6 7 8 9 10	S2			60"/46"	Brown, sandy SILT, wet	ML		
11 12 13 14 15	S3			60"/44"	Tan, poorly graded SAND with trace gravel, dry			
16 17 18 19 20								

NOTES:

GW not observed

LEGEND

S - Split Spoon Sample O/A - Sample Collected Off the Augers

UT - Undisturbed Tube Sample

Trace - Approximately 0 to 10% Some - Approximately 20 to 35%

Little - Approximately 10 to 20% And - Approximately 35 to 50%

0-4 Coarse Soil N Value - Very Loose 11-30 Coarse Soil N Value - Medium Dense

5-10 Coarse Soil N Value - Loose 31-50 Coarse Soil N Value - Dense

0-2 Fine Soil N Value - Very Soft 4-8 Fine Soil N Value - Medium Stiff

2-4 Fine Soil N Value - Soft 8-15 Fine Soil N Value - Stiff

BORING LOG

Project: Sea Street Pump Station Force Main No. 3

Location: Nantucket, MA

Client: Town of Nantucket

Driller: Crawford Drilling Services

Drilling Methods: Geoprobe

Weather: Sunny 60

Performed By: SJG Date: 11/6/20

Checked By: ZFK Date: 12/16/20

Sea Street Pump Station Force Main No. 3

SEE SITE PLAN

Boring Locus Map

Boring No.: **B-89**

Location: See Plan

Approx. Ground Elevation:

Approx. Groundwater Elevation:

Date/Time of GW EL.

Datum: NAVD88

Project No. 360-2001

Depth (feet)	*Sample No.*	*Blows per 6-inch*	*SPT Value*	*Pen./ Rec.*	*Soil Description*		*Stratum Change Depth (feet)*	*Note No.*
1 2 3 4 5	S1			60"/48"	6" Asphalt 14" Brown, silty SAND, dry 28" Tan to brown, poorly graded SAND with trace silt and gravel, dry			
6 7 8 9 10	S2			60"/47"	Brown, poorly graded SAND with trace gravel, dry			
11 12 13 14 15	S3			60"/43"	Tan, poorly graded SAND with trace gravel, dry			
16 17 18 19 20								

NOTES:

GW not observed

LEGEND

S - Split Spoon Sample	O/A - Sample Collected Off the Augers
UT - Undisturbed Tube Sample	
Trace - Approximately 0 to 10%	Some - Approximately 20 to 35%
Little - Approximately 10 to 20%	And - Approximately 35 to 50%
0-4 Coarse Soil N Value - Very Loose	11-30 Coarse Soil N Value - Medium Dense
5-10 Coarse Soil N Value - Loose	31-50 Coarse Soil N Value - Dense
0-2 Fine Soil N Value - Very Soft	4-8 Fine Soil N Value - Medium Stiff
2-4 Fine Soil N Value - Soft	8-15 Fine Soil N Value - Stiff

BORING LOG

Project: Sea Street Pump Station Force Main No. 3

Location: Nantucket, MA

Client: Town of Nantucket

Driller: Crawford Drilling Services

Drilling Methods: Geoprobe

Weather: Sunny 60

Performed By: SJG Date: 11/6/20

Checked By: ZFK Date: 12/16/20

Sea Street Pump Station Force Main No. 3

SEE SITE PLAN

Boring Locus Map

Boring No.: **B-90**

Location: See Plan

Approx. Ground Elevation:

Approx. Groundwater Elevation:

Date/Time of GW EL.

Datum: NAVD88

Project No. 360-2001

Depth (feet)	*Sample No.*	*Blows per 6-inch*	*SPT Value*	*Pen./ Rec.*	*Soil Description*		*Stratum Change Depth (feet)*	*Note No.*
1 2 3 4 5	S1			60"/49"	6" Asphalt 14" Brown, silty SAND, dry 29" Tan, poorly graded SAND with trace gravel, dry			
6 7 8 9 10	S2			60"/53"	Tan, poorly graded SAND, dry	SP		
11 12 13 14 15	S3			60"/36"	Tan, poorly graded SAND with trace gravel, dry			
16 17 18 19 20								

NOTES:

GW not observed

LEGEND

S - Split Spoon Sample	O/A - Sample Collected Off the Augers
UT - Undisturbed Tube Sample	
Trace - Approximately 0 to 10%	Some - Approximately 20 to 35%
Little - Approximately 10 to 20%	And - Approximately 35 to 50%
0-4 Coarse Soil N Value - Very Loose	11-30 Coarse Soil N Value - Medium Dense
5-10 Coarse Soil N Value - Loose	31-50 Coarse Soil N Value - Dense
0-2 Fine Soil N Value - Very Soft	4-8 Fine Soil N Value - Medium Stiff
2-4 Fine Soil N Value - Soft	8-15 Fine Soil N Value - Stiff

BORING LOG

Project: Sea Street Pump Station Force Main No. 3

Location: Nantucket, MA

Client: Town of Nantucket

Driller: Crawford Drilling Services

Drilling Methods: Geoprobe

Weather: Sunny 60s

Performed By: SJG Date: 11/6/20

Checked By: ZFK Date: 12/16/20

Sea Street Pump Station Force Main No. 3

SEE SITE PLAN

Boring Locus Map

Boring No.: **B-91**

Location: See Plan

Approx. Ground Elevation:

Approx. Groundwater Elevation:

Date/Time of GW EL.

Datum: NAVD88

Project No. 360-2001

Depth (feet)	*Sample No.*	*Blows per 6-inch*	*SPT Value*	*Pen./ Rec.*	*Soil Description*		*Stratum Change Depth (feet)*	*Note No.*
1 2 3 4 5	S1			60"/46"	5" Asphalt 41" Brown, poorly graded SAND, trace silt, dry			
6 7 8 9 10	S2			60"/46"	Tan poorly graded SAND with trace gravel, dry			
11 12 13 14 15	S3			60"/38"	Tan, poorly graded SAND with trace gravel, dry			
16 17 18 19 20								

NOTES:

LEGEND

S - Split Spoon Sample	O/A - Sample Collected Off the Augers
UT - Undisturbed Tube Sample	
Trace - Approximately 0 to 10%	Some - Approximately 20 to 35%
Little - Approximately 10 to 20%	And - Approximately 35 to 50%
0-4 Coarse Soil N Value - Very Loose	11-30 Coarse Soil N Value - Medium Dense
5-10 Coarse Soil N Value - Loose	31-50 Coarse Soil N Value - Dense
0-2 Fine Soil N Value - Very Soft	4-8 Fine Soil N Value - Medium Stiff
2-4 Fine Soil N Value - Soft	8-15 Fine Soil N Value - Stiff

BORING LOG

Project: Sea Street Pump Station Force Main No. 3

Location: Nantucket, MA

Client: Town of Nantucket

Driller: Crawford Drilling Services

Drilling Methods: Geoprobe

Weather: Sunny 60s

Performed By: SJG Date: 11/6/20

Checked By: ZFK Date: 12/16/20

Sea Street Pump Station Force Main No. 3

SEE SITE PLAN

Boring Locus Map

Boring No.: **B-92**

Location: See Plan

Approx. Ground Elevation:

Approx. Groundwater Elevation:

Date/Time of GW EL.

Datum: NAVD88

Project No. 360-2001

Depth (feet)	*Sample No.*	*Blows per 6-inch*	*SPT Value*	*Pen./ Rec.*	*Soil Description*		*Stratum Change Depth (feet)*	*Note No.*
1 2 3 4 5	S1			60"/48"	6" Asphalt 8" Brown, silty SAND, dry 28" Tan, fine to med SAND with trace gravel, dry 6" Brown, silty SAND, dry			
6 7 8 9 10	S2			60"/50"	42" Brown/orange poorly graded SAND with silt 8" Brown, poorly graded SAND with silt, dry	SP-SM		
11 12 13 14 15	S3			60"/40"	Tan, poorly graded SAND with trace gravel, dry			
16 17 18 19 20								

NOTES:

LEGEND

S - Split Spoon Sample	O/A - Sample Collected Off the Augers
UT - Undisturbed Tube Sample	
Trace - Approximately 0 to 10%	Some - Approximately 20 to 35%
Little - Approximately 10 to 20%	And - Approximately 35 to 50%
0-4 Coarse Soil N Value - Very Loose	11-30 Coarse Soil N Value - Medium Dense
5-10 Coarse Soil N Value - Loose	31-50 Coarse Soil N Value - Dense
0-2 Fine Soil N Value - Very Soft	4-8 Fine Soil N Value - Medium Stiff
2-4 Fine Soil N Value - Soft	8-15 Fine Soil N Value - Stiff

BORING LOG

Project: Sea Street Pump Station Force Main No. 3

Location: Nantucket, MA

Client: Town of Nantucket

Driller: Crawford Drilling Services

Drilling Methods: Geoprobe

Weather: Sunny 60

Performed By: SJG Date: 11/6/20

Checked By: ZFK Date: 12/16/20

Sea Street Pump Station Force Main No. 3

SEE SITE PLAN

Boring Locus Map

Boring No.: **B-93**

Location: See Plan

Approx. Ground Elevation:

Approx. Groundwater Elevation:

Date/Time of GW EL.

Datum: NAVD88

Project No. 360-2001

Depth (feet)	*Sample No.*	*Blows per 6-inch*	*SPT Value*	*Pen./ Rec.*	*Soil Description*		*Stratum Change Depth (feet)*	*Note No.*
1 2 3 4 5	S1			60"/46"	6" Asphalt 14" Brown, silty SAND, dry 26" Brown to tan, fine to med SAND with trace gravel, dry			
6 7 8 9 10	S2			60"/50"	Tan, poorly graded SAND with trace silt and gravel, dry			
11 12 13 14 15	S3			60"/35"	Tan, poorly graded SAND with trace gravel, dry			
16 17 18 19 20								

NOTES:

LEGEND

S - Split Spoon Sample	O/A - Sample Collected Off the Augers
UT - Undisturbed Tube Sample	
Trace - Approximately 0 to 10%	Some - Approximately 20 to 35%
Little - Approximately 10 to 20%	And - Approximately 35 to 50%
0-4 Coarse Soil N Value - Very Loose	11-30 Coarse Soil N Value - Medium Dense
5-10 Coarse Soil N Value - Loose	31-50 Coarse Soil N Value - Dense
0-2 Fine Soil N Value - Very Soft	4-8 Fine Soil N Value - Medium Stiff
2-4 Fine Soil N Value - Soft	8-15 Fine Soil N Value - Stiff

BORING LOG

Project: Sea Street Pump Station Force Main No. 3

Location: Nantucket, MA

Client: Town of Nantucket

Driller: Crawford Drilling Services

Drilling Methods: Geoprobe

Weather: Sunny 50s

Performed By: SJG Date: 11/9/20

Checked By: ZFK Date: 12/16/20

Sea Street Pump Station Force Main No. 3

SEE SITE PLAN

Boring Locus Map

Boring No.: **B-94**

Location: See Plan

Approx. Ground Elevation:

Approx. Groundwater Elevation:

Date/Time of GW EL.

Datum: NAVD88

Project No. 360-2001

Depth (feet)	*Sample No.*	*Blows per 6-inch*	*SPT Value*	*Pen./ Rec.*	*Soil Description*		*Stratum Change Depth (feet)*	*Note No.*
1 2 3 4 5	S1			60"/53"	5" Asphalt 48" Brown, silty SAND with trace gravel			
6 7 8 9 10	S2			60"/39"	Brown, poorly graded SAND, dry	SP		
11 12 13 14 15	S3			60"/42"	Tan, poorly graded SAND with trace gravel, dry			
16 17 18 19 20								

NOTES:

GW not observed

LEGEND

S - Split Spoon Sample O/A - Sample Collected Off the Augers

UT - Undisturbed Tube Sample

Trace - Approximately 0 to 10% Some - Approximately 20 to 35%

Little - Approximately 10 to 20% And - Approximately 35 to 50%

0-4 Coarse Soil N Value - Very Loose 11-30 Coarse Soil N Value - Medium Dense

5-10 Coarse Soil N Value - Loose 31-50 Coarse Soil N Value - Dense

0-2 Fine Soil N Value - Very Soft 4-8 Fine Soil N Value - Medium Stiff

2-4 Fine Soil N Value - Soft 8-15 Fine Soil N Value - Stiff

BORING LOG

Project: Sea Street Pump Station Force Main No. 3

Location: Nantucket, MA

Client: Town of Nantucket

Driller: Crawford Drilling Services

Drilling Methods: Auger

Weather: Sunny 60s

Performed By: SJG Date: 11/9/20

Checked By: ZFK Date: 12/16/20

Sea Street Pump Station Force Main No. 3

SEE SITE PLAN

Boring Locus Map

Boring No.: **B-95**

Location: See Plan

Approx. Ground Elevation:

Approx. Groundwater Elevation:

Date/Time of GW EL.

Datum: NAVD88

Project No. 360-2001

Depth (feet)	*Sample No.*	*Blows per 6-inch*	*SPT Value*	*Pen./ Rec.*	*Soil Description*		*Stratum Change Depth (feet)*	*Note No.*
1 2	S1	Asphalt 4 6 7		24"/14"	5" Asphalt Brown, fine to med SAND with trace silt and gravel, dry			
3 4 5								
6 7	S2	3 4 12 18		24"/14"	Brown poorly graded SAND with trace gravel, dry			
8 9 10								
11 12	S3	5 6 5 5		24"/14"	Tan, fine to med SAND with trace gravel, dry			
13 14 15								
16 17	S4	2 2 2 2		24"/15"	Tan, poorly graded SAND with trace gravel, dry			
18 19 20								
21 22								

NOTES:

GW not observed

LEGEND

S - Split Spoon Sample	O/A - Sample Collected Off the Augers
UT - Undisturbed Tube Sample	
Trace - Approximately 0 to 10%	Some - Approximately 20 to 35%
Little - Approximately 10 to 20%	And - Approximately 35 to 50%
0-4 Coarse Soil N Value - Very Loose	11-30 Coarse Soil N Value - Medium Dense
5-10 Coarse Soil N Value - Loose	31-50 Coarse Soil N Value - Dense
0-2 Fine Soil N Value - Very Soft	4-8 Fine Soil N Value - Medium Stiff
2-4 Fine Soil N Value - Soft	8-15 Fine Soil N Value - Stiff

BORING LOG

Project: Sea Street Pump Station Force Main No. 3

Location: Nantucket, MA

Client: Town of Nantucket

Driller: Crawford Drilling Services

Drilling Methods: Geoprobe

Weather: Sunny 60s

Performed By: SJG Date: 11/9/20

Checked By: ZFK Date: 12/16/20

Sea Street Pump Station Force Main No. 3

SEE SITE PLAN

Boring Locus Map

Boring No.: **B-96**

Location: See Plan

Approx. Ground Elevation:

Approx. Groundwater Elevation:

Date/Time of GW EL.

Datum: NAVD88

Project No. 360-2001

Depth (feet)	*Sample No.*	*Blows per 6-inch*	*SPT Value*	*Pen./ Rec.*	*Soil Description*		*Stratum Change Depth (feet)*	*Note No.*
1 2 3 4 5	S1			60"/49"	5" Asphalt 8" Brown silty SAND, dry 36" Tan, poorly graded SAND with trace silt and gravel, dry			
6 7 8 9 10	S2			60"/37"	Tan to brown, poorly graded SAND with trace silt and gravel, dry			
11 12 13 14 15	S3			60"/24"	Tan, fine to med SAND with trace gravel, dry			
16 17 18 19 20	S4			60"/26"	Tan, poorly graded SAND with trace gravel, dry			

NOTES:

LEGEND

S - Split Spoon Sample	O/A - Sample Collected Off the Augers
UT - Undisturbed Tube Sample	
Trace - Approximately 0 to 10%	Some - Approximately 20 to 35%
Little - Approximately 10 to 20%	And - Approximately 35 to 50%
0-4 Coarse Soil N Value - Very Loose	11-30 Coarse Soil N Value - Medium Dense
5-10 Coarse Soil N Value - Loose	31-50 Coarse Soil N Value - Dense
0-2 Fine Soil N Value - Very Soft	4-8 Fine Soil N Value - Medium Stiff
2-4 Fine Soil N Value - Soft	8-15 Fine Soil N Value - Stiff

BORING LOG

Project: Sea Street Pump Station Force Main No. 3

Location: Nantucket, MA

Client: Town of Nantucket

Driller: Crawford Drilling Services

Drilling Methods: Geoprobe

Weather: Sunny 60s

Performed By: SJG Date: 11/9/20

Checked By: ZFK Date: 12/16/20

Sea Street Pump Station Force Main No. 3

SEE SITE PLAN

Boring Locus Map

Boring No.: **B-97**

Location: See Plan

Approx. Ground Elevation:

Approx. Groundwater Elevation:

Date/Time of GW EL.

Datum: NAVD88

Project No. 360-2001

Depth (feet)	*Sample No.*	*Blows per 6-inch*	*SPT Value*	*Pen./ Rec.*	*Soil Description*		*Stratum Change Depth (feet)*	*Note No.*
1 2 3 4 5	S1			60"/43"	5" Asphalt 14" Brown, fine to med SAND with trace silt and gravel, dry 8" Brown, silty SAND, dry 16" Tan, poorly graded SAND with trace gravel, dry			
6 7 8 9 10	S2			60"/48"	Brown to tan, poorly graded SAND with trace gravel, dry			
11 12 13 14 15	S3			60"/43"	Tan, fine to med SAND with trace gravel, dry			
16 17 18 19 20								

NOTES:

GW not observed

LEGEND

S - Split Spoon Sample	O/A - Sample Collected Off the Augers
UT - Undisturbed Tube Sample	
Trace - Approximately 0 to 10%	Some - Approximately 20 to 35%
Little - Approximately 10 to 20%	And - Approximately 35 to 50%
0-4 Coarse Soil N Value - Very Loose	11-30 Coarse Soil N Value - Medium Dense
5-10 Coarse Soil N Value - Loose	31-50 Coarse Soil N Value - Dense
0-2 Fine Soil N Value - Very Soft	4-8 Fine Soil N Value - Medium Stiff
2-4 Fine Soil N Value - Soft	8-15 Fine Soil N Value - Stiff

BORING LOG

Project: Sea Street Pump Station Force Main No. 3

Location: Nantucket, MA

Client: Town of Nantucket

Driller: Crawford Drilling Services

Drilling Methods: Geoprobe

Weather: Sunny 60s

Performed By: SJG Date: 11/9/20

Checked By: ZFK Date: 12/16/20

Sea Street Pump Station Force Main No. 3

SEE SITE PLAN

Boring Locus Map

Boring No.: **B-98**

Location: See Plan

Approx. Ground Elevation:

Approx. Groundwater Elevation:

Date/Time of GW EL.

Datum: NAVD88

Project No. 360-2001

Depth (feet)	*Sample No.*	*Blows per 6-inch*	*SPT Value*	*Pen./ Rec.*	*Soil Description*		*Stratum Change Depth (feet)*	*Note No.*
1 2 3 4 5	S1			60"/44"	5" Asphalt 20" Brown, silty SAND, dry 19" Brown/tan poorly graded SAND with trace gravel, dry			
6 7 8 9 10	S2			60"/37"	Brown to orange, silty SAND, dry	SM		
11 12 13 14 15	S3			60"/45"	7" Brown, sandy SILT, dry 38" Brown, poorly graded SAND with trace gravel, dry			
16 17 18 19 20								

NOTES:

GW not observed

LEGEND

S - Split Spoon Sample	O/A - Sample Collected Off the Augers
UT - Undisturbed Tube Sample	
Trace - Approximately 0 to 10%	Some - Approximately 20 to 35%
Little - Approximately 10 to 20%	And - Approximately 35 to 50%
0-4 Coarse Soil N Value - Very Loose	11-30 Coarse Soil N Value - Medium Dense
5-10 Coarse Soil N Value - Loose	31-50 Coarse Soil N Value - Dense
0-2 Fine Soil N Value - Very Soft	4-8 Fine Soil N Value - Medium Stiff
2-4 Fine Soil N Value - Soft	8-15 Fine Soil N Value - Stiff

BORING LOG

Project: Sea Street Pump Station Force Main No. 3

Location: Nantucket, MA

Client: Town of Nantucket

Driller: Crawford Drilling Services

Drilling Methods: Geoprobe

Weather: Sunny 60s

Performed By: SJG Date: 11/9/20

Checked By: ZFK Date: 12/16/20

Sea Street Pump Station Force Main No. 3

SEE SITE PLAN

Boring Locus Map

Boring No.: **B-99**

Location: See Plan

Approx. Ground Elevation:

Approx. Groundwater Elevation:

Date/Time of GW EL.

Datum: NAVD88

Project No. 360-2001

Depth (feet)	*Sample No.*	*Blows per 6-inch*	*SPT Value*	*Pen./ Rec.*	*Soil Description*		*Stratum Change Depth (feet)*	*Note No.*
1 2 3 4 5	S1			60"/39"	3" Asphalt Brown, poorly graded SAND with trace silt and gravel, dry			
6 7 8 9 10	S2			60"/56"	Tan, fine to med SAND with trace gravel, dry			
11 12 13 14 15	S3			60"/46"	Tan/orange, poorly graded SAND with trace gravel, dry			
16 17 18 19 20								

NOTES:

GW not observed

LEGEND

S - Split Spoon Sample	O/A - Sample Collected Off the Augers
UT - Undisturbed Tube Sample	
Trace - Approximately 0 to 10%	Some - Approximately 20 to 35%
Little - Approximately 10 to 20%	And - Approximately 35 to 50%
0-4 Coarse Soil N Value - Very Loose	11-30 Coarse Soil N Value - Medium Dense
5-10 Coarse Soil N Value - Loose	31-50 Coarse Soil N Value - Dense
0-2 Fine Soil N Value - Very Soft	4-8 Fine Soil N Value - Medium Stiff
2-4 Fine Soil N Value - Soft	8-15 Fine Soil N Value - Stiff

BORING LOG

Project: Sea Street Pump Station Force Main No. 3

Location: Nantucket, MA

Client: Town of Nantucket

Driller: Crawford Drilling Services

Drilling Methods: Geoprobe

Weather: Sunny 60

Performed By: SJG Date: 11/9/20

Checked By: ZFK Date: 12/16/20

Sea Street Pump Station Force Main No. 3

SEE SITE PLAN

Boring Locus Map

Boring No.: **B-100**

Location: See Plan

Approx. Ground Elevation:

Approx. Groundwater Elevation:

Date/Time of GW EL.

Datum: NAVD88

Project No. 360-2001

Depth (feet)	*Sample No.*	*Blows per 6-inch*	*SPT Value*	*Pen./ Rec.*	*Soil Description*		*Stratum Change Depth (feet)*	*Note No.*
1 2 3 4 5	S1			60"/40"	8" Asphalt 2" Fill (crushed asphalt) 30" Brown, silty SAND, dry	SM		
6 7 8 9 10	S2			60"/55"	Tan, poorly graded SAND, dry			
11 12 13 14 15	S3			60"/41"	Tan, poorly graded SAND, dry			
16 17 18 19 20								

NOTES:

LEGEND

S - Split Spoon Sample	O/A - Sample Collected Off the Augers
UT - Undisturbed Tube Sample	
Trace - Approximately 0 to 10%	Some - Approximately 20 to 35%
Little - Approximately 10 to 20%	And - Approximately 35 to 50%
0-4 Coarse Soil N Value - Very Loose	11-30 Coarse Soil N Value - Medium Dense
5-10 Coarse Soil N Value - Loose	31-50 Coarse Soil N Value - Dense
0-2 Fine Soil N Value - Very Soft	4-8 Fine Soil N Value - Medium Stiff
2-4 Fine Soil N Value - Soft	8-15 Fine Soil N Value - Stiff

BORING LOG

Project: Sea Street Pump Station Force Main No. 3

Location: Nantucket, MA

Client: Town of Nantucket

Driller: Crawford Drilling Services

Drilling Methods: Geoprobe

Weather: Sunny 60s

Performed By: SJG Date: 11/9/20

Checked By: ZFK Date: 12/16/20

Sea Street Pump Station Force Main No. 3

SEE SITE PLAN

Boring Locus Map

Boring No.: **B-101**

Location: See Plan

Approx. Ground Elevation:

Approx. Groundwater Elevation:

Date/Time of GW EL.

Datum: NAVD88

Project No. 360-2001

Depth (feet)	*Sample No.*	*Blows per 6-inch*	*SPT Value*	*Pen./ Rec.*	*Soil Description*		*Stratum Change Depth (feet)*	*Note No.*
1 2 3 4 5	S1			60"/52"	8" Asphalt Brown, poorly graded SAND with trace silt and gravel, dry			
6 7 8 9 10	S2			60"/49"	20" Brown/orange fine SAND, dry 29" Tan, poorly graded SAND with trace gravel, dry			
11 12 13 14 15	S3			60"/36"	Tan, poorly graded SAND with trace gravel, dry			
16 17 18 19 20								

NOTES:

GW not observed

LEGEND

S - Split Spoon Sample	O/A - Sample Collected Off the Augers
UT - Undisturbed Tube Sample	
Trace - Approximately 0 to 10%	Some - Approximately 20 to 35%
Little - Approximately 10 to 20%	And - Approximately 35 to 50%
0-4 Coarse Soil N Value - Very Loose	11-30 Coarse Soil N Value - Medium Dense
5-10 Coarse Soil N Value - Loose	31-50 Coarse Soil N Value - Dense
0-2 Fine Soil N Value - Very Soft	4-8 Fine Soil N Value - Medium Stiff
2-4 Fine Soil N Value - Soft	8-15 Fine Soil N Value - Stiff

BORING LOG

Project: Sea Street Pump Station Force Main No. 3

Location: Nantucket, MA

Client: Town of Nantucket

Driller: Crawford Drilling Services

Drilling Methods: Geoprobe

Weather: Sunny 60s

Performed By: SJG Date: 11/9/20

Checked By: ZFK Date: 12/16/20

Sea Street Pump Station Force Main No. 3

SEE SITE PLAN

Boring Locus Map

Boring No.: **B-102**

Location: See Plan

Approx. Ground Elevation:

Approx. Groundwater Elevation:

Date/Time of GW EL.

Datum: NAVD88

Project No. 360-2001

Depth (feet)	*Sample No.*	*Blows per 6-inch*	*SPT Value*	*Pen./ Rec.*	*Soil Description*		*Stratum Change Depth (feet)*	*Note No.*
1 2 3 4 5	S1			60"/51"	5" Asphalt 24" Brown, silty SAND, dry 22" Brown, fine to med SAND, dry			
6 7 8 9 10	S2			60"/41"	7" Brown/orange poorly graded SAND, dry 7" Brown, silty SAND, dry 27" Brown, poorly graded SAND, dry			
11 12 13 14 15	S3			60"/33"	Tan, poorly graded SAND with trace gravel, dry			
16 17 18 19 20								

NOTES:

GW not observed

LEGEND

S - Split Spoon Sample	O/A - Sample Collected Off the Augers
UT - Undisturbed Tube Sample	
Trace - Approximately 0 to 10%	Some - Approximately 20 to 35%
Little - Approximately 10 to 20%	And - Approximately 35 to 50%
0-4 Coarse Soil N Value - Very Loose	11-30 Coarse Soil N Value - Medium Dense
5-10 Coarse Soil N Value - Loose	31-50 Coarse Soil N Value - Dense
0-2 Fine Soil N Value - Very Soft	4-8 Fine Soil N Value - Medium Stiff
2-4 Fine Soil N Value - Soft	8-15 Fine Soil N Value - Stiff

BORING LOG

Project: Sea Street Pump Station Force Main No. 3

Location: Nantucket, MA

Client: Town of Nantucket

Driller: Crawford Drilling Services

Drilling Methods: Geoprobe

Weather: Sunny 60s

Performed By: SJG Date: 11/10/20

Checked By: ZFK Date: 12/16/20

Sea Street Pump Station Force Main No. 3

SEE SITE PLAN

Boring Locus Map

Boring No.: **B-103**

Location: See Plan

Approx. Ground Elevation:

Approx. Groundwater Elevation:

Date/Time of GW EL.

Datum: NAVD88

Project No. 360-2001

Depth (feet)	*Sample No.*	*Blows per 6-inch*	*SPT Value*	*Pen./ Rec.*	*Soil Description*		*Stratum Change Depth (feet)*	*Note No.*
1 2 3 4 5	S1			60"/48"	5" Asphalt 20" Brown, silty SAND, dry 23" Tan, poorly graded SAND with trace gravel, dry			
6 7 8 9 10	S2			60"/47"	Tan, fine to med SAND with trace gravel, dry			
11 12 13 14 15	S3			60"/42"	Tan, poorly graded SAND with trace gravel and orange oxidation layer			
16 17 18 19 20								

NOTES:

GW not observed

LEGEND

S - Split Spoon Sample	O/A - Sample Collected Off the Augers
UT - Undisturbed Tube Sample	
Trace - Approximately 0 to 10%	Some - Approximately 20 to 35%
Little - Approximately 10 to 20%	And - Approximately 35 to 50%
0-4 Coarse Soil N Value - Very Loose	11-30 Coarse Soil N Value - Medium Dense
5-10 Coarse Soil N Value - Loose	31-50 Coarse Soil N Value - Dense
0-2 Fine Soil N Value - Very Soft	4-8 Fine Soil N Value - Medium Stiff
2-4 Fine Soil N Value - Soft	8-15 Fine Soil N Value - Stiff

BORING LOG

Project: Sea Street Pump Station Force Main No. 3

Location: Nantucket, MA

Client: Town of Nantucket

Driller: Crawford Drilling Services

Drilling Methods: Geoprobe

Weather: Sunny 60

Performed By: SJG Date: 11/10/20

Checked By: ZFK Date: 12/16/20

Sea Street Pump Station Force Main No. 3

SEE SITE PLAN

Boring Locus Map

Boring No.: **B-104**

Location: See Plan

Approx. Ground Elevation:

Approx. Groundwater Elevation:

Date/Time of GW EL.

Datum: NAVD88

Project No. 360-2001

Depth (feet)	*Sample No.*	*Blows per 6-inch*	*SPT Value*	*Pen./ Rec.*	*Soil Description*		*Stratum Change Depth (feet)*	*Note No.*
1 2 3 4 5	S1			60"/54"	5" Asphalt 9" Fill 20" Brown, silty SAND, dry 20" Brown, poorly graded SAND with trace gravel, dry			
6 7 8 9 10	S2			60"/55"	Tan/brown, poorly graded SAND, dry	SP		
11 12 13 14 15	S3			60"/20"	Tan, poorly graded SAND with trace gravel, dry			
16 17 18 19 20								

NOTES:

GW not observed

LEGEND

S - Split Spoon Sample	O/A - Sample Collected Off the Augers
UT - Undisturbed Tube Sample	
Trace - Approximately 0 to 10%	Some - Approximately 20 to 35%
Little - Approximately 10 to 20%	And - Approximately 35 to 50%
0-4 Coarse Soil N Value - Very Loose	11-30 Coarse Soil N Value - Medium Dense
5-10 Coarse Soil N Value - Loose	31-50 Coarse Soil N Value - Dense
0-2 Fine Soil N Value - Very Soft	4-8 Fine Soil N Value - Medium Stiff
2-4 Fine Soil N Value - Soft	8-15 Fine Soil N Value - Stiff

BORING LOG

Project: Sea Street Pump Station Force Main No. 3

Location: Nantucket, MA

Client: Town of Nantucket

Driller: Crawford Drilling Services

Drilling Methods: Geoprobe

Weather: Sunny 60s

Performed By: SJG Date:

Checked By: ZFK Date: 12/16/20

Sea Street Pump Station Force Main No. 3

SEE SITE PLAN

Boring Locus Map

Boring No.: **B-105**

Location: See Plan

Approx. Ground Elevation:

Approx. Groundwater Elevation:

Date/Time of GW EL.

Datum: NAVD88

Project No. 360-2001

Depth (feet)	*Sample No.*	*Blows per 6-inch*	*SPT Value*	*Pen./ Rec.*	*Soil Description*		*Stratum Change Depth (feet)*	*Note No.*
1 2 3 4 5	S1			60"/46"	3" Asphalt 34" Brown, silty SAND with trace gravel, dry 9" Brown, fine to med SAND with trace gravel			
6 7 8 9 10	S2			60"/52"	Brown, fine to med SAND with trace gravel, dry			
11 12 13 14 15	S3			60"/42"	Tan, poorly graded SAND with trace gravel and oxidized layer, dry			
16 17 18 19 20								

NOTES:

GW not observed

LEGEND

S - Split Spoon Sample	O/A - Sample Collected Off the Augers
UT - Undisturbed Tube Sample	
Trace - Approximately 0 to 10%	Some - Approximately 20 to 35%
Little - Approximately 10 to 20%	And - Approximately 35 to 50%
0-4 Coarse Soil N Value - Very Loose	11-30 Coarse Soil N Value - Medium Dense
5-10 Coarse Soil N Value - Loose	31-50 Coarse Soil N Value - Dense
0-2 Fine Soil N Value - Very Soft	4-8 Fine Soil N Value - Medium Stiff
2-4 Fine Soil N Value - Soft	8-15 Fine Soil N Value - Stiff

BORING LOG

Project: Sea Street Pump Station Force Main No. 3

Location: Nantucket, MA

Client: Town of Nantucket

Driller: Crawford Drilling Services

Drilling Methods: Geoprobe

Weather: Sunny 60

Performed By: SJG Date: 11/10/20

Checked By: ZFK Date: 12/16/20

Sea Street Pump Station Force Main No. 3

SEE SITE PLAN

Boring Locus Map

Boring No.: **B-106**

Location: See Plan

Approx. Ground Elevation:

Approx. Groundwater Elevation:

Date/Time of GW EL.

Datum: NAVD88

Project No. 360-2001

Depth (feet)	*Sample No.*	*Blows per 6-inch*	*SPT Value*	*Pen./ Rec.*	*Soil Description*		*Stratum Change Depth (feet)*	*Note No.*
1 2 3 4 5	S1			60"/53"	3" Asphalt 10" Base (crushed asphalt & silty SAND) 15" Brown, silty SAND, dry 25" Tan, fine to med SAND with trace gravel, dry			
6 7 8 9 10	S2			60"/58"	Tan/orange poorly graded SAND with trace gravel, dry			
11 12 13 14 15	S3			60"/40"	Tan, poorly graded SAND with trace gravel and oxidization layers, dry			
16 17 18 19 20								

NOTES:

GW not observed

LEGEND

S - Split Spoon Sample	O/A - Sample Collected Off the Augers
UT - Undisturbed Tube Sample	
Trace - Approximately 0 to 10%	Some - Approximately 20 to 35%
Little - Approximately 10 to 20%	And - Approximately 35 to 50%
0-4 Coarse Soil N Value - Very Loose	11-30 Coarse Soil N Value - Medium Dense
5-10 Coarse Soil N Value - Loose	31-50 Coarse Soil N Value - Dense
0-2 Fine Soil N Value - Very Soft	4-8 Fine Soil N Value - Medium Stiff
2-4 Fine Soil N Value - Soft	8-15 Fine Soil N Value - Stiff

BORING LOG

Project: Sea Street Pump Station Force Main No. 3

Location: Nantucket, MA

Client: Town of Nantucket

Driller: Crawford Drilling Services

Drilling Methods: Geoprobe

Weather: Sunny 60s

Performed By: SJG Date: 11/10/20

Checked By: ZFK Date: 12/16/20

Sea Street Pump Station Force Main No. 3

SEE SITE PLAN

Boring Locus Map

Boring No.: **B-107**

Location: See Plan

Approx. Ground Elevation:

Approx. Groundwater Elevation:

Date/Time of GW EL.

Datum: NAVD88

Project No. 360-2001

Depth (feet)	*Sample No.*	*Blows per 6-inch*	*SPT Value*	*Pen./ Rec.*	*Soil Description*		*Stratum Change Depth (feet)*	*Note No.*
1 2 3 4 5	S1			60"/51"	5" Asphalt 27" Brown, silty SAND, dry 19" Tan, poorly graded SAND with gravel, dry			
6 7 8 9 10	S2			60"/54"	28" Tan, poorly graded SAND with trace gravel, dry 26" Tan, fine SAND, dry			
11 12 13 14 15	S3			60"/40"	Tan, poorly graded SAND with trace gravel, dry			
16 17 18 19 20								

NOTES:

GW not observed

LEGEND

S - Split Spoon Sample	O/A - Sample Collected Off the Augers
UT - Undisturbed Tube Sample	
Trace - Approximately 0 to 10%	Some - Approximately 20 to 35%
Little - Approximately 10 to 20%	And - Approximately 35 to 50%
0-4 Coarse Soil N Value - Very Loose	11-30 Coarse Soil N Value - Medium Dense
5-10 Coarse Soil N Value - Loose	31-50 Coarse Soil N Value - Dense
0-2 Fine Soil N Value - Very Soft	4-8 Fine Soil N Value - Medium Stiff
2-4 Fine Soil N Value - Soft	8-15 Fine Soil N Value - Stiff

BORING LOG

Project: Sea Street Pump Station Force Main No. 3

Location: Nantucket, MA

Client: Town of Nantucket

Driller: Crawford Drilling Services

Drilling Methods: Geoprobe

Weather: Sunny 60

Performed By: SJG Date: 11/10/20

Checked By: ZFK Date: 12/16/20

Sea Street Pump Station Force Main No. 3

SEE SITE PLAN

Boring Locus Map

Boring No.: **B-108**

Location: See Plan

Approx. Ground Elevation:

Approx. Groundwater Elevation:

Date/Time of GW EL.

Datum: NAVD88

Project No. 360-2001

Depth (feet)	*Sample No.*	*Blows per 6-inch*	*SPT Value*	*Pen./ Rec.*	*Soil Description*		*Stratum Change Depth (feet)*	*Note No.*
1 2 3 4 5	S1			60"/53"	3" Asphalt 5" Fill (crushed asphalt & silty SAND) 18" Brown, silty SAND, dry 27" Brown, fine to med SAND with trace gravel, dry			
6 7 8 9 10	S2			60"/43"	Tan, poorly graded SAND with trace gravel, dry			
11 12 13 14 15	S3			60"/34"	22" Tan, poorly graded SAND with trace gravel, dry 6" Brown, fine SAND, dry 6" Tan, medium SAND, dry			
16 17 18 19 20								

NOTES:

GW not observed

LEGEND

S - Split Spoon Sample	O/A - Sample Collected Off the Augers
UT - Undisturbed Tube Sample	
Trace - Approximately 0 to 10%	Some - Approximately 20 to 35%
Little - Approximately 10 to 20%	And - Approximately 35 to 50%
0-4 Coarse Soil N Value - Very Loose	11-30 Coarse Soil N Value - Medium Dense
5-10 Coarse Soil N Value - Loose	31-50 Coarse Soil N Value - Dense
0-2 Fine Soil N Value - Very Soft	4-8 Fine Soil N Value - Medium Stiff
2-4 Fine Soil N Value - Soft	8-15 Fine Soil N Value - Stiff

BORING LOG

Project: Sea Street Pump Station Force Main No. 3

Location: Nantucket, MA

Client: Town of Nantucket

Driller: Crawford Drilling Services

Drilling Methods: Geoprobe

Weather: Sunny 60

Performed By: SJG Date: 11/10/20

Checked By: ZFK Date: 12/16/20

Sea Street Pump Station Force Main No. 3

SEE SITE PLAN

Boring Locus Map

Boring No.: **B-109**

Location: See Plan

Approx. Ground Elevation:

Approx. Groundwater Elevation:

Date/Time of GW EL.

Datum: NAVD88

Project No. 360-2001

Depth (feet)	*Sample No.*	*Blows per 6-inch*	*SPT Value*	*Pen./ Rec.*	*Soil Description*		*Stratum Change Depth (feet)*	*Note No.*
1 2 3 4 5	S1			60"/50"	5" Asphalt 6" Fill 24" Brown, silty SAND, dry 15" Brown, fine to med SAND with trace gravel, dry			
6 7 8 9 10	S2			60"/46"	7" Brown/orange poorly graded SAND, dry 19" Brown, fine SAND, dry 20" Brown, poorly graded SAND with trace gravel, dry			
11 12 13 14 15	S3			60"/41"	Brown, poorly graded SAND with trace gravel and oxidized layer, dry			
16 17 18 19 20								

NOTES:

GW not observed

LEGEND

S - Split Spoon Sample	O/A - Sample Collected Off the Augers
UT - Undisturbed Tube Sample	
Trace - Approximately 0 to 10%	Some - Approximately 20 to 35%
Little - Approximately 10 to 20%	And - Approximately 35 to 50%
0-4 Coarse Soil N Value - Very Loose	11-30 Coarse Soil N Value - Medium Dense
5-10 Coarse Soil N Value - Loose	31-50 Coarse Soil N Value - Dense
0-2 Fine Soil N Value - Very Soft	4-8 Fine Soil N Value - Medium Stiff
2-4 Fine Soil N Value - Soft	8-15 Fine Soil N Value - Stiff

BORING LOG

Project: Sea Street Pump Station Force Main No. 3

Location: Nantucket, MA

Client: Town of Nantucket

Driller: Crawford Drilling Services

Drilling Methods: Geoprobe

Weather: Sunny 60

Performed By: SJG Date: 11/10/20

Checked By: ZFK Date: 12/16/20

Sea Street Pump Station Force Main No. 3

SEE SITE PLAN

Boring Locus Map

Boring No.: **B-110**

Location: See Plan

Approx. Ground Elevation:

Approx. Groundwater Elevation:

Date/Time of GW EL.

Datum: NAVD88

Project No. 360-2001

Depth (feet)	*Sample No.*	*Blows per 6-inch*	*SPT Value*	*Pen./ Rec.*	*Soil Description*		*Stratum Change Depth (feet)*	*Note No.*
1 2 3 4 5	S1			60"/51"	3" Asphalt 9" Fill 25" Brown, well-graded SAND with silt, dry 13" Brown/orange well-graded SAND with silt, dry	SW-SM		
6 7 8 9 10	S2			60"/51"	Orange/Brown fine to med SAND with trace gravel, cored cobble, dry			
11 12 13 14 15	S3			60"/42"	Tan, fine to med SAND with trace gravel, dry			
16 17 18 19 20								

NOTES:

GW not observed

LEGEND

S - Split Spoon Sample	O/A - Sample Collected Off the Augers
UT - Undisturbed Tube Sample	
Trace - Approximately 0 to 10%	Some - Approximately 20 to 35%
Little - Approximately 10 to 20%	And - Approximately 35 to 50%
0-4 Coarse Soil N Value - Very Loose	11-30 Coarse Soil N Value - Medium Dense
5-10 Coarse Soil N Value - Loose	31-50 Coarse Soil N Value - Dense
0-2 Fine Soil N Value - Very Soft	4-8 Fine Soil N Value - Medium Stiff
2-4 Fine Soil N Value - Soft	8-15 Fine Soil N Value - Stiff

BORING LOG

Project: Sea Street Pump Station Force Main No. 3

Location: Nantucket, MA

Client: Town of Nantucket

Driller: Crawford Drilling Services

Drilling Methods: Geoprobe

Weather: Sunny 60

Performed By: SJG Date: 11/10/20

Checked By: ZFK Date: 12/16/20

Sea Street Pump Station Force Main No. 3

SEE SITE PLAN

Boring Locus Map

Boring No.: **B-111**

Location: See Plan

Approx. Ground Elevation:

Approx. Groundwater Elevation:

Date/Time of GW EL.

Datum: NAVD88

Project No. 360-2001

Depth (feet)	*Sample No.*	*Blows per 6-inch*	*SPT Value*	*Pen./ Rec.*	*Soil Description*		*Stratum Change Depth (feet)*	*Note No.*
1 2 3 4 5	S1			60"/48"	3" Asphalt 9" Fill 15" Brown, silty SAND, dry 21" Brown, fine to med SAND with trace gravel, dry			
6 7 8 9 10	S2			60"/42"	Brown to tan, fine to med SAND with trace gravel, dry			
11 12 13 14 15	S3			60"/30"	Tan, poorly graded SAND with trace gravel, dry			
16 17 18 19 20								

NOTES:

GW not observed

LEGEND

S - Split Spoon Sample	O/A - Sample Collected Off the Augers
UT - Undisturbed Tube Sample	
Trace - Approximately 0 to 10%	Some - Approximately 20 to 35%
Little - Approximately 10 to 20%	And - Approximately 35 to 50%
0-4 Coarse Soil N Value - Very Loose	11-30 Coarse Soil N Value - Medium Dense
5-10 Coarse Soil N Value - Loose	31-50 Coarse Soil N Value - Dense
0-2 Fine Soil N Value - Very Soft	4-8 Fine Soil N Value - Medium Stiff
2-4 Fine Soil N Value - Soft	8-15 Fine Soil N Value - Stiff

BORING LOG

Project: Sea Street Pump Station Force Main No. 3

Location: Nantucket, MA

Client: Town of Nantucket

Driller: Crawford Drilling Services

Drilling Methods: Geoprobe

Weather: Sunny 60s

Performed By: SJG Date: 11/10/20

Checked By: ZFK Date: 12/16/20

Sea Street Pump Station Force Main No. 3

SEE SITE PLAN

Boring Locus Map

Boring No.: **B-112**

Location: See Plan

Approx. Ground Elevation:

Approx. Groundwater Elevation:

Date/Time of GW EL.

Datum: NAVD88

Project No. 360-2001

Depth (feet)	*Sample No.*	*Blows per 6-inch*	*SPT Value*	*Pen./ Rec.*	*Soil Description*		*Stratum Change Depth (feet)*	*Note No.*
1 2 3 4 5	S1			60"/51"	3" Asphalt 7" Fill 41" Brown, silty SAND, with trace gravel, dry			
6 7 8 9 10	S2			60"/50"	Brown, fine to med SAND with trace gravel and oxidized layer, dry			
11 12 13 14 15	S3			60"/41"	Tan, poorly graded SAND with trace gravel, dry			
16 17 18 19 20								

NOTES:

GW not observed

LEGEND

S - Split Spoon Sample	O/A - Sample Collected Off the Augers
UT - Undisturbed Tube Sample	
Trace - Approximately 0 to 10%	Some - Approximately 20 to 35%
Little - Approximately 10 to 20%	And - Approximately 35 to 50%
0-4 Coarse Soil N Value - Very Loose	11-30 Coarse Soil N Value - Medium Dense
5-10 Coarse Soil N Value - Loose	31-50 Coarse Soil N Value - Dense
0-2 Fine Soil N Value - Very Soft	4-8 Fine Soil N Value - Medium Stiff
2-4 Fine Soil N Value - Soft	8-15 Fine Soil N Value - Stiff

BORING LOG

Project: Sea Street Pump Station Force Main No. 3

Location: Nantucket, MA

Client: Town of Nantucket

Driller: Crawford Drilling Services

Drilling Methods: Auger

Weather: Sunny 60s

Performed By: SJG Date: 11/11/20

Checked By: ZFK Date: 12/16/20

Sea Street Pump Station Force Main No. 3

SEE SITE PLAN

Boring Locus Map

Boring No.: **B-113**

Location: See Plan

Approx. Ground Elevation:

Approx. Groundwater Elevation:

Date/Time of GW EL.

Datum: NAVD88

Project No. 360-2001

Depth (feet)	*Sample No.*	*Blows per 6-inch*	*SPT Value*	*Pen./ Rec.*	*Soil Description*		*Stratum Change Depth (feet)*	*Note No.*
1 2	S1	Auger 11 10 10		24"/19"	9" Fill 10" Brown, silty SAND, dry			
3 4 5								
6 7	S2	12 22 28 25		24"/18"	8" Brown, fine SAND, dry 10" Brown/orange, poorly graded SAND with trace gravel, dry			
8 9 10								
11 12	S3	4 4 6 6		24"/13"	Tan, fine to med SAND with trace gravel, dry			
13 14 15								
16 17	S4	3 4 3 3		24"/14"	Tan, fine to med SAND with trace gravel, dry			
18 19 20								
21 22								

NOTES:

GW not observed

LEGEND

S - Split Spoon Sample	O/A - Sample Collected Off the Augers
UT - Undisturbed Tube Sample	
Trace - Approximately 0 to 10%	Some - Approximately 20 to 35%
Little - Approximately 10 to 20%	And - Approximately 35 to 50%
0-4 Coarse Soil N Value - Very Loose	11-30 Coarse Soil N Value - Medium Dense
5-10 Coarse Soil N Value - Loose	31-50 Coarse Soil N Value - Dense
0-2 Fine Soil N Value - Very Soft	4-8 Fine Soil N Value - Medium Stiff
2-4 Fine Soil N Value - Soft	8-15 Fine Soil N Value - Stiff

BORING LOG

Project: Sea Street Pump Station Force Main No. 3

Location: Nantucket, MA

Client: Town of Nantucket

Driller: Crawford Drilling Services

Drilling Methods: Geoprobe

Weather: Sunny 60s

Performed By: SJG Date: 11/11/20

Checked By: ZFK Date: 12/16/20

Sea Street Pump Station Force Main No. 3

SEE SITE PLAN

Boring Locus Map

Boring No.: **B-114**

Location: See Plan

Approx. Ground Elevation:

Approx. Groundwater Elevation:

Date/Time of GW EL.

Datum: NAVD88

Project No. 360-2001

Depth (feet)	*Sample No.*	*Blows per 6-inch*	*SPT Value*	*Pen./ Rec.*	*Soil Description*		*Stratum Change Depth (feet)*	*Note No.*
1 2 3 4 5	S1			60"/52"	3" Asphalt 5" Fill 33" Brown, silty SAND, with gravel, dry 11" Brown, fine to med SAND with trace gravel, dry			
6 7 8 9 10	S2			60"/44"	Tan/orange, poorly graded SAND, dry	SP		
11 12 13 14 15	S3			60"/43"	Tan, fine to med SAND with trace gravel, dry			
16 17 18 19 20								

NOTES:

GW not observed

LEGEND

S - Split Spoon Sample	O/A - Sample Collected Off the Augers
UT - Undisturbed Tube Sample	
Trace - Approximately 0 to 10%	Some - Approximately 20 to 35%
Little - Approximately 10 to 20%	And - Approximately 35 to 50%
0-4 Coarse Soil N Value - Very Loose	11-30 Coarse Soil N Value - Medium Dense
5-10 Coarse Soil N Value - Loose	31-50 Coarse Soil N Value - Dense
0-2 Fine Soil N Value - Very Soft	4-8 Fine Soil N Value - Medium Stiff
2-4 Fine Soil N Value - Soft	8-15 Fine Soil N Value - Stiff

BORING LOG

Project: Sea Street Pump Station Force Main No. 3

Location: Nantucket, MA

Client: Town of Nantucket

Driller: Crawford Drilling Services

Drilling Methods: Geoprobe

Weather: Sunny 60s

Performed By: SJG Date: 11/11/20

Checked By: ZFK Date: 12/16/20

Sea Street Pump Station Force Main No. 3

SEE SITE PLAN

Boring Locus Map

Boring No.: **B-115**

Location: See Plan

Approx. Ground Elevation:

Approx. Groundwater Elevation:

Date/Time of GW EL.

Datum: NAVD88

Project No. 360-2001

Depth (feet)	*Sample No.*	*Blows per 6-inch*	*SPT Value*	*Pen./ Rec.*	*Soil Description*		*Stratum Change Depth (feet)*	*Note No.*
1 2 3 4 5	S1			60"/53"	3" Asphalt 3" Fill 22" Brown, silty SAND, dry 25" Brown, fine to med SAND with trace gravel, dry			
6 7 8 9 10	S2			60"/60"	Tan, poorly graded SAND with trace gravel, dry			
11 12 13 14 15	S3			60"/26"	Tan, poorly graded SAND with trace gravel, dry			
16 17 18 19 20	S4			60"/32"	Tan, poorly graded SAND with trace gravel and oxidized layers, dry			

NOTES:

GW not observed

LEGEND

S - Split Spoon Sample	O/A - Sample Collected Off the Augers
UT - Undisturbed Tube Sample	
Trace - Approximately 0 to 10%	Some - Approximately 20 to 35%
Little - Approximately 10 to 20%	And - Approximately 35 to 50%
0-4 Coarse Soil N Value - Very Loose	11-30 Coarse Soil N Value - Medium Dense
5-10 Coarse Soil N Value - Loose	31-50 Coarse Soil N Value - Dense
0-2 Fine Soil N Value - Very Soft	4-8 Fine Soil N Value - Medium Stiff
2-4 Fine Soil N Value - Soft	8-15 Fine Soil N Value - Stiff

BORING LOG

Project: Sea Street Pump Station Force Main No. 3

Location: Nantucket, MA

Client: Town of Nantucket

Driller: Crawford Drilling Services

Drilling Methods: Geoprobe

Weather: Sunny 60

Performed By: SJG Date: 11/11/20

Checked By: ZFK Date: 12/16/20

Sea Street Pump Station Force Main No. 3

SEE SITE PLAN

Boring Locus Map

Boring No.: **B-116**

Location: See Plan

Approx. Ground Elevation:

Approx. Groundwater Elevation:

Date/Time of GW EL.

Datum: NAVD88

Project No. 360-2001

Depth (feet)	*Sample No.*	*Blows per 6-inch*	*SPT Value*	*Pen./ Rec.*	*Soil Description*		*Stratum Change Depth (feet)*	*Note No.*
1 2 3 4 5	S1			60"/54"	3" Asphalt 2" Fill 24" Brown, silty SAND, dry 25" Brown/tan, fine SAND with trace gravel, dry			
6 7 8 9 10	S2			60"/54"	Brown/tan poorly graded SAND with trace gravel, dry			
11 12 13 14 15	S3			60"/41"	Tan, poorly graded SAND with trace gravel, dry			
16 17 18 19 20								

NOTES:

GW not observed

LEGEND

S - Split Spoon Sample	O/A - Sample Collected Off the Augers
UT - Undisturbed Tube Sample	
Trace - Approximately 0 to 10%	Some - Approximately 20 to 35%
Little - Approximately 10 to 20%	And - Approximately 35 to 50%
0-4 Coarse Soil N Value - Very Loose	11-30 Coarse Soil N Value - Medium Dense
5-10 Coarse Soil N Value - Loose	31-50 Coarse Soil N Value - Dense
0-2 Fine Soil N Value - Very Soft	4-8 Fine Soil N Value - Medium Stiff
2-4 Fine Soil N Value - Soft	8-15 Fine Soil N Value - Stiff

BORING LOG

Project: Sea Street Pump Station Force Main No. 3

Location: Nantucket, MA

Client: Town of Nantucket

Driller: Crawford Drilling Services

Drilling Methods: Geoprobe

Weather: Sunny 60s

Performed By: SJG Date: 11/11/20

Checked By: ZFK Date: 12/16/20

Sea Street Pump Station Force Main No. 3

SEE SITE PLAN

Boring Locus Map

Boring No.: **B-117**

Location: See Plan

Approx. Ground Elevation:

Approx. Groundwater Elevation:

Date/Time of GW EL.

Datum: NAVD88

Project No. 360-2001

Depth (feet)	*Sample No.*	*Blows per 6-inch*	*SPT Value*	*Pen./ Rec.*	*Soil Description*		*Stratum Change Depth (feet)*	*Note No.*
1 2 3 4 5	S1			60"/53"	3" Asphalt 3" Fill 21" Brown, silty SAND 26" Poorly graded SAND with trace gravel, dry			
6 7 8 9 10	S2			60"/56"	Brown to tan, poorly graded SAND with trace gravel, and oxidized layer, dry			
11 12 13 14 15	S3			60"/44"	Brown, poorly graded SAND with trace gravel, dry			
16 17 18 19 20								

NOTES:

GW not observed

LEGEND

S - Split Spoon Sample	O/A - Sample Collected Off the Augers
UT - Undisturbed Tube Sample	
Trace - Approximately 0 to 10%	Some - Approximately 20 to 35%
Little - Approximately 10 to 20%	And - Approximately 35 to 50%
0-4 Coarse Soil N Value - Very Loose	11-30 Coarse Soil N Value - Medium Dense
5-10 Coarse Soil N Value - Loose	31-50 Coarse Soil N Value - Dense
0-2 Fine Soil N Value - Very Soft	4-8 Fine Soil N Value - Medium Stiff
2-4 Fine Soil N Value - Soft	8-15 Fine Soil N Value - Stiff

BORING LOG

Project: Sea Street Pump Station Force Main No. 3

Location: Nantucket, MA

Client: Town of Nantucket

Driller: Crawford Drilling Services

Drilling Methods: Geoprobe

Weather: Sunny 60s

Performed By: SJG Date: 11/11/20

Checked By: ZFK Date: 12/16/20

Sea Street Pump Station Force Main No. 3

SEE SITE PLAN

Boring Locus Map

Boring No.: **B-118**

Location: See Plan

Approx. Ground Elevation:

Approx. Groundwater Elevation:

Date/Time of GW EL.

Datum: NAVD88

Project No. 360-2001

Depth (feet)	*Sample No.*	*Blows per 6-inch*	*SPT Value*	*Pen./ Rec.*	*Soil Description*		*Stratum Change Depth (feet)*	*Note No.*
1 2 3 4 5	S1			60"/55"	3" Asphalt 36" Brown, silty SAND with trace gravel, dry 16" Brown, fine to med SAND with trace gravel, dry			
6 7 8 9 10	S2			60"/56"	Brown to orange poorly graded SAND with trace gravel, dry			
11 12 13 14 15	S3			60"/41"	Tan, poorly graded SAND with trace gravel, dry			
16 17 18 19 20								

NOTES:

GW not observed

LEGEND

S - Split Spoon Sample	O/A - Sample Collected Off the Augers
UT - Undisturbed Tube Sample	
Trace - Approximately 0 to 10%	Some - Approximately 20 to 35%
Little - Approximately 10 to 20%	And - Approximately 35 to 50%
0-4 Coarse Soil N Value - Very Loose	11-30 Coarse Soil N Value - Medium Dense
5-10 Coarse Soil N Value - Loose	31-50 Coarse Soil N Value - Dense
0-2 Fine Soil N Value - Very Soft	4-8 Fine Soil N Value - Medium Stiff
2-4 Fine Soil N Value - Soft	8-15 Fine Soil N Value - Stiff

BORING LOG

Project: Sea Street Pump Station Force Main No. 3

Location: Nantucket, MA

Client: Town of Nantucket

Driller: Crawford Drilling Services

Drilling Methods: Geoprobe

Weather: Sunny 60s

Performed By: SJG Date: 11/11/20

Checked By: ZFK Date: 12/16/20

Sea Street Pump Station Force Main No. 3

SEE SITE PLAN

Boring Locus Map

Boring No.: **B-119**

Location: See Plan

Approx. Ground Elevation:

Approx. Groundwater Elevation:

Date/Time of GW EL.

Datum: NAVD88

Project No. 360-2001

Depth (feet)	*Sample No.*	*Blows per 6-inch*	*SPT Value*	*Pen./ Rec.*	*Soil Description*		*Stratum Change Depth (feet)*	*Note No.*
1 2 3 4 5	S1			60"/50"	13" Asphalt 16" Brown, silty SAND, dry 31" Brown, poorly graded SAND with trace gravel, dry			
6 7 8 9 10	S2			60"/57"	17" Brown, fine to med SAND, dry 40" Brown/orange, poorly graded SAND with trace gravel, dry			
11 12 13 14 15	S3			60"/43"	Tan, poorly graded SAND, dry			
16 17 18 19 20								

NOTES:

GW not observed

LEGEND

S - Split Spoon Sample	O/A - Sample Collected Off the Augers
UT - Undisturbed Tube Sample	
Trace - Approximately 0 to 10%	Some - Approximately 20 to 35%
Little - Approximately 10 to 20%	And - Approximately 35 to 50%
0-4 Coarse Soil N Value - Very Loose	11-30 Coarse Soil N Value - Medium Dense
5-10 Coarse Soil N Value - Loose	31-50 Coarse Soil N Value - Dense
0-2 Fine Soil N Value - Very Soft	4-8 Fine Soil N Value - Medium Stiff
2-4 Fine Soil N Value - Soft	8-15 Fine Soil N Value - Stiff

BORING LOG

Project: Sea Street Pump Station Force Main No. 3

Location: Nantucket, MA

Client: Town of Nantucket

Driller: Crawford Drilling Services

Drilling Methods: Geoprobe

Weather: Sunny 60s

Performed By: SJG Date: 11/11/20

Checked By: ZFK Date: 12/16/20

Sea Street Pump Station Force Main No. 3

SEE SITE PLAN

Boring Locus Map

Boring No.: **B-120**

Location: See Plan

Approx. Ground Elevation:

Approx. Groundwater Elevation:

Date/Time of GW EL.

Datum: NAVD88

Project No. 360-2001

Depth (feet)	*Sample No.*	*Blows per 6-inch*	*SPT Value*	*Pen./ Rec.*	*Soil Description*		*Stratum Change Depth (feet)*	*Note No.*
1 2 3 4 5	S1			60"/43"	2" Asphalt 12" Brown, silty SAND, dry 29" Brown, fine to med SAND with trace gravel, dry			
6 7 8 9 10	S2			60"/47"	Brown, poorly graded SAND with gravel, dry			
11 12 13 14 15	S3			60"/34"	Tan, poorly graded SAND with trace gravel, dry			
16 17 18 19 20								

NOTES:

GW not observed

LEGEND

S - Split Spoon Sample	O/A - Sample Collected Off the Augers
UT - Undisturbed Tube Sample	
Trace - Approximately 0 to 10%	Some - Approximately 20 to 35%
Little - Approximately 10 to 20%	And - Approximately 35 to 50%
0-4 Coarse Soil N Value - Very Loose	11-30 Coarse Soil N Value - Medium Dense
5-10 Coarse Soil N Value - Loose	31-50 Coarse Soil N Value - Dense
0-2 Fine Soil N Value - Very Soft	4-8 Fine Soil N Value - Medium Stiff
2-4 Fine Soil N Value - Soft	8-15 Fine Soil N Value - Stiff

BORING LOG

Project: Sea Street Pump Station Force Main No. 3

Location: Nantucket, MA

Client: Town of Nantucket

Driller: Crawford Drilling Services

Drilling Methods: Geoprobe

Weather: Sunny 50s

Performed By: SJG Date: 11/16/20

Checked By: ZFK Date: 12/16/20

Sea Street Pump Station Force Main No. 3

SEE SITE PLAN

Boring Locus Map

Boring No.: **B-121**

Location: See Plan

Approx. Ground Elevation:

Approx. Groundwater Elevation:

Date/Time of GW EL.

Datum: NAVD88

Project No. 360-2001

Depth (feet)	*Sample No.*	*Blows per 6-inch*	*SPT Value*	*Pen./ Rec.*	*Soil Description*		*Stratum Change Depth (feet)*	*Note No.*
1 2 3 4 5	S1			60"/50"	3" Asphalt 26" Brown, silty SAND, dry 21" Tan, fine SAND, dry			
6 7 8 9 10	S2			60"/54"	Brown to tan poorly graded SAND with trace silt and gravel, dry			
11 12 13 14 15	S3			60"/42"	Tan, fine to med SAND with trace gravel, dry			
16 17 18 19 20								

NOTES:

GW not observed

LEGEND

S - Split Spoon Sample	O/A - Sample Collected Off the Augers
UT - Undisturbed Tube Sample	
Trace - Approximately 0 to 10%	Some - Approximately 20 to 35%
Little - Approximately 10 to 20%	And - Approximately 35 to 50%
0-4 Coarse Soil N Value - Very Loose	11-30 Coarse Soil N Value - Medium Dense
5-10 Coarse Soil N Value - Loose	31-50 Coarse Soil N Value - Dense
0-2 Fine Soil N Value - Very Soft	4-8 Fine Soil N Value - Medium Stiff
2-4 Fine Soil N Value - Soft	8-15 Fine Soil N Value - Stiff

BORING LOG

Project: Sea Street Pump Station Force Main No. 3

Location: Nantucket, MA

Client: Town of Nantucket

Driller: Crawford Drilling Services

Drilling Methods: Geoprobe

Weather: Sunny 50

Performed By: SJG Date: 11/16/20

Checked By: ZFK Date: 12/16/20

Sea Street Pump Station Force Main No. 3

SEE SITE PLAN

Boring Locus Map

Boring No.: **B-122**

Location: See Plan

Approx. Ground Elevation:

Approx. Groundwater Elevation:

Date/Time of GW EL.

Datum: NAVD88

Project No. 360-2001

Depth (feet)	*Sample No.*	*Blows per 6-inch*	*SPT Value*	*Pen./ Rec.*	*Soil Description*		*Stratum Change Depth (feet)*	*Note No.*
1 2 3 4 5	S1			60"/54"	2" Asphalt 17" Brown, silty SAND, dry 35" Tan, fine SAND, dry			
6 7 8 9 10	S2			60"/60"	Brown/tan poorly graded SAND, dry	SP		
11 12 13 14 15	S3			60"/39"	Brown/tan poorly graded SAND with trace gravel, dry			
16 17 18 19 20								

NOTES:

GW not observed

LEGEND

S - Split Spoon Sample O/A - Sample Collected Off the Augers

UT - Undisturbed Tube Sample

Trace - Approximately 0 to 10% Some - Approximately 20 to 35%

Little - Approximately 10 to 20% And - Approximately 35 to 50%

0-4 Coarse Soil N Value - Very Loose 11-30 Coarse Soil N Value - Medium Dense

5-10 Coarse Soil N Value - Loose 31-50 Coarse Soil N Value - Dense

0-2 Fine Soil N Value - Very Soft 4-8 Fine Soil N Value - Medium Stiff

2-4 Fine Soil N Value - Soft 8-15 Fine Soil N Value - Stiff

BORING LOG

Project: Sea Street Pump Station Force Main No. 3

Location: Nantucket, MA

Client: Town of Nantucket

Driller: Crawford Drilling Services

Drilling Methods: Geoprobe

Weather: Sunny 50s

Performed By: SJG Date: 11/16/20

Checked By: ZFK Date: 12/16/20

Sea Street Pump Station Force Main No. 3

SEE SITE PLAN

Boring Locus Map

Boring No.: **B-123**

Location: See Plan

Approx. Ground Elevation:

Approx. Groundwater Elevation:

Date/Time of GW EL.

Datum: NAVD88

Project No. 360-2001

Depth (feet)	*Sample No.*	*Blows per 6-inch*	*SPT Value*	*Pen./ Rec.*	*Soil Description*		*Stratum Change Depth (feet)*	*Note No.*
1 2 3 4 5	S1			60"/53"	2" Asphalt 21" Brown, silty SAND, dry 35" Brown, fine to med SAND with trace gravel, dry			
6 7 8 9 10	S2			60"/39"	Tan, fine to med SAND with trace gravel, dry			
11 12 13 14 15	S3			60"/38"	Tan, poorly graded SAND with trace gravel, dry			
16 17 18 19 20								

NOTES:

GW not observed

LEGEND

S - Split Spoon Sample	O/A - Sample Collected Off the Augers
UT - Undisturbed Tube Sample	
Trace - Approximately 0 to 10%	Some - Approximately 20 to 35%
Little - Approximately 10 to 20%	And - Approximately 35 to 50%
0-4 Coarse Soil N Value - Very Loose	11-30 Coarse Soil N Value - Medium Dense
5-10 Coarse Soil N Value - Loose	31-50 Coarse Soil N Value - Dense
0-2 Fine Soil N Value - Very Soft	4-8 Fine Soil N Value - Medium Stiff
2-4 Fine Soil N Value - Soft	8-15 Fine Soil N Value - Stiff

BORING LOG

Project: Sea Street Pump Station Force Main No. 3

Location: Nantucket, MA

Client: Town of Nantucket

Driller: Crawford Drilling Services

Drilling Methods: Geoprobe

Weather: Sunny 50s

Performed By: SJG Date: 11/17/20

Checked By: ZFK Date: 12/16/20

Sea Street Pump Station Force Main No. 3

SEE SITE PLAN

Boring Locus Map

Boring No.: **B-124**

Location: See Plan

Approx. Ground Elevation:

Approx. Groundwater Elevation:

Date/Time of GW EL.

Datum: NAVD88

Project No. 360-2001

Depth (feet)	*Sample No.*	*Blows per 6-inch*	*SPT Value*	*Pen./ Rec.*	*Soil Description*		*Stratum Change Depth (feet)*	*Note No.*
1 2 3 4 5	S1			60"/46"	2" Asphalt 10" Brown, silty SAND with trace gravel, dry 34" Brown, poorly graded SAND with trace gravel, dry			
6 7 8 9 10	S2			60"/53"	Tan, fine to med SAND with trace gravel, dry			
11 12 13 14 15	S3			60"/40"	Tan, poorly graded SAND with trace gravel and oxidized layers, dry			
16 17 18 19 20								

NOTES:

GW not observed

LEGEND

S - Split Spoon Sample	O/A - Sample Collected Off the Augers
UT - Undisturbed Tube Sample	
Trace - Approximately 0 to 10%	Some - Approximately 20 to 35%
Little - Approximately 10 to 20%	And - Approximately 35 to 50%
0-4 Coarse Soil N Value - Very Loose	11-30 Coarse Soil N Value - Medium Dense
5-10 Coarse Soil N Value - Loose	31-50 Coarse Soil N Value - Dense
0-2 Fine Soil N Value - Very Soft	4-8 Fine Soil N Value - Medium Stiff
2-4 Fine Soil N Value - Soft	8-15 Fine Soil N Value - Stiff

BORING LOG

Project: Sea Street Pump Station Force Main No. 3

Location: Nantucket, MA

Client: Town of Nantucket

Driller: Crawford Drilling Services

Drilling Methods: Geoprobe

Weather: Sunny 50s

Performed By: SJG Date: 11/16/20

Checked By: ZFK Date: 12/16/20

Sea Street Pump Station Force Main No. 3

SEE SITE PLAN

Boring Locus Map

Boring No.: **B-125**

Location: See Plan

Approx. Ground Elevation:

Approx. Groundwater Elevation:

Date/Time of GW EL.

Datum: NAVD88

Project No. 360-2001

Depth (feet)	*Sample No.*	*Blows per 6-inch*	*SPT Value*	*Pen./ Rec.*	*Soil Description*		*Stratum Change Depth (feet)*	*Note No.*
1 2 3 4 5	S1			60"/49"	2" Asphalt 22" Brown, silty SAND, dry 2" Cored cobble 34" Brown, poorly graded SAND with trace gravel, rock fragment, dry			
6 7 8 9 10	S2			60"/34"	16" Brown, poorly graded SAND, dry 18" Brown, poorly graded SAND, dry	SP		
11 12 13 14 15	S3			60"/37"	Tan, poorly graded SAND with trace gravel and oxidation layers, dry			
16 17 18 19 20								

NOTES:

GW not observed

LEGEND

S - Split Spoon Sample	O/A - Sample Collected Off the Augers
UT - Undisturbed Tube Sample	
Trace - Approximately 0 to 10%	Some - Approximately 20 to 35%
Little - Approximately 10 to 20%	And - Approximately 35 to 50%
0-4 Coarse Soil N Value - Very Loose	11-30 Coarse Soil N Value - Medium Dense
5-10 Coarse Soil N Value - Loose	31-50 Coarse Soil N Value - Dense
0-2 Fine Soil N Value - Very Soft	4-8 Fine Soil N Value - Medium Stiff
2-4 Fine Soil N Value - Soft	8-15 Fine Soil N Value - Stiff

BORING LOG

Project: Sea Street Pump Station Force Main No. 3

Location: Nantucket, MA

Client: Town of Nantucket

Driller: Crawford Drilling Services

Drilling Methods: Geoprobe

Weather: Sunny 50

Performed By: SJG Date: 11/16/20

Checked By: ZFK Date: 12/16/20

Sea Street Pump Station Force Main No. 3

SEE SITE PLAN

Boring Locus Map

Boring No.: **B-126**

Location: See Plan

Approx. Ground Elevation:

Approx. Groundwater Elevation:

Date/Time of GW EL.

Datum: NAVD88

Project No. 360-2001

Depth (feet)	*Sample No.*	*Blows per 6-inch*	*SPT Value*	*Pen./ Rec.*	*Soil Description*		*Stratum Change Depth (feet)*	*Note No.*
1 2 3 4 5	S1			60"/48"	2" Asphalt 14" Brown, silty SAND, dry 32" Brown, poorly graded SAND with trace gravel, dry			
6 7 8 9 10	S2			60"/42"	Brown, poorly graded SAND with trace silt, dry			
11 12 13 14 15	S3			60"/32"	Tan, poorly graded SAND with trace gravel and oxidation layers, dry			
16 17 18 19 20								

NOTES:

GW not observed

LEGEND

S - Split Spoon Sample	O/A - Sample Collected Off the Augers
UT - Undisturbed Tube Sample	
Trace - Approximately 0 to 10%	Some - Approximately 20 to 35%
Little - Approximately 10 to 20%	And - Approximately 35 to 50%
0-4 Coarse Soil N Value - Very Loose	11-30 Coarse Soil N Value - Medium Dense
5-10 Coarse Soil N Value - Loose	31-50 Coarse Soil N Value - Dense
0-2 Fine Soil N Value - Very Soft	4-8 Fine Soil N Value - Medium Stiff
2-4 Fine Soil N Value - Soft	8-15 Fine Soil N Value - Stiff

BORING LOG

Project: Sea Street Pump Station Force Main No. 3

Location: Nantucket, MA

Client: Town of Nantucket

Driller: Crawford Drilling Services

Drilling Methods: Geoprobe

Weather: Sunny 50s

Performed By: SJG Date: 11/16/20

Checked By: ZFK Date: 12/16/20

Sea Street Pump Station Force Main No. 3

SEE SITE PLAN

Boring Locus Map

Boring No.: **B-127**

Location: See Plan

Approx. Ground Elevation:

Approx. Groundwater Elevation:

Date/Time of GW EL.

Datum: NAVD88

Project No. 360-2001

Depth (feet)	*Sample No.*	*Blows per 6-inch*	*SPT Value*	*Pen./ Rec.*	*Soil Description*		*Stratum Change Depth (feet)*	*Note No.*
1 2 3 4 5	S1			60"/55"	2" Asphalt 33" Brown, silty SAND with trace gravel, dry 20" Brown, poorly graded SAND with trace gravel, dry			
6 7 8 9 10	S2			60"/40"	Tan to Brown, poorly graded SAND with trace gravel, dry			
11 12 13 14 15	S3			60"/40"	Tan, poorly graded SAND with trace gravel and oxidation layers, dry			
16 17 18 19 20								

NOTES:

GW not observed

LEGEND

S - Split Spoon Sample	O/A - Sample Collected Off the Augers
UT - Undisturbed Tube Sample	
Trace - Approximately 0 to 10%	Some - Approximately 20 to 35%
Little - Approximately 10 to 20%	And - Approximately 35 to 50%
0-4 Coarse Soil N Value - Very Loose	11-30 Coarse Soil N Value - Medium Dense
5-10 Coarse Soil N Value - Loose	31-50 Coarse Soil N Value - Dense
0-2 Fine Soil N Value - Very Soft	4-8 Fine Soil N Value - Medium Stiff
2-4 Fine Soil N Value - Soft	8-15 Fine Soil N Value - Stiff

BORING LOG

Project: Sea Street Pump Station Force Main No. 3

Location: Nantucket, MA

Client: Town of Nantucket

Driller: Crawford Drilling Services

Drilling Methods: Geoprobe

Weather: Sunny 50s

Performed By: SJG Date: 11/16/20

Checked By: ZFK Date: 12/16/20

Sea Street Pump Station Force Main No. 3

SEE SITE PLAN

Boring Locus Map

Boring No.: **B-128**

Location: See Plan

Approx. Ground Elevation:

Approx. Groundwater Elevation:

Date/Time of GW EL.

Datum: NAVD88

Project No. 360-2001

Depth (feet)	*Sample No.*	*Blows per 6-inch*	*SPT Value*	*Pen./ Rec.*	*Soil Description*		*Stratum Change Depth (feet)*	*Note No.*
1 2 3 4 5	S1			60"/54"	4" Asphalt 24" Brown, silty SAND, dry 26" Poorly graded SAND with trace gravel and 2" cored cobble			
6 7 8 9 10	S2			60"/50"	Brown, poorly graded SAND with trace gravel			
11 12 13 14 15	S3			60"/42"	Tan, poorly graded SAND with trace gravel and oxidized layers, dry			
16 17 18 19 20								

NOTES:

GW not observed

LEGEND

S - Split Spoon Sample	O/A - Sample Collected Off the Augers
UT - Undisturbed Tube Sample	
Trace - Approximately 0 to 10%	Some - Approximately 20 to 35%
Little - Approximately 10 to 20%	And - Approximately 35 to 50%
0-4 Coarse Soil N Value - Very Loose	11-30 Coarse Soil N Value - Medium Dense
5-10 Coarse Soil N Value - Loose	31-50 Coarse Soil N Value - Dense
0-2 Fine Soil N Value - Very Soft	4-8 Fine Soil N Value - Medium Stiff
2-4 Fine Soil N Value - Soft	8-15 Fine Soil N Value - Stiff

BORING LOG

Project: Sea Street Pump Station Force Main No. 3

Location: Nantucket, MA

Client: Town of Nantucket

Driller: Crawford Drilling Services

Drilling Methods: Geoprobe

Weather: Sunny 40s

Performed By: SJG Date: 11/16/20

Checked By: ZFK Date: 12/16/20

Sea Street Pump Station Force Main No. 3

SEE SITE PLAN

Boring Locus Map

Boring No.: **B-129**

Location: See Plan

Approx. Ground Elevation:

Approx. Groundwater Elevation:

Date/Time of GW EL.

Datum: NAVD88

Project No. 360-2001

Depth (feet)	*Sample No.*	*Blows per 6-inch*	*SPT Value*	*Pen./ Rec.*	*Soil Description*		*Stratum Change Depth (feet)*	*Note No.*
1 2 3 4 5	S1			60"/52"	4" Asphalt 13" Brown, silty SAND, dry 13" Brown, poorly graded SAND with trace gravel, dry 22" Brown, fine to med SAND with trace gravel, dry			
6 7 8 9 10	S2			60"/56"	Brown, poorly graded SAND with trace gravel, dry			
11 12 13 14 15	S3			60"/43"	Tan, poorly graded SAND with trace gravel and oxidized layers, dry			
16 17 18 19 20								

NOTES:

GW not observed

LEGEND

S - Split Spoon Sample	O/A - Sample Collected Off the Augers
UT - Undisturbed Tube Sample	
Trace - Approximately 0 to 10%	Some - Approximately 20 to 35%
Little - Approximately 10 to 20%	And - Approximately 35 to 50%
0-4 Coarse Soil N Value - Very Loose	11-30 Coarse Soil N Value - Medium Dense
5-10 Coarse Soil N Value - Loose	31-50 Coarse Soil N Value - Dense
0-2 Fine Soil N Value - Very Soft	4-8 Fine Soil N Value - Medium Stiff
2-4 Fine Soil N Value - Soft	8-15 Fine Soil N Value - Stiff

BORING LOG

Project: Sea Street Pump Station Force Main No. 3

Location: Nantucket, MA

Client: Town of Nantucket

Driller: Crawford Drilling Services

Drilling Methods: Auger

Weather: Sunny 50

Performed By: SJG Date: 11/17/20

Checked By: ZFK Date: 12/16/20

Sea Street Pump Station Force Main No. 3

SEE SITE PLAN

Boring Locus Map

Boring No.: **B-130**

Location: See Plan

Approx. Ground Elevation: 20.59'

Approx. Groundwater El: possibly 3.59'

Date/Time of GW EL.

Datum: NAVD88

Project No. 360-2001

Depth (feet)	*Sample No.*	*Blows per 6-inch*	*SPT Value*	*Pen./ Rec.*	*Soil Description*		*Stratum Change Depth (feet)*	*Note No.*
1 2	S1	11 6 7 6		24"/24"	1" Asphalt Brown, silty SAND with trace gravel, dry			
3 4 5								
6 7	S2	21 30 28 23		24"/20"	Brown, poorly graded SAND with trace gravel and pulverized cobble fragments, dry			
8 9 10								
11 12	S3	2 3 1 4		24"/14"	Tan, poorly graded SAND with trace gravel, dry			
13 14 15								
16 17	S4	4 4 5 5		24"/14"	Tan, poorly graded SAND with trace gravel, possibly moist at 17'			
18 19 20								
21 22								

NOTES:

GW possibly at 17'

LEGEND

S - Split Spoon Sample	O/A - Sample Collected Off the Augers
UT - Undisturbed Tube Sample	
Trace - Approximately 0 to 10%	Some - Approximately 20 to 35%
Little - Approximately 10 to 20%	And - Approximately 35 to 50%
0-4 Coarse Soil N Value - Very Loose	11-30 Coarse Soil N Value - Medium Dense
5-10 Coarse Soil N Value - Loose	31-50 Coarse Soil N Value - Dense
0-2 Fine Soil N Value - Very Soft	4-8 Fine Soil N Value - Medium Stiff
2-4 Fine Soil N Value - Soft	8-15 Fine Soil N Value - Stiff

BORING LOG

Project: Sea Street Pump Station Force Main No. 3

Location: Nantucket, MA

Client: Town of Nantucket

Driller: Crawford Drilling Services

Drilling Methods: Geoprobe

Weather: Sunny 50

Performed By: SJG Date: 11/17/20

Checked By: ZFK Date: 12/16/20

Sea Street Pump Station Force Main No. 3

SEE SITE PLAN

Boring Locus Map

Boring No.: **B-131**

Location: See Plan

Approx. Ground Elevation:

Approx. Groundwater Elevation:

Date/Time of GW EL.

Datum: NAVD88

Project No. 360-2001

Depth (feet)	*Sample No.*	*Blows per 6-inch*	*SPT Value*	*Pen./ Rec.*	*Soil Description*		*Stratum Change Depth (feet)*	*Note No.*
1 2 3 4 5	S1			60"/51"	2" Asphalt 10" Brown, silty SAND, dry 39" Brown, fine to med SAND with trace gravel, dry			
6 7 8 9 10	S2			60"/53"	Brown, poorly graded SAND with trace gravel, dry			
11 12 13 14 15	S3			60"/41"	Tan, poorly graded SAND with trace gravel and oxidized layers, dry			
16 17 18 19 20								

NOTES:

GW not observed

LEGEND

S - Split Spoon Sample	O/A - Sample Collected Off the Augers
UT - Undisturbed Tube Sample	
Trace - Approximately 0 to 10%	Some - Approximately 20 to 35%
Little - Approximately 10 to 20%	And - Approximately 35 to 50%
0-4 Coarse Soil N Value - Very Loose	11-30 Coarse Soil N Value - Medium Dense
5-10 Coarse Soil N Value - Loose	31-50 Coarse Soil N Value - Dense
0-2 Fine Soil N Value - Very Soft	4-8 Fine Soil N Value - Medium Stiff
2-4 Fine Soil N Value - Soft	8-15 Fine Soil N Value - Stiff

BORING LOG

Project: Sea Street Pump Station Force Main No. 3

Location: Nantucket, MA

Client: Town of Nantucket

Driller: Crawford Drilling Services

Drilling Methods: Geoprobe

Weather: Sunny 50s

Performed By: SJG Date: 11/17/20

Checked By: ZFK Date: 12/16/20

Sea Street Pump Station Force Main No. 3

SEE SITE PLAN

Boring Locus Map

Boring No.: **B-132**

Location: See Plan

Approx. Ground Elevation:

Approx. Groundwater Elevation:

Date/Time of GW EL.

Datum: NAVD88

Project No. 360-2001

Depth (feet)	*Sample No.*	*Blows per 6-inch*	*SPT Value*	*Pen./ Rec.*	*Soil Description*		*Stratum Change Depth (feet)*	*Note No.*
1 2 3 4 5	S1			60"/53"	40" Dark Brown, poorly graded SAND with trace silt, dry 13" Brown, silty SAND, dry			
6 7 8 9 10	S2			60"/42"	Brown, poorly graded SAND, dry	SP		
11 12 13 14 15	S3			60"/41"	Tan, poorly graded SAND with trace gravel, dry			
16 17 18 19 20								

NOTES:

GW not observed

LEGEND

S - Split Spoon Sample O/A - Sample Collected Off the Augers

UT - Undisturbed Tube Sample

Trace - Approximately 0 to 10% Some - Approximately 20 to 35%

Little - Approximately 10 to 20% And - Approximately 35 to 50%

0-4 Coarse Soil N Value - Very Loose 11-30 Coarse Soil N Value - Medium Dense

5-10 Coarse Soil N Value - Loose 31-50 Coarse Soil N Value - Dense

0-2 Fine Soil N Value - Very Soft 4-8 Fine Soil N Value - Medium Stiff

2-4 Fine Soil N Value - Soft 8-15 Fine Soil N Value - Stiff

ATTACHMENT D

Laboratory Analysis

THIELSCH ENGINEERING
14 Rocsam Park Road
Braintree, MA 02184
Phone: (781)-848-5184
Fax: (401)-467-2398
thielsch.com
Let's Build a Solid Foundation

Client Information:
Environmental Partners
Quincy, MA
PM: Not Provided
Assigned By: SJG
Collected By: SJG

Project Information:
Sea Street PS FM No. 3
Nantucket, MA
TEI Project Number: 74-20-0002.179
Summary Page: 1 of 3
Report Date: 12.10.2020

LABORATORY TESTING DATA SHEET, Report No. 7420-M-B006

Boring ID	Sample No.	Depth (ft)	Laboratory No.	Identification Tests								Proctor / CBR / Permeability Tests								Laboratory Log and Soil Description
				As Received Water Content %	LL %	PL %	Gravel %	Sand %	Fines %	Org. %	G_s	Dry unit wt. pcf	Test Water Content %	γ_d MAX (pcf) W_{opt} (%)	γ_d MAX (pcf) W_{opt} (%) (Corr.)	Target Test Setup as % of Proctor	CBR @ 0.1"	CBR @ 0.2"	Perme-ability cm/sec	
				D2216	D4318		D6913			D2874	D854			D1557						
B-76	S-2	5-10	20-S-B354				3.6	92.8	3.6											Light Brown poorly graded sand (SP)
B-79	S-2	5-10	20-S-B355				8.2	90.9	0.9											Light Brown poorly graded sand (SP)
B-82	S-2	5-10	20-S-B356				2.1	96.7	1.2											Light Brown poorly graded sand (SP)
B-84	S-2	5-10	20-S-B357				3.2	93.8	3.0											Light Brown poorly graded sand (SP)
B-86	S-2	5-10	20-S-B358				5.3	89.1	5.6											Light Brown poorly graded sand with silt (SP-SM)
B-88	S-2	5-10	20-S-B359				1.1	45.5	53.4											Light Brown sandy silt (ML)
B-90	S-2	5-10	20-S-B360				1.0	94.4	4.6											Light Brown poorly graded sand (SP)
B-92	S-2	5-10	20-S-B361				6.9	81.7	11.4											Brown poorly graded sand with silt (SP-SM)
B-94	S-2	5-10	20-S-B362				4.1	91.4	4.5											Light Brown poorly graded sand (SP)
B-98	S-2	5-10	20-S-B363				2.6	83.3	14.1											Brown silty sand (SM)

Date Received *12.02.2020*

Reviewed By: Ronald LeBlanc

Date Reviewed: *12.10.2020*

THIELSCH ENGINEERING
14 Rocsam Park Road
Braintree, MA 02184
Phone: (781)-848-5184
Fax: (401)-467-2398
thielsch.com
Let's Build a Solid Foundation

Client Information:
Environmental Partners
Quincy, MA
PM: Not Provided
Assigned By: SJG
Collected By: SJG

Project Information:
Sea Street PS FM No. 3
Nantucket, MA
TEI Project Number: 74-20-0002.179
Summary Page: 2 of 3
Report Date: 12.10.2020

LABORATORY TESTING DATA SHEET, Report No. 7420-M-B006

Boring ID	Sample No.	Depth (ft)	Laboratory No.	Identification Tests								Proctor / CBR / Permeability Tests								Laboratory Log and Soil Description
				As Received Water Content %	LL %	PL %	Gravel %	Sand %	Fines %	Org. %	G_s	Dry unit wt. pcf	Test Water Content %	γ_d MAX (pcf) W_{opt} (%)	γ_d MAX (pcf) W_{opt} (%) (Corr.)	Target Test Setup as % of Proctor	CBR @ 0.1"	CBR @ 0.2"	Perme-ability cm/sec	
				D2216	D4318		D6913			D2874	D854			D1557						
B-1/MW-1	S-2	5-7	20-S-B364				0.0	94.9	5.1											Brown poorly graded sand with silt (SP-SM)
B-1/MW-1	S-3	10-12	20-S-B365				11.2	87.4	1.4											Light Brown poorly graded sand (SP)
B-21	S-2	5-7	20-S-B366				3.4	94.5	2.1											Light Brown poorly graded sand (SP)
B-22	S-2	5-7	20-S-B367				0.8	87.1	12.1											Light Brown silty sand (SM)
B-23	S-2	5-10	20-S-B368				0.2	24.8	75.0											Brown-Grey clay with sand (CL)
B-24	S-2	5-10	20-S-B369				0.5	41.9	57.6											Brown-Grey sandy clay (CL)
B-25/MW-2	S-2	5-10	20-S-B370				0.2	57.5	42.3											Brown-Grey clayey sand (SC)
B-38	S-2	5-10	20-S-B371				1.6	94.1	4.3											Light Brown poorly graded sand (SP)
B-44	S-2	5-10	20-S-B372				2.4	94.3	3.3											Light Brown poorly graded sand (SP)
B-52	S-1	0-5	20-S-B373				0.2	85.3	14.5											Brown-Orange silty sand (SM)
B-61/MW-3	S-2	5-10	20-S-B374				0.4	79.8	19.8											Light Brown-Orange silty sand (SM)
B-61/MW-3	S-3	10-15	20-S-B375				0.0	78.7	21.3											Light Brown silty sand (SM)

Date Received *12.02.2020*

Reviewed By: Ronelle L. Blanc

Date Reviewed: *12.10.2020*

THIELSCH ENGINEERING
14 Rocsam Park Road
Braintree, MA 02184
Phone: (781)-848-5184
Fax: (401)-467-2398
thielsch.com
Let's Build a Solid Foundation

Client Information:
Environmental Partners
Quincy, MA
PM: Not Provided
Assigned By: SJG
Collected By: SJG

Project Information:
Sea Street PS FM No. 3
Nantucket, MA
TEI Project Number: 74-20-0002.179
Summary Page: 3 of 3
Report Date: 12.10.2020

LABORATORY TESTING DATA SHEET, Report No. 7420-M-B006

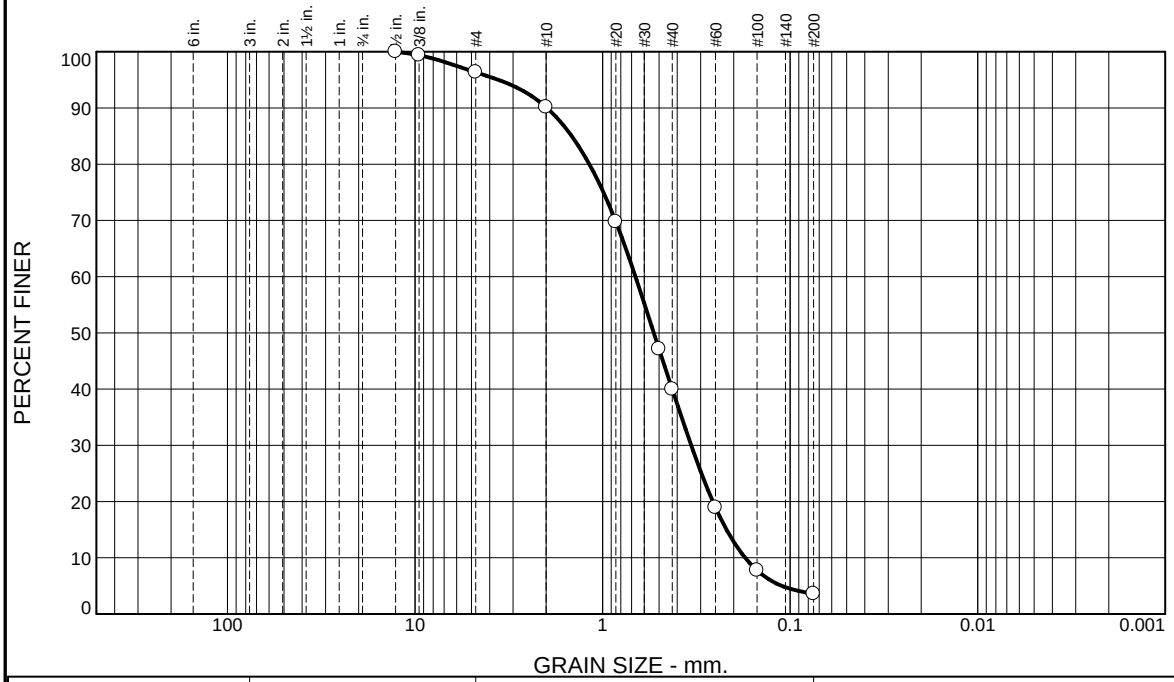
Boring ID	Sample No.	Depth (ft)	Laboratory No.	Identification Tests								Proctor / CBR / Permeability Tests								Laboratory Log and Soil Description
				As Received Water Content %	LL %	PL %	Gravel %	Sand %	Fines %	Org. %	G_s	Dry unit wt. pcf	Test Water Content %	γ_d MAX (pcf) W_{opt} (%)	γ_d MAX (pcf) W_{opt} (%) (Corr.)	Target Test Setup as % of Proctor	CBR @ 0.1"	CBR @ 0.2"	Perme-ability cm/sec	
				D2216	D4318		D6913			D2874	D854			D1557						
B-100	S-1	0-5	20-S-B376				2.1	80.8	17.1											Brown silty sand (SM)
B-104	S-2	5-10	20-S-B377				0.2	96.8	3.0											Light Brown poorly graded sand (SP)
B-110	S-1	0-5	20-S-B378				4.4	86.5	9.1											Brown-Orange well-graded sand with silt (SW-SM)
B-114	S-2	5-10	20-S-B379				3.1	95.0	1.9											Light Brown-Orange poorly graded sand (SP)
B-122	S-2	5-10	20-S-B380				4.4	94.4	1.2											Light Brown poorly graded sand (SP)
B-125	S-2	5-10	20-S-B381				0.9	97.1	2.0											Light Brown poorly graded sand (SP)
B-132	S-2	5-10	20-S-B382				4.2	94.7	1.1											Light Brown-Orange poorly graded sand (SP)

Date Received *12.02.2020*

Reviewed By: Ronald LeBlanc

Date Reviewed: *12.10.2020*

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	3.6	6.2	50.2	36.4	3.6	

Test Results (D6913 & ASTM D 1140)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
1/2"	100.0		
3/8"	99.4		
#4	96.4		
#10	90.2		
#20	69.8		
#35	47.1		
#40	40.0		
#60	18.9		
#100	7.8		
#200	3.6		

* (no specification provided)

Material Description

Light Brown poorly graded sand (SP)

Atterberg Limits (ASTM D 4318)

PL= NP **LL=** NV **PI=** NP

Classification

USCS (D 2487)= SP **AASHTO (M 145)=** A-1-b

Coefficients

D_{90}= 1.9767 D_{85}= 1.4595 D_{60}= 0.6682
D_{50}= 0.5334 D_{30}= 0.3368 D_{15}= 0.2183
D_{10}= 0.1737 C_u= 3.85 C_c= 0.98

Remarks

Date Received: 12/2/2020 **Date Tested:** 12/7/2020

Tested By: CC / RL

Checked By: Christina Colman

Title: Laboratory Coordinator

Source of Sample: Boring **Depth:** 5-10' **Date Sampled:**
Sample Number: B-76 / S2

Thielsch Engineering Inc.

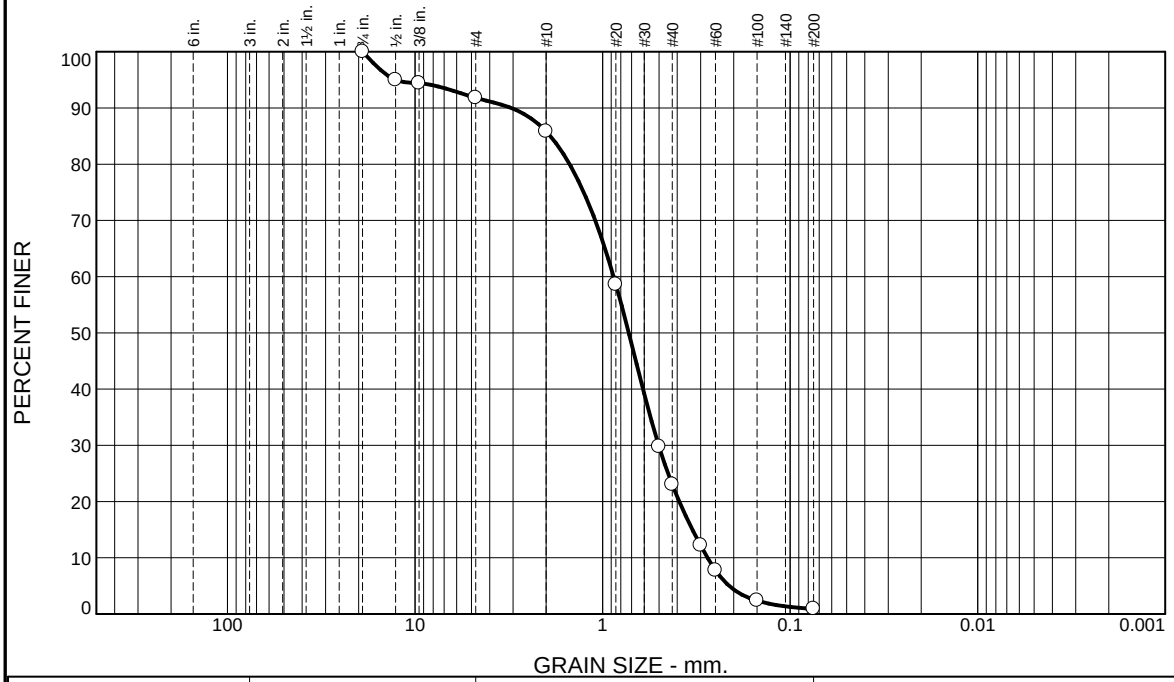
Cranston, RI

Client: Environmental Partners

Project: Sea Street PS FM No. 3
Nantucket, MA

Project No: 20-0002.179 **Figure** 20-S-B354

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	8.2	6.0	62.8	22.1	0.9	

Test Results (D6913 & ASTM D 1140)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
3/4"	100.0		
1/2"	95.0		
3/8"	94.4		
#4	91.8		
#10	85.8		
#20	58.6		
#35	29.8		
#40	23.0		
#50	12.2		
#60	7.8		
#100	2.4		
#200	0.9		

* (no specification provided)

Material Description

Light Brown poorly graded sand (SP)

Atterberg Limits (ASTM D 4318)

PL= NP **LL=** NV **PI=** NP

Classification

USCS (D 2487)= SP **AASHTO (M 145)=** A-1-b

Coefficients

D_{90}= 3.0669 D_{85}= 1.8991 D_{60}= 0.8735
D_{50}= 0.7258 D_{30}= 0.5027 D_{15}= 0.3319
D_{10}= 0.2756 C_u= 3.17 C_c= 1.05

Remarks

Date Received: 12/2/2020 **Date Tested:** 12/7/2020

Tested By: CC / RL

Checked By: Christina Colman

Title: Laboratory Coordinator

Source of Sample: Boring **Depth:** 5-10' **Date Sampled:**
Sample Number: B-79 / S2

Thielsch Engineering Inc.

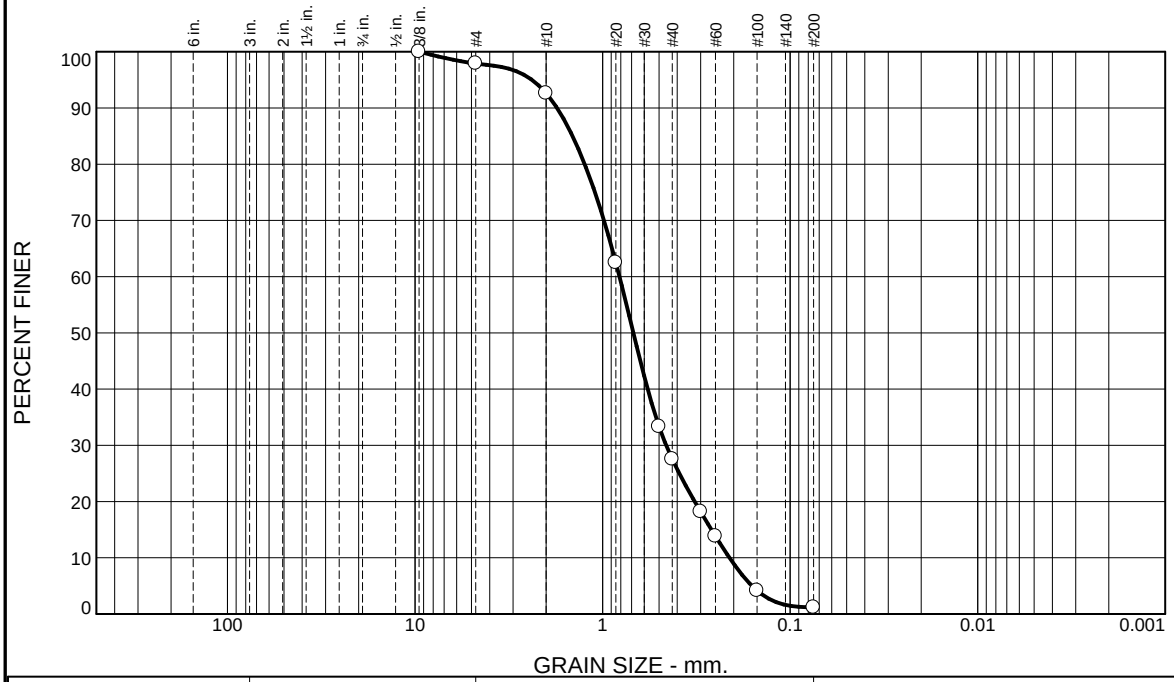
Cranston, RI

Client: Environmental Partners

Project: Sea Street PS FM No. 3
Nantucket, MA

Project No: 20-0002.179 **Figure** 20-S-B355

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	2.1	5.3	65.1	26.3	1.2	

Test Results (D6913 & ASTM D 1140)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
3/8"	100.0		
#4	97.9		
#10	92.6		
#20	62.5		
#35	33.3		
#40	27.5		
#50	18.2		
#60	13.8		
#100	4.2		
#200	1.2		

* (no specification provided)

Material Description

Light Brown poorly graded sand (SP)

Atterberg Limits (ASTM D 4318)

PL= NP **LL=** NV **PI=** NP

Classification

USCS (D 2487)= SP **AASHTO (M 145)=** A-1-b

Coefficients

D_{90}= 1.7485 D_{85}= 1.4453 D_{60}= 0.8131
D_{50}= 0.6858 D_{30}= 0.4582 D_{15}= 0.2627
D_{10}= 0.2105 C_u= 3.86 C_c= 1.23

Remarks

Date Received: 12/2/2020 **Date Tested:** 12/7/2020

Tested By: CC / RL

Checked By: Christina Colman

Title: Laboratory Coordinator

Source of Sample: Boring **Depth:** 5-10' **Date Sampled:**
Sample Number: B-82 / S2

Thielsch Engineering Inc.

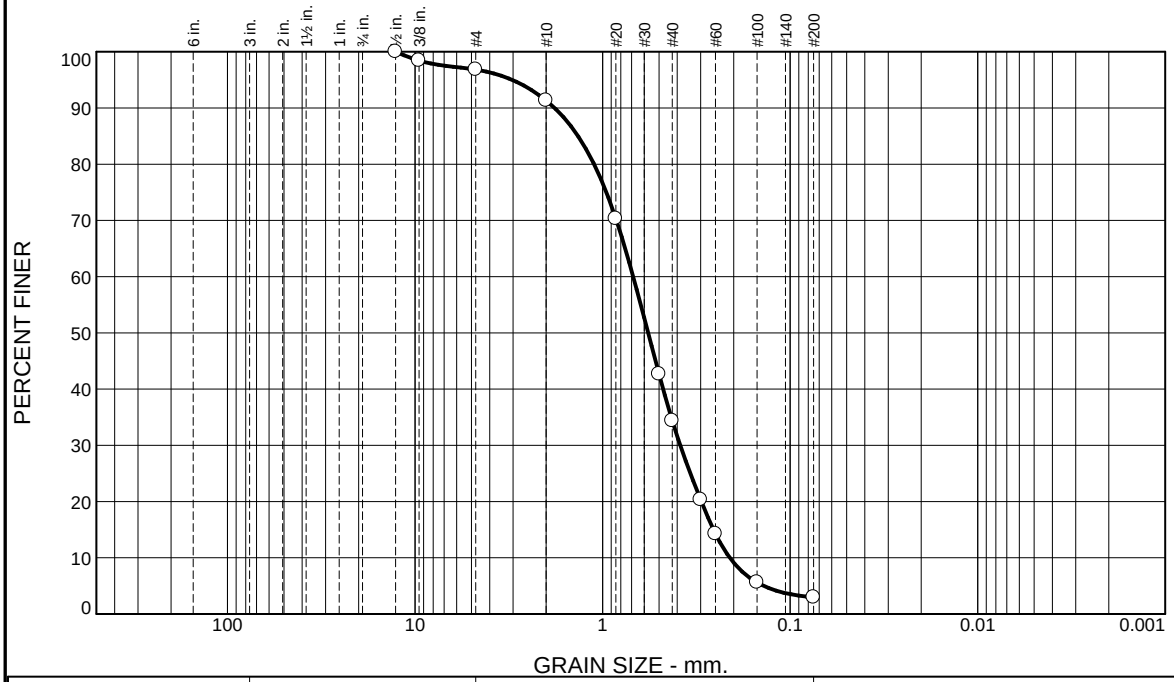
Cranston, RI

Client: Environmental Partners

Project: Sea Street PS FM No. 3
Nantucket, MA

Project No: 20-0002.179 **Figure** 20-S-B356

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	3.2	5.5	56.9	31.4	3.0	

Test Results (D6913 & ASTM D 1140)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
1/2"	100.0		
3/8"	98.4		
#4	96.8		
#10	91.3		
#20	70.3		
#35	42.7		
#40	34.4		
#50	20.3		
#60	14.2		
#100	5.6		
#200	3.0		

* (no specification provided)

Material Description

Light Brown poorly graded sand (SP)

Atterberg Limits (ASTM D 4318)

PL= NP **LL=** NV **PI=** NP

Classification

USCS (D 2487)= SP **AASHTO (M 145)=** A-1-b

Coefficients

D_{90}= 1.8025 D_{85}= 1.3511 D_{60}= 0.6873
D_{50}= 0.5716 D_{30}= 0.3856 D_{15}= 0.2564
D_{10}= 0.2098 C_u= 3.28 C_c= 1.03

Remarks

Date Received: 12/2/2020 **Date Tested:** 12/7/2020

Tested By: CC / RL

Checked By: Christina Colman

Title: Laboratory Coordinator

Source of Sample: Boring **Depth:** 5-10' **Date Sampled:**
Sample Number: B-84 / S2

Thielsch Engineering Inc.

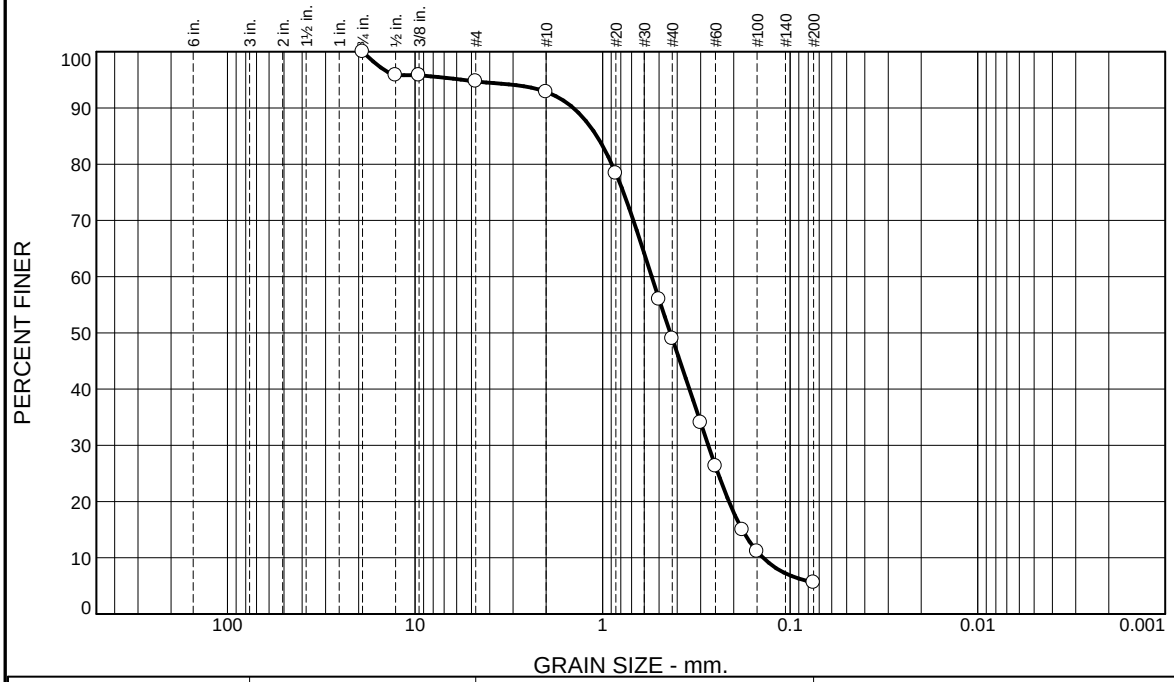
Cranston, RI

Client: Environmental Partners

Project: Sea Street PS FM No. 3
Nantucket, MA

Project No: 20-0002.179 **Figure** 20-S-B357

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	5.3	1.8	43.9	43.4	5.6	

Test Results (D6913 & ASTM D 1140)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
3/4"	100.0		
1/2"	95.8		
3/8"	95.8		
#4	94.7		
#10	92.9		
#20	78.4		
#35	56.0		
#40	49.0		
#50	34.1		
#60	26.3		
#80	15.0		
#100	11.1		
#200	5.6		

* (no specification provided)

Material Description

Light Brown poorly graded sand with silt (SP-SM)

Atterberg Limits (ASTM D 4318)

PL= NP **LL=** NV **PI=** NP

Classification

USCS (D 2487)= SP-SM **AASHTO (M 145)=** A-1-b

Coefficients

D_{90}= 1.4293 D_{85}= 1.0731 D_{60}= 0.5473
D_{50}= 0.4354 D_{30}= 0.2731 D_{15}= 0.1802
D_{10}= 0.1392 C_u= 3.93 C_c= 0.98

Remarks

Date Received: 12/2/2020 **Date Tested:** 12/7/2020

Tested By: CC / RL

Checked By: Christina Colman

Title: Laboratory Coordinator

Source of Sample: Boring **Depth:** 5-10' **Date Sampled:**
Sample Number: B-86 / S2

Thielsch Engineering Inc.

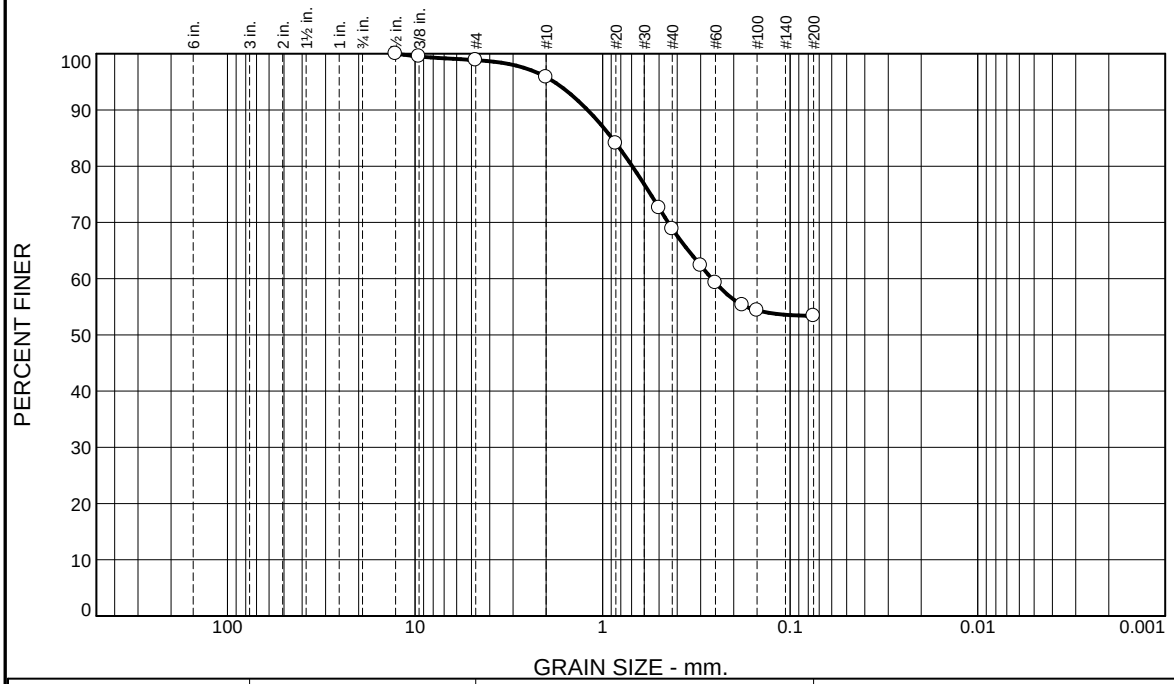
Cranston, RI

Client: Environmental Partners

Project: Sea Street PS FM No. 3
Nantucket, MA

Project No: 20-0002.179 **Figure** 20-S-B358

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	1.1	3.0	27.0	15.5	53.4	

Test Results (D6913 & ASTM D 1140)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
1/2"	100.0		
3/8"	99.5		
#4	98.9		
#10	95.9		
#20	84.1		
#35	72.6		
#40	68.9		
#50	62.4		
#60	59.3		
#80	55.3		
#100	54.4		
#200	53.4		

* (no specification provided)

Material Description

Light Brown sandy silt (ML)

Atterberg Limits (ASTM D 4318)

PL= NP **LL=** NV **PI=** NP

Classification

USCS (D 2487)= ML **AASHTO (M 145)=** A-4(0)

Coefficients

D_{90}= 1.2017 D_{85}= 0.8923 D_{60}= 0.2615
D_{50}= D_{30}= D_{15}=
D_{10}= C_u= C_c=

Remarks

Sample visually classified as non-plastic.

Date Received: 12/2/2020 **Date Tested:** 12/7/2020

Tested By: CC / RL

Checked By: Christina Colman

Title: Laboratory Coordinator

Source of Sample: Boring **Depth:** 5-10' **Date Sampled:**
Sample Number: B-88 / S2

Thielsch Engineering Inc.

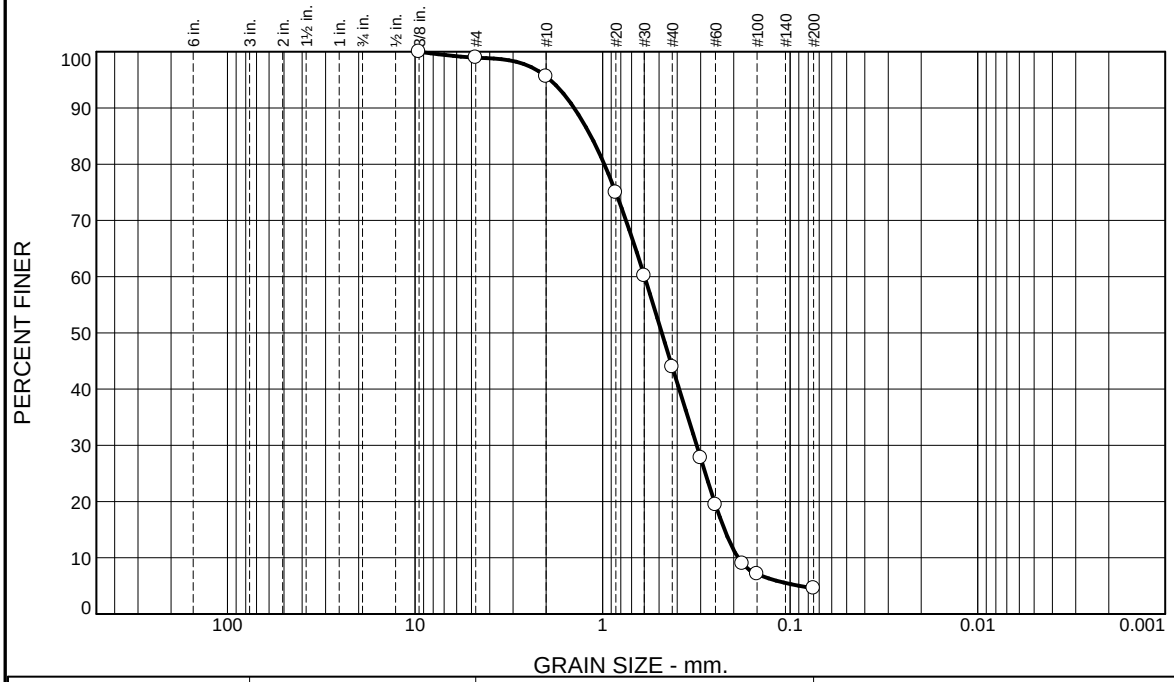
Cranston, RI

Client: Environmental Partners

Project: Sea Street PS FM No. 3
Nantucket, MA

Project No: 20-0002.179 **Figure** 20-S-B359

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	1.0	3.4	51.7	39.3	4.6	

Test Results (D6913 & ASTM D 1140)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
3/8"	100.0		
#4	99.0		
#10	95.6		
#20	75.0		
#30	60.2		
#40	43.9		
#50	27.8		
#60	19.4		
#80	9.0		
#100	7.1		
#200	4.6		

* (no specification provided)

Material Description

Light Brown poorly graded sand (SP)

Atterberg Limits (ASTM D 4318)

PL= NP **LL=** NV **PI=** NP

Classification

USCS (D 2487)= SP **AASHTO (M 145)=** A-1-b

Coefficients

D_{90}= 1.4170 D_{85}= 1.1554 D_{60}= 0.5976
D_{50}= 0.4831 D_{30}= 0.3148 D_{15}= 0.2238
D_{10}= 0.1896 C_u= 3.15 C_c= 0.87

Remarks

Date Received: 12/2/2020 **Date Tested:** 12/7/2020

Tested By: CC / RL

Checked By: Christina Colman

Title: Laboratory Coordinator

Source of Sample: Boring **Depth:** 5-10' **Date Sampled:**
Sample Number: B-90 / S2

Thielsch Engineering Inc.

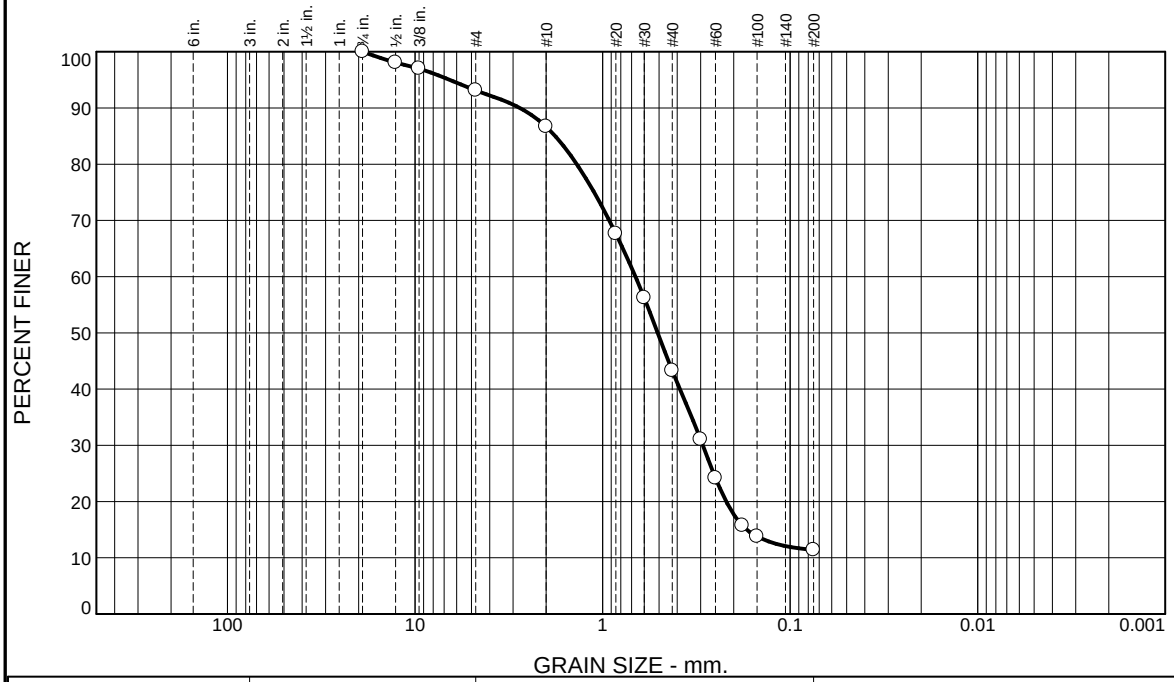
Cranston, RI

Client: Environmental Partners

Project: Sea Street PS FM No. 3
Nantucket, MA

Project No: 20-0002.179 **Figure** 20-S-B360

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	6.9	6.4	43.4	31.9	11.4	

Test Results (D6913 & ASTM D 1140)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
3/4"	100.0		
1/2"	98.1		
3/8"	97.0		
#4	93.1		
#10	86.7		
#20	67.6		
#30	56.2		
#40	43.3		
#50	31.0		
#60	24.2		
#80	15.7		
#100	13.8		
#200	11.4		

* (no specification provided)

Material Description

Brown poorly graded sand with silt (SP-SM)

Atterberg Limits (ASTM D 4318)

PL= NP **LL=** NV **PI=** NP

Classification

USCS (D 2487)= SP-SM **AASHTO (M 145)=** A-1-b

Coefficients

D_{90}= 2.7623 D_{85}= 1.7877 D_{60}= 0.6680
D_{50}= 0.5084 D_{30}= 0.2918 D_{15}= 0.1706
D_{10}= C_u= C_c=

Remarks

Date Received: 12/2/2020 **Date Tested:** 12/7/2020

Tested By: CC / RL

Checked By: Christina Colman

Title: Laboratory Coordinator

Source of Sample: Boring **Depth:** 5-10' **Date Sampled:**
Sample Number: B-92 / S2

Thielsch Engineering Inc.

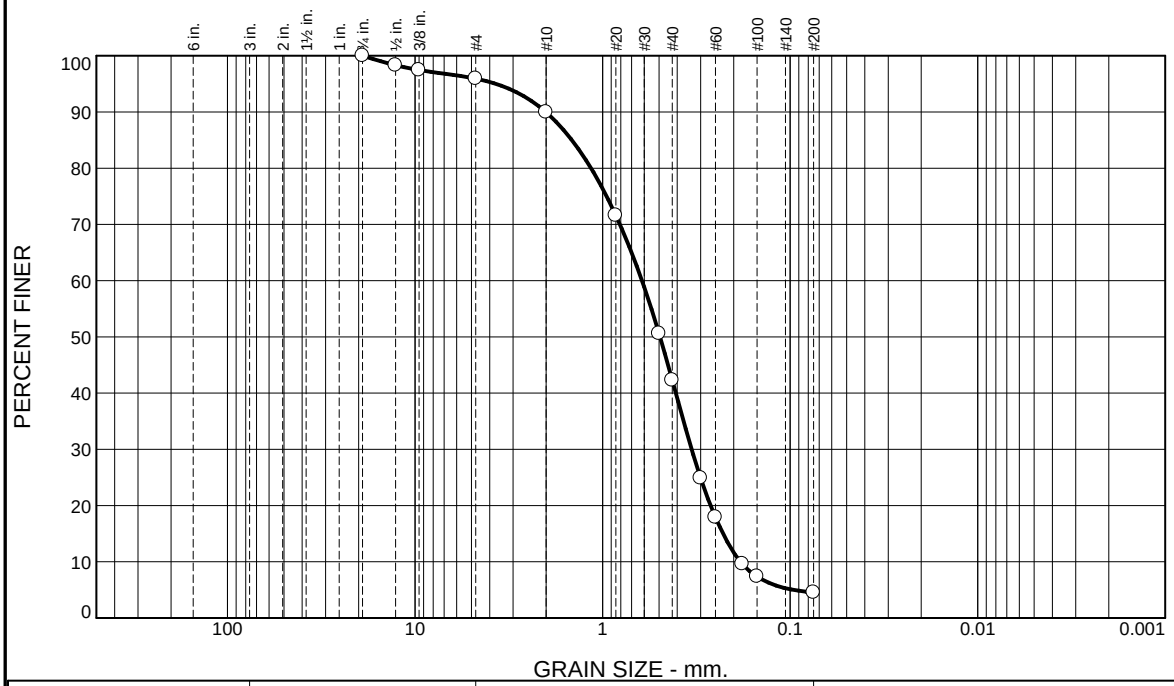
Cranston, RI

Client: Environmental Partners

Project: Sea Street PS FM No. 3
Nantucket, MA

Project No: 20-0002.179 **Figure** 20-S-B361

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	4.1	6.0	47.6	37.8	4.5	

Test Results (D6913 & ASTM D 1140)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
3/4"	100.0		
1/2"	98.3		
3/8"	97.5		
#4	95.9		
#10	89.9		
#20	71.6		
#35	50.6		
#40	42.3		
#50	24.9		
#60	17.9		
#80	9.6		
#100	7.4		
#200	4.5		

* (no specification provided)

Material Description

Light Brown poorly graded sand (SP)

Atterberg Limits (ASTM D 4318)

PL= NP **LL=** NV **PI=** NP

Classification

USCS (D 2487)= SP **AASHTO (M 145)=** A-1-b

Coefficients

D_{90}= 2.0084 D_{85}= 1.4575 D_{60}= 0.6168
D_{50}= 0.4941 D_{30}= 0.3352 D_{15}= 0.2278
D_{10}= 0.1843 C_u= 3.35 C_c= 0.99

Remarks

Date Received: 12/2/2020 **Date Tested:** 12/7/2020

Tested By: CC / RL

Checked By: Christina Colman

Title: Laboratory Coordinator

Source of Sample: Boring **Depth:** 5-10' **Date Sampled:**
Sample Number: B-94 / S2

Thielsch Engineering Inc.

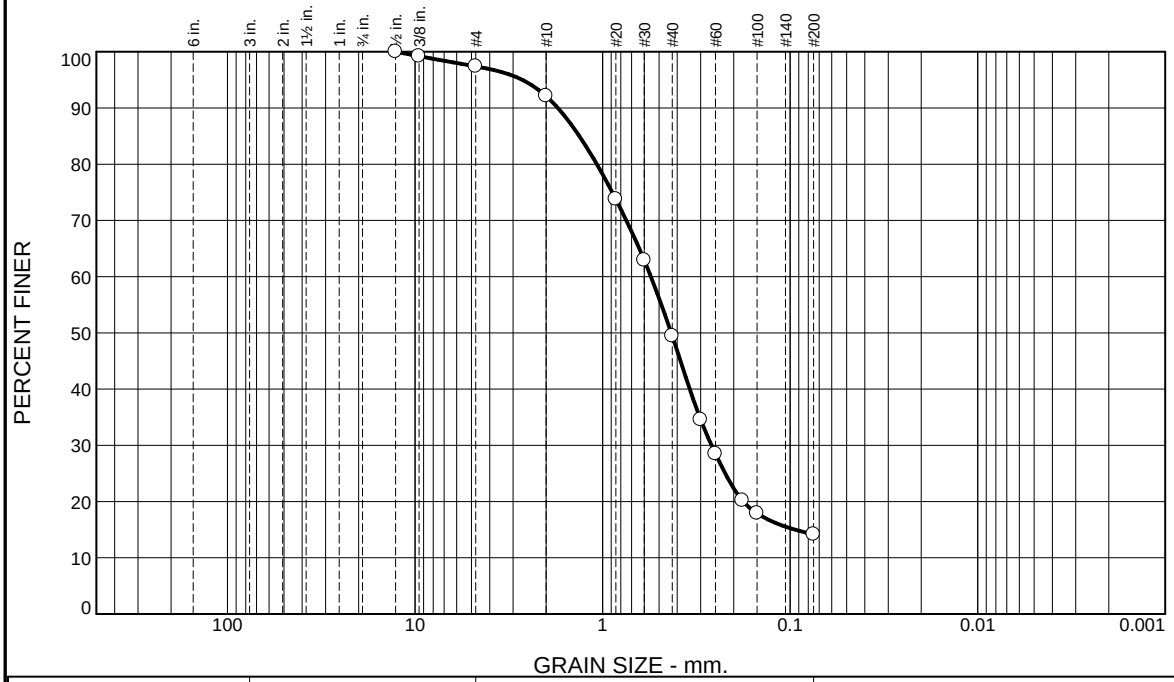
Cranston, RI

Client: Environmental Partners

Project: Sea Street PS FM No. 3
Nantucket, MA

Project No: 20-0002.179 **Figure** 20-S-B362

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	2.6	5.3	42.7	35.3	14.1	

Test Results (D6913 & ASTM D 1140)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
1/2"	100.0		
3/8"	99.2		
#4	97.4		
#10	92.1		
#20	73.8		
#30	62.9		
#40	49.4		
#50	34.6		
#60	28.5		
#80	20.2		
#100	17.9		
#200	14.1		

* (no specification provided)

Material Description

Brown silty sand (SM)

Atterberg Limits (ASTM D 4318)

PL= NP **LL=** NV **PI=** NP

Classification

USCS (D 2487)= SM **AASHTO (M 145)=** A-1-b

Coefficients

D_{90}= 1.7308 D_{85}= 1.3297 D_{60}= 0.5528
D_{50}= 0.4305 D_{30}= 0.2624 D_{15}= 0.0943
D_{10}= C_u= C_c=

Remarks

Date Received: 12/2/2020 **Date Tested:** 12/7/2020

Tested By: CC / RL

Checked By: Christina Colman

Title: Laboratory Coordinator

Source of Sample: Boring **Depth:** 5-10' **Date Sampled:**
Sample Number: B-98 / S2

Thielsch Engineering Inc.

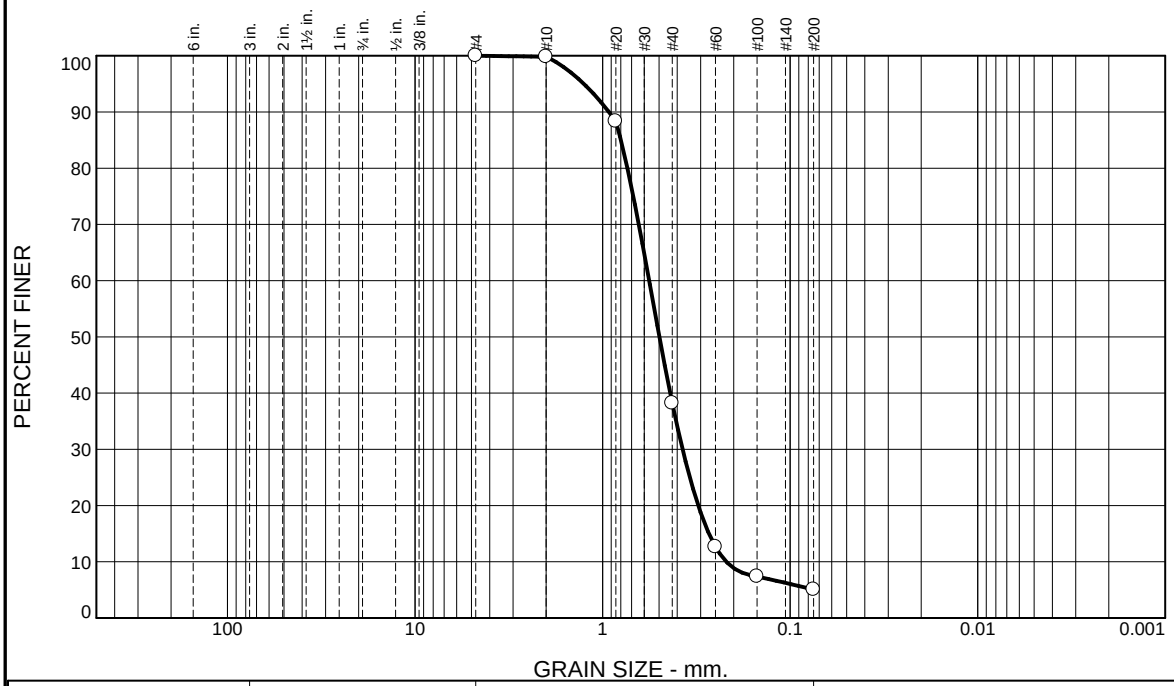
Cranston, RI

Client: Environmental Partners

Project: Sea Street PS FM No. 3
Nantucket, MA

Project No: 20-0002.179 **Figure** 20-S-B363

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.2	61.6	33.1	5.1	

Test Results (D6913 & ASTM D 1140)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
#4	100.0		
#10	99.8		
#20	88.3		
#40	38.2		
#60	12.7		
#100	7.4		
#200	5.1		

* (no specification provided)

Material Description

Brown poorly graded sand with silt (SP-SM)

Atterberg Limits (ASTM D 4318)

PL= NP **LL=** NV **PI=** NP

Classification

USCS (D 2487)= SP-SM **AASHTO (M 145)=** A-1-b

Coefficients

D_{90}= 0.9259 D_{85}= 0.7992 D_{60}= 0.5645
D_{50}= 0.4977 D_{30}= 0.3745 D_{15}= 0.2710
D_{10}= 0.2190 C_u= 2.58 C_c= 1.13

Remarks

Sample contained organic material (loam).

Date Received: 12/2/2020 **Date Tested:** 12/9/2020

Tested By: RL/RD

Checked By: Ronelle LeBlanc, E.I.T.

Title: Laboratory Coordinator

Source of Sample: Boring **Depth:** 5-7' **Date Sampled:**
Sample Number: B-1/MW-1 / S2

Thielsch Engineering Inc.

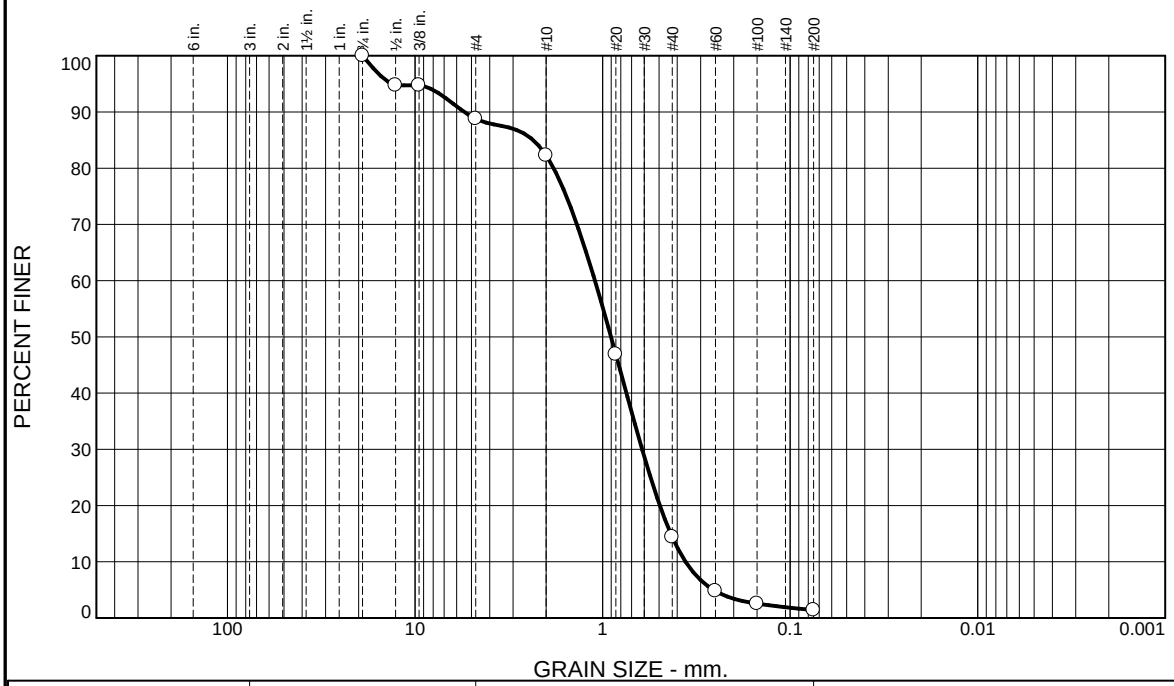
Cranston, RI

Client: Environmental Partners

Project: Sea Street PS FM No. 3
Nantucket, MA

Project No: 20-0002.179 **Figure** 20-S-B364

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	11.2	6.5	67.9	13.0	1.4	

Test Results (D6913 & ASTM D 1140)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
3/4"	100.0		
1/2"	94.7		
3/8"	94.7		
#4	88.8		
#10	82.3		
#20	46.9		
#40	14.4		
#60	4.8		
#100	2.6		
#200	1.4		

* (no specification provided)

Material Description

Light Brown poorly graded sand (SP)

Atterberg Limits (ASTM D 4318)

PL= NP **LL=** NV **PI=** NP

Classification

USCS (D 2487)= SP **AASHTO (M 145)=** A-1-b

Coefficients

D_{90}= 5.4577 D_{85}= 2.3451 D_{60}= 1.0989
D_{50}= 0.9021 D_{30}= 0.6156 D_{15}= 0.4331
D_{10}= 0.3610 C_u= 3.04 C_c= 0.96

Remarks

Date Received: 12/2/2020 **Date Tested:** 12/9/2020

Tested By: RL/RD

Checked By: Ronelle LeBlanc, E.I.T.

Title: Laboratory Coordinator

Source of Sample: Boring **Depth:** 10-12' **Date Sampled:**
Sample Number: B-1/MW-1 / S3

Thielsch Engineering Inc.

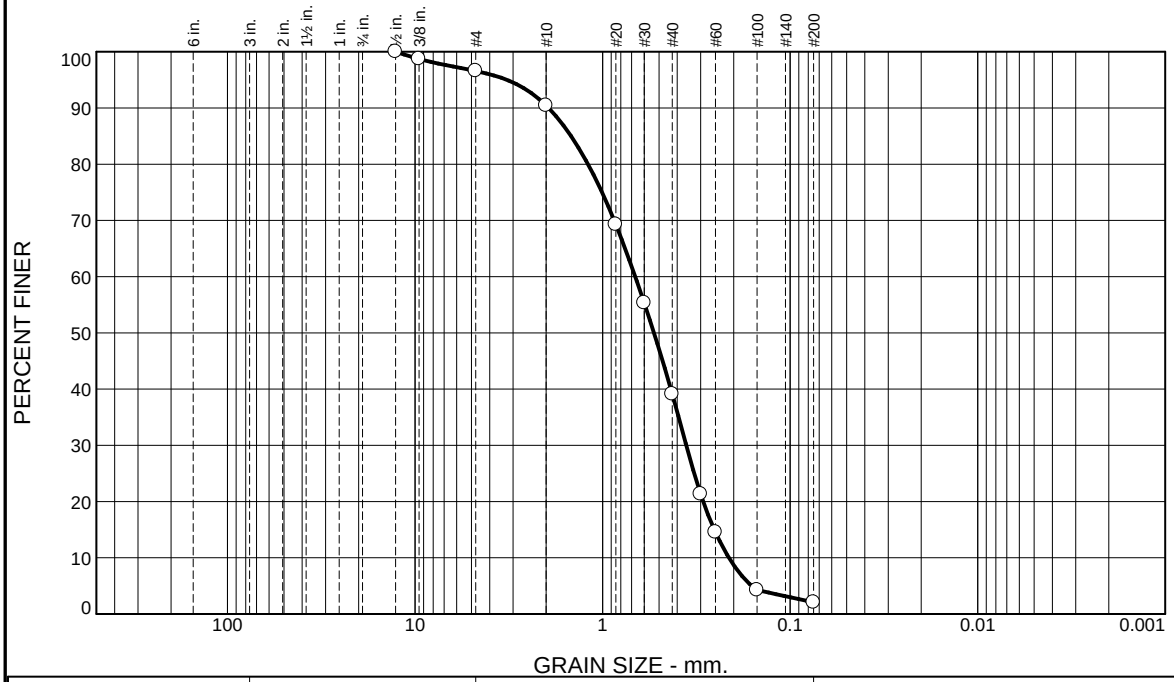
Cranston, RI

Client: Environmental Partners

Project: Sea Street PS FM No. 3
Nantucket, MA

Project No: 20-0002.179 **Figure** 20-S-B365

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	3.4	6.2	51.3	37.0	2.1	

Test Results (D6913 & ASTM D 1140)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
1/2"	100.0		
3/8"	98.7		
#4	96.6		
#10	90.4		
#20	69.3		
#30	55.3		
#40	39.1		
#50	21.3		
#60	14.5		
#100	4.3		
#200	2.1		

* (no specification provided)

Material Description

Light Brown poorly graded sand (SP)

Atterberg Limits (ASTM D 4318)

PL= NP **LL=** NV **PI=** NP

Classification

USCS (D 2487)= SP **AASHTO (M 145)=** A-1-b

Coefficients

D_{90}= 1.9392 D_{85}= 1.4718 D_{60}= 0.6700
D_{50}= 0.5322 D_{30}= 0.3580 D_{15}= 0.2537
D_{10}= 0.2120 C_u= 3.16 C_c= 0.90

Remarks

Date Received: 12/2/2020 **Date Tested:** 12/9/2020

Tested By: RL/RD

Checked By: Ronelle LeBlanc, E.I.T.

Title: Laboratory Coordinator

Source of Sample: Boring **Depth:** 5-7' **Date Sampled:**
Sample Number: B-21 / S2

Thielsch Engineering Inc.

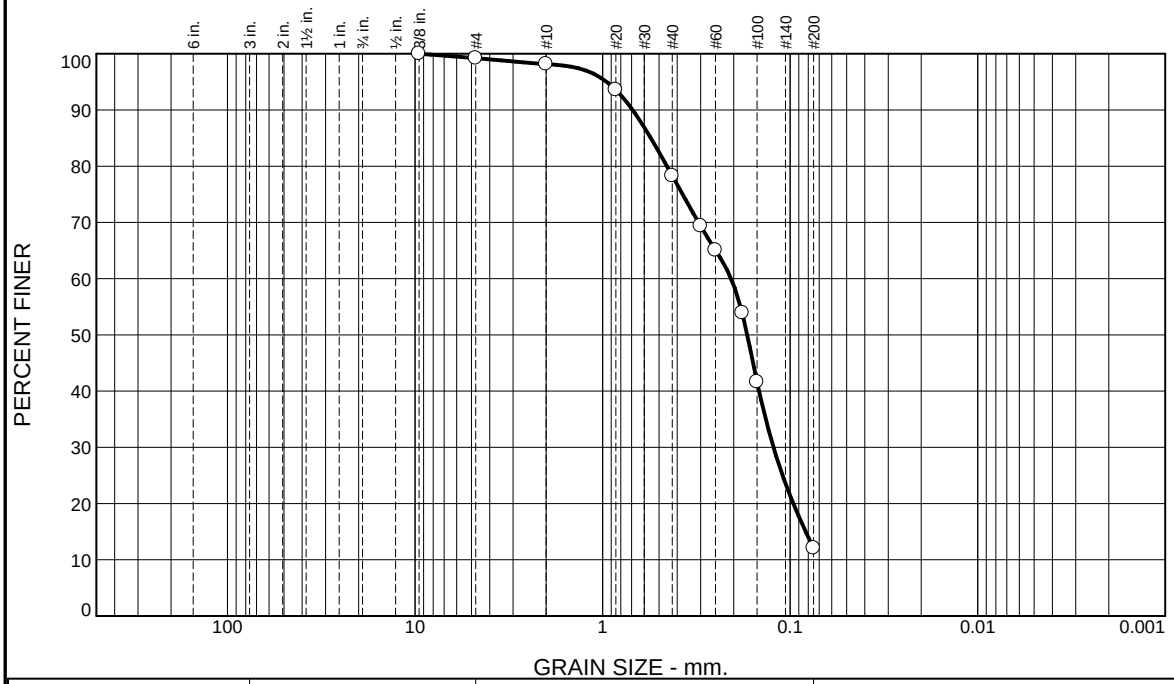
Cranston, RI

Client: Environmental Partners

Project: Sea Street PS FM No. 3
Nantucket, MA

Project No: 20-0002.179 **Figure** 20-S-B366

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.8	1.0	19.9	66.2	12.1	

Test Results (D6913 & ASTM D 1140)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
3/8"	100.0		
#4	99.2		
#10	98.2		
#20	93.6		
#40	78.3		
#50	69.4		
#60	65.1		
#80	53.9		
#100	41.6		
#200	12.1		

* (no specification provided)

Material Description

Light Brown silty sand (SM)

Atterberg Limits (ASTM D 4318)

PL= NP **LL=** NV **PI=** NP

Classification

USCS (D 2487)= SM **AASHTO (M 145)=** A-2-4(0)

Coefficients

D_{90}= 0.6919 D_{85}= 0.5531 D_{60}= 0.2063
D_{50}= 0.1692 D_{30}= 0.1227 D_{15}= 0.0826
D_{10}= C_u= C_c=

Remarks

Date Received: 12/2/2020 **Date Tested:** 12/9/2020

Tested By: RL/RD

Checked By: Ronelle LeBlanc, E.I.T.

Title: Laboratory Coordinator

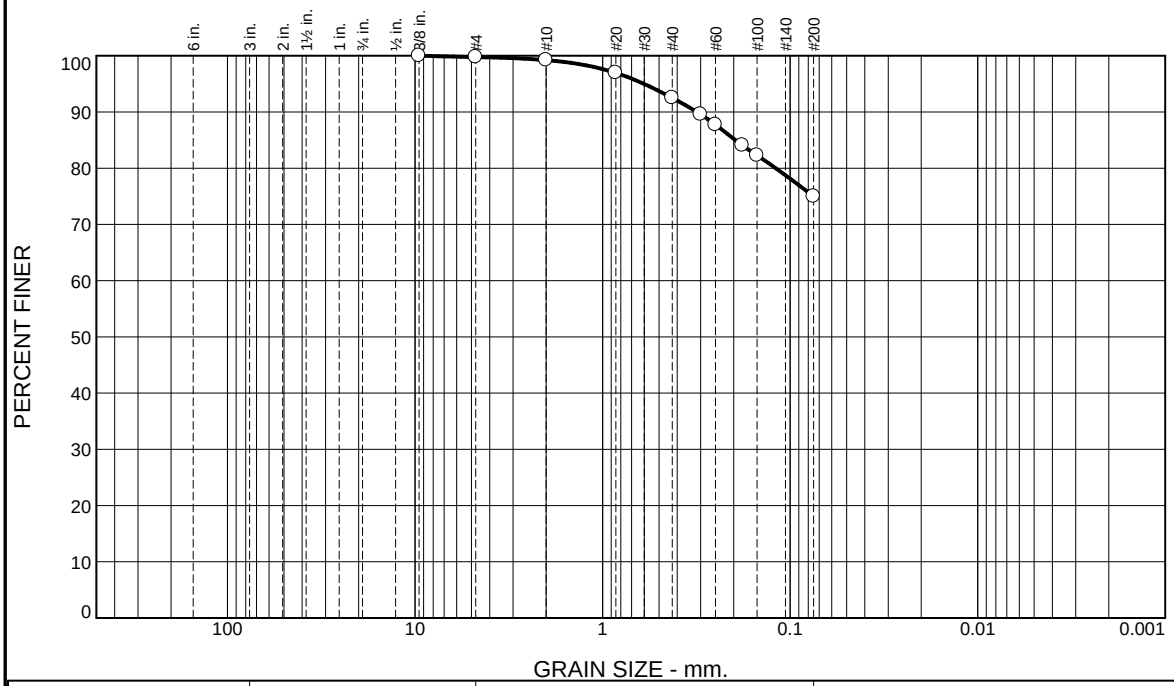
Source of Sample: Boring **Depth:** 5-7' **Date Sampled:**
Sample Number: B-22 / S2

Thielsch Engineering Inc.

Cranston, RI

Client: Environmental Partners
Project: Sea Street PS FM No. 3
Nantucket, MA
Project No: 20-0002.179 **Figure** 20-S-B367

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.2	0.6	6.7	17.5	75.0	

Test Results (D6913 & ASTM D 1140)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
3/8"	100.0		
#4	99.8		
#10	99.2		
#20	97.0		
#40	92.5		
#50	89.6		
#60	87.7		
#80	84.1		
#100	82.3		
#200	75.0		

* (no specification provided)

Material Description

Brown-Grey clay with sand (CL)

Atterberg Limits (ASTM D 4318)

PL= **LL=** **PI=**

Classification

USCS (D 2487)= CL **AASHTO (M 145)=** A-4(0)

Coefficients

D_{90}= 0.3145 D_{85}= 0.1963 D_{60}=
D_{50}= D_{30}= D_{15}=
D_{10}= C_u= C_c=

Remarks

Sample visually classified as plastic. Sample rolled to 1/8".

Date Received: 12/2/2020 **Date Tested:** 12/9/2020

Tested By: RL/RD

Checked By: Ronelle LeBlanc, E.I.T.

Title: Laboratory Coordinator

Source of Sample: Boring **Depth:** 5-10' **Date Sampled:**
Sample Number: B-23 / S2

Thielsch Engineering Inc.

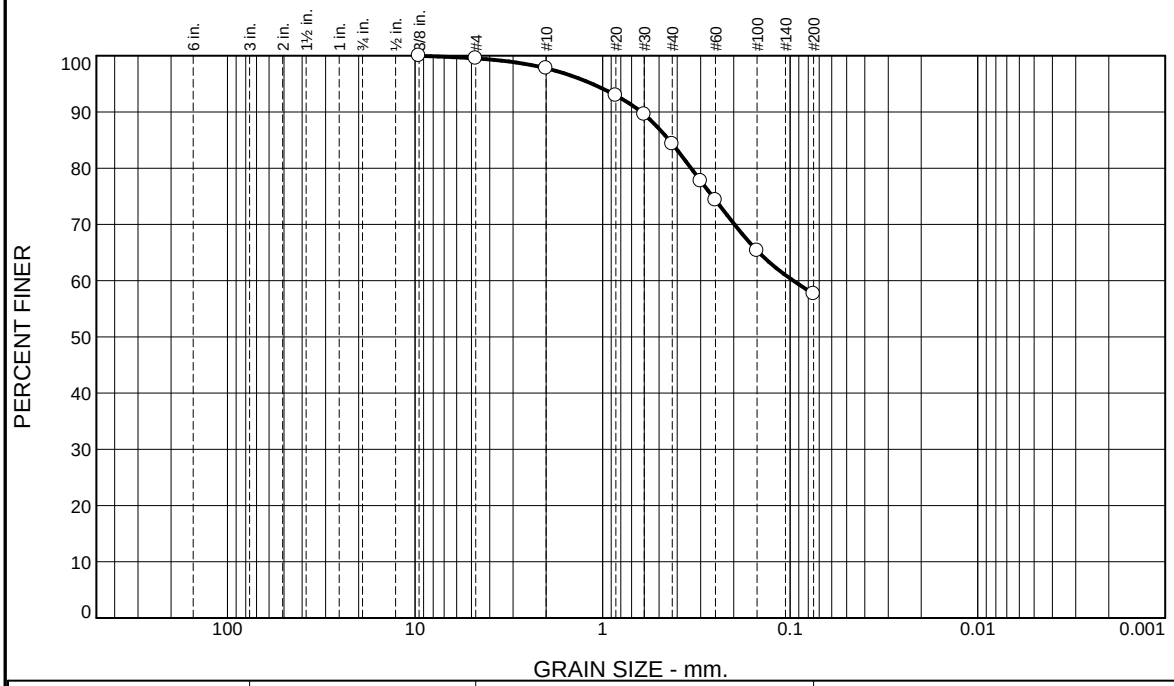
Cranston, RI

Client: Environmental Partners

Project: Sea Street PS FM No. 3
Nantucket, MA

Project No: 20-0002.179 **Figure** 20-S-B368

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.5	1.7	13.5	26.7	57.6	

Test Results (D6913 & ASTM D 1140)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
3/8"	100.0		
#4	99.5		
#10	97.8		
#20	92.9		
#30	89.6		
#40	84.3		
#50	77.7		
#60	74.3		
#100	65.3		
#200	57.6		

* (no specification provided)

Material Description

Brown-Grey sandy clay (CL)

Atterberg Limits (ASTM D 4318)

PL= **LL=** **PI=**

Classification

USCS (D 2487)= CL **AASHTO (M 145)=** A-4(0)

Coefficients

D_{90}= 0.6219 D_{85}= 0.4417 D_{60}= 0.0962
D_{50}= D_{30}= D_{15}=
D_{10}= C_u= C_c=

Remarks

Sample visually classified as plastic. Sample rolled to 1/8".

Date Received: 12/2/2020 **Date Tested:** 12/9/2020

Tested By: RL/RD

Checked By: Ronelle LeBlanc, E.I.T.

Title: Laboratory Coordinator

Source of Sample: Boring **Depth:** 5-10' **Date Sampled:**
Sample Number: B-24 / S2

Thielsch Engineering Inc.

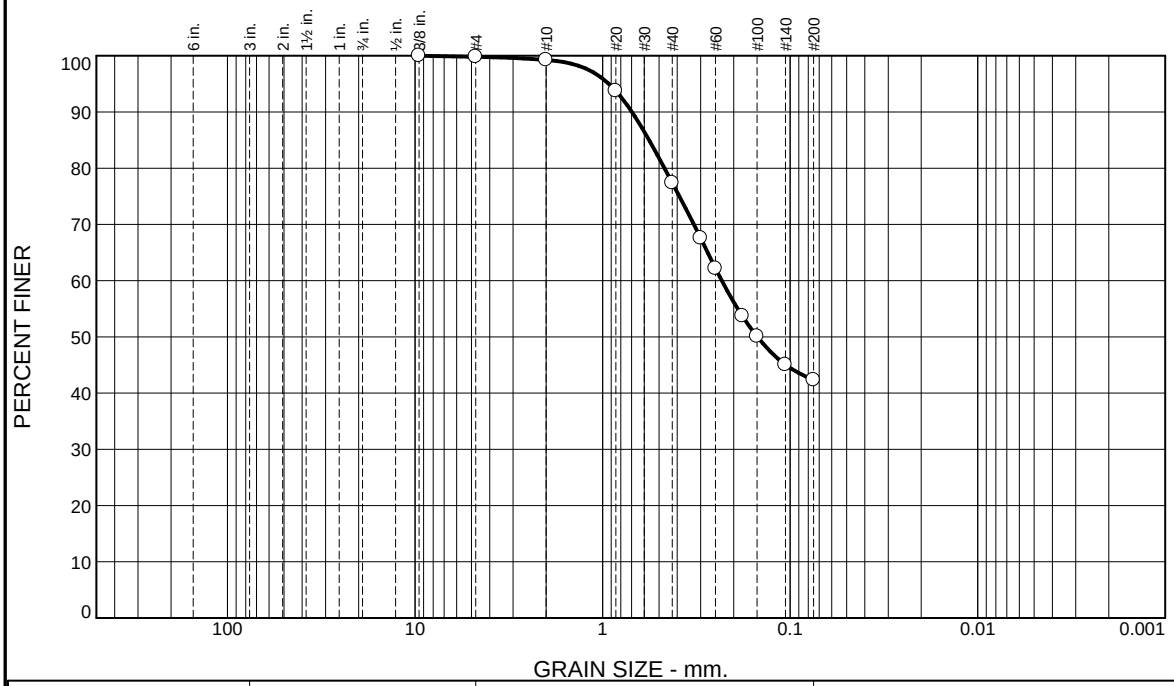
Cranston, RI

Client: Environmental Partners

Project: Sea Street PS FM No. 3
Nantucket, MA

Project No: 20-0002.179 **Figure** 20-S-B369

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.2	0.6	21.8	35.1	42.3	

Test Results (D6913 & ASTM D 1140)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
3/8"	100.0		
#4	99.8		
#10	99.2		
#20	93.8		
#40	77.4		
#50	67.6		
#60	62.2		
#80	53.7		
#100	50.1		
#140	45.0		
#200	42.3		

* (no specification provided)

Material Description

Brown-Grey clayey sand (SC)

Atterberg Limits (ASTM D 4318)

PL= **LL=** **PI=**

Classification

USCS (D 2487)= SC **AASHTO (M 145)=** A-4(0)

Coefficients

D_{90}= 0.6975 D_{85}= 0.5649 D_{60}= 0.2315
D_{50}= 0.1493 D_{30}= D_{15}=
D_{10}= C_u= C_c=

Remarks

Sample visually classified as plastic. Sample rolled to 1/8".

Date Received: 12/2/2020 **Date Tested:** 12/9/2020

Tested By: RL/RD

Checked By: Ronelle LeBlanc, E.I.T.

Title: Laboratory Coordinator

Source of Sample: Boring **Depth:** 5-10' **Date Sampled:**
Sample Number: B-25/MW-2 / S2

Thielsch Engineering Inc.

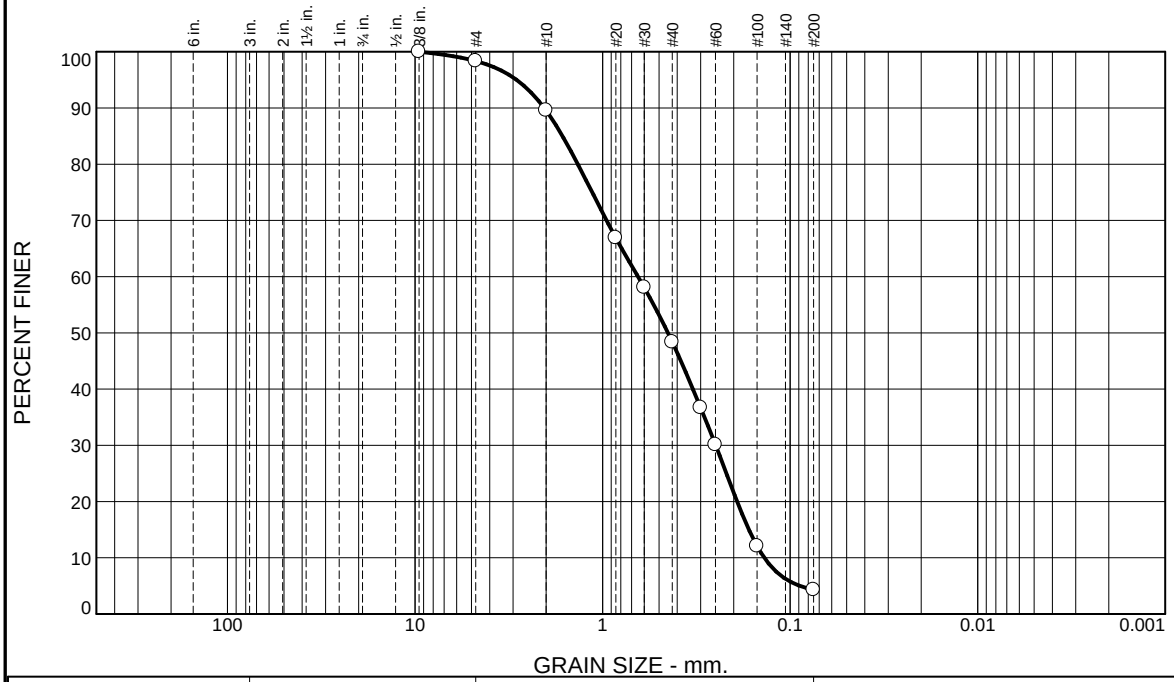
Cranston, RI

Client: Environmental Partners

Project: Sea Street PS FM No. 3
Nantucket, MA

Project No: 20-0002.179 **Figure** 20-S-B370

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	1.6	8.8	41.2	44.1	4.3	

Test Results (D6913 & ASTM D 1140)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
3/8"	100.0		
#4	98.4		
#10	89.6		
#20	66.9		
#30	58.1		
#40	48.4		
#50	36.7		
#60	30.1		
#100	12.1		
#200	4.3		

* (no specification provided)

Material Description

Light Brown poorly graded sand (SP)

Atterberg Limits (ASTM D 4318)

PL= NP **LL=** NV **PI=** NP

Classification

USCS (D 2487)= SP **AASHTO (M 145)=** A-1-b

Coefficients

D_{90}= 2.0459 D_{85}= 1.6358 D_{60}= 0.6476
D_{50}= 0.4482 D_{30}= 0.2493 D_{15}= 0.1659
D_{10}= 0.1372 C_u= 4.72 C_c= 0.70

Remarks

Date Received: 12/2/2020 **Date Tested:** 12/9/2020

Tested By: RL/RD

Checked By: Ronelle LeBlanc, E.I.T.

Title: Laboratory Coordinator

Source of Sample: Boring **Depth:** 5-10' **Date Sampled:**
Sample Number: B-38 / S2

Thielsch Engineering Inc.

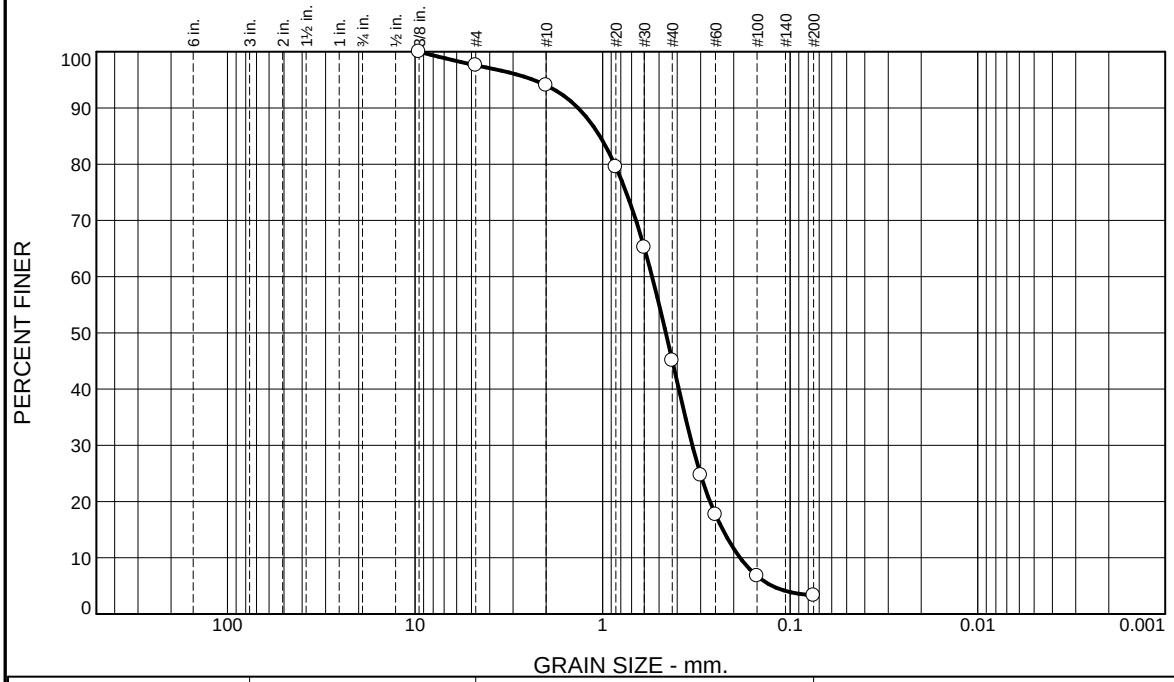
Cranston, RI

Client: Environmental Partners

Project: Sea Street PS FM No. 3
Nantucket, MA

Project No: 20-0002.179 **Figure** 20-S-B371

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	2.4	3.6	48.9	41.8	3.3	

Test Results (D6913 & ASTM D 1140)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
3/8"	100.0		
#4	97.6		
#10	94.0		
#20	79.5		
#30	65.2		
#40	45.1		
#50	24.7		
#60	17.7		
#100	6.8		
#200	3.3		

* (no specification provided)

Material Description

Light Brown poorly graded sand (SP)

Atterberg Limits (ASTM D 4318)

PL= NP **LL=** NV **PI=** NP

Classification

USCS (D 2487)= SP **AASHTO (M 145)=** A-1-b

Coefficients

D_{90}= 1.3498 D_{85}= 1.0351 D_{60}= 0.5445
D_{50}= 0.4598 D_{30}= 0.3324 D_{15}= 0.2287
D_{10}= 0.1849 C_u= 2.95 C_c= 1.10

Remarks

Date Received: 12/2/2020 **Date Tested:** 12/9/2020

Tested By: RL/RD

Checked By: Ronelle LeBlanc, E.I.T.

Title: Laboratory Coordinator

Source of Sample: Boring **Depth:** 5-10' **Date Sampled:**
Sample Number: B-44 / S2

Thielsch Engineering Inc.

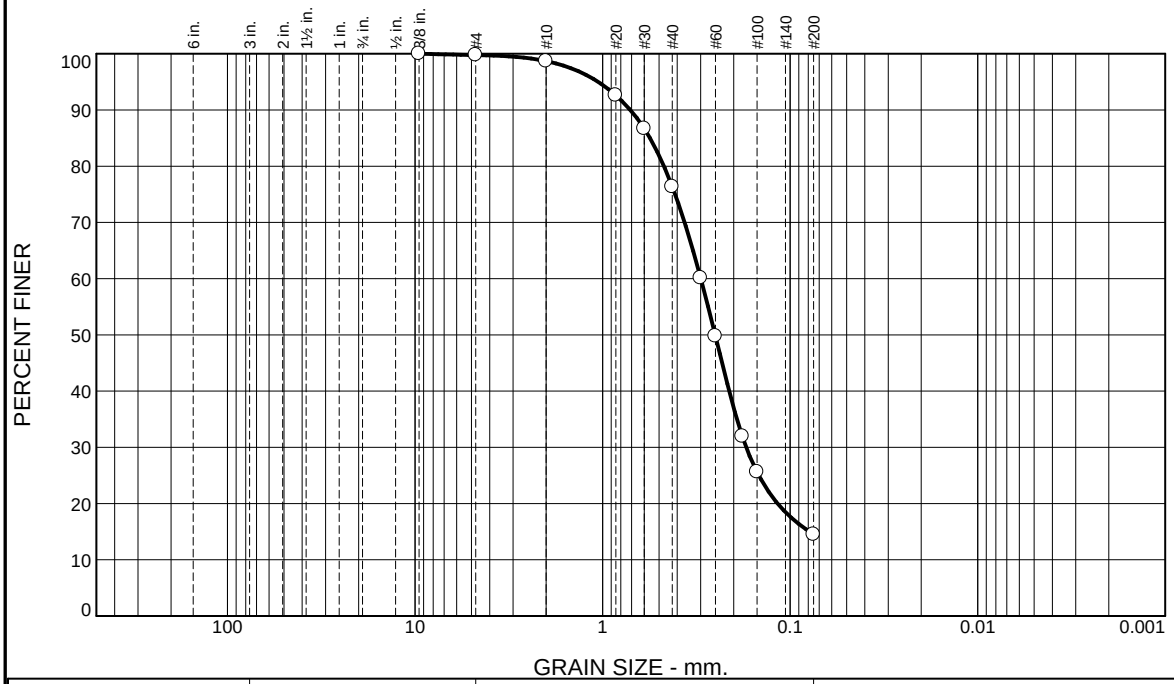
Cranston, RI

Client: Environmental Partners

Project: Sea Street PS FM No. 3
Nantucket, MA

Project No: 20-0002.179 **Figure** 20-S-B372

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.2	1.1	22.3	61.9	14.5	

Test Results (D6913 & ASTM D 1140)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
3/8"	100.0		
#4	99.8		
#10	98.7		
#20	92.6		
#30	86.7		
#40	76.4		
#50	60.1		
#60	49.8		
#80	32.0		
#100	25.6		
#200	14.5		

* (no specification provided)

Material Description

Brown-Orange silty sand (SM)

Atterberg Limits (ASTM D 4318)

PL= NP **LL=** NV **PI=** NP

Classification

USCS (D 2487)= SM **AASHTO (M 145)=** A-2-4(0)

Coefficients

D_{90}= 0.7112 D_{85}= 0.5588 D_{60}= 0.2993
D_{50}= 0.2509 D_{30}= 0.1715 D_{15}= 0.0789
D_{10}= C_u= C_c=

Remarks

Date Received: 12/2/2020 **Date Tested:** 12/9/2020

Tested By: RL/RD

Checked By: Ronelle LeBlanc, E.I.T.

Title: Laboratory Coordinator

Source of Sample: Boring **Depth:** 0-5' **Date Sampled:**
Sample Number: B-52 / S1

Thielsch Engineering Inc.

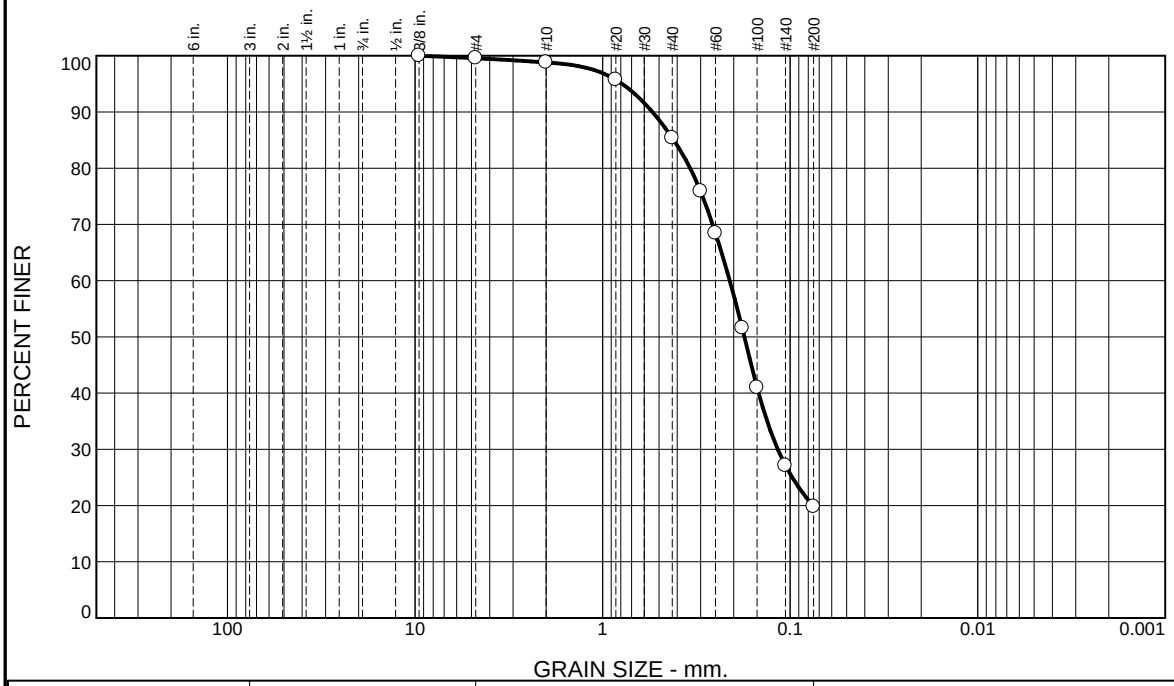
Cranston, RI

Client: Environmental Partners

Project: Sea Street PS FM No. 3
Nantucket, MA

Project No: 20-0002.179 **Figure** 20-S-B373

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.4	0.8	13.4	65.6	19.8	

Test Results (D6913 & ASTM D 1140)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
3/8"	100.0		
#4	99.6		
#10	98.8		
#20	95.7		
#40	85.4		
#50	75.9		
#60	68.4		
#80	51.6		
#100	41.0		
#140	27.1		
#200	19.8		

* (no specification provided)

Material Description

Light Brown-Orange silty sand (SM)

Atterberg Limits (ASTM D 4318)

PL= NP **LL=** NV **PI=** NP

Classification

USCS (D 2487)= SM **AASHTO (M 145)=** A-2-4(0)

Coefficients

D_{90}= 0.5419 D_{85}= 0.4176 D_{60}= 0.2099
D_{50}= 0.1753 D_{30}= 0.1164 D_{15}=
D_{10}= C_u= C_c=

Remarks

Date Received: 12/2/2020 **Date Tested:** 12/9/2020

Tested By: RD/RL

Checked By: Ronelle LeBlanc, E.I.T.

Title: Laboratory Coordinator

Source of Sample: Boring **Depth:** 5-10' **Date Sampled:**
Sample Number: B-61/MW-3 / S2

Thielsch Engineering Inc.

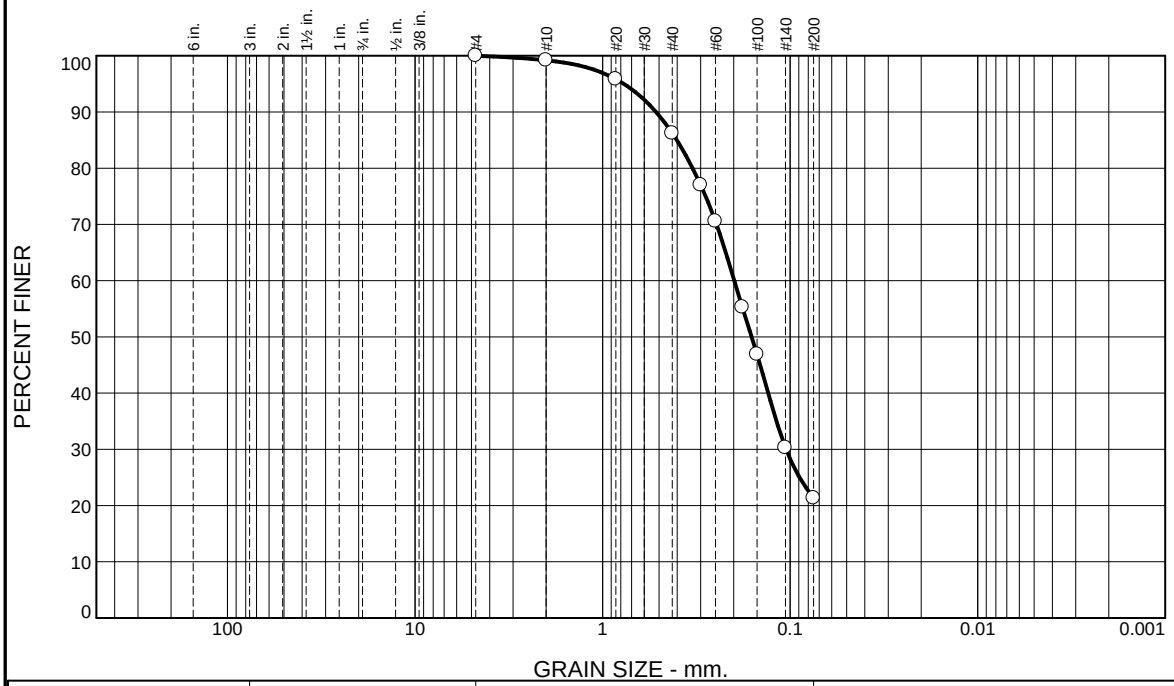
Cranston, RI

Client: Environmental Partners

Project: Sea Street PS FM No. 3
Nantucket, MA

Project No: 20-0002.179 **Figure** 20-S-B374

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.8	13.0	64.9	21.3	

Test Results (D6913 & ASTM D 1140)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
#4	100.0		
#10	99.2		
#20	95.8		
#40	86.2		
#50	77.0		
#60	70.6		
#80	55.3		
#100	46.9		
#140	30.3		
#200	21.3		

* (no specification provided)

Material Description

Light Brown silty sand (SM)

Atterberg Limits (ASTM D 4318)

PL= NP **LL=** NV **PI=** NP

Classification

USCS (D 2487)= SM **AASHTO (M 145)=** A-2-4(0)

Coefficients

D_{90}= 0.5183 D_{85}= 0.4022 D_{60}= 0.1986
D_{50}= 0.1603 D_{30}= 0.1052 D_{15}=
D_{10}= C_u= C_c=

Remarks

Date Received: 12/2/2020 **Date Tested:** 12/9/2020

Tested By: RD/RL

Checked By: Ronelle LeBlanc, E.I.T.

Title: Laboratory Coordinator

Source of Sample: Boring **Depth:** 10-15' **Date Sampled:**
Sample Number: B-61/MW-3 / S3

Thielsch Engineering Inc.

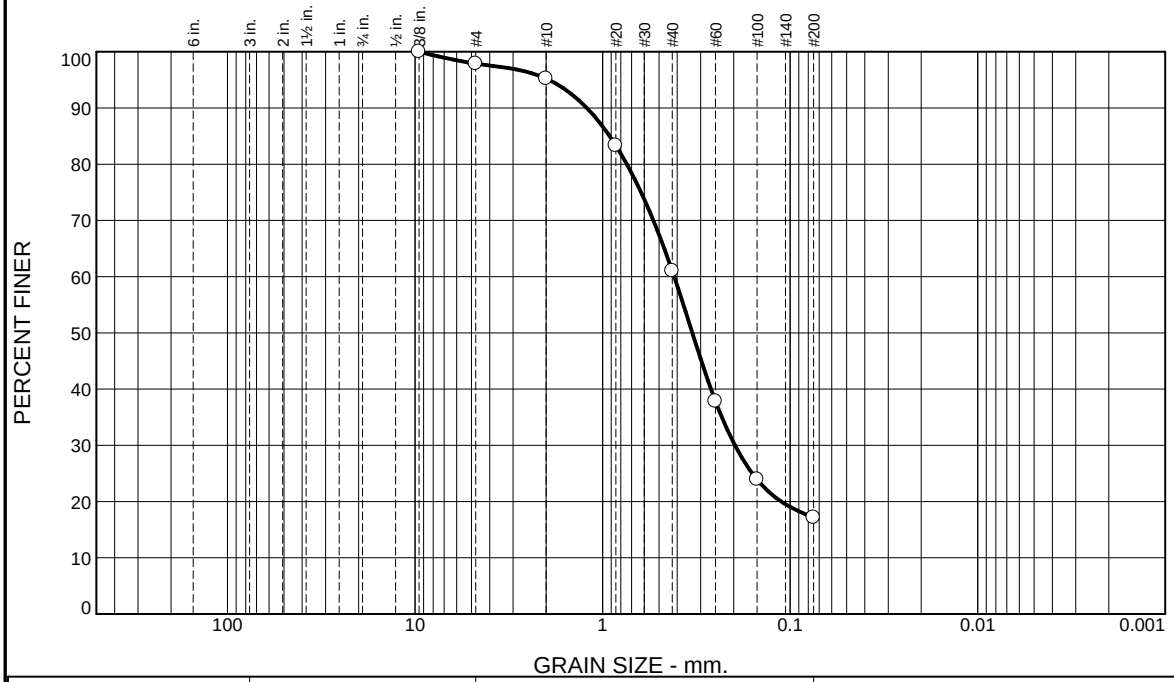
Cranston, RI

Client: Environmental Partners

Project: Sea Street PS FM No. 3
Nantucket, MA

Project No: 20-0002.179 **Figure** 20-S-B375

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	2.1	2.7	34.2	43.9	17.1	

Test Results (D6913 & ASTM D 1140)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
3/8"	100.0		
#4	97.9		
#10	95.2		
#20	83.3		
#40	61.0		
#60	37.8		
#100	23.9		
#200	17.1		

* (no specification provided)

Material Description

Brown silty sand (SM)

Atterberg Limits (ASTM D 4318)

PL= NP **LL=** NV **PI=** NP

Classification

USCS (D 2487)= SM **AASHTO (M 145)=** A-2-4(0)

Coefficients

D_{90}= 1.2133 D_{85}= 0.9176 D_{60}= 0.4151
D_{50}= 0.3322 D_{30}= 0.1968 D_{15}=
D_{10}= C_u= C_c=

Remarks

Date Received: 12/2/2020 **Date Tested:** 12/7/2020

Tested By: RL / CC

Checked By: Christina Colman

Title: Laboratory Coordinator

Source of Sample: Boring **Depth:** 0-5' **Date Sampled:**
Sample Number: B-100 / S1

Thielsch Engineering Inc.

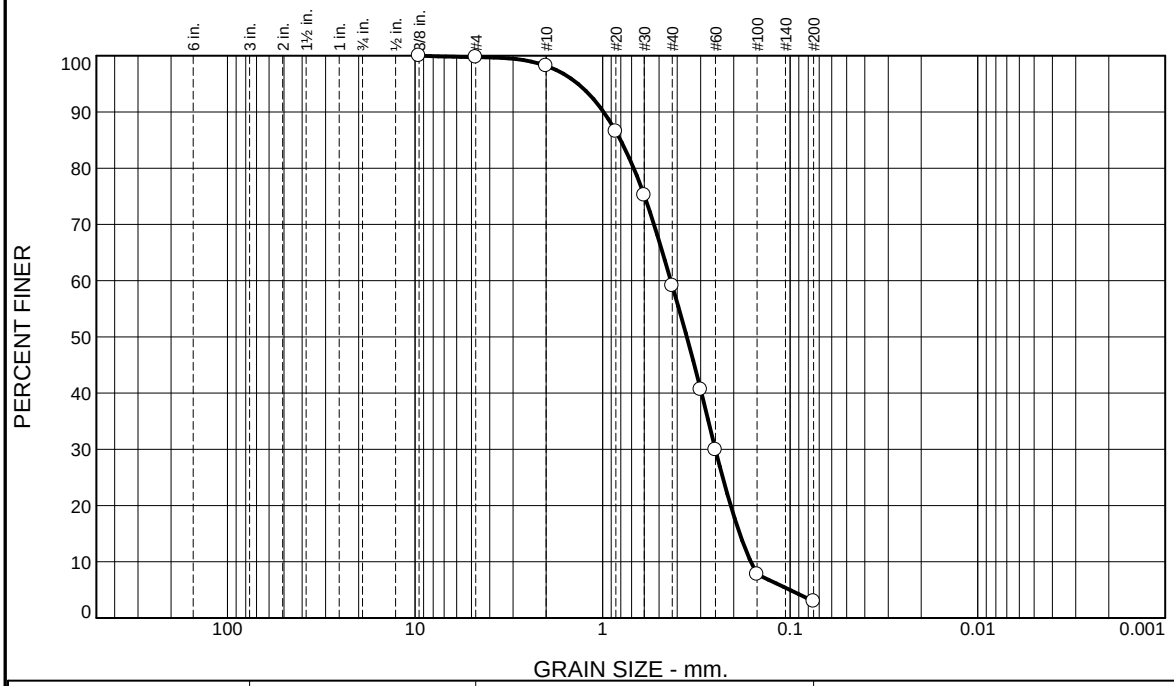
Cranston, RI

Client: Environmental Partners

Project: Sea Street PS FM No. 3
Nantucket, MA

Project No: 20-0002.179 **Figure** 20-S-B376

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.2	1.6	39.1	56.1	3.0	

Test Results (D6913 & ASTM D 1140)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
3/8"	100.0		
#4	99.8		
#10	98.2		
#20	86.5		
#30	75.2		
#40	59.1		
#50	40.6		
#60	29.9		
#100	7.8		
#200	3.0		

* (no specification provided)

Material Description

Light Brown poorly graded sand (SP)

Atterberg Limits (ASTM D 4318)

PL= NP **LL=** NV **PI=** NP

Classification

USCS (D 2487)= SP **AASHTO (M 145)=** A-3

Coefficients

D_{90}= 0.9879 D_{85}= 0.8019 D_{60}= 0.4327
D_{50}= 0.3557 D_{30}= 0.2504 D_{15}= 0.1856
D_{10}= 0.1620 C_u= 2.67 C_c= 0.89

Remarks

Date Received: 12/2/2020 **Date Tested:** 12/7/2020

Tested By: RL / CC

Checked By: Christina Colman

Title: Laboratory Coordinator

Source of Sample: Boring **Depth:** 5-10' **Date Sampled:**
Sample Number: B-104 / S2

Thielsch Engineering Inc.

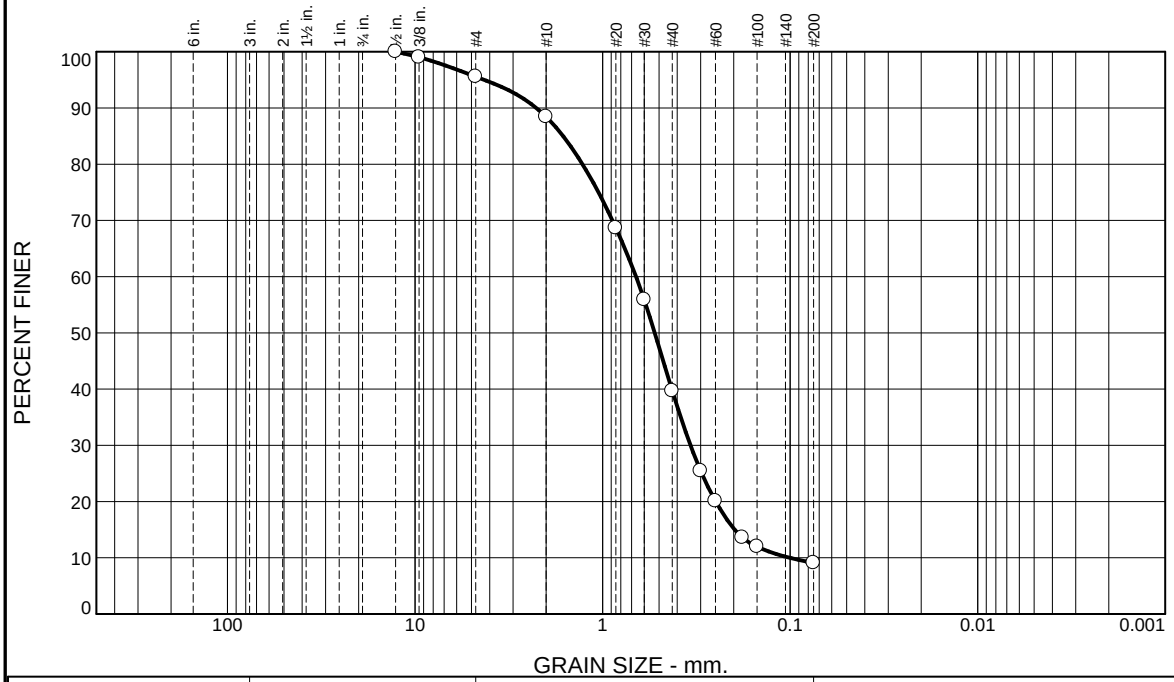
Cranston, RI

Client: Environmental Partners

Project: Sea Street PS FM No. 3
Nantucket, MA

Project No: 20-0002.179 **Figure** 20-S-B377

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	4.4	7.2	48.7	30.6	9.1	

Test Results (D6913 & ASTM D 1140)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
1/2"	100.0		
3/8"	99.0		
#4	95.6		
#10	88.4		
#20	68.7		
#30	55.9		
#40	39.7		
#50	25.4		
#60	20.1		
#80	13.6		
#100	12.0		
#200	9.1		

* (no specification provided)

Material Description

Brown-Orange well-graded sand with silt (SW-SM)

Atterberg Limits (ASTM D 4318)

PL= NP **LL=** NV **PI=** NP

Classification

USCS (D 2487)= SW-SM **AASHTO (M 145)=** A-1-b

Coefficients

D_{90}= 2.2550 D_{85}= 1.6226 D_{60}= 0.6633
D_{50}= 0.5272 D_{30}= 0.3399 D_{15}= 0.1978
D_{10}= 0.1005 C_u= 6.60 C_c= 1.73

Remarks

Date Received: 12/2/2020 **Date Tested:** 12/7/2020

Tested By: RL / CC

Checked By: Christina Colman

Title: Laboratory Coordinator

Source of Sample: Boring **Depth:** 0-5' **Date Sampled:**
Sample Number: B-110 / S1

Thielsch Engineering Inc.

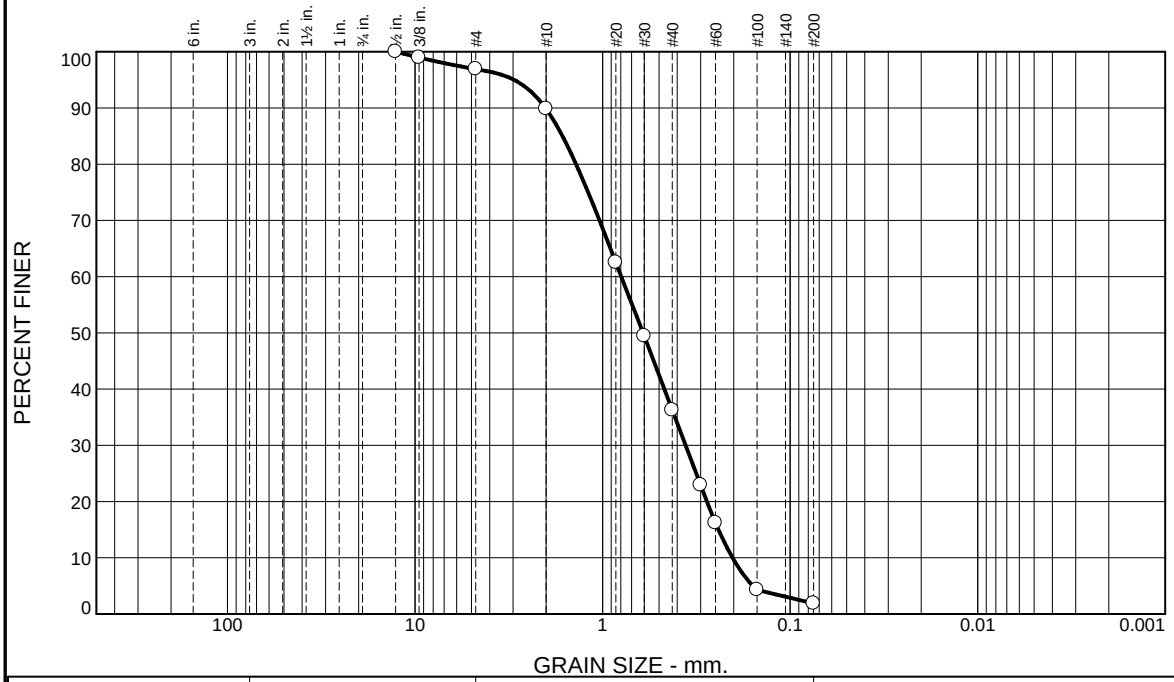
Cranston, RI

Client: Environmental Partners

Project: Sea Street PS FM No. 3
Nantucket, MA

Project No: 20-0002.179 **Figure** 20-S-B378

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	3.1	7.1	53.5	34.4	1.9	

Test Results (D6913 & ASTM D 1140)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
1/2"	100.0		
3/8"	99.0		
#4	96.9		
#10	89.8		
#20	62.5		
#30	49.5		
#40	36.3		
#50	22.9		
#60	16.2		
#100	4.3		
#200	1.9		

* (no specification provided)

Material Description

Light Brown-Orange poorly graded sand (SP)

Atterberg Limits (ASTM D 4318)

PL= NP **LL=** NV **PI=** NP

Classification

USCS (D 2487)= SP **AASHTO (M 145)=** A-1-b

Coefficients

D_{90}= 2.0151 D_{85}= 1.6349 D_{60}= 0.7947
D_{50}= 0.6086 D_{30}= 0.3609 D_{15}= 0.2412
D_{10}= 0.2029 C_u= 3.92 C_c= 0.81

Remarks

Date Received: 12/2/2020 **Date Tested:** 12/7/2020

Tested By: RL / CC

Checked By: Christina Colman

Title: Laboratory Coordinator

Source of Sample: Boring **Depth:** 5-10' **Date Sampled:**
Sample Number: B-114 / S2

Thielsch Engineering Inc.

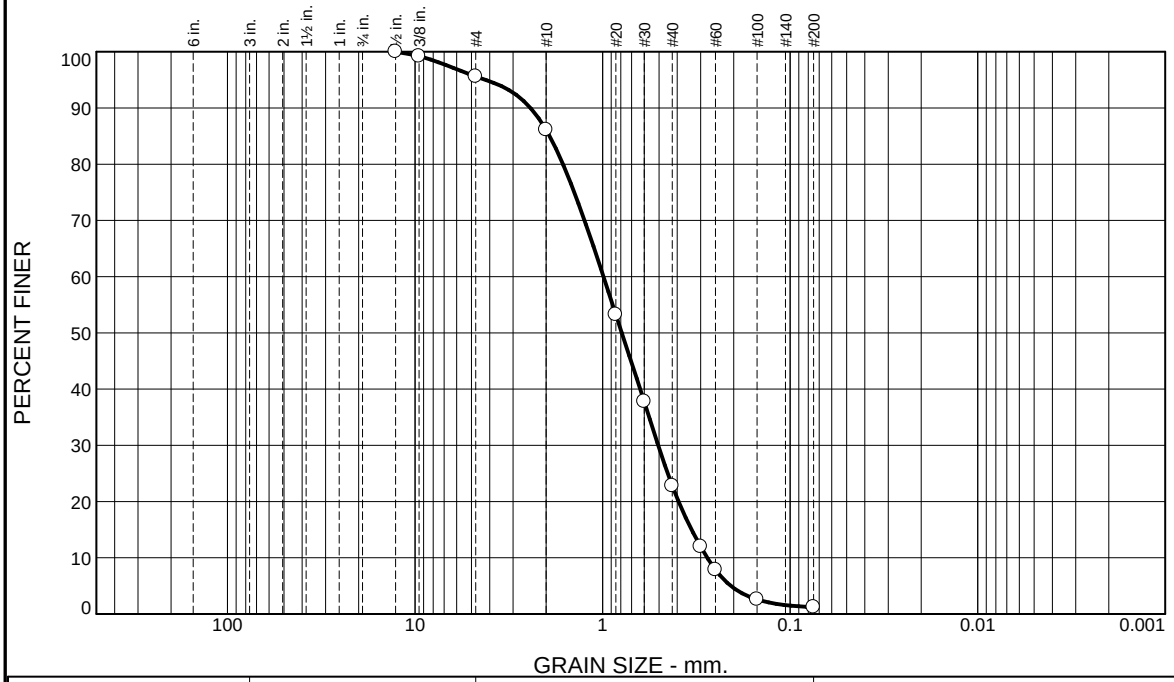
Cranston, RI

Client: Environmental Partners

Project: Sea Street PS FM No. 3
Nantucket, MA

Project No: 20-0002.179 **Figure** 20-S-B379

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	4.4	9.5	63.3	21.6	1.2	

Test Results (D6913 & ASTM D 1140)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
1/2"	100.0		
3/8"	99.2		
#4	95.6		
#10	86.1		
#20	53.3		
#30	37.8		
#40	22.8		
#50	12.0		
#60	7.9		
#100	2.6		
#200	1.2		

* (no specification provided)

Material Description

Light Brown poorly graded sand (SP)

Atterberg Limits (ASTM D 4318)

PL= NP **LL=** NV **PI=** NP

Classification

USCS (D 2487)= SP **AASHTO (M 145)=** A-1-b

Coefficients

D_{90}= 2.4221 D_{85}= 1.9158 D_{60}= 0.9894
D_{50}= 0.7898 D_{30}= 0.5053 D_{15}= 0.3355
D_{10}= 0.2764 C_u= 3.58 C_c= 0.93

Remarks

Date Received: 12/2/2020 **Date Tested:** 12/7/2020

Tested By: RL / CC

Checked By: Christina Colman

Title: Laboratory Coordinator

Source of Sample: Boring **Depth:** 5-10' **Date Sampled:**
Sample Number: B-122 / S2

Thielsch Engineering Inc.

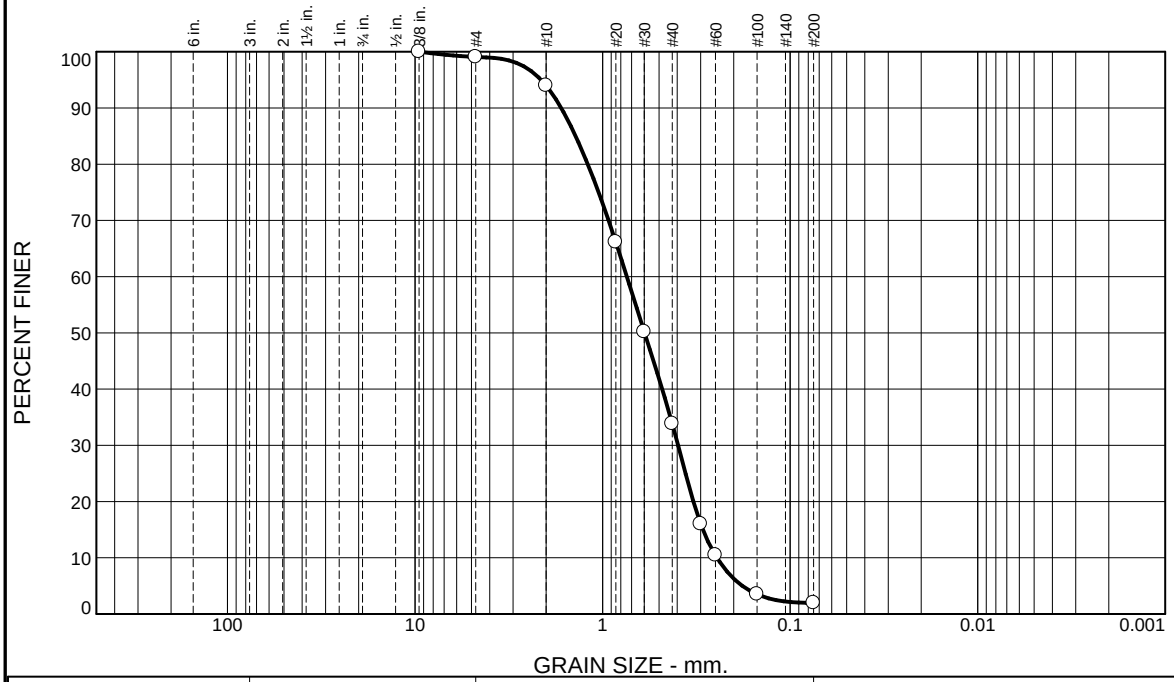
Cranston, RI

Client: Environmental Partners

Project: Sea Street PS FM No. 3
Nantucket, MA

Project No: 20-0002.179 **Figure** 20-S-B380

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.9	5.1	60.2	31.8	2.0	

Test Results (D6913 & ASTM D 1140)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
3/8"	100.0		
#4	99.1		
#10	94.0		
#20	66.1		
#30	50.2		
#40	33.8		
#50	16.0		
#60	10.4		
#100	3.5		
#200	2.0		

* (no specification provided)

Material Description

Light Brown poorly graded sand (SP)

Atterberg Limits (ASTM D 4318)

PL= NP **LL=** NV **PI=** NP

Classification

USCS (D 2487)= SP **AASHTO (M 145)=** A-1-b

Coefficients

D_{90}= 1.6616 D_{85}= 1.3921 D_{60}= 0.7421
D_{50}= 0.5975 D_{30}= 0.3958 D_{15}= 0.2921
D_{10}= 0.2453 C_u= 3.03 C_c= 0.86

Remarks

Date Received: 12/2/2020 **Date Tested:** 12/7/2020

Tested By: RL / CC

Checked By: Christina Colman

Title: Laboratory Coordinator

Source of Sample: Boring **Depth:** 5-10' **Date Sampled:**
Sample Number: B-125 / S2

Thielsch Engineering Inc.

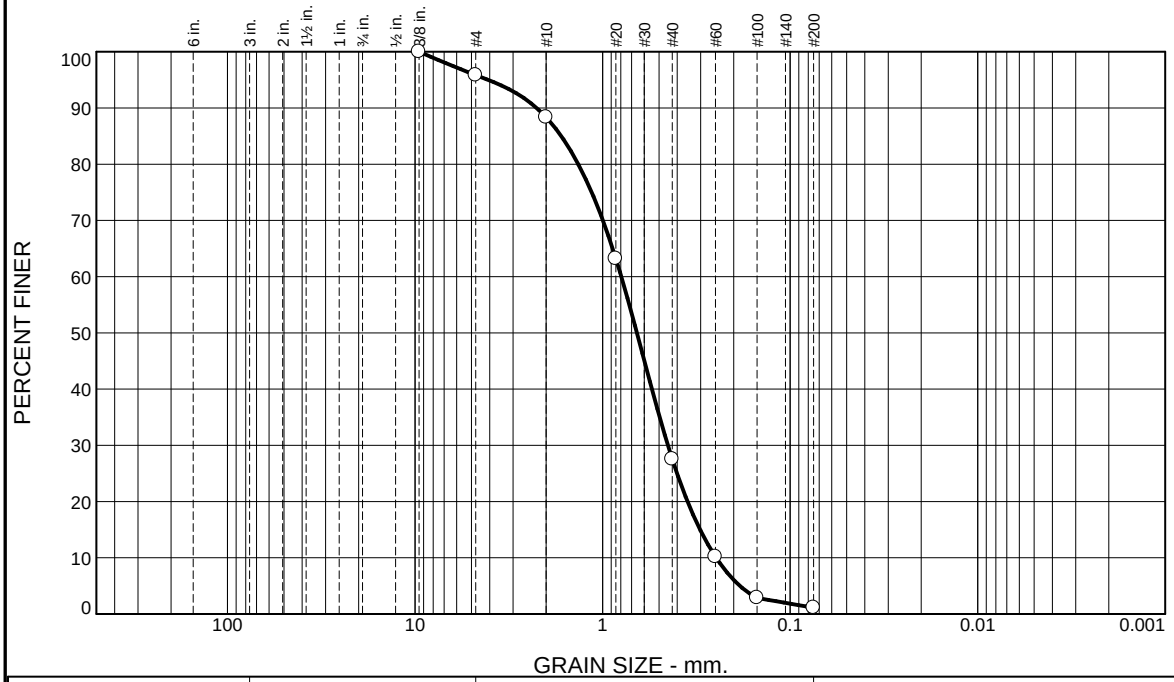
Cranston, RI

Client: Environmental Partners

Project: Sea Street PS FM No. 3
Nantucket, MA

Project No: 20-0002.179 **Figure** 20-S-B381

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	4.2	7.5	60.8	26.4	1.1	

Test Results (D6913 & ASTM D 1140)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
3/8"	100.0		
#4	95.8		
#10	88.3		
#20	63.2		
#40	27.5		
#60	10.2		
#100	2.9		
#200	1.1		

* (no specification provided)

Material Description

Light Brown-Orange poorly graded sand (SP)

Atterberg Limits (ASTM D 4318)

PL= NP **LL=** NV **PI=** NP

Classification

USCS (D 2487)= SP **AASHTO (M 145)=** A-1-b

Coefficients

D_{90}= 2.2475 D_{85}= 1.6610 D_{60}= 0.7952
D_{50}= 0.6564 D_{30}= 0.4484 D_{15}= 0.3020
D_{10}= 0.2478 C_u= 3.21 C_c= 1.02

Remarks

Date Received: 12/2/2020 **Date Tested:** 12/7/2020

Tested By: RL / CC

Checked By: Christina Colman

Title: Laboratory Coordinator

Source of Sample: Boring **Depth:** 5-10' **Date Sampled:**
Sample Number: B-132 / S2

Thielsch Engineering Inc.

Cranston, RI

Client: Environmental Partners

Project: Sea Street PS FM No. 3
Nantucket, MA

Project No: 20-0002.179 **Figure** 20-S-B382

ATTACHMENT E

Weston and Sampson Boring Plan and Logs

VESPER LANE

SURFSIDE ROAD

BARTLETT ROAD

B-1
B-2
B-3
B-4
B-5
B-6
B-7
B-8
B-9
B-10
B-11
B-12
B-13
B-14
B-15
B-16
B-17
B-18
B-19
B-20
B-21
PS-1
PS-2

200 100 0 200 400

SCALE: 1"=200'

TOWN OF NANTUCKET, MASSACHUSETTS
SURFSIDE ROAD SEWER IMPROVEMENTS

BORING LOCATION PLAN

DECEMBER 2019 SCALE: 1" = 200'

Weston & Sampson℠

\\wes03.local\WSE\Projects\MA\Nantucket MA\2190978 Surfside Rd Area Sewer Improvements Design\CAD\Surfside Road Preliminary Boring Layout.dwg

Weston & Sampson

WSE Project: 2190978

Surfside Road Area Sewer Improvements
Nantucket, MA
Town of Nantucket

BORING ID: B-1

CONTRACTOR:	**Technical Drilling Services, Inc.**	BORING LOCATION:	**See Site Plan**	DATE START:	**December 17, 2019**
FOREMAN:	**Darwin Newton**	ADVANCE METHOD:	**Hollow-Stem Auger Drilling**	DATE FINISH:	**December 17, 2019**
LOGGED BY:	**Nathaniel Parker**	AUGER DIAMETER:	**4-1/4" ID (Stem), 7-5/8" OD (Flights)**	GROUND EL:	**25.0 ± (NAVD88)**
CHECKED BY:	**Thomas Strike, PE**	SUPPORT CASING:	**N/A**	FINAL DEPTH:	**22.0 ft.**
EQUIPMENT:	**Truck Mounted Drill Rig**	CORING METHOD:	**N/A**	GRID COORDS:	**N/A**
SPT HAMMER:	**Automatic (140-lb.)**	BACKFILL MATERIAL:	**Drill Cuttings and Asphalt Patch**	GRID SYSTEM:	**N/A**

DEPTH BELOW GROUND SURFACE [VERTICAL FT.]	SAMPLE TYPE GRAPHIC	SAMPLE ID NUMBER AND RECOVERY RATIO [IN./IN.]	SPT BLOWS / 6 IN. (OR) CORE RATE / 12 IN. [MIN.]	SPT RESISTANCE, RQD, AND LABORATORY DATA	STRATIGRAPHY LOG	STRATUM IDENTIFICATION AND DESCRIPTION	ELEVATION SCALE SHOWN TO NEAREST FT.	REMARKS, OTHER TESTS, AND INSTALLATIONS
				● N-Value, Raw (bpf) ⊕ Moisture Content (%) ▶ Plastic Limit (%) ◀ Liquid Limit (%) ☒ Organic Content (%) 10 20 30 40		Surface: Asphalt concrete (AC) pavement.		
						Asphalt- 5.5" Thickness.		
		S-1 18/24	5 7 2 1	● 9		**Silty sand (SM)** - Loose; orange-brown to black; moist; some non plastic fines; no odor. **[BURIED TOPSOIL/SUBSOIL]**		
		S-2 6/24	2 4 9 11	● 13		**Poorly graded sand with silt (SP-SM)** - Medium dense; brown; moist; mostly fine to medium SAND, few non plastic fines, trace gravel; no odor.		
5		S-3 14/24	6 6 8 11	● 14		**Well graded sand (SW)** - Medium dense; light brown; moist; mostly fine to coarse SAND, trace non plastic fines, trace gravel; no odor.	20	
						Poorly graded sand (SP) - Medium dense; light brown; moist; mostly fine to medium SAND, trace non plastic fines, trace fine gravel; no odor.		
10		S-4 12/24	5 5 7 8	● 12			15	
15		S-5 14/24	2 7 13 11	● 20			10	
						Well graded sand (SW) - Loose; light brown; wet; mostly fine to coarse SAND, trace non plastic fines, trace gravel; no odor.		
20		S-6 12/24	3 3 3 3	● 6			5	[20.0] Water level measured on 12/17/19 (during drilling).
								Exploration ended at 22.0 ft.

Refer to the attached index sheets for important information about this log including general notes, legends, and guidance on description methods and procedures.

Weston & Sampson

WSE Project: 2190978

Surfside Road Area Sewer Improvements
Nantucket, MA
Town of Nantucket

BORING ID: B-2

CONTRACTOR:	**Technical Drilling Services, Inc.**	BORING LOCATION:	**See Site Plan**	DATE START:	**December 16, 2019**
FOREMAN:	**Darwin Newton**	ADVANCE METHOD:	**Hollow-Stem Auger Drilling**	DATE FINISH:	**February 16, 2020**
LOGGED BY:	**Nathaniel Parker**	AUGER DIAMETER:	**4-1/4" ID (Stem), 7-5/8" OD (Flights)**	GROUND EL:	**23.0 ± (NAVD88)**
CHECKED BY:	**Thomas Strike, PE**	SUPPORT CASING:	**N/A**	FINAL DEPTH:	**22.0 ft.**
EQUIPMENT:	**Truck Mounted Drill Rig**	CORING METHOD:	**N/A**	GRID COORDS:	**N/A**
SPT HAMMER:	**Automatic (140-lb.)**	BACKFILL MATERIAL:	**Drill Cuttings and Asphalt Patch**	GRID SYSTEM:	**N/A**

DEPTH BELOW GROUND SURFACE [VERTICAL FT.]	SAMPLE TYPE GRAPHIC	SAMPLE ID NUMBER AND RECOVERY RATIO [IN./IN.]	SPT BLOWS / 6 IN. (OR) CORE RATE / 12 IN. [MIN.]	SPT RESISTANCE, RQD, AND LABORATORY DATA	STRATIGRAPHY LOG	STRATUM IDENTIFICATION AND DESCRIPTION	ELEVATION SCALE SHOWN TO NEAREST FT.	REMARKS, OTHER TESTS, AND INSTALLATIONS
				● N-Value, Raw (bpf) ⊕ Moisture Content (%) ▶ Plastic Limit (%) ◀ Liquid Limit (%) ☒ Organic Content (%) 10 20 30 40		Surface: Asphalt concrete (AC) pavement.		
						Asphalt- 5" Thickness.		
		S-1 18/24	11 12 11 15	● 23		**Poorly graded sand (SP)** - Medium dense; brown; moist; mostly fine to medium SAND, few gravel, trace non plastic fines; no odor. **[FILL]**		
		S-2 3/24	9 10 8 3	● 18		**Poorly graded gravel with silt and sand (GP-GM)** - Medium dense; brown; moist; mostly fine to coarse GRAVEL, some fine to coarse sand, few non plastic fines; no odor. **[FILL]**		
5		S-3 10/24	3 3 2 1	● 5		**Poorly graded sand (SP)** - Loose; brown; moist; mostly fine to coarse SAND, few gravel, trace non plastic fines; no odor. **[FILL]**	18	
10		S-4 18/24	2 5 5 8	● 10		**Poorly graded sand (SP)** - Loose to medium dense; brown; moist to wet; mostly fine to coarse SAND, trace gravel, trace non plastic fines; no odor.	13	
15		S-5 15/24	2 2 3 4	● 5			8	[15.0] Water level measured on 12/16/19 (during drilling).
20		S-6 18/24	1 3 6 14	● 9		**Well graded sand (SW)** - Loose; brown; wet; mostly fine to coarse SAND, few fine to coarse gravel, trace non plastic fines; no odor.	3	
								Exploration ended at 22.0 ft.

Refer to the attached index sheets for important information about this log including general notes, legends, and guidance on description methods and procedures.

Weston & Sampson

WSE Project: 2190978

Surfside Road Area Sewer Improvements
Nantucket, MA
Town of Nantucket

BORING ID: B-3

CONTRACTOR:	**Technical Drilling Services, Inc.**	BORING LOCATION:	**See Site Plan**	DATE START:	**December 18, 2019**
FOREMAN:	**Darwin Newton**	ADVANCE METHOD:	**Hollow-Stem Auger Drilling**	DATE FINISH:	**December 18, 2019**
LOGGED BY:	**Nathaniel Parker**	AUGER DIAMETER:	**4-1/4" ID (Stem), 7-5/8" OD (Flights)**	GROUND EL:	**29.0 ± (NAVD88)**
CHECKED BY:	**Thomas Strike, PE**	SUPPORT CASING:	**N/A**	FINAL DEPTH:	**22.0 ft.**
EQUIPMENT:	**Truck Mounted Drill Rig**	CORING METHOD:	**N/A**	GRID COORDS:	**N/A**
SPT HAMMER:	**Automatic (140-lb.)**	BACKFILL MATERIAL:	**Drill Cuttings and Asphalt Patch**	GRID SYSTEM:	**N/A**

DEPTH BELOW GROUND SURFACE [VERTICAL FT.]	SAMPLE TYPE GRAPHIC	SAMPLE ID NUMBER AND RECOVERY RATIO [IN./IN.]	SPT BLOWS / 6 IN. (OR) CORE RATE / 12 IN. [MIN.]	SPT RESISTANCE, RQD, AND LABORATORY DATA	STRATIGRAPHY LOG	STRATUM IDENTIFICATION AND DESCRIPTION	ELEVATION SCALE SHOWN TO NEAREST FT.	REMARKS, OTHER TESTS, AND INSTALLATIONS
				● N-Value, Raw (bpf) ⊕ Moisture Content (%) ▶ Plastic Limit (%) ◀ Liquid Limit (%) ☒ Organic Content (%) 10 20 30 40		Surface: Asphalt concrete (AC) pavement.		
		S-1 22/24	4 2 2 4	● 4		Asphalt- 4" Thickness. **Silty sand (SM)** - Loose; dark brown; moist; mostly SAND, some non plastic fines; no odor; few debris (brick). **[FILL]**		
		S-2 14/24	4 7 9 17	● 16		**Poorly graded sand (SP)** - Loose to dense; light brown to brown; moist; mostly fine to coarse SAND, trace non plastic fines, trace gravel; no odor.		
5		S-3 18/24	11 16 19 21	● 35			24	
10		S-4 14/24	5 8 13 16	● 21			19	[13.0] Auger grinding on possible cobble/boulder.
15		S-5 16/24	3 7 13 12	● 20			14	
20		S-6 14/24	2 3 6 6	● 9			9	**Exploration ended at 22.0 ft.**

Refer to the attached index sheets for important information about this log including general notes, legends, and guidance on description methods and procedures.

Weston & Sampson

WSE Project: 2190978

Surfside Road Area Sewer Improvements
Nantucket, MA
Town of Nantucket

BORING ID: B-4

CONTRACTOR:	**Technical Drilling Services, Inc.**	BORING LOCATION:	**See Site Plan**	DATE START:	**December 18, 2019**
FOREMAN:	**Darwin Newton**	ADVANCE METHOD:	**Hollow-Stem Auger Drilling**	DATE FINISH:	**December 18, 2019**
LOGGED BY:	**Nathaniel Parker**	AUGER DIAMETER:	**4-1/4" ID (Stem), 7-5/8" OD (Flights)**	GROUND EL:	**33.0 ± (NAVD88)**
CHECKED BY:	**Thomas Strike, PE**	SUPPORT CASING:	**N/A**	FINAL DEPTH:	**27.0 ft.**
EQUIPMENT:	**Truck Mounted Drill Rig**	CORING METHOD:	**N/A**	GRID COORDS:	**N/A**
SPT HAMMER:	**Automatic (140-lb.)**	BACKFILL MATERIAL:	**Drill Cuttings and Asphalt Patch**	GRID SYSTEM:	**N/A**

DEPTH BELOW GROUND SURFACE [VERTICAL FT.]	SAMPLE TYPE GRAPHIC	SAMPLE ID NUMBER AND RECOVERY RATIO [IN./IN.]	SPT BLOWS / 6 IN. (OR) CORE RATE / 12 IN. [MIN.]	SPT RESISTANCE, RQD, AND LABORATORY DATA	STRATIGRAPHY LOG	STRATUM IDENTIFICATION AND DESCRIPTION	ELEVATION SCALE SHOWN TO NEAREST FT.	REMARKS, OTHER TESTS, AND INSTALLATIONS
				● N-Value, Raw (bpf) ⊕ Moisture Content (%) ▶ Plastic Limit (%) ◀ Liquid Limit (%) ☒ Organic Content (%) 10 20 30 40		Surface: Asphalt concrete (AC) pavement.		
		S-1 18/24	5 6 5 6	● 11		Asphalt- 4" Thickness. **Silty sand (SM)** - Medium dense; black; moist; mostly fine to medium SAND, little non plastic fines, trace gravel; no odor. **[FILL]**		
		S-2 12/24	4 5 9 11	● 14		**Well graded sand (SW)** - Medium dense; light brown; moist; mostly fine to coarse SAND, trace gravel, trace non plastic fines; no odor.		
5		S-3 18/24	4 9 15 17	● 24		**Poorly graded sand (SP)** - Medium dense; light brown; moist; mostly fine SAND, trace gravel, trace non plastic fines; no odor.	28	
						Well graded sand (SW) - Medium dense to loose; light brown; moist to wet; mostly fine to coarse SAND, trace gravel, trace non plastic fines; no odor.		
10		S-4 12/24	4 8 10 10	● 18			23	
15		S-5 16/24	3 6 8 8	● 14			18	
20		S-6 12/24	3 3 3 5	● 6			13	[20.0] Water level measured on 12/18/19 (during drilling).

Refer to the attached index sheets for important information about this log including general notes, legends, and guidance on description methods and procedures.

DEPTH BELOW GROUND SURFACE [VERTICAL FT.]	SAMPLE TYPE GRAPHIC	SAMPLE ID NUMBER AND RECOVERY RATIO [IN./IN.]	SPT BLOWS / 6 IN. (OR) CORE RATE / 12 IN. [MIN.]	SPT RESISTANCE, RQD, AND LABORATORY DATA	STRATIGRAPHY LOG	STRATUM IDENTIFICATION AND DESCRIPTION	ELEVATION SCALE SHOWN TO NEAREST FT.	REMARKS, OTHER TESTS, AND INSTALLATIONS
		S-7 18/24	2 2 2 4	● N-Value, Raw (bpf) ⊕ Moisture Content (%) ▶ Plastic Limit (%) ◀ Liquid Limit (%) ☒ Organic Content (%) 10 20 30 40 ● 4		**Well graded sand (SW) -** Loose; light brown; wet; mostly fine to coarse SAND, trace gravel, trace non plastic fines; no odor.		
								Exploration ended at 27.0 ft.
30							3	
35							-2	
40							-7	
45							-12	
50							-17	

Refer to the attached index sheets for important information about this log including general notes, legends, and guidance on description methods and procedures.

Weston & Sampson

WSE Project: 2190978

Surfside Road Area Sewer Improvements
Nantucket, MA
Town of Nantucket

BORING ID: B-5

CONTRACTOR:	**Technical Drilling Services, Inc.**	BORING LOCATION:	**See Site Plan**	DATE START:	**December 17, 2019**
FOREMAN:	**Darwin Newton**	ADVANCE METHOD:	**Hollow-Stem Auger Drilling**	DATE FINISH:	**December 17, 2019**
LOGGED BY:	**Nathaniel Parker**	AUGER DIAMETER:	**4-1/4" ID (Stem), 7-5/8" OD (Flights)**	GROUND EL:	**32.0 ± (NAVD88)**
CHECKED BY:	**Thomas Strike, PE**	SUPPORT CASING:	**N/A**	FINAL DEPTH:	**22.0 ft.**
EQUIPMENT:	**Truck Mounted Drill Rig**	CORING METHOD:	**N/A**	GRID COORDS:	**N/A**
SPT HAMMER:	**Automatic (140-lb.)**	BACKFILL MATERIAL:	**Drill Cuttings and Asphalt Patch**	GRID SYSTEM:	**N/A**

DEPTH BELOW GROUND SURFACE [VERTICAL FT.]	SAMPLE TYPE GRAPHIC	SAMPLE ID NUMBER AND RECOVERY RATIO [IN./IN.]	SPT BLOWS / 6 IN. (OR) CORE RATE / 12 IN. [MIN.]	SPT RESISTANCE, RQD, AND LABORATORY DATA	STRATIGRAPHY LOG	STRATUM IDENTIFICATION AND DESCRIPTION	ELEVATION SCALE SHOWN TO NEAREST FT.	REMARKS, OTHER TESTS, AND INSTALLATIONS
				● N-Value, Raw (bpf) ⊕ Moisture Content (%) ▶ Plastic Limit (%) ◀ Liquid Limit (%) ☒ Organic Content (%) 10 20 30 40		Surface: Asphalt concrete (AC) pavement.		
						Asphalt- 4.5" Thickness.		
		S-1 18/24	9 12 12 6	● 24		**Poorly graded sand with silt (SP-SM)** - Medium dense; brown to black; moist; mostly fine to medium SAND, few fine to coarse gravel, few non plastic fines; no odor; few debris (concrete). **[FILL]**		
		S-2 0/24	2 2 4 6	● 6				[2.4 - 4.4] No recovery.
5		S-3 12/24	3 5 11 15	● 16		**Poorly graded sand (SP)** - Medium dense; brown; moist; mostly fine to coarse SAND, trace fine to coarse gravel, trace non plastic fines; no odor.	27	
10		S-4 15/24	6 8 10 11	● 18			22	
15		S-5 18/24	3 6 6 8	● 12			17	
20		S-6 24/24	3 5 7 8	● 12			12	
								Exploration ended at 22.0 ft.

Refer to the attached index sheets for important information about this log including general notes, legends, and guidance on description methods and procedures.

Weston & Sampson

WSE Project: 2190978

Surfside Road Area Sewer Improvements
Nantucket, MA
Town of Nantucket

BORING ID: B-6

CONTRACTOR:	**Technical Drilling Services, Inc.**	BORING LOCATION:	**See Site Plan**	DATE START:	**December 17, 2019**
FOREMAN:	**Darwin Newton**	ADVANCE METHOD:	**Hollow-Stem Auger Drilling**	DATE FINISH:	**December 17, 2019**
LOGGED BY:	**Nathaniel Parker**	AUGER DIAMETER:	**4-1/4" ID (Stem), 7-5/8" OD (Flights)**	GROUND EL:	**28.0 ± (NAVD88)**
CHECKED BY:	**Thomas Strike, PE**	SUPPORT CASING:	**N/A**	FINAL DEPTH:	**17.0 ft.**
EQUIPMENT:	**Truck Mounted Drill Rig**	CORING METHOD:	**N/A**	GRID COORDS:	**N/A**
SPT HAMMER:	**Automatic (140-lb.)**	BACKFILL MATERIAL:	**Drill Cuttings and Asphalt Patch**	GRID SYSTEM:	**N/A**

DEPTH BELOW GROUND SURFACE [VERTICAL FT.]	SAMPLE TYPE GRAPHIC	SAMPLE ID NUMBER AND RECOVERY RATIO [IN./IN.]	SPT BLOWS / 6 IN. (OR) CORE RATE / 12 IN. [MIN.]	SPT RESISTANCE, RQD, AND LABORATORY DATA	STRATIGRAPHY LOG	STRATUM IDENTIFICATION AND DESCRIPTION	ELEVATION SCALE SHOWN TO NEAREST FT.	REMARKS, OTHER TESTS, AND INSTALLATIONS
				● N-Value, Raw (bpf) ⊕ Moisture Content (%) ▶ Plastic Limit (%) ◀ Liquid Limit (%) ☒ Organic Content (%) 10 20 30 40		Surface: Asphalt concrete (AC) pavement.		
		S-1 15/24	6 11 8 9	● 19		Asphalt- 5" Thickness. **Silty sand (SM)** - Medium dense; black to brown; moist; mostly fine to medium SAND, little non plastic fines; no odor; little debris (concrete and brick). **[FILL]**		
		S-2 12/24	5 2 4 5	● 6		**Poorly graded sand (SP)** - Medium dense to loose; light brown; moist; mostly fine to coarse SAND, trace non plastic fines, trace gravel; no odor.		
5		S-3 12/24	4 5 8 14	● 13			23	
10		S-4 15/24	3 7 11 11	● 18		**Well graded sand (SW)** - Medium dense; light brown; moist; mostly fine to coarse SAND, trace gravel, trace non plastic fines; no odor.	18	
15		S-5 12/24	2 7 8 8	● 15			13	**Exploration ended at 17.0 ft.**
20							8	

Refer to the attached index sheets for important information about this log including general notes, legends, and guidance on description methods and procedures.

Weston & Sampson

WSE Project: 2190978

Surfside Road Area Sewer Improvements
Nantucket, MA
Town of Nantucket

BORING ID: B-7

CONTRACTOR:	**Technical Drilling Services, Inc.**	BORING LOCATION:	**See Site Plan**	DATE START:	**December 16, 2019**
FOREMAN:	**Darwin Newton**	ADVANCE METHOD:	**Hollow-Stem Auger Drilling**	DATE FINISH:	**December 16, 2019**
LOGGED BY:	**Nathaniel Parker**	AUGER DIAMETER:	**4-1/4" ID (Stem), 7-5/8" OD (Flights)**	GROUND EL:	**26.0 ± (NAVD88)**
CHECKED BY:	**Thomas Strike, PE**	SUPPORT CASING:	**N/A**	FINAL DEPTH:	**12.0 ft.**
EQUIPMENT:	**Truck Mounted Drill Rig**	CORING METHOD:	**N/A**	GRID COORDS:	**N/A**
SPT HAMMER:	**Automatic (140-lb.)**	BACKFILL MATERIAL:	**Drill Cuttings and Asphalt Patch**	GRID SYSTEM:	**N/A**

DEPTH BELOW GROUND SURFACE [VERTICAL FT.]	SAMPLE TYPE GRAPHIC	SAMPLE ID NUMBER AND RECOVERY RATIO [IN./IN.]	SPT BLOWS / 6 IN. (OR) CORE RATE / 12 IN. [MIN.]	SPT RESISTANCE, RQD, AND LABORATORY DATA	STRATIGRAPHY LOG	STRATUM IDENTIFICATION AND DESCRIPTION	ELEVATION SCALE SHOWN TO NEAREST FT.	REMARKS, OTHER TESTS, AND INSTALLATIONS
				● N-Value, Raw (bpf) ⊕ Moisture Content (%) ▶ Plastic Limit (%) ◀ Liquid Limit (%) ☒ Organic Content (%) 10 20 30 40		Surface: Asphalt concrete (AC) pavement.		
		S-1 18/24	7 7 6 9	● 13		Asphalt- 5.25" Thickness.		
						Poorly graded sand with silt (SP-SM) - Medium dense; brown to black; moist; mostly fine to medium SAND, few gravel, few non plastic fines; no odor. **[FILL]**		
		S-2 0/24	7 5 7 4	● 12		**Poorly graded sand (SP)** - Loose to medium dense; light brown; moist; mostly fine to medium SAND, trace fine to medium gravel, trace non plastic fines; no odor.		
5		S-3 15/24	3 3 3 6	● 6			21	
10		S-4 15/24	7 11 11 15	● 22			16	**Exploration ended at 12.0 ft.**
15							11	
20							6	

Refer to the attached index sheets for important information about this log including general notes, legends, and guidance on description methods and procedures.

Weston & Sampson

WSE Project: 2190978

Surfside Road Area Sewer Improvements
Nantucket, MA
Town of Nantucket

BORING ID: B-8

CONTRACTOR:	**Technical Drilling Services, Inc.**	BORING LOCATION:	**See Site Plan**	DATE START:	**December 17, 2019**
FOREMAN:	**Darwin Newton**	ADVANCE METHOD:	**Hollow-Stem Auger Drilling**	DATE FINISH:	**December 17, 2019**
LOGGED BY:	**Nathaniel Parker**	AUGER DIAMETER:	**4-1/4" ID (Stem), 7-5/8" OD (Flights)**	GROUND EL:	**31.0 ± (NAVD88)**
CHECKED BY:	**Thomas Strike, PE**	SUPPORT CASING:	**N/A**	FINAL DEPTH:	**17.0 ft.**
EQUIPMENT:	**Truck Mounted Drill Rig**	CORING METHOD:	**N/A**	GRID COORDS:	**N/A**
SPT HAMMER:	**Automatic (140-lb.)**	BACKFILL MATERIAL:	**Drill Cuttings and Asphalt Patch**	GRID SYSTEM:	**N/A**

DEPTH BELOW GROUND SURFACE [VERTICAL FT.]	SAMPLE TYPE GRAPHIC	SAMPLE ID NUMBER AND RECOVERY RATIO [IN./IN.]	SPT BLOWS / 6 IN. (OR) CORE RATE / 12 IN. [MIN.]	SPT RESISTANCE, RQD, AND LABORATORY DATA	STRATIGRAPHY LOG	STRATUM IDENTIFICATION AND DESCRIPTION	ELEVATION SCALE SHOWN TO NEAREST FT.	REMARKS, OTHER TESTS, AND INSTALLATIONS
				● N-Value, Raw (bpf) ⊕ Moisture Content (%) ▶ Plastic Limit (%) ◀ Liquid Limit (%) ☒ Organic Content (%) 10 20 30 40		Surface: Asphalt concrete (AC) pavement.		
						Asphalt- 5" Thickness.		
		S-1 18/24	4 7 9 9	● 16		**Poorly graded sand with silt (SP-SM)** - Medium dense; brown; moist; mostly fine to medium SAND, few non plastic fines, trace gravel; no odor; trace debris (brick). **[FILL]**		
		S-2 12/24	7 7 11 17	● 18		**Poorly graded sand (SP)** - Medium dense; light brown; moist; mostly fine to medium SAND, trace gravel, trace non plastic fines; no odor.		
5		S-3 18/24	10 10 11 13	● 21		**Poorly graded sand with silt (SP-SM)** - Medium dense; brown; moist; mostly fine to medium SAND, few non plastic fines, trace gravel; no odor.	26	
						Poorly graded sand (SP) - Medium dense; light brown; moist; mostly fine to medium SAND, trace gravel, trace non plastic fines; no odor.		
10		S-4 18/24	4 5 6 8	● 11			21	
15		S-5 12/24	2 3 7 10	● 10			16	**Exploration ended at 17.0 ft.**
20							11	

Refer to the attached index sheets for important information about this log including general notes, legends, and guidance on description methods and procedures.

Weston & Sampson

WSE Project: 2190978

Surfside Road Area Sewer Improvements
Nantucket, MA
Town of Nantucket

BORING ID: B-9

CONTRACTOR:	**Technical Drilling Services, Inc.**	BORING LOCATION:	**See Site Plan**	DATE START:	**December 17, 2019**
FOREMAN:	**Darwin Newton**	ADVANCE METHOD:	**Hollow-Stem Auger Drilling**	DATE FINISH:	**December 17, 2019**
LOGGED BY:	**Nathaniel Parker**	AUGER DIAMETER:	**4-1/4" ID (Stem), 7-5/8" OD (Flights)**	GROUND EL:	**33.0 ± (NAVD88)**
CHECKED BY:	**Thomas Strike, PE**	SUPPORT CASING:	**N/A**	FINAL DEPTH:	**17.0 ft.**
EQUIPMENT:	**Truck Mounted Drill Rig**	CORING METHOD:	**N/A**	GRID COORDS:	**N/A**
SPT HAMMER:	**Automatic (140-lb.)**	BACKFILL MATERIAL:	**Drill Cuttings and Asphalt Patch**	GRID SYSTEM:	**N/A**

DEPTH BELOW GROUND SURFACE [VERTICAL FT.]	SAMPLE TYPE GRAPHIC	SAMPLE ID NUMBER AND RECOVERY RATIO [IN./IN.]	SPT BLOWS / 6 IN. (OR) CORE RATE / 12 IN. [MIN.]	SPT RESISTANCE, RQD, AND LABORATORY DATA	STRATIGRAPHY LOG	STRATUM IDENTIFICATION AND DESCRIPTION	ELEVATION SCALE SHOWN TO NEAREST FT.	REMARKS, OTHER TESTS, AND INSTALLATIONS
				● N-Value, Raw (bpf) ⊕ Moisture Content (%) ▶ Plastic Limit (%) ◀ Liquid Limit (%) ☒ Organic Content (%) 10 20 30 40		Surface: Asphalt concrete (AC) pavement.		
		S-1 18/24	5 8 11 11	● 19		Asphalt- 4.5" Thickness. **Silty sand (SM)** - Medium dense; dark brown; moist; mostly fine to medium SAND, little non plastic fines, trace gravel; no odor; trace debris (brick). **[FILL]**		
		S-2 14/24	7 7 8 11	● 15		**Poorly graded sand (SP)** - Medium dense to loose; brown and light brown; moist; mostly fine to medium SAND, trace fine gravel, trace non plastic fines; no odor.		
5		S-3 20/24	7 8 10 16	● 18			28	
10		S-4 15/24	2 2 4 4	● 6			23	
15		S-5 18/24	3 6 10 12	● 16			18	**Exploration ended at 17.0 ft.**
20							13	

Refer to the attached index sheets for important information about this log including general notes, legends, and guidance on description methods and procedures.

Weston & Sampson

WSE Project: 2190978

Surfside Road Area Sewer Improvements
Nantucket, MA
Town of Nantucket

BORING ID: B-10

CONTRACTOR:	**Technical Drilling Services, Inc.**	BORING LOCATION:	**See Site Plan**	DATE START:	**December 17, 2019**
FOREMAN:	**Darwin Newton**	ADVANCE METHOD:	**Hollow-Stem Auger Drilling**	DATE FINISH:	**December 17, 2019**
LOGGED BY:	**Nathaniel Parker**	AUGER DIAMETER:	**4-1/4" ID (Stem), 7-5/8" OD (Flights)**	GROUND EL:	**37.0 ± (NAVD88)**
CHECKED BY:	**Thomas Strike, PE**	SUPPORT CASING:	**N/A**	FINAL DEPTH:	**17.0 ft.**
EQUIPMENT:	**Truck Mounted Drill Rig**	CORING METHOD:	**N/A**	GRID COORDS:	**N/A**
SPT HAMMER:	**Automatic (140-lb.)**	BACKFILL MATERIAL:	**Drill Cuttings and Asphalt Patch**	GRID SYSTEM:	**N/A**

DEPTH BELOW GROUND SURFACE [VERTICAL FT.]	SAMPLE TYPE GRAPHIC	SAMPLE ID NUMBER AND RECOVERY RATIO [IN./IN.]	SPT BLOWS / 6 IN. (OR) CORE RATE / 12 IN. [MIN.]	SPT RESISTANCE, RQD, AND LABORATORY DATA	STRATIGRAPHY LOG	STRATUM IDENTIFICATION AND DESCRIPTION	ELEVATION SCALE SHOWN TO NEAREST FT.	REMARKS, OTHER TESTS, AND INSTALLATIONS
				● N-Value, Raw (bpf) ⊕ Moisture Content (%) ▶ Plastic Limit (%) ◀ Liquid Limit (%) ☒ Organic Content (%) 10 20 30 40		Surface: Asphalt concrete (AC) pavement.		
		S-1 12/24	6 3 4 3	● 7		Asphalt- 3" Thickness. **Silty sand (SM)** - Loose; brown and black; moist; mostly fine to medium SAND, some non plastic fines; no odor; little debris (concrete, brick). **[FILL]**		
		S-2 18/24	1 2 4 5	● 6		**Silty sand (SM)** - Loose; brown; moist; mostly fine to medium SAND, little non plastic fines, trace gravel; no odor. **[FILL]**		
5		S-3 20/24	3 5 5 9	● 10		**Sandy silt (ML)** - Brown; moist; mostly low plasticity FINES, little fine to medium sand; little clay. **[FILL]** **Poorly graded sand (SP)** - Medium dense; brown to light brown; moist; mostly fine to coarse SAND, trace non plastic fines, trace gravel; no odor.	32	
10		S-4 14/24	7 8 10 14	● 18			27	
15		S-5 14/24	2 5 10 10	● 15			22	**Exploration ended at 17.0 ft.**
20							17	

Refer to the attached index sheets for important information about this log including general notes, legends, and guidance on description methods and procedures.

Weston & Sampson

WSE Project: 2190978

Surfside Road Area Sewer Improvements
Nantucket, MA
Town of Nantucket

BORING ID: B-11

CONTRACTOR:	**Technical Drilling Services, Inc.**	BORING LOCATION:	**See Site Plan**	DATE START:	**December 18, 2019**
FOREMAN:	**Darwin Newton**	ADVANCE METHOD:	**Hollow-Stem Auger Drilling**	DATE FINISH:	**December 18, 2019**
LOGGED BY:	**Nathaniel Parker**	AUGER DIAMETER:	**4-1/4" ID (Stem), 7-5/8" OD (Flights)**	GROUND EL:	**36.0 ± (NAVD88)**
CHECKED BY:	**Thomas Strike, PE**	SUPPORT CASING:	**N/A**	FINAL DEPTH:	**17.0 ft.**
EQUIPMENT:	**Truck Mounted Drill Rig**	CORING METHOD:	**N/A**	GRID COORDS:	**N/A**
SPT HAMMER:	**Automatic (140-lb.)**	BACKFILL MATERIAL:	**Drill Cuttings and Asphalt Patch**	GRID SYSTEM:	**N/A**

DEPTH BELOW GROUND SURFACE [VERTICAL FT.]	SAMPLE TYPE GRAPHIC	SAMPLE ID NUMBER AND RECOVERY RATIO [IN./IN.]	SPT BLOWS / 6 IN. (OR) CORE RATE / 12 IN. [MIN.]	SPT RESISTANCE, RQD, AND LABORATORY DATA	STRATIGRAPHY LOG	STRATUM IDENTIFICATION AND DESCRIPTION	ELEVATION SCALE SHOWN TO NEAREST FT.	REMARKS, OTHER TESTS, AND INSTALLATIONS
				● N-Value, Raw (bpf) ⊕ Moisture Content (%) ▶ Plastic Limit (%) ◀ Liquid Limit (%) ☒ Organic Content (%) 10 20 30 40		Surface: Asphalt concrete (AC) pavement.		
						Asphalt- 5" Thickness.		
		S-1 14/24	7 16 23 10	39		**Silty sand (SM)** - Dense; brown with black; moist; mostly fine to medium SAND, little non plastic fines; no odor; trace debris (brick). **[FILL]**		
		S-2 12/24	4 3 4 6	7		**Poorly graded sand (SP)** - Loose; brown; moist; mostly fine SAND, trace gravel, trace non plastic fines; no odor. **[FILL]**		
5		S-3 4/24	7 9 9 11	18		**Poorly graded sand with gravel (SP)** - Medium dense; brown to gray; moist; mostly fine to medium SAND, little gravel, trace non plastic fines; no odor. **[FILL]**	31	
10		S-4 16/24	4 11 10 14	21		**Poorly graded sand (SP)** - Medium dense; light brown; moist; mostly fine to medium SAND, trace non plastic fines, trace gravel; no odor.	26	
15		S-5 16/24	2 6 9 13	15			21	**Exploration ended at 17.0 ft.**
20							16	

Refer to the attached index sheets for important information about this log including general notes, legends, and guidance on description methods and procedures.

Weston & Sampson

WSE Project: 2190978

Surfside Road Area Sewer Improvements
Nantucket, MA
Town of Nantucket

BORING ID: B-12

CONTRACTOR:	**Technical Drilling Services, Inc.**	BORING LOCATION:	**See Site Plan**	DATE START:	**December 18, 2019**
FOREMAN:	**Darwin Newton**	ADVANCE METHOD:	**Hollow-Stem Auger Drilling**	DATE FINISH:	**December 18, 2019**
LOGGED BY:	**Nathaniel Parker**	AUGER DIAMETER:	**4-1/4" ID (Stem), 7-5/8" OD (Flights)**	GROUND EL:	**36.0 ± (NAVD88)**
CHECKED BY:	**Thomas Strike, PE**	SUPPORT CASING:	**N/A**	FINAL DEPTH:	**12.0 ft.**
EQUIPMENT:	**Truck Mounted Drill Rig**	CORING METHOD:	**N/A**	GRID COORDS:	**N/A**
SPT HAMMER:	**Automatic (140-lb.)**	BACKFILL MATERIAL:	**Drill Cuttings and Asphalt Patch**	GRID SYSTEM:	**N/A**

DEPTH BELOW GROUND SURFACE [VERTICAL FT.]	SAMPLE TYPE GRAPHIC	SAMPLE ID NUMBER AND RECOVERY RATIO [IN./IN.]	SPT BLOWS / 6 IN. (OR) CORE RATE / 12 IN. [MIN.]	SPT RESISTANCE, RQD, AND LABORATORY DATA	STRATIGRAPHY LOG	STRATUM IDENTIFICATION AND DESCRIPTION	ELEVATION SCALE SHOWN TO NEAREST FT.	REMARKS, OTHER TESTS, AND INSTALLATIONS
				● N-Value, Raw (bpf) ⊕ Moisture Content (%) ▶ Plastic Limit (%) ◀ Liquid Limit (%) ☒ Organic Content (%) 10 20 30 40		Surface: Asphalt concrete (AC) pavement.		
						Asphalt- 5" Thickness.		
		S-1 20/24	6 9 9 8	● 18		**Silty sand (SM)** - Medium dense; brown; moist; mostly fine to medium SAND, little non plastic fines, trace fine gravel; no odor; trace debris (brick). **[FILL]**		
		S-2 16/24	6 4 3 3	● 7		**Silty sand (SM)** - Loose; brown; moist; few non plastic fines; no odor. **[FILL]**		
5		S-3 24/24	2 2 2 2	● 4			31	
						Poorly graded sand with silt (SP-SM) - Medium dense; brown; moist; mostly fine to medium SAND, few non plastic fines, trace gravel; no odor.		
10		S-4 20/24	5 10 10 12	● 20			26	
								Exploration ended at 12.0 ft.
15							21	
20							16	

Refer to the attached index sheets for important information about this log including general notes, legends, and guidance on description methods and procedures.

Weston & Sampson

WSE Project: 2190978

Surfside Road Area Sewer Improvements
Nantucket, MA
Town of Nantucket

BORING ID: B-13

CONTRACTOR:	**Technical Drilling Services, Inc.**	BORING LOCATION:	**See Site Plan**	DATE START:	**December 20, 2019**
FOREMAN:	**Darwin Newton**	ADVANCE METHOD:	**Hollow-Stem Auger Drilling**	DATE FINISH:	**December 20, 2019**
LOGGED BY:	**Nathaniel Parker**	AUGER DIAMETER:	**4-1/4" ID (Stem), 7-5/8" OD (Flights)**	GROUND EL:	**26.0 ± (NAVD88)**
CHECKED BY:	**Thomas Strike, PE**	SUPPORT CASING:	**N/A**	FINAL DEPTH:	**12.0 ft.**
EQUIPMENT:	**Truck Mounted Drill Rig**	CORING METHOD:	**N/A**	GRID COORDS:	**N/A**
SPT HAMMER:	**Automatic (140-lb.)**	BACKFILL MATERIAL:	**Drill Cuttings and Asphalt Patch**	GRID SYSTEM:	**N/A**

DEPTH BELOW GROUND SURFACE [VERTICAL FT.]	SAMPLE TYPE GRAPHIC	SAMPLE ID NUMBER AND RECOVERY RATIO [IN./IN.]	SPT BLOWS / 6 IN. (OR) CORE RATE / 12 IN. [MIN.]	SPT RESISTANCE, RQD, AND LABORATORY DATA	STRATIGRAPHY LOG	STRATUM IDENTIFICATION AND DESCRIPTION	ELEVATION SCALE SHOWN TO NEAREST FT.	REMARKS, OTHER TESTS, AND INSTALLATIONS
				● N-Value, Raw (bpf) ⊕ Moisture Content (%) ▶ Plastic Limit (%) ◀ Liquid Limit (%) ☒ Organic Content (%) 10 20 30 40		Surface: Asphalt concrete (AC) pavement.		
						Asphalt- 3" Thickness.		
		S-1 15/24	5 4 5 3	● 9		**Poorly graded sand (SP)** - Loose to medium dense; brown to black; moist; mostly fine to medium SAND; trace to few non plastic fines, trace gravel; trace to few debris (brick). **[FILL]**		
		S-2 8/24	5 2 5 5	● 7				
5		S-3 0/24	12 14 15 16	● 29			21	[4.0 - 6.0] No recovery in S-3, blow counts likely affected by possible cobbles.
						Poorly graded sand (SP) - Medium dense; light brown; moist; mostly fine to medium SAND, trace gravel, trace non plastic fines; no odor.		
10		S-4 16/24	4 6 8 9	● 14			16	
								Exploration ended at 12.0 ft.
15							11	
20							6	

Refer to the attached index sheets for important information about this log including general notes, legends, and guidance on description methods and procedures.

Weston & Sampson

WSE Project: 2190978

Surfside Road Area Sewer Improvements
Nantucket, MA
Town of Nantucket

BORING ID: B-14

CONTRACTOR:	**Technical Drilling Services, Inc.**	BORING LOCATION:	**See Site Plan**	DATE START:	**December 20, 2019**
FOREMAN:	**Darwin Newton**	ADVANCE METHOD:	**Hollow-Stem Auger Drilling**	DATE FINISH:	**December 20, 2019**
LOGGED BY:	**Nathaniel Parker**	AUGER DIAMETER:	**4-1/4" ID (Stem), 7-5/8" OD (Flights)**	GROUND EL:	**29.0 ± (NAVD88)**
CHECKED BY:	**Thomas Strike, PE**	SUPPORT CASING:	**N/A**	FINAL DEPTH:	**12.0 ft.**
EQUIPMENT:	**Truck Mounted Drill Rig**	CORING METHOD:	**N/A**	GRID COORDS:	**N/A**
SPT HAMMER:	**Automatic (140-lb.)**	BACKFILL MATERIAL:	**Drill Cuttings and Asphalt Patch**	GRID SYSTEM:	**N/A**

DEPTH BELOW GROUND SURFACE [VERTICAL FT.]	SAMPLE TYPE GRAPHIC	SAMPLE ID NUMBER AND RECOVERY RATIO [IN./IN.]	SPT BLOWS / 6 IN. (OR) CORE RATE / 12 IN. [MIN.]	SPT RESISTANCE, RQD, AND LABORATORY DATA	STRATIGRAPHY LOG	STRATUM IDENTIFICATION AND DESCRIPTION	ELEVATION SCALE SHOWN TO NEAREST FT.	REMARKS, OTHER TESTS, AND INSTALLATIONS
				● N-Value, Raw (bpf) ⊕ Moisture Content (%) ▶ Plastic Limit (%) ◀ Liquid Limit (%) ☒ Organic Content (%) 10 20 30 40		Surface: Asphalt concrete (AC) pavement.		
						Asphalt- 4" Thickness.		
		S-1 14/24	8 10 8 5	18		**Silty sand (SM)** - Medium dense; dark gray to black; moist; mostly fine to medium SAND, little non plastic fines, trace gravel; no odor; trace debris (brick). **[FILL]**		
		S-2 12/24	3 4 5 5	9		**Silty sand (SM)** - Loose; brown; moist; mostly fine to medium SAND, little non plastic fines, trace gravel; no odor. **[FILL]**		
5		S-3 10/24	4 10 15 15	25		**Poorly graded sand with silt and gravel (SP-SM)** - Medium dense; brown to dark brown; moist; mostly fine to medium SAND, some gravel, few non plastic fines; no odor. **[FILL]**	24	
10		S-4 12/24	5 3 6 8	9		**Poorly graded sand (SP)** - Loose; brown; moist; mostly fine to medium SAND, trace non plastic fines, trace fine gravel; no odor.	19	**Exploration ended at 12.0 ft.**
15							14	
20							9	

Refer to the attached index sheets for important information about this log including general notes, legends, and guidance on description methods and procedures.

Weston & Sampson

WSE Project: 2190978

Surfside Road Area Sewer Improvements
Nantucket, MA
Town of Nantucket

BORING ID: B-15

CONTRACTOR:	**Technical Drilling Services, Inc.**	BORING LOCATION:	**See Site Plan**	DATE START:	**December 19, 2019**
FOREMAN:	**Darwin Newton**	ADVANCE METHOD:	**Hollow-Stem Auger Drilling**	DATE FINISH:	**December 19, 2019**
LOGGED BY:	**Nathaniel Parker**	AUGER DIAMETER:	**4-1/4" ID (Stem), 7-5/8" OD (Flights)**	GROUND EL:	**26.0 ± (NAVD88)**
CHECKED BY:	**Thomas Strike, PE**	SUPPORT CASING:	**N/A**	FINAL DEPTH:	**12.0 ft.**
EQUIPMENT:	**Truck Mounted Drill Rig**	CORING METHOD:	**N/A**	GRID COORDS:	**N/A**
SPT HAMMER:	**Automatic (140-lb.)**	BACKFILL MATERIAL:	**Drill Cuttings and Asphalt Patch**	GRID SYSTEM:	**N/A**

DEPTH BELOW GROUND SURFACE [VERTICAL FT.]	SAMPLE TYPE GRAPHIC	SAMPLE ID NUMBER AND RECOVERY RATIO [IN./IN.]	SPT BLOWS / 6 IN. (OR) CORE RATE / 12 IN. [MIN.]	SPT RESISTANCE, RQD, AND LABORATORY DATA	STRATIGRAPHY LOG	STRATUM IDENTIFICATION AND DESCRIPTION	ELEVATION SCALE SHOWN TO NEAREST FT.	REMARKS, OTHER TESTS, AND INSTALLATIONS
				● N-Value, Raw (bpf) ⊕ Moisture Content (%) ▶ Plastic Limit (%) ◀ Liquid Limit (%) ☒ Organic Content (%) 10 20 30 40		Surface: Asphalt concrete (AC) pavement.		
						Asphalt- 4" Thickness.		
		S-1 18/24	11 15 12 9	27		**Silty sand (SM)** - Medium dense; orange-brown to black; moist; few non plastic fines; no odor. **[BURIED TOPSOIL/SUBSOIL]**		
		S-2 14/24	6 6 6 8	12		**Poorly graded sand (SP)** - Medium dense; light brown to brown; moist; mostly fine to medium SAND, trace gravel, trace non plastic fines; no odor.		
5		S-3 18/24	3 4 6 7	10			21	
10		S-4 15/24	3 6 6 7	12			16	**Exploration ended at 12.0 ft.**
15							11	
20							6	

Refer to the attached index sheets for important information about this log including general notes, legends, and guidance on description methods and procedures.

Weston & Sampson

WSE Project: 2190978

Surfside Road Area Sewer Improvements
Nantucket, MA
Town of Nantucket

BORING ID: B-16

CONTRACTOR:	**Technical Drilling Services, Inc.**	BORING LOCATION:	**See Site Plan**	DATE START:	**December 19, 2019**
FOREMAN:	**Darwin Newton**	ADVANCE METHOD:	**Hollow-Stem Auger Drilling**	DATE FINISH:	**December 19, 2019**
LOGGED BY:	**Nathaniel Parker**	AUGER DIAMETER:	**4-1/4" ID (Stem), 7-5/8" OD (Flights)**	GROUND EL:	**34.0 ± (NAVD88)**
CHECKED BY:	**Thomas Strike, PE**	SUPPORT CASING:	**N/A**	FINAL DEPTH:	**12.0 ft.**
EQUIPMENT:	**Truck Mounted Drill Rig**	CORING METHOD:	**N/A**	GRID COORDS:	**N/A**
SPT HAMMER:	**Automatic (140-lb.)**	BACKFILL MATERIAL:	**Drill Cuttings and Asphalt Patch**	GRID SYSTEM:	**N/A**

DEPTH BELOW GROUND SURFACE [VERTICAL FT.]	SAMPLE TYPE GRAPHIC	SAMPLE ID NUMBER AND RECOVERY RATIO [IN./IN.]	SPT BLOWS / 6 IN. (OR) CORE RATE / 12 IN. [MIN.]	SPT RESISTANCE, RQD, AND LABORATORY DATA ● N-Value, Raw (bpf) ⊕ Moisture Content (%) ▶ Plastic Limit (%) ◀ Liquid Limit (%) ☒ Organic Content (%)	STRATIGRAPHY LOG	STRATUM IDENTIFICATION AND DESCRIPTION	ELEVATION SCALE SHOWN TO NEAREST FT.	REMARKS, OTHER TESTS, AND INSTALLATIONS
				10 20 30 40		Surface: Asphalt concrete (AC) pavement.		
						Asphalt- 5.5" Thickness.		
		S-1 16/24	10 11 12 9	● 23		**Silty sand (SM)** - Medium dense; orange-brown to black; moist; some non plastic fines; no odor. **[BURIED TOPSOIL/SUBSOIL]**		
		S-2 12/24	8 8 9 10	● 17		**Poorly graded sand (SP)** - Medium dense; light brown to brown; moist; mostly fine to coarse SAND, trace gravel, trace non plastic fines; no odor.		
5		S-3 14/24	1 5 7 8	● 12			29	
10		S-4 18/24	8 4 6 9	● 10			24	**Exploration ended at 12.0 ft.**
15							19	
20							14	

Refer to the attached index sheets for important information about this log including general notes, legends, and guidance on description methods and procedures.

Weston & Sampson

WSE Project: 2190978

Surfside Road Area Sewer Improvements
Nantucket, MA
Town of Nantucket

BORING ID: B-17

CONTRACTOR:	**Technical Drilling Services, Inc.**	BORING LOCATION:	**See Site Plan**	DATE START:	**December 19, 2019**
FOREMAN:	**Darwin Newton**	ADVANCE METHOD:	**Hollow-Stem Auger Drilling**	DATE FINISH:	**December 19, 2019**
LOGGED BY:	**Nathaniel Parker**	AUGER DIAMETER:	**4-1/4" ID (Stem), 7-5/8" OD (Flights)**	GROUND EL:	**36.0 ± (NAVD88)**
CHECKED BY:	**Thomas Strike, PE**	SUPPORT CASING:	**N/A**	FINAL DEPTH:	**17.0 ft.**
EQUIPMENT:	**Truck Mounted Drill Rig**	CORING METHOD:	**N/A**	GRID COORDS:	**N/A**
SPT HAMMER:	**Automatic (140-lb.)**	BACKFILL MATERIAL:	**Drill Cuttings and Asphalt Patch**	GRID SYSTEM:	**N/A**

DEPTH BELOW GROUND SURFACE [VERTICAL FT.]	SAMPLE TYPE GRAPHIC	SAMPLE ID NUMBER AND RECOVERY RATIO [IN./IN.]	SPT BLOWS / 6 IN. (OR) CORE RATE / 12 IN. [MIN.]	SPT RESISTANCE, RQD, AND LABORATORY DATA	STRATIGRAPHY LOG	STRATUM IDENTIFICATION AND DESCRIPTION	ELEVATION SCALE SHOWN TO NEAREST FT.	REMARKS, OTHER TESTS, AND INSTALLATIONS
				● N-Value, Raw (bpf) ⊕ Moisture Content (%) ▶ Plastic Limit (%) ◀ Liquid Limit (%) ☒ Organic Content (%) 10 20 30 40		Surface: Asphalt concrete (AC) pavement.		
		S-1 20/24	7 9 11 11	● 20		Asphalt- 5" Thickness. **Silty sand (SM)** - Medium dense; orange-brown to black; moist; few non plastic fines; no odor. **[BURIED TOPSOIL/SUBSOIL]**		
		S-2 12/24	9 11 14 17	● 25		**Poorly graded sand (SP)** - Medium dense; light brown; moist; mostly fine to coarse SAND, trace non plastic fines, trace gravel; no odor.		
5		S-3 12/24	3 9 15 21	● 24			31	
10		S-4 12/24	2 5 6 7	● 11			26	
15		S-5 6/24	3 7 9 8	● 16			21	**Exploration ended at 17.0 ft.**
20							16	

Refer to the attached index sheets for important information about this log including general notes, legends, and guidance on description methods and procedures.

Weston & Sampson

WSE Project: 2190978

Surfside Road Area Sewer Improvements
Nantucket, MA
Town of Nantucket

BORING ID: B-18

CONTRACTOR:	**Technical Drilling Services, Inc.**	BORING LOCATION:	**See Site Plan**	DATE START:	**December 19, 2019**
FOREMAN:	**Darwin Newton**	ADVANCE METHOD:	**Hollow-Stem Auger Drilling**	DATE FINISH:	**December 19, 2019**
LOGGED BY:	**Nathaniel Parker**	AUGER DIAMETER:	**4-1/4" ID (Stem), 7-5/8" OD (Flights)**	GROUND EL:	**34.0 ± (NAVD88)**
CHECKED BY:	**Thomas Strike, PE**	SUPPORT CASING:	**N/A**	FINAL DEPTH:	**17.0 ft.**
EQUIPMENT:	**Truck Mounted Drill Rig**	CORING METHOD:	**N/A**	GRID COORDS:	**N/A**
SPT HAMMER:	**Automatic (140-lb.)**	BACKFILL MATERIAL:	**Drill Cuttings and Asphalt Patch**	GRID SYSTEM:	**N/A**

DEPTH BELOW GROUND SURFACE [VERTICAL FT.]	SAMPLE TYPE GRAPHIC	SAMPLE ID NUMBER AND RECOVERY RATIO [IN./IN.]	SPT BLOWS / 6 IN. (OR) CORE RATE / 12 IN. [MIN.]	SPT RESISTANCE, RQD, AND LABORATORY DATA	STRATIGRAPHY LOG	STRATUM IDENTIFICATION AND DESCRIPTION	ELEVATION SCALE SHOWN TO NEAREST FT.	REMARKS, OTHER TESTS, AND INSTALLATIONS
				● N-Value, Raw (bpf) ⊕ Moisture Content (%) ▶ Plastic Limit (%) ◀ Liquid Limit (%) ☒ Organic Content (%) 10 20 30 40		Surface: Asphalt concrete (AC) pavement.		
		S-1 16/24	7 12 9 7	● 21		Asphalt- 5.5" Thickness. **Silty sand (SM)** - Medium dense; orange-brown to black; moist; some non plastic fines; no odor. **[BURIED TOPSOIL/SUBSOIL]**		
		S-2 18/24	5 7 9 12	● 16		**Poorly graded sand (SP)** - Medium dense to loose; brown to light brown; moist; mostly fine to coarse SAND, trace gravel, trace non plastic fines; no odor.		
5		S-3 20/24	6 8 12 15	● 20			29	
10		S-4 18/24	4 7 10 11	● 17			24	
15		S-5 18/24	2 2 3 4	● 5			19	**Exploration ended at 17.0 ft.**
20							14	

Refer to the attached index sheets for important information about this log including general notes, legends, and guidance on description methods and procedures.

Weston & Sampson

WSE Project: 2190978

Surfside Road Area Sewer Improvements
Nantucket, MA
Town of Nantucket

BORING ID: B-19

CONTRACTOR:	**Technical Drilling Services, Inc.**	BORING LOCATION:	**See Site Plan**	DATE START:	**December 18, 2019**
FOREMAN:	**Darwin Newton**	ADVANCE METHOD:	**Hollow-Stem Auger Drilling**	DATE FINISH:	**December 18, 2019**
LOGGED BY:	**Nathaniel Parker**	AUGER DIAMETER:	**4-1/4" ID (Stem), 7-5/8" OD (Flights)**	GROUND EL:	**38.0 ± (NAVD88)**
CHECKED BY:	**Thomas Strike, PE**	SUPPORT CASING:	**N/A**	FINAL DEPTH:	**17.0 ft.**
EQUIPMENT:	**Truck Mounted Drill Rig**	CORING METHOD:	**N/A**	GRID COORDS:	**N/A**
SPT HAMMER:	**Automatic (140-lb.)**	BACKFILL MATERIAL:	**Drill Cuttings and Asphalt Patch**	GRID SYSTEM:	**N/A**

DEPTH BELOW GROUND SURFACE [VERTICAL FT.]	SAMPLE TYPE GRAPHIC	SAMPLE ID NUMBER AND RECOVERY RATIO [IN./IN.]	SPT BLOWS / 6 IN. (OR) CORE RATE / 12 IN. [MIN.]	SPT RESISTANCE, RQD, AND LABORATORY DATA	STRATIGRAPHY LOG	STRATUM IDENTIFICATION AND DESCRIPTION	ELEVATION SCALE SHOWN TO NEAREST FT.	REMARKS, OTHER TESTS, AND INSTALLATIONS
				● N-Value, Raw (bpf) ⊕ Moisture Content (%) ▶ Plastic Limit (%) ◀ Liquid Limit (%) ☒ Organic Content (%) 10 20 30 40		Surface: Asphalt concrete (AC) pavement.		
						Asphalt- 5" Thickness.		
		S-1 18/24	6 9 18 12	27		**Silty sand (SM)** - Medium dense; orange-brown to black; moist; few non plastic fines; no odor. **[BURIED TOPSOIL/SUBSOIL]**		
		S-2 18/24	6 4 4 17	8		**Silty sand (SM)** - Loose; brown; moist; mostly fine to medium SAND, little non plastic fines; no odor.		
5		S-3 20/24	7 12 18 16	30		**Poorly graded sand (SP)** - Medium dense; light brown to brown; moist; mostly fine to medium SAND, trace gravel, trace non plastic fines; no odor.	33	
10		S-4 12/24	5 8 7 10	15			28	
15		S-5 16/24	4 6 7 9	13			23	**Exploration ended at 17.0 ft.**
20							18	

Refer to the attached index sheets for important information about this log including general notes, legends, and guidance on description methods and procedures.

Weston & Sampson

WSE Project: 2190978

Surfside Road Area Sewer Improvements
Nantucket, MA
Town of Nantucket

BORING ID: B-20

CONTRACTOR:	**Technical Drilling Services, Inc.**	BORING LOCATION:	**See Site Plan**	DATE START:	**December 18, 2019**
FOREMAN:	**Darwin Newton**	ADVANCE METHOD:	**Hollow-Stem Auger Drilling**	DATE FINISH:	**December 18, 2019**
LOGGED BY:	**Nathaniel Parker**	AUGER DIAMETER:	**4-1/4" ID (Stem), 7-5/8" OD (Flights)**	GROUND EL:	**38.0 ± (NAVD88)**
CHECKED BY:	**Thomas Strike, PE**	SUPPORT CASING:	**N/A**	FINAL DEPTH:	**17.0 ft.**
EQUIPMENT:	**Truck Mounted Drill Rig**	CORING METHOD:	**N/A**	GRID COORDS:	**N/A**
SPT HAMMER:	**Automatic (140-lb.)**	BACKFILL MATERIAL:	**Drill Cuttings and Asphalt Patch**	GRID SYSTEM:	**N/A**

DEPTH BELOW GROUND SURFACE [VERTICAL FT.]	SAMPLE TYPE GRAPHIC	SAMPLE ID NUMBER AND RECOVERY RATIO [IN./IN.]	SPT BLOWS / 6 IN. (OR) CORE RATE / 12 IN. [MIN.]	SPT RESISTANCE, RQD, AND LABORATORY DATA (● N-Value, Raw (bpf); ⊕ Moisture Content (%); ▶ Plastic Limit (%); ◀ Liquid Limit (%); ☒ Organic Content (%); 10 20 30 40)	STRATIGRAPHY LOG	STRATUM IDENTIFICATION AND DESCRIPTION	ELEVATION SCALE SHOWN TO NEAREST FT.	REMARKS, OTHER TESTS, AND INSTALLATIONS
						Surface: Asphalt concrete (AC) pavement.		
						Asphalt- 5" Thickness.		
		S-1 20/24	6 6 5 4	● 11		Medium dense to loose; brown; moist; mostly fine to coarse SAND, few non plastic fines, trace gravel; no odor. **[FILL]**		
		S-2 12/24	4 2 2 2	● 4				
5		S-3 12/24	3 5 5 6	● 10			33	
						Poorly graded sand (SP) - Medium dense; light brown; moist; mostly fine to medium SAND, trace gravel, trace non plastic fines; no odor.		
10		S-4 16/24	2 6 8 9	● 14			28	
15		S-5 16/24	2 6 9 12	● 15			23	
								Exploration ended at 17.0 ft.
20							18	

Refer to the attached index sheets for important information about this log including general notes, legends, and guidance on description methods and procedures.

Weston & Sampson

WSE Project: 2190978

Surfside Road Area Sewer Improvements
Nantucket, MA
Town of Nantucket

BORING ID: B-21

CONTRACTOR:	**Technical Drilling Services, Inc.**	BORING LOCATION:	**See Site Plan**	DATE START:	**December 18, 2019**
FOREMAN:	**Darwin Newton**	ADVANCE METHOD:	**Hollow-Stem Auger Drilling**	DATE FINISH:	**December 18, 2019**
LOGGED BY:	**Nathaniel Parker**	AUGER DIAMETER:	**4-1/4" ID (Stem), 7-5/8" OD (Flights)**	GROUND EL:	**37.0 ± (NAVD88)**
CHECKED BY:	**Thomas Strike, PE**	SUPPORT CASING:	**N/A**	FINAL DEPTH:	**17.0 ft.**
EQUIPMENT:	**Truck Mounted Drill Rig**	CORING METHOD:	**N/A**	GRID COORDS:	**N/A**
SPT HAMMER:	**Automatic (140-lb.)**	BACKFILL MATERIAL:	**Drill Cuttings and Asphalt Patch**	GRID SYSTEM:	**N/A**

DEPTH BELOW GROUND SURFACE [VERTICAL FT.]	SAMPLE TYPE GRAPHIC	SAMPLE ID NUMBER AND RECOVERY RATIO [IN./IN.]	SPT BLOWS / 6 IN. (OR) CORE RATE / 12 IN. [MIN.]	SPT RESISTANCE, RQD, AND LABORATORY DATA	STRATIGRAPHY LOG	STRATUM IDENTIFICATION AND DESCRIPTION	ELEVATION SCALE SHOWN TO NEAREST FT.	REMARKS, OTHER TESTS, AND INSTALLATIONS
				● N-Value, Raw (bpf) ⊕ Moisture Content (%) ▶ Plastic Limit (%) ◀ Liquid Limit (%) ☒ Organic Content (%) 10 20 30 40		Surface: Asphalt concrete (AC) pavement.		
		S-1 18/24	8 8 6 8	● 14		Asphalt- 4" Thickness. **Silty sand (SM)** - Medium dense; brown; moist; few non plastic fines; no odor. **[FILL]**		
		S-2 18/24	8 9 11 15	● 20		**Poorly graded sand (SP)** - Loose to dense; brown; moist; mostly fine to medium SAND, trace gravel, trace non plastic fines; no odor.		
5		S-3 12/24	10 12 21 21	● 33			32	
10		S-4 12/24	3 3 5 6	● 8			27	
15		S-5 18/24	3 3 6 6	● 9			22	**Exploration ended at 17.0 ft.**
20							17	

Refer to the attached index sheets for important information about this log including general notes, legends, and guidance on description methods and procedures.

Weston & Sampson

WSE Project: 2190978

Surfside Road Area Sewer Improvements
Nantucket, MA
Town of Nantucket

BORING ID: PS-1

CONTRACTOR:	Technical Drilling Services, Inc.	BORING LOCATION:	See Site Plan	DATE START:	December 19, 2019
FOREMAN:	Darwin Newton	ADVANCE METHOD:	Hollow-Stem Auger Drilling	DATE FINISH:	December 19, 2019
LOGGED BY:	Nathaniel Parker	AUGER DIAMETER:	4-1/4" ID (Stem), 7-5/8" OD (Flights)	GROUND EL:	20.0 ± (NAVD88)
CHECKED BY:	Thomas Strike, PE	SUPPORT CASING:	N/A	FINAL DEPTH:	32.0 ft.
EQUIPMENT:	Truck Mounted Drill Rig	CORING METHOD:	N/A	GRID COORDS:	N/A
SPT HAMMER:	Automatic (140-lb.)	BACKFILL MATERIAL:	Monitoring Well Installed	GRID SYSTEM:	N/A

DEPTH BELOW GROUND SURFACE [VERTICAL FT.]	SAMPLE TYPE GRAPHIC	SAMPLE ID NUMBER AND RECOVERY RATIO [IN./IN.]	SPT BLOWS / 6 IN. (OR) CORE RATE / 12 IN. [MIN.]	SPT RESISTANCE, RQD, AND LABORATORY DATA	STRATIGRAPHY LOG	STRATUM IDENTIFICATION AND DESCRIPTION	ELEVATION SCALE SHOWN TO NEAREST FT.	REMARKS, OTHER TESTS, AND INSTALLATIONS
		S-1 18/24	26 23 25 20	48		**Poorly graded sand (SP)** - Dense; brown; moist; mostly SAND, few gravel, trace non plastic fines; no odor. **[FILL]**		[0.0 - 2.0] Frozen soil.
		S-2 16/24	9 7 9 8	16		**Poorly graded sand (SP)** - Medium dense to loose; light brown to brown; moist; mostly fine to medium SAND, trace gravel, trace non plastic fines; no odor.		
5		S-3 14/24	3 4 5 7	9			15	
10		S-4 16/24	5 4 5 6	9			10	[13.0] Water level measured on 12/19/19 (during drilling).
15		S-5 12/24	1 2 2 2	4		**Well graded sand (SW)** - Loose; light brown; wet; mostly fine to coarse SAND, trace gravel, trace non plastic fines; no odor.	5	
						Poorly graded sand (SP) - Medium dense; light brown; wet; mostly fine to medium SAND, trace non plastic fines, trace gravel; no odor.		[18.0] Installed monitoring well (MW-1) at 18 feet.
20		S-6 12/24	3 3 7 8	10			0	

SPT RESISTANCE, RQD, AND LABORATORY DATA
● N-Value, Raw (bpf)
⊕ Moisture Content (%)
▶ Plastic Limit (%)
◀ Liquid Limit (%)
☒ Organic Content (%)
10 20 30 40

Refer to the attached index sheets for important information about this log including general notes, legends, and guidance on description methods and procedures.

Weston & Sampson

WSE Project: 2190978

Surfside Road Area Sewer Improvements
Nantucket, MA
Town of Nantucket

BORING ID: PS-1

DEPTH BELOW GROUND SURFACE [VERTICAL FT.]	SAMPLE TYPE GRAPHIC	SAMPLE ID NUMBER AND RECOVERY RATIO [IN./IN.]	SPT BLOWS / 6 IN. (OR) CORE RATE / 12 IN. [MIN.]	SPT RESISTANCE, RQD, AND LABORATORY DATA	STRATIGRAPHY LOG	STRATUM IDENTIFICATION AND DESCRIPTION	ELEVATION SCALE SHOWN TO NEAREST FT.	REMARKS, OTHER TESTS, AND INSTALLATIONS
		S-7 22/24	6 10 14 10	● N-Value, Raw (bpf) ⊕ Moisture Content (%) ▶ Plastic Limit (%) ◀ Liquid Limit (%) ☒ Organic Content (%) 10 20 30 40 24		**Poorly graded sand (SP)** - Medium dense to dense; light brown; wet; mostly fine to medium SAND, trace gravel, trace non plastic fines; no odor.		
30		S-8 12/24	6 13 19 15	32			-10	**Exploration ended at 32.0 ft.**
35							-15	
40							-20	
45							-25	
50							-30	

Refer to the attached index sheets for important information about this log including general notes, legends, and guidance on description methods and procedures.

Weston & Sampson

WSE Project: 2190978

Surfside Road Area Sewer Improvements
Nantucket, MA
Town of Nantucket

BORING ID: PS-2

CONTRACTOR:	**Technical Drilling Services, Inc.**	BORING LOCATION:	**See Site Plan**	DATE START:	**December 19, 2019**
FOREMAN:	**Darwin Newton**	ADVANCE METHOD:	**Hollow-Stem Auger Drilling**	DATE FINISH:	**December 19, 2019**
LOGGED BY:	**Nathaniel Parker**	AUGER DIAMETER:	**4-1/4" ID (Stem), 7-5/8" OD (Flights)**	GROUND EL:	**20.0 ± (NAVD88)**
CHECKED BY:	**Thomas Strike, PE**	SUPPORT CASING:	**N/A**	FINAL DEPTH:	**32.0 ft.**
EQUIPMENT:	**Truck Mounted Drill Rig**	CORING METHOD:	**N/A**	GRID COORDS:	**N/A**
SPT HAMMER:	**Automatic (140-lb.)**	BACKFILL MATERIAL:	**Drill Cuttings**	GRID SYSTEM:	**N/A**

DEPTH BELOW GROUND SURFACE [VERTICAL FT.]	SAMPLE TYPE GRAPHIC	SAMPLE ID NUMBER AND RECOVERY RATIO [IN./IN.]	SPT BLOWS / 6 IN. (OR) CORE RATE / 12 IN. [MIN.]	SPT RESISTANCE, RQD, AND LABORATORY DATA	STRATIGRAPHY LOG	STRATUM IDENTIFICATION AND DESCRIPTION	ELEVATION SCALE SHOWN TO NEAREST FT.	REMARKS, OTHER TESTS, AND INSTALLATIONS
		S-1 15/24	6 9 12 10	21		**Poorly graded sand with silt and gravel (SP-SM)** - Medium dense; brown; moist; mostly fine to coarse SAND, some gravel, few non plastic fines; no odor. **[FILL]**		
		S-2 14/24	9 9 13 15	22		**Poorly graded sand with silt (SP-SM)** - Brown; moist; mostly fine to medium SAND, few non plastic fines, trace gravel; no odor. **[FILL]**		
		S-3 13/18	13 38 50	>> 88		**Poorly graded sand (SP)** - Very dense; light brown; moist; mostly fine to medium SAND, few gravel, trace non plastic fines; no odor.		
5							15	[5.0] Possible cobble/boulder at 5 feet.
						Well graded sand (SW) - Loose to medium dense; light brown; wet to moist; mostly fine to coarse SAND, few gravel, trace non plastic fines; no odor.		
10		S-4 12/24	5 8 18 21	26			10	
								[14.0] Water level measured on 12/19/19 (during drilling).
15		S-5 12/24	1 1 3 4	4			5	
20		S-6 18/24	3 5 9 11	14			0	

SPT RESISTANCE, RQD, AND LABORATORY DATA: ● N-Value, Raw (bpf); ⊕ Moisture Content (%); ▶ Plastic Limit (%); ◀ Liquid Limit (%); ☒ Organic Content (%); 10 20 30 40

Refer to the attached index sheets for important information about this log including general notes, legends, and guidance on description methods and procedures.

Weston & Sampson

WSE Project: 2190978

Surfside Road Area Sewer Improvements
Nantucket, MA
Town of Nantucket

BORING ID: PS-2

DEPTH BELOW GROUND SURFACE [VERTICAL FT.]	SAMPLE TYPE GRAPHIC	SAMPLE ID NUMBER AND RECOVERY RATIO [IN./IN.]	SPT BLOWS / 6 IN. (OR) CORE RATE / 12 IN. [MIN.]	SPT RESISTANCE, RQD, AND LABORATORY DATA	STRATIGRAPHY LOG	STRATUM IDENTIFICATION AND DESCRIPTION	ELEVATION SCALE SHOWN TO NEAREST FT.	REMARKS, OTHER TESTS, AND INSTALLATIONS
		S-7 20/24	6 8 32 39	● N-Value, Raw (bpf) ⊕ Moisture Content (%) ▶ Plastic Limit (%) ◀ Liquid Limit (%) ☒ Organic Content (%) 10 20 30 40 40		**Well graded sand (SW)** - Medium dense to dense; light brown; wet; mostly fine to coarse SAND, few gravel, trace non plastic fines; no odor.		
30		S-8 14/24	2 4 10 21	14			-10	**Exploration ended at 32.0 ft.**
35							-15	
40							-20	
45							-25	
50							-30	

Refer to the attached index sheets for important information about this log including general notes, legends, and guidance on description methods and procedures.

APPENDIX B

Preserving Historic Pavement on Nantucket

PRESERVING HISTORIC PAVEMENT ON NANTUCKET



INFORMATION AND GUIDELINES FOR PRESERVATION AND MAINTENANCE

THE NANTUCKET HISTORICAL COMMISSION, NANTUCKET, MA

Published in 2021 by The Nantucket Historical Commission
Cover Photo: A View of Upper Main Street by John Santoro.
Page three lithograph from an 1835 drawing by Fitz Henry Lane
showing Dock Square, courtesy of the Boston Athenaeum.
Page seven 1980s image of Main Street crosswalk by Robert Gambee, reprinted with
permission from the book Nantucket Island.

About The Nantucket Historical Commission

The NHC is a Town of Nantucket Municipal Agency that serves the public by protecting the National Historic Landmark of Nantucket. Nantucket's important historic resources include structures as well as their setting and context, the American and Native American artifacts, and the island's special visual quality, as expressed in the natural and built environment. The NHC advises the Select Board on matters of preservation, and works with Nantucket's Preservation Planner, Planning Director, and other municipal agencies. It creates plans and guidelines for historic preservation, directs surveys of buildings and lands of archaeological and historic significance, and advocates for historic preservation. The NHC complements the local Historic District Commission, which is Nantucket's regulatory architectural review board. It also liaises with the Massachusetts Historical Commission and local preservation and conservation non-profits. https:// www.nantucket-ma.gov

Acknowledgements

Many people assisted with this project. We would like especially to thank Brian Pfeiffer and Penelope Austin, whose expertise and tireless commitment in the early phases of this effort were essential. Also, Michael May, The Nantucket Preservation Trust; The Preservation Institute: Nantucket; Preservation Massachusetts, Inc; The Massachusetts Historical Commission; The Community Foundation of Nantucket; Matthew Bronski of Simpson, Gumpertz and Heger; Jeff and Caroline Paduch; Rich and Pam Merriman; Kevin Kuester and Lucy Dillon; Jeffrey Rayport, and Esta-Lee Stone. We would also like to thank The Town of Nantucket Preservation Planner Holly Backus; The Nantucket Historic District Commission; The Nantucket Commission on Disabilities; Tree Advisory Committee representatives Ben and Dave Champoux; The Nantucket Select Board; C. Elizabeth Gibson; and the Nantucket Department of Public Works. And last but far from least, the hundreds of citizens who wrote letters, signed petitions, and attended public meetings on Nantucket to advocate for the protection of historic pavement. Thank you all.

NANTUCKET HISTORICAL COMMISSION
TOWN OF NANTUCKET
2 FAIRGROUNDS ROAD
NANTUCKET, MASSACHUSETTS

Commissioners
Hillary Hedges Rayport (Chair), Angus Macleod (Vice-Chair), David Silver (Secretary), Clement Durkes, Thomas M. Montgomery, Georgia U. Raysman, Milton Rowland, Don DeMichelle, Susan Handy, Benjamin Normand

The Nantucket Historical Commission is Nantucket's municipal preservation planning agency. We maintain surveys of historic resources, propose plans and guidelines for preservation of the Nantucket National Historic Landmark, and advocate for island-wide preservation.

Surveying and protecting original paving material has been a key initiative of the current Commission. But we were hardly the first to value this picturesque and important original asset. In 1919, a group of islanders and summer residents petitioned the Nantucket Board of Selectmen to reverse the decision to cover Main Street Square with concrete. The debate was intense. Only after independently raising the funds to repair the cobblestone road did the preservationists ultimately prevail. It may be the very first instance of an American preservation movement devoted to pavement.

Fast-forward 102 years, and Nantucket is internationally famous for its authentically historic built environment. All we have is here today because of the brave and visionary actions of conservationists and preservationists who came before us. Often, they worked in direct opposition to their own immediate financial prospects. Time and again, costly and restrictive initiatives were supported by the tax-paying public who voted at Town Meeting. Nantucketers invested in a future that would prove to be priceless.

But as Nantucket's charms continue to grow, so does development pressure on its increasingly rare historic resources. We hope this guide to preserving historic pavement inspires and instructs all who walk the streets of Nantucket, and all who work hand in hand to keep it well maintained and authentic for the pleasure of future generations.

The Nantucket Historical Commission
January 5, 2021

CONTENTS

PART ONE

03

HISTORIC PAVEMENT ON NANTUCKET

04-14

PRESERVATION GOALS AND PLANNING

PART TWO

16

SIMPSON GUMPERTZ AND HEGER
PRESERVATION ENGINEERING STUDY ON
HISTORIC COBBLESTONE STREET PAVING

HISTORIC PAVEMENT ON NANTUCKET

Nantucket Island is a Historic District and a National Historic Landmark exceptional for many qualities, including its quantity of 19th and early 20th century paving materials and street artifacts.

Many paved areas in the Historic Core have endured for centuries. Schist and granite curbstones bearing marks of hand tools, enormous flagstones cut to fit snugly around the foundations of whaling captain's homes, and miles of beach-cobble roads are some of Nantucket's notable heritage assets. Authentic historic pavement is irreplaceable today. Together with historic structures and scenic beauty, historic pavement is part of what makes Nantucket distinctive, for residents and visitors alike.

Preservation in a Living Community

For the past 65 years, the Historic District Commission (HDC), Nantucket's architectural review board, has evaluated all changes to structures that are visible from a public way. The 1967 Historic District Commission Guidebook eloquently describes the challenge of stewarding a historic town that must also grow and respond to community needs:

What we are attempting to preserve is much more than a scattering of old historic structures....The complicated problem is to maintain the beauty, charm, and historical authenticity of the community yet let it live and prosper with the greatest possible individual freedom. While the law gives the Commission power to enforce its decisions, administration by force is undesirable and usually unnecessary. We believe that an understanding of the purpose, policy and goals of the Historic Districts Commission will generate the whole-hearted cooperation of everyone sincerely concerned with the future of Nantucket.

Historic District Commission Guidebook, 1967

Nantucket's extraordinary commitment to preserving not only the old structures but also their authentic context is unusual.



source: Archepedia New England

This 1835 engraving of Faneuil Hall in Boston (above) shows cobblestone pavement with stone slab crosswalks of the exact sort found on Nantucket's Main Street. Nantucket was at the height of its prosperity in the 1840's, and like Boston would have equipped its streets with the best materials and technology of the time. Cobblestones and historic crosswalks have since disappeared from Faneuil Hall and other New England cities.



Salvage yards like this one in Rhode Island re-sell historic pavement that has been torn out of other New England towns.

A Maintenance Challenge

That Nantucket's historic pavement has endured is a testament to its strength and quality. But today, much of Nantucket's network of sidewalks and stone streets have accumulated significant deferred maintenance. Knowing how to identify, maintain, and rehabilitate the Island's unusual and increasingly rare historic pavement has been a challenge for those charged with also meeting transportation, accessibility, and maintenance goals.

THE PRESERVATION GOAL

The Nantucket Historical Commission developed these goals and guidelines to assist the Town of Nantucket and elected officials with planning for the management of this important and often undervalued historic resource.

The Historical Commission's goal regarding management of historic pavement on Nantucket is straightforward. It is:

To retain the authentic character of the streets and sidewalks in the historic town.

Importantly, "historic" does not mean crooked and full of tripping hazards. Pavement acquires its historic character from authentic materials and appropriate maintenance, not from neglect.

"Character" is expressed by:

- Authentic material from different time periods including the mid-20th century.
- Original form, shape and scale.
- Original finish and pattern of wear.
- Historic trees, street furniture, and objects that have endured.

PRESERVATION PLANNING FOR HISTORIC PAVEMENT

The Town of Nantucket has an initiative underway to improve the condition and accessibility of its cobblestone roads and historic sidewalks. This complicated project calls for significant expenditures of time and money to maintain, restore, and rehabilitate our public walkways. It also calls for a thoughtful approach if the historic goal is to be achieved.

Preservation Methodology

The Historical Commission has defined a methodology of preservation planning for historic pavement maintenance. The methodology draws on well-developed fundamental principals of preservation: the U.S. Department of the Interior Standards for Work on historic properties; Nantucket's Historic District Act; and a preservation engineering report commissioned especially for the purpose of developing these guidelines. This methodology is summarized in the six steps outlined below.

Preservation Planning for Historic Pavement Maintenance: Six Steps

1. **Identify the appropriate site-specific Standard of Treatment**
2. **Identify historic material and special conditions at location**
3. **Align specification with the Guidelines for Work on Historic Resources**
4. **Align specification with Preservation Engineering Practices**
5. **Review changes to shape and material with NHC or HDC**
6. **Request MAAB / CMR 521 waivers as necessary**

1. SELECT THE CORRECT STANDARD OF TREATMENT

Sidewalks and streets in Nantucket's historic areas are unique combinations of materials, conditions, use requirements, and constraints. Taken together, these qualities represent the site condition of each location. Maintaining Nantucket's historic streets and sidewalks requires a specific assessment of conditions and requirements at each site. Selecting the correct approach to repair is a fundamental first step in achieving a desirable outcome.

U.S. Department of the Interior Standards
The U.S. Department of the Interior has defined and established "standards of treatment" that help project managers communicate consistently and accurately about a selected maintenance program for historic resources. These standards are explained on the chart below.

Determining the Standard of Treatment
Determining the appropriate standard of treatment is a starting point for specifying any work on heritage resources. Choosing the wrong standard can result in unnecessarily lifting historic sidewalks, which erodes historic character through breakage and loss of the finish and pattern of wear.

For a sidewalk that is in good condition, the treatment should be **preservation,** otherwise known as basic maintenance. These sidewalks should not be lifted and reset.

Restoration is appropriate for a sidewalk or cobblestone road that has deteriorated or been harmed to such an extent that preservation maintenance is not sufficient.

A resource that no longer meets the demands of use can be **rehabilitated** to meet current needs.

A sidewalk or street that used to be historic but has lost its original materials and character can be **reconstructed**.

Note that "renovation" means making what was old new through replacement, and is not an appropriate treatment for a historic resource.

THE FOUR STANDARDS OF TREATMENT FOR HISTORIC RESOURCES

Preservation	Rehabilitation	Restoration	Reconstruction
Sustaining the existing form of a historic resource	The compatible reuse of a historic resource through repair, alterations and additions	Depicting the features of a property as it appeared at a particular time.	Depicting the form, features, and detailing of a non-surviving site, landscape or building
Repairing and maintaining the historic resource, rather than extensive replacement or new additions	Altering a resource to meet continuing or new use, while retaining historic character	Preserving features from an identified period of significance and removing those from other periods.	Recreating a vanished or non-surviving building with new materials, primarily for interpretive purposes
Example The Pacific Club	***Example*** The Atheneum	***Example*** The Jared Coffin House c. 1962	***Example*** Great Point Light

TREATMENT 1.A PRESERVATION

Complete reconstruction of a sidewalk is expensive, disruptive, and inevitably leads to a loss of historic integrity and character due to breakage, disruption of the site, and the addition of new material. If a sidewalk or stone street is in good overall condition, is acceptably flat and accessible, and meets use requirements, the correct treatment is always **preservation.** Resources managed under the preservation treatment require an ongoing maintenance plan and spot repairs. Below are some examples.



The sidewalk above is on a lightly used side street and is generally flat. It is not recommended to lift and reset this sidewalk.

The crosswalk shown at the right is a classic Nantucket adaptation of a 19th century crosswalk. Under the heritage tourism initiative of the 1970s and early 1980s, old flagstone crosswalks were set more widely apart and brick was added to make them more accessible. This walk is in good, flat, accessible condition and should have been preserved through appropriate maintenance. However, this crosswalk was replaced with a new brick crosswalk in 2018.



The sidewalk above is generally flat and accessible but bricks have been displaced by tree roots. A spot repair is required.

Tree Roots

Problems with tree roots are common and sidewalks near trees inevitably contort as trees grow. Surface roots can be trimmed under the supervision of a Certified Arborist. Arborists consulted as part of this project recommended excavating around tree roots with an air spade in order to identify roots for trimming. A more extensive approach could replace compacted soil with a structural soil product. Structural soils support traffic loads while directing water and nutrients downward. This encourages roots to grow deep which prevents them from displacing pavement.



TREATMENT 1.B RESTORATION

When the sidewalk or stone street has suffered years of inappropriate treatment or neglect, it requires extensive repair. **Restoration** is the appropriate treatment. The historic crosswalk below is a street artifact, not an accessible crosswalk. Both photos show the same location, but the photo on the right is from the 1980s, when the street was well maintained. The photo on the left was taken in 2018, and shows the lack of maintenance and even loss of material. The missing stone was found in the garden of a nearby house.





Image by Robert Gambee reprinted with permission



Site Specific Planning

Restoration projects require detailed site-specific planning by the Town. Considerations include assessing the condition of remaining material, sourcing correct supplemental material as needed, and lifting and rebuilding the walk or street. It is especially important to follow the six steps of preservation planning for historic pavement maintenance when planning a restoration.

Problems with tree roots are common and sidewalks near trees inevitably contort as trees grow. Surface roots can be trimmed under the supervision of a Certified Arborist.

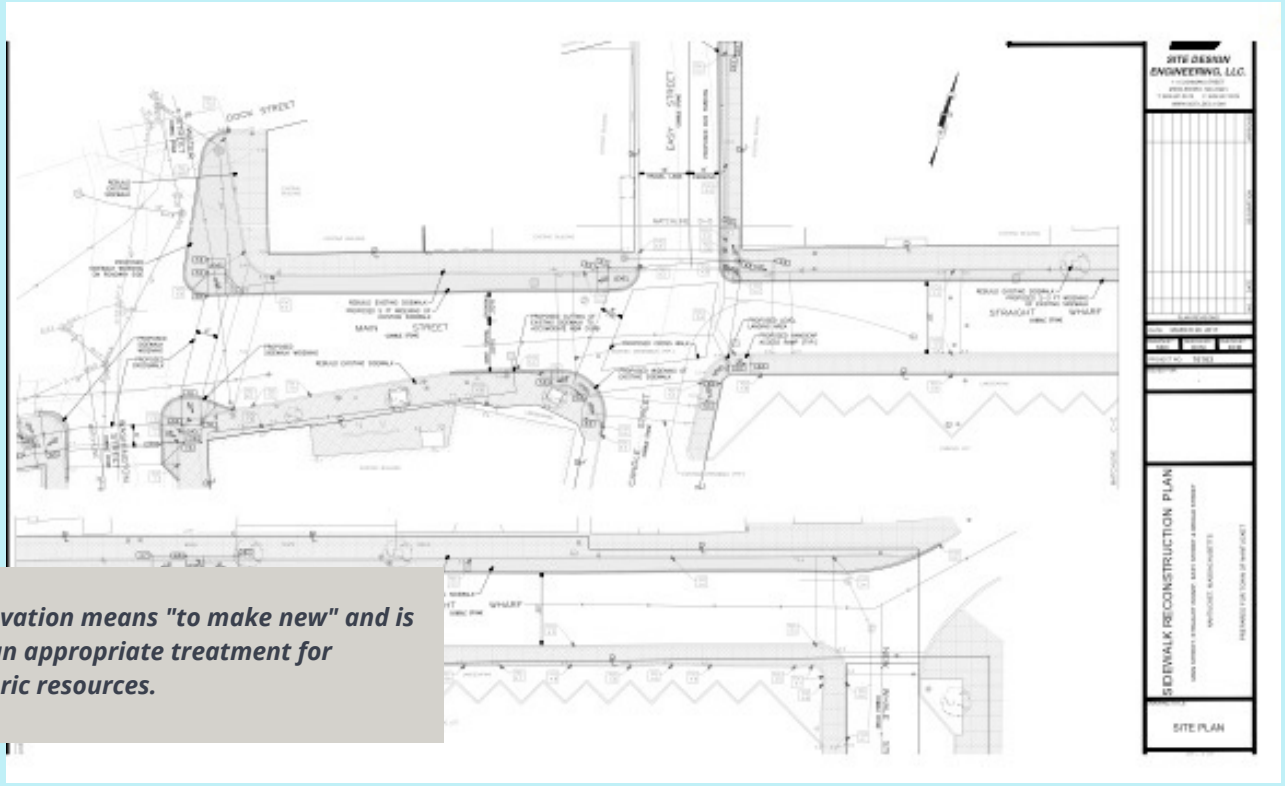
TREATMENT 1.C REHABILITATION

Rehabilitation means adapting a historic resource to meet a new need. In the case of historic pavement, this may mean adding accessible ramps, or widening a sidewalk to accommodate a greater amount of pedestrian traffic or reduce the travel lane for vehicles. It might also mean adding bike paths.

Successful Rehabilitations
Successful rehabilitations are carefully planned to adapt historic resources to new uses without losing their historic character. As with a restoration, it is especially important to follow the preservation planning methodology when rehabilitating a historic sidewalk. The plan below shows widening Main Street sidewalks and constructing 16' wide bump-out in front of the Pacific Club. Historic flagstone crosswalks are removed and replaced with new crosswalks in a modern shape. This plan is a renovation, because little of the old scale, shape, or material is saved.

Reconstruction
Unfortunately, a large portion of this plan was implemented without consideration of historic material. The historic character of the streetscape was negatively impacted and the area is now a candidate for a different Standard of Treatment: reconstruction. Reconstruction is employed when a historic resource has been destroyed but enough information about what it looked like is available in order to achieve an accurate reconstruction. A reconstructed sidewalk is no longer an authentic historic sidewalk, but may contain historic material and is faithful to the original.

DOWNTOWN SIDEWALK IMPROVEMENT PLAN



Renovation means "to make new" and is not an appropriate treatment for historic resources.

2. IDENTIFY HISTORIC MATERIAL AT THE SITE

What follows are some examples of historic pavement and street features. This is not a complete list. The Historical Commission can assist with identifying historic pavement in the field. The Preservation Institute Nantucket and the Nantucket Preservation Trust are undertaking a study of historic pavement and will deliver a geo-located database in 2022. The study is funded by the Community Preservation Act.









1. Early 19th century schist curbstones, individually carved with steam driven tools. 2. Distinctive markers and plaques. 3. 20th century split faced granite curbstones. 4. Adaptations that have endured over time, like these tree-wells. Concrete curbing (on tree at right) should only be removed if it is failing. Mid-century concrete is a historic material which, if functioning and in good condition, should be preserved. Large trees are protected.











1. Carved stone drainage channels and wide flagstone sidewalks. 2. These flagstones are not an accessible crosswalk but should be restored and maintained as a street artifact. 3. Bollards. Not all bollards are historic. Age can be determined from examination and historic photos. 4. Beach cobbles. 5. Flagstone and brick crosswalks. Some brick is historic and all should be reused.

3. THE GUIDELINES FOR WORK ON HISTORIC RESOURCES

The Guidelines for work on historic resources were developed by the U.S. Secretary of The Interior. They are common-sense historic preservation principals in non-technical language. The Guidelines, along with the Standards of Treatment, promote best practices and help preserve our nation's irreplaceable cultural resources. The Nantucket Historical Commission has adapted The Guidelines for specific application to historic pavement.

The Guidelines are straight-forward. Materials that have endured over time and still serve their purpose are respected and left in place. When a rehabilitation calls for additions and changes, these changes are planned so the historic design is still apparent. Importantly, The Guidelines are silent as to whether traditional or modern methods are used in the restoration project. Whatever the method, the important thing is to preserve the historic material and character of the site.

A Preservation Mindset

Taking the time to understand The Standards and The Guidelines will help project managers develop a preservation mindset. This is especially important when caring for a National Historic Landmark notable for the quality of its historic structures in their authentic context. It's a matter of civic pride and National heritage.

THE GUIDELINES FOR WORK ON HISTORIC STRUCTURES

1. Historic material is documented and retained in its original location. Historic character (materials, finishes, shapes and scale) is retained.

2. Material is repaired and reused, rather than replaced.

3. Where replacement and addition is required, material is sourced from salvage or new, to match existing in size, color, and finish.

4. Do not create a false sense of history by removing features that have endured and acquired significance, or adding faux-historic features. New features should be distinguishable from the old.

5. Additions and alterations should be minimal and compatible with the historic character and should not erase the historic material or form. Changes should be reversible, without harm or loss of the historic material.

WHAT TO AVOID

Historic pavement is an often overlooked and under-appreciated heritage resource. When the incorrect Standard is applied or The Guidelines are not followed, historic character will be eroded because of the removal and breakage of the resource, or application of inappropriate designs. The photos below show a few such unfortunate projects that should be approached differently in the future.



Incorrect treatment, eventual loss of historic material

This site at Fair Street and Judith Chase Lane was in good condition and did not require the reconstruction it received. Curbs should have a 3-4" reveal, but these curbstones were reset nearly flush with the street. This is inappropriate aesthetically and functionally. Old curbs are typically shallower than what is called for in modern specifications. If the historic curb is not accounted for in plans, contractors will "make do" in the field, which is likely what happened here. Future paving will raise the level of the street and overwhelm the curbs, which are now set in concrete.



Inappropriate shape

This bump-out at the corner of Cambridge and Easy Street was constructed for traffic control. Bump outs like this are not compatible with the Old Historic District and should not be used. Planners should work with the HDC or NHC to create solutions with scale, form, and materials that are appropriate for the historic town. See Guideline 5.



Inappropriate design, material

Stone walks should be dry set, not set in a wide margin of mortar. Handicapped access to the adjacent building was achieved but the bi-level walk creates a falling hazard. Planners should work with the Commission on Disabilities and the HDC when adapting sidewalks for access. If it is desirable to raise a sidewalk, planners should consider whether it is also necessary to raise the street. For this reason and others it is advantageous to consider rehabilitation or restoration of sidewalks and the street simultaneously.



Inappropriate design, historic material removed

This important and sensitive location was renovated and is now a candidate for historic reconstruction. The original schist curbs were removed to widen the sidewalk next to the Pacific Club. A better approach would have been to leave these curbs in place, and extend the sidewalk on the other side of them (see Guideline 4 and 5). The width of the sidewalk - it was extended from 5' to 10.5 feet -- should have been reviewed with the HDC. The old flagstone crosswalks should not have been removed.

4. ALIGN PROJECT SPECIFICATION WITH PRESERVATION ENGINEERING PRACTICES

We know from contemporary reports that for approximately 40 years in the 20th century, Nantucket considered her cobblestone roads to be renewable, sustainable, "practically maintenance free," and a better investment than bituminous concrete. But today, laying cobblestones is a lost art. Portions of Main Street are in an expensive 9-year cycle of ruin and repair. Some have suggested cobblestone roads are not up to the demands of modern traffic.

Understanding Cobblestone Roads
Developing a sophisticated understanding of load bearing capacity of a cobblestone road and how it is constructed is fundamental to any lasting restoration effort.

Thanks to the generosity of individuals who contributed to the Keep Nantucket Real project fund at the Community Foundation for Nantucket, funds were available for a Preservation Engineering Study. CFN retained engineering firm Simpson, Gumpertz & Heger (SGH). Work was performed by Matthew Bronski, a licensed engineer and architect who began his career working as a highway engineer for the Massachusetts Department of Transportation. Mr. Bronski has consulted on the preservation of historic masonry across the Northeast, and has particular experience in historic pavement.

The SGH study is included in this report and offers valuable analysis, knowledge, and recommendations for restoring historic stone streets and sidewalks so they will meet the needs of our community for many years to come.

Test Sites and Specifications
The report recommends the Town develop preservation engineering specifications and a "solution toolkit" for common problems. Developing the specifications will require building and and monitoring test sites in real conditions over several seasons.


1.


2.


3.

1. Cobblestones bedded in compacted stone dust hold water, leading to frost heaving and pot holes.

2. Stones must be oblong and set vertically. Stones set on their flat sides will dislodge. If stones are not set vertically and closely together, fewer stones fit in the road.

3. Piles of stone dust on Main Street after 2020 repaving and patching.

KEY PRESERVATION ENGINEERING OBSERVATIONS AND RECOMMENDATIONS

- **Cobblestone roads are sustainable and renewable.**

- **A properly designed and constructed cobblestone road is strong and suitable for modern loads including truck traffic, provided the base and subbase are compacted and sufficiently deep.**

- **Cobblestone bedding material must be specified for a balance between compatibility, cohesion, and permeability. A cobblestone road has the benefit of being somewhat permeable, allowing rainwater to drain back into the ground and reducing the volume of water collecting in catch basins.**

- **The current practice of setting cobblestones in stone dust is not recommended, because most stone dust used in paving does not drain well, thus rendering the paving more susceptible to puddles, frost heaving, and potholes.**

- **Developing a specification and supply of appropriate bedding material is critical to success. Historically, Nantucket's native "dirty sand," which is a natural combination of sand and clay, was used to bed cobblestones. Sand deposits contain varying amounts of clay and fines depending on geology and storage. Analysis and testing of potential bedding material including native sand is recommended as a priority.**

- **The shape of the stone is important. Cobblestones suitable for roads are oblong and set vertically in the bedding material, in contact with surrounding stones.**

- **Spherical stones should be avoided because they are prone to popping loose, especially under the wheels of turning vehicles.**

- **Curbs require a strong support to resist turning over, but a u-shaped concrete "saddle" holds water and should not be used. Rather, set historic curbs on crushed stone, with concrete reinforcers on either side.**

- **Historic curbs should be set with a sacrificial barrier, such as simple craft paper, between the curb and the concrete to prevent adhesion and allow for re-use.**

- **Restoration and rehabilitation of a sidewalk should be planned together with restoration of the street, in order to allow for overall, comprehensive, and integrated solutions to accessibility, tree maintenance, and historic goals.**

- **Testing materials, and constructing and evaluating several adjacent test strips across the full roadway, over several seasons, is recommended as a next step in developing a plan for restoration and ongoing maintenance of cobblestone roads.**

- **Sidewalk situations are varied and site-specific. Nantucket should develop a "toolkit" of potential options and design solutions.**

from SGH report Preservation Engineering Study on Historic Cobblestone Street Paving September 24, 2020

5. REVIEW CHANGES TO SHAPE AND MATERIAL WITH THE NHC OR HDC

Chapter 395 of the Acts of 1970 designated all of Nantucket as a Historic District. The Historic District Commission was established to review and approve "the appropriateness of the architectural features of buildings or structures whenever such exterior features are subject to view from [a public way]." The Act defines a structure as "a combination of materials other than a building, including, but not limited to ...a driveway or walk...." The Act excepts from review ordinary maintenance and work required for public safety.

Whenever a change of sidewalks and paving shape, scale, or material is proposed in the Old Historic District or Sconset Old Historic District, the DPW or other project manager should submit the proposed changes to one of the two municipal preservation commissions (NHC or HDC) for review and comment prior to finalizing the design.

6. REQUEST MAAB WAIVERS AS NECESSARY

The Massachusetts Architectural Access Board (MAAB) issues regulations in order to make public buildings and facilities accessible to, functional for, and safe for use by persons with disabilities. These regulations, which are listed as Section 521 of the Code of Massachusetts Regulations, define accessibility standards. In the case of public sidewalks, CMR 521 defines the minimum width and maximum allowed slopes of sidewalks, as well as requirements for curb cuts and acceptable changes in level. Whenever a sidewalk is altered, which includes any repair, it is supposed to be brought in line with CMR 521.

Accessibility in Historic Towns

Accessible sidewalks are a goal of every community, but it is not practical, affordable, or even possible to eliminate all pinch-points or match required cross slopes when a 150 year old tree or a 200 year old building is in the way. Municipal liability is limited under MGL Chapter 84 Section 15. It would be equally unacceptable for a town to neglect sidewalk maintenance and create a public safety hazard, because full compliance with CMR 521 was financially prohibitive or impossible.

A Team Effort

For major sidewalk reconstruction projects that cannot comply with CMR 521 because of the historic setting, Nantucket seeks MAAB waivers. The Nantucket Commission on Disabilities (COMDIS) and the NHC are important consulting commissions in this process. The MAAB relies on the local COMDIS to ensure that the needs of disabled people in the community are being adequately met. The NHC can request the Massachusetts Historical Commission's support regarding waiver applications for preservation purposes. For these reasons, project managers should review sidewalk accessibility concerns and conflicts with the COMDIS and NHC.



The current version of CMR 521 (2006) **does not** require the use of tactile warning pads.

The current version of CMR 521 (2006) **does not** require the use of tactile warning pads at crosswalks. These optional "pads" are not historic.

SOURCES

Paving: The Conservation of Historic Ground Surfaces, 2015
http://www.buildingsofireland.ie/resources/

Building With Nantucket In Mind, 1995
Nantucket Historic District Commission
https://www.nantucket-ma.gov/DocumentCenter/View/12329/Building-With-Nantucket-In-Mind-1992-PDF

U.S. Park Service Technical Standards for The Treatment of Historic Properties https://www.nps.gov/tps/standards.htm

City of Baltimore Design Guidelines
https://chap.baltimorecity.gov/sites/default/files/CHAPDesignGuidelines_2019.02.15_small.pdf

City of New Bedford Design Guidelines
http://www.newbedford-ma.gov/planning/standards-and-guidelines-for-the-bedford-landing-waterfront-historical-district/

Simpson Gumpertz and Heger Preservation Engineering
Study on Historic cobblestone Street Paving 2020

PART TWO

SIMPSON GUMPERTZ AND HEGER
PRESERVATION ENGINNERING REPORT



Preservation Engineering Study on Historic Cobblestone Street Paving

Nantucket, MA
24 September 2020

SGH Project 200702

SIMPSON GUMPERTZ & HEGER
Engineering of Structures and Building Enclosures

PREPARED FOR:

Ms. Margaretta Andrews
Executive Director
Community Foundation Nantucket
9B Bayberry Court
P.O. Box 204
Nantucket, MA 02554

RE: Keep Nantucket Real
Project Fund

PREPARED BY:

Simpson Gumpertz & Heger Inc.
480 Totten Pond Road
Waltham, MA 02451
Tel: 781.907.9000
Fax: 781.907.9009

Design, Investigate,
and Rehabilitate

Boston
Chicago
Houston
New York
San Francisco
Southern California
Washington, DC

www.sgh.com

SIMPSON GUMPERTZ & HEGER
Engineering of Structures
and Building Enclosures

24 September 2020

Ms. Margaretta Andrews
Executive Director
Community Foundation Nantucket
9B Bayberry Court
P.O. Box 204
Nantucket, MA 02554

RE: Keep Nantucket Real Project Fund

Project 200702 – Preservation Engineering Study of Historic Cobblestone Street Paving

Dear Ms. Andrews:

Please find attached our preservation engineering study report on the historic cobblestone street paving on Nantucket. I truly hope that you and many others on the island will find it helpful in preserving and maintaining this remarkably significant and beautiful historic resource for generations to come.

Sincerely yours,

Matthew B. Bronski, P.E.
Principal
MA License Number 52573
I:\BOS\Projects\2020\200702.00-COBL\WP\001MBBronski-L-200702.00.amb.docx
Encls.

Table of Contents

Letter of Transmittal

1. BACKGROUND INFORMATION 1
   1.1 General 1
   1.2 Study Objectives 3
   1.3 Acknowledgements 4

2. SUMMARY FINDINGS 5
   2.1 Cobblestone Street Paving 5
   2.2 Stone Curbs 17
   2.3 Brick and Flagstone Sidewalks 22

3. CONCLUSIONS AND RECOMMENDATIONS 26
   3.1 Cobblestone Street Paving 26
   3.2 Stone Curbs 30
   3.3 Brick and Flagstone Sidewalks 30

ILLUSTRATIONS

Figures 1 through 24

APPENDICES

APPENDIX A – “A Cobblestone Gathers No Moss” by Hillary Hedges Rayport
APPENDIX B – Circa 1980s Nantucket Specification
APPENDIX C – Circa 2014 Nantucket DPW Specification
APPENDIX D – References

1. BACKGROUND INFORMATION

1.1 General

The cobblestone paving on Main Street, as well as Cobblestone Hill, Stone Alley, India Street, Liberty Street, and Ash Street, are a character-defining feature of the historic center of Nantucket. They are among the few extant examples of cobble paving (as opposed to stone setts, stone flags, or stone slabs) on public streets in Massachusetts.



Figure 1 – Overview of Cobblestone Street Paving on Upper Main Street.

The general background information below on the history and maintenance of Nantucket's cobblestone streets is summarized from the article from *Archipedia*[1] "A Cobblestone Gathers No Moss" (Appendix A).

- Main Street and surrounding streets were originally paved with cobblestones around 1836, possibly as early as 1834. The original stones selected for use as paving were oblong, with flat tops. They were installed over unpaved streets that had been spread over with sand, to control mud.

- The streets were generally durable and little disturbed until the turn of the century, when a series of below-grade infrastructure improvements (e.g., installation of vitrified pipe) began, necessitating digging up the streets and resetting the cobblestones. This resulted in a cycle of increased potholes, maintenance, repairs, and complaints. Circa 1919 to

1920, some consideration was given to paving over a wide swath of Main Street, as was done to some other cobblestone streets on Nantucket, but strong opposition saved the cobblestone paving.

- From roughly 1931 to 1973, the cobblestone paving on Nantucket entered a renaissance period, with a small group of skilled craftsmen, including Antone Sylvia (who immigrated to the US in his teens from the Azore Islands, where cobblestone paving is common) and later Thomas McGrath Sr., executing the maintenance and repair work on the streets, and extending the cobblestone paving along Main Street. During this renaissance period, Nantucket was proud that its cobblestones streets were less expensive to repair and maintain than bituminous concrete (aka asphalt (sic) or blacktop) streets. Comparisons of the town expenditures for maintenance and repair of cobblestone streets versus bituminous concrete streets from roughly 1947 to 1957 support these claims.

- Regarding the materials and procedures for setting cobblestones during this renaissance period of skilled craftsmen and low maintenance, *The Charleston Evening Post* interviewed mason Tom McGrath (Jr.) and Superintendent of Streets Michael Driscoll in a 1967 article titled, "Yankees Conquer Cobblestones." The article includes the following information:

    - *Tom McGrath tells me that the proper bed for cobblestones is 3 to 4 inches of "dirty sand," i.e., sand with sufficient fine powdered material so that it will hold together when squeezed, but the mixture should not become muddy when wet . Driscoll says they have no problems with freezes. Water drains right through the sand before it freezes. The only problem is occasionally a motorist spinning a wheel and flipping out a stone. He says, however, that it is no more than a 15-minute job to replace a few like that and really the only trick is to put the most pointed end down. In other words, get the stone sunk as deep as possible into the dirty sand base with a relatively small area of each stone on the surface. This he says is much better than skimping on stones and having the largest side lying flat on top of the ground.*

- Since the unexpected passing of Thomas McGrath Jr. in 1973, without a successor, history has repeated itself in the period from 1974 to the present, and Nantucket's cobblestone streets have again entered a problematic period similar to that of 1900 to 1930. Since 1974, Nantucket has again been in a repeated cycle of digging up the cobblestone streets for infrastructure and utility improvements, resetting or relaying them, and having stones dislodge, potholes occur, complaints occur, etc. The last major campaign of new stone paving on Nantucket occurred in 1980, when North Water Street was repaved with Belgian block (rectangular stone pavers, roughly brick-sized), and India Street and South Water Street from India to Main were paved with cobblestones.

    - *[N.B. – Multiple people I have spoken with on Nantucket have mentioned that during some of the cobblestone removal and resetting work attendant to utility and infrastructure improvements during this period, many cobbles were left over at the conclusion of the project, despite the area of paving being unchanged. This struck people as curious: If the surface area is the same, how could so many cobbles be left over from simply removing and resetting cobbles? This issue is further discussed below.]*

- After years of these cycles, there is a question of whether the cobblestone paving is viable and practical, or whether it is simply an outdated technology or lost art—and an inevitable maintenance headache unsuited for modern traffic—as compared to more common contemporary use of bituminous concrete (aka “asphalt”) paving. Similarly, there are calls to preserve the cobblestone streets, and rediscover the lost art and craft of installing and maintaining them in a manner that makes them highly durable and low maintenance, as during the renaissance period of Nantucket’s cobblestone streets from roughly 1931 to 1973.

Toward this broad goal of rediscovering the best practices and materials for maintaining, repairing, and rehabilitating Nantucket’s historic cobblestone streets, with a focus on durability and low maintenance, Simpson Gumpertz & Heger Inc. (SGH) was retained by the Community Foundation for Nantucket, to conduct this preservation engineering study of the cobblestone street paving along Main Street. The specific objectives of this study are further described below.

1.2 Study Objectives

The primary objective of this study is to provide a preservation engineering assessment of the technical issues and best practices concerning the installation, rehabilitation, and maintenance of cobblestone streets that addresses the following issues:

- Are cobblestone streets technically viable today, or do contemporary vehicle loads (including the types of trucks common on Nantucket) make this an obsolete technology incapable of meeting contemporary demands?
- Is it possible to reduce required maintenance and improve durability of the cobblestone streets, especially the tendency of stones to become dislodged from the pavement?
- If so, what are best practices (drawing from both local sources and relevant sources abroad), including materials and methods for installing, rehabilitating, and maintaining a durable cobblestone street?
- Are cobblestone streets able to withstand contemporary vehicular loads?
- Would paving streets in bituminous concrete (similar to other modern streets), then installing cobblestones over the bituminous concrete perhaps improve the durability of the cobblestone street?
- Can the historic curbstones be reset and reused? Discuss their ability to resist loads versus preservation concerns for preventing damage and allowing for future resetting and reuse.

As a secondary objective, comment to the extent possible on how to approach balancing the multiple issues and considerations (e.g., accessibility, historic, transportation, etc.) that are sometimes at odds in developing optimal designs and procedures for repairing or rehabilitating the sidewalks along Main Street.

1.3 Acknowledgements

Many individuals and organizations on Nantucket very generously assisted me in one way or another, by providing background documents, by sharing their knowledge of Nantucket's history, by welcoming me so graciously during my field work, by walking the streets and sidewalks with me and pointing out issues and challenges, etc. I wish to thank them all, although my list below will inevitably be incomplete:

Jeffrey Paduch and Caroline Hempstead

Richardson Merriman

Lucy Dillon and Kevin Kuester

Penelope Austin

Mary Bergman (Executive Director, Nantucket Preservation Trust)

Morris Hylton (Director, Preservation Institute: Nantucket)

Holly Backus (Preservation Planner, Town of Nantucket)

Ray Pohl (Chair, Nantucket Historic District Commission)

Hillary Hedges Rayport (Chair, Nantucket Historical Commission)

Brian Pfeiffer (Architectural Historian)

Robert McNeil (Director, Nantucket Public Works)

C. Elizabeth Gibson (Town Manager, Nantucket)

Jason Bridges (Vice Chair, Nantucket Select Board)

Stephen Welch (Commissioner, Nantucket Historic District Commission)

Brenda McDonough (Nantucket Commission on Disabilities)

Milton Rowland (Nantucket Commission on Disabilities)

David and Ben Champoux (Champoux Landscaping)

The Community Foundation Nantucket

2. SUMMARY FINDINGS

2.1 Cobblestone Street Paving

Materials and Installation Details on Nantucket

From my review of available literature and documents, the materials, details, and procedures for installing cobblestone street paving on Nantucket has varied considerably over time, as summarized below.

Circa 1836 to 1899: This was the period of the original construction of the cobblestone roads, and the first "golden" period of generally durable and relatively low maintenance cobblestone streets. While technical information on the details of construction in this period is not abundant, the *Archipedia* article "A Cobblestone Gathers No Moss" reports that the original stones selected for use as paving were oblong, with flat tops, and that they were installed over unpaved streets that had been spread over with sand, to control mud.

While this information is not extensive, it does include some key pieces of technical information:

- The stones were set in sand. Given the period, it is safe to assume this would have been local sand.
- The stones were selected carefully for use in paving, based on their size and shape. In other words, the early road builders on Nantucket did not randomly pick up any stone on the beach for use as street paving. The key criteria were the oblong shape, and the flat top. The oblong shape would have allowed the stones to be driven vertically into the sand.
- I observed several small areas of flat-topped, closely spaced, apparently vertically oriented cobbles on lower Main Street that appear to match this description (Figure 2). Generally these areas of flat-topped cobbles appear in excellent condition, with few if any dislodged pavers, and with the tops of the pavers relatively even and the street surface relatively smooth as compared to other eras of cobblestone paving, but where the top surface is still predominantly stone rather than setting material.



Figure 2 – Overview Flat-Topped Pavers on Lower Main Street.

Circa 1900 to 1930: This was a period of repeated cycles of digging up the cobblestone streets to install buried utilities and infrastructure (e.g., gas, water, and sewer lines), repairing or relaying them, and frustrations with disrepair and potholes. I did not review any specific information on the details, materials, or procedures during this period of upheaval and disrepair. However, the accounts summarized in "A Cobblestone Gathers No Moss" suggest that installation issues and lack of knowledge and experience in setting cobblestone were likely primary contributors to the problems:

- During this period, both on Nantucket and elsewhere in the United States, installation of stone paved streets became less common, as the general technology and construction trend shifted to bituminous concrete. Thus, workers skilled and highly experienced in the proper setting of cobblestones became increasingly rare over this thirty-year period.

- After a major excavation in 1926, the cobbles were reset in frozen ground that was poorly graded, resulting in a poor-quality installation with hollows in the street.

- In 1930, Water Company president Frank Gifford was determined to repair the cobblestone on Main Street properly after the installation of a new water main. However, multiple island contractors who had once installed cobblestone paving, but had since shifted their work to bituminous concrete paving, declined the job, prompting Gifford to remark that laying cobbles was a "lost art."

Circa 1931 to 1973: This was a renaissance period of durable, well-constructed, low-maintenance cobblestone roads on Nantucket, with a succession of a few skilled and experienced workers (e.g., Antone Sylvia, Thomas McGrath Sr., Tom McGrath Jr.) maintaining the cobblestone streets in good condition, and extending them along Main Street. During this period Nantucket touted the durability and low maintenance costs of their cobblestone streets, as compared to their bituminous concrete paved streets, and even extended the cobblestone paving along Main Street. The best descriptions of the materials, details, and installation procedures are

from the 1947 *Charleston Evening Post* article that interviewed mason Tom McGrath and Superintendent of Streets Michael Driscoll, the key technical points of which I summarize below:

- Cobblestones were set vertically, with the smaller and more pointed end down, in a setting bed of 3 to 4 in. of "dirty sand," and driven as deeply as possible. Do not set the cobbles with the largest side lying flat on the surface.

- The dirty sand should have sufficient fines such that it will hold together when squeezed, but not so large an amount of fines that it becomes muddy when wet. This amount of fines in the sand allows water to drain promptly through it, such that water does not accumulate in or freeze in the "dirty sand" setting bed, thus frost heave problems are avoided.

I understand that the native soil in many areas of Nantucket is a "dirty" sand, i.e., a sand that includes fines such as silt and clay. I observed some of this native sand where a hole was being dug at a house under renovation on upper Main Street, near the corner of Ray's Court. When I squeezed a handful of this native, freshly dug "dirty sand" in my hand, it held its shape (Figure 3), as described by Tom McGrath as the preferred sand for setting cobbles in the 1947 *Charleston Evening Post* article.



Figure 3 – Freshly-dug Native "Dirty Sand" at a Property on Upper Main Street.

Circa 1974 to Present: This was a period similar to that of 1900 to 1931, with multiple buried infrastructure improvement projects requiring that the cobblestone streets be repeatedly dug up and repaired or reinstalled—but not apparently well or durably—and with many complaints of potholes, disrepair, and high maintenance costs. During this period, again similar to 1900 to 1931, there was great difficulty finding contractors skilled and experienced in setting cobblestone streets, with some people thinking of this work as possibly a lost art. Similar to the prior dark period of 1900 to 1931, observations of improper installation in the streets themselves, in this

case installing cobbles on the flat rather than vertical, lend credence to the idea that installation techniques and workmanship were a key contributor to the problems. Details and specifications for the work of this period are summarized below:

Circa 1980s: The c. 1980s Nantucket specification is a letter-sized format that includes both technical specification language, as well as details (Appendix B). The document is undated, but reportedly from the 1980s, which appears consistent with the graphics. Both the written technical language and the detail are consistent in calling for the cobbles to be set in a stone dust setting bed, with a sand/cement mixture at the surface. The detail showing the cobblestone setting (which appears twice, as Plate No. 8 and Plate No. 14) shows a depth of 9 in. minimum and 12 in. maximum, with all but the top 3 in. of each cobble (6 in. to 9 in.) embedded in the stone dust (Figure 4).

The materials section of the c. 1980s specification further clarifies that:

- The cobbles shall be granite, of fairly uniform size, and shall be similar to existing cobblestones on downtown streets.
- The stone dust shall be fine, with a gradation (particle size distribution) as follows:
    - 100% passing the No. 4 sieve,
    - 90% passing the No. 50 sieve, and
    - 65% passing the No. 200 sieve.

The procedures section of the c. 1980s written specifications further clarifies that:

- The cobbles shall be oriented vertically, and rammed by hand into place, with each cobble touching another cobble.
- The cobbles shall be tamped and compacted with a mechanical plate compactor.
- The surface dressing, consisting of a mixture of one part cement to three parts sand (a material often called “dry-pack mortar,” though that term is not used on this specification) shall be swept into place, fogged, and compacted with a plate compacted, then the joints reswept and refilled, repeating the process for up to five days until all joints are full and compacted for up to five days.

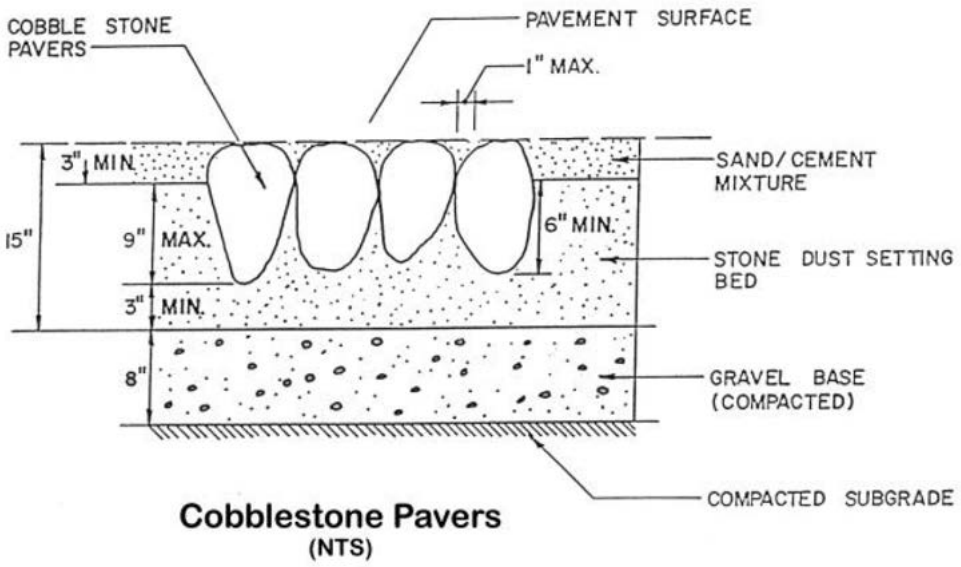


Figure 4 – Detail from c. 1980s Nantucket Specification (Appendix B).

- One key observation regarding the detail above is that the setting course in the joints between cobbles is shown as installed generally flush with the crown (uppermost point) of each adjacent cobble, rather than recessed below the crown as would be more traditional for a round-topped cobble. This has both technical and aesthetic implications.
    - On the technical side, it makes the roadway surface smoother, both for pedestrians and vehicles, yet it makes it more difficult to retain the dressing material in the joints, as each downward pointing triangle seen above in section is a cone shape in three dimensions that is not geometrically retained by the stones, and thus is very prone to dislodge (if a hardened materials like mortar), or scatter (if a loose fill material). By contrast, the setting bed material below the maximum circumference of the cobbles tends to be geometrically retained by the stones, and thus is not very prone to being dislodged or scattered.
    - On the aesthetic side, cobble pavement set in this manner looks smoother and more planar, but with a great deal more of the dressing material exposed, and relatively less of the stones exposed. This appears less like a series of individual stones set closely together, and appears more like a lot of setting material, with isolated stones in it that do not appear in contact with each other at the exposed surface.

Circa 2014: The c. 2014 Nantucket DPW specification (Appendix C) is an updated version of the 1980s specification and details described above. The vast majority of the details, materials, and procedures remain the same. The detail showing cobblestone paving, Still Plates No. 8 and No. 14, is unchanged from 2008 (Figure 5).

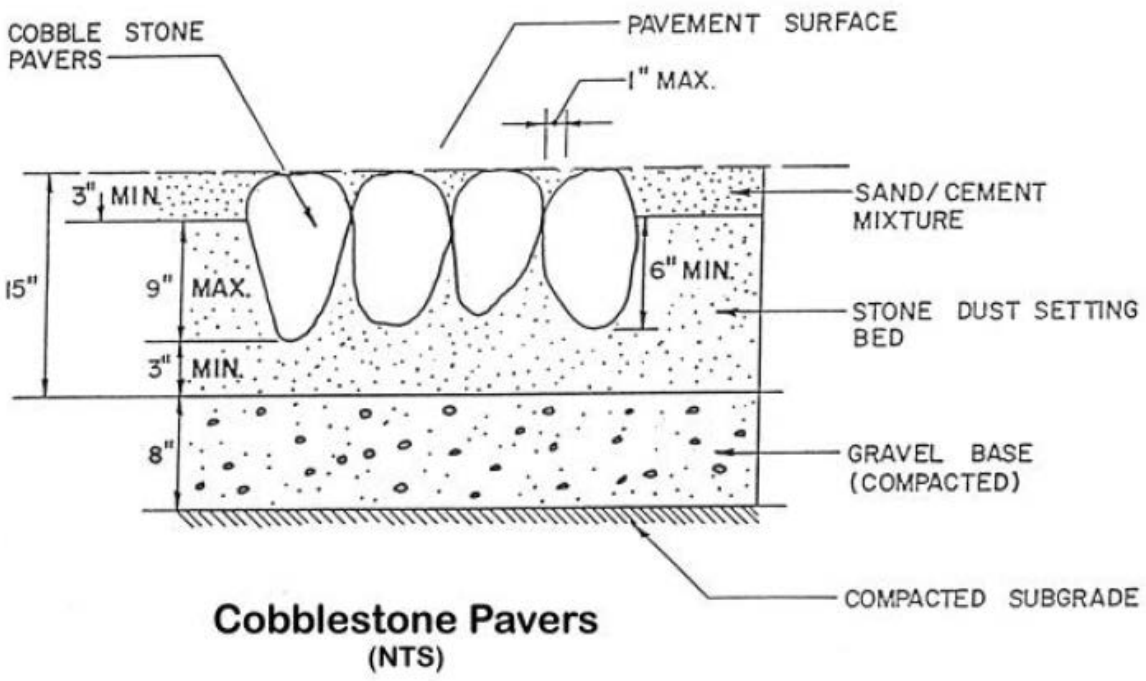


Figure 5 – Detail from c. 2014s Nantucket Specification (Appendix C).

Today – Current and Recent Documents and Practice: The recent Nantucket DPW drawings prepared by Stantec for the pedestrian ramp at #86 Main Street, show a detail for pervious cobblestone pavement, with the existing cobblestones removed and reset in 3 in. sand, over a base of 6 in. dense crushed stone, over a subbase of 8 in. of gravel borrow (Figure 6). This detail does not specifically call out a separate "dressing" material between the stones at the top surface, thus, based on the detail, that surface dressing material (for that particular detail and project) would presumably be the same as the 3 in. sand bed immediately below. The surface dressing material in the joints between cobbles is shown as installed generally flush with the crown (uppermost point) of each adjacent cobble (Figure 6), rather than recessed below the crown.

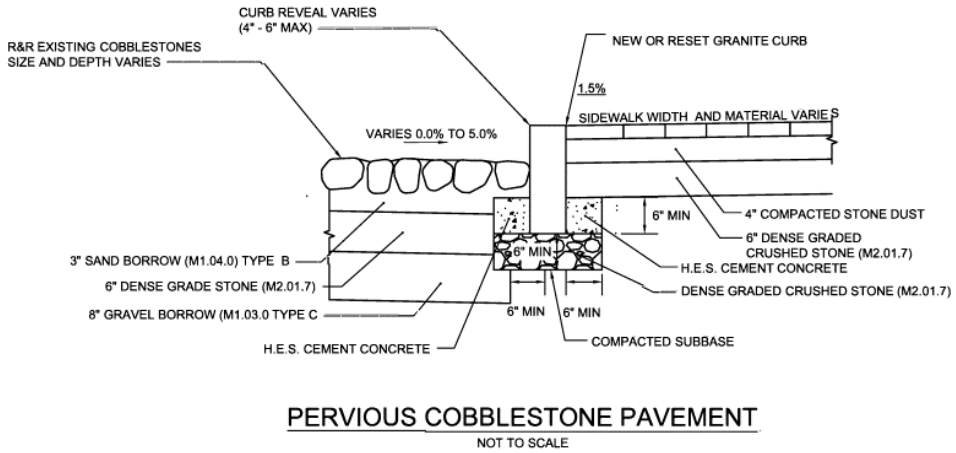


Figure 6 – Detail from Recent (c. 2020) Stantec Drawings for Main Street Construction.

- Although neither the Stantec detail above, nor the c. 2008 and the c. 2014 Nantucket specifications and details indicate a surface dressing of stone dust (the Stantec details indicates sand, and the 2008 and 2014 town details indicate a cement/sand mixture), multiple people in the town familiar with the roadway work in recent years have told me that the common practice on Nantucket for many years has been to use stone dust rather than these other materials for the top dressing course of the cobble stone paving.

- The Annual Roadwork Bid Specification for the Town of Nantucket, from which I received excerpts, does call for stone dust as the top dressing course for cobblestones. This appears to be the likely specification which has steered the actual practice on Nantucket of using both a setting bed and a top dressing course of stone dust. Under Item 704.2 – Remove and Reset Miscellaneous Roadway Surface Treatments (Bricks, Cobbles, Belgian Blocks), that specification reads:

    - *Cobblestones shall be carefully laid on a stone dust setting bed as shown on the plans, and shall be solidly rammed in position by hand. The cobblestones shall be set with the long axis of each stone vertical to the roadway surface. The cobblestones shall be set such that each cobblestone is touching another cobblestone. The cobblestones shall be compacted and tamped with a mechanical plate compactor or by another method approved by the Director or his/her designee. After a sufficient area of pavement has been laid, the pavement surface shall be tested with a 10-foot straight edge and laid parallel with the centerline and any variations exceeding 1/2 inch shall be corrected and brought to proper grade. Any stones that become cracked during these procedures shall be removed and replaced.*
    - *The cobblestones shall be swept with stone dust and fogged with water. The pavement surface shall be vibrated with a lightweight plate compactor to insure compaction between the joints. Additional joint filler of stone dust shall be uniformly distributed as necessary to fill all of the voids. The process shall be repeated for a minimum of five days until all the joints are full.*

Engineering Classification of Pavement Systems

In engineering literature, vehicular paving systems tend to be broadly classified into two main categories:

- Flexible paving systems, such as bituminous concrete (often called “asphalt” by laypersons), that can flex and deform under traffic loads or to accommodate movement such as settlement of substrates.

- Rigid paving systems, such as reinforced cement concrete, which are extremely stiff and rigid and typically do not flex or deform under traffic loads or to accommodate movement such as settlement of substrates.

“Unbound” cobblestone paving such as that on Nantucket (cobblestone paving with loose granular fill in the joints and bedding layer, not hardened mortar or concrete) tends to behave as a hybrid, exhibiting some qualities of both rigid and flexible pavements:

- The granite cobblestone material itself has a hardness, stiffness, and strength much greater than that of the cementitious concrete used in roadway construction, thus the cobbles are extremely stiff.

- However, the granular fill joints between the cobbles are flexible and allow the pavement system as a whole (cobblestones and granular fill/setting bed materials) to flex to gradually change shape under traffic loads, or to accommodate movement such as settlement of substrates.

Applied Loads, Forces, and Behavior

Vehicular loads apply significant loads and forces to all pavement types. Given the significance of these loads, some methods for installing stone cobbles or pavers that may work well for pedestrian-only loadings (such as walks and patios) simply will not prove durable under vehicular traffic. Some of the more significant loads and forces imparted:

- Applied vertical loading and compressive stresses, from vehicle mass acting vertically downward on the pavement system (all layers, including the base, subbase, etc.).

- Applied horizontal loading, acting approximately parallel or sub-parallel to the surface, imparting shear stresses in the pavement from vehicles braking when approaching a stop sign, etc. Over time, braking loads often cause rutting (trough-like depressions along wheel lines) in bituminous concrete pavement.

- Applied torque (twisting) loading, acting in a circular manner on the paving surface, from turning wheels under the weight of the vehicle imparting torsional stresses to the pavement (further discussed below).

Comparing the paving surfaces, given that the compressive strength of the granite cobblestones (approximately 30,000 psi) is roughly six times greater than that of cement concrete (roughly 4,000 – 5,000 psi), and that bituminous concrete in turn has a far lower compressive strength than cement concrete, the wearing surface of the granite cobbles themselves is well suited to accommodating the heavy wheel loads of trucks. As all paving surfaces transmit the loads described above to the underlying base and subbase, all three pavements (whether concrete, bituminous concrete, or cobblestone), rely on dense, well-compacted base and subbase materials to successfully accommodate these wheel loads. Of the three, bituminous concrete would tend to rely the most on the subbase and base layers to accommodate truck loads because it is the most flexible of these three pavements.

The greatest concern with respect to cobblestone pavement behaving differently than bituminous pavement or concrete pavement under vehicular loads is the vulnerability of cobbles to becoming loose and displaced on the surface of the street, not only creating a need for maintenance, but also creating a gap where previously adjacent cobblestones lack the lateral bracing previously provided by the missing stone; they can now more easily come loose and be displaced. The conditions most likely to create this scenario are:

- The applied torque (i.e., twisting force) from wheels turning, especially when the vehicle is stationary, and the full weight of each front wheel is sustained by a few stones or even by a single stone. The situation of a wheel being turned while a vehicle is stationary often occurs during parallel parking.

- If the stones sustaining these applied torque forces are in direct contact with adjacent stones, the adjacent stones, and the additional stones adjacent to those stones, will share the load and help brace the subject stone to prevent it from twisting loose. However, if the stones sustaining the torque forces are not in direct contact with

surrounding stones, the surrounding stones will not share the load, and the stones directly sustaining the torque forces will be more vulnerable to being twisted loose.

- Additionally, the deeper the stones are driven into the ground, the more capable they are of resisting these forces. Consequently, oblong cobblestones are better suited than roughly spherical cobblestones to being set in a durable way as oblong stones (e.g., potato shaped) stones can be driven deeply into the ground, like a pile supporting a foundation, with a large below-grade surface area below grade (to transfer shear to the setting material and adjacent stones) in comparison to the surface area at grade that can be loaded by a vehicle wheel.

- Cobbles that are not oblong but are closer to spherical simply are not well suited to stable, durable setting in granular materials such as sand, dirty sand, or stone dust. Roughly spherical cobbles should not be selected when choosing paving stones, and should be weeded out and not used when resetting existing cobblestone paving. Simply put, cobblestones selected for paving should be oblong (roughly potato shaped), not spherical (roughly cantaloupe shaped). Many of the cobbles that I saw completely dislodged were roughly spherical (Figure 7).



Figure 7 – Dislodged, Roughly Spherical Cobbles.

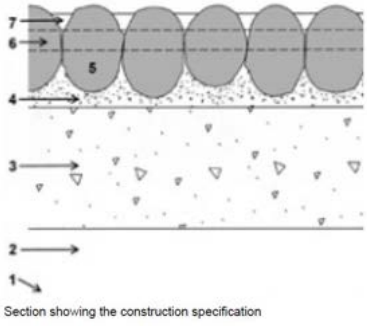
- Cobblestones installed “on the flat” (with width greater than depth) are highly prone to being dislodged by traffic, especially by the torque imparted by turning wheels. Setting cobbles on the flat when they had previously been installed vertically may explain the previous reports of many cobblestones being left over when the cobblestones were removed and reinstalled on certain streets in decades past, because the surface coverage is significantly greater when stones are set “on the flat” rather than installed vertically, thus far fewer of the same oblong stones are needed to cover a given surface area when they installed on the flat as compared to when they are installed vertically.

Key Findings from Technical Literature Search on Stone Paving

- In the Czech paper "The Issue of Cobbled Roadways," presented at the Seventeenth International Multidisciplinary Scientific Geoconference SGEM 2017, Associate Professor Ivana Mahldova of VSB –Technical University of Ostrava, Czech Republic[2], notes the following regarding the movement and failures of flat-topped pavers (e.g., Belgian block):
    - Over time, the granular material filling the joints between the block pavers can wash out, leaving the surface of the paving not resistant enough against the movements and rotations of the cobbled surface due to the horizontal and shear forces induced by the passing wheel of vehicles.
    - Consequently, unfilled surface gaps can result in the movement of block pavers.
    - Thus, routine maintenance in refilling washed-out or lost material at surface joints is important to preventing movement and displacement of block pavers.
- In the 2019 English paper "Setts and the City: Cobbles, setts, and the historic townscape,"[3] Architect and town planner focusing on urban design practice Colin Davis describes technical lessons learned in resetting rounded stone cobbles in the street at Radcliffe Square, at the center of historic Oxford, England.
    - The surface was laid more than 150 years ago, but by the 1960s was in disrepair as the stone cobbles became dislodged in areas and potholes occurred. Once a cobble became dislodged, the surrounding cobbles became unstable, and potholes quickly grew. To mitigate the problem of potholes rapidly progressing in size, unsympathetic repairs utilized bituminous concrete or cement concrete.
    - With the restoration that began in 2005, care was taken to prepare test samples of materials and their installation to determine the optimal approach. Consequently, the approach that was successfully implemented stressed the importance of:
        - Utilizing various layers of well-compacted granular base and subbase to accommodate traffic loads.
        - Installing the cobbles vertically, driven down into the setting material, very tightly spaced and in contact with adjacent cobbles, so that the visible surface is primarily stones, with relatively little dressing material. It further stressed the technical and aesthetic drawbacks of spacing out the stones so they are not in direct contact with adjacent stones, creating the appearance of cobbles "appearing to float in a sea of mortar, like icebergs" (Figure 8).
        - The topmost layer at the surface (Layer 7 in Figure 9), above the maximum circumference of the cobbles, referred to as a "hoggin" top dressing, was a locally sourced material consisting of a mixture of clay, sand, and gravel.
        - Service trenches were installed in the paving to allow service pipes and cables to be accessed and repaired or replaced by lifting designated stone slabs along a designated trench, and not by digging up the rounded cobbles.



Figure 8 – Example of "Sea of Icebergs" Visual Effect.
Visible at a localized area on Main Street, Nantucket.



Section showing the construction specification


The new cobbles before hoggin dressing

Figure 9 – Successful Solution Implemented at Radcliffe Square, Oxford, England.
Left, section detail showing tightly spaced vertical cobbles in contact with each other.
Right, the implemented solution, just before the "hoggin" surface dressing was applied.

- In the 2019 Italian paper "Stone pavement materials and construction methods in Europe and North America between the 19th and 20th century,"[4] published in the *International Journal of Architectural Heritage*, authors Erika Garilli and Felice Giuliani of the Universita degli studi di Parma note that a great deal of technical engineering research was done in the nineteenth and early twentieth century on designing and constructing durable stone pavements, before that engineering research shifted to modern roadway materials such as macadam, bituminous concrete, and concrete. The authors give an encyclopedic comparison of materials and practices for installing stone paving in multiple cities in the nineteenth and early twentieth centuries, with precise descriptions of materials and methods and best practices from technical engineering documents of the period. Some key notes they convey on best practices for installation of cobblestone paving from technical literature of the period are:

    - The stability of the pavement under carriage and wagon loads (which had hard wheels and often carried heavy goods) depended greatly on having a very dense, well compacted subgrade with great strength. Repeated wetting and tamping were necessary for adequate compaction.
    - Extremely hard, strong, and durable stones (such as granite, basalt, etc.) were typically used.
    - Oblong-shaped cobbles, of certain proportions, and approximately the same relative size, were used (Figure 10). The oblong cobbles were driven into the ground vertically, with the smaller end pointing down, using heavy hammers or tampers.

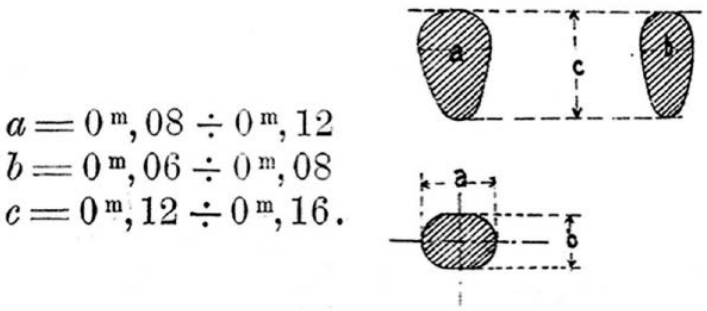


Figure 10 – Typical Proportions of Cobbles Used in Cobblestone Paving.
In Garilli and Giuliani, original detail from period technical literature (Lanino,[5] 1898).

- At the beginning of the twentieth century in the United States, a 6 in.-thick layer of loamy sand was recommended for the bedding layer into which the cobbles were driven, because if the sand was too clean, or too much loamy sand was used, the cobbles became loose and their position in the pavement could not be maintained. The authors cite Morrison[6] (1908) and Tillson[7] (1900) on this period technical research. [N.B. - Loamy Sand is one of the soils types that has been clearly defined by the US Department of Agriculture[8] since the early twentieth century (Figure 11).]

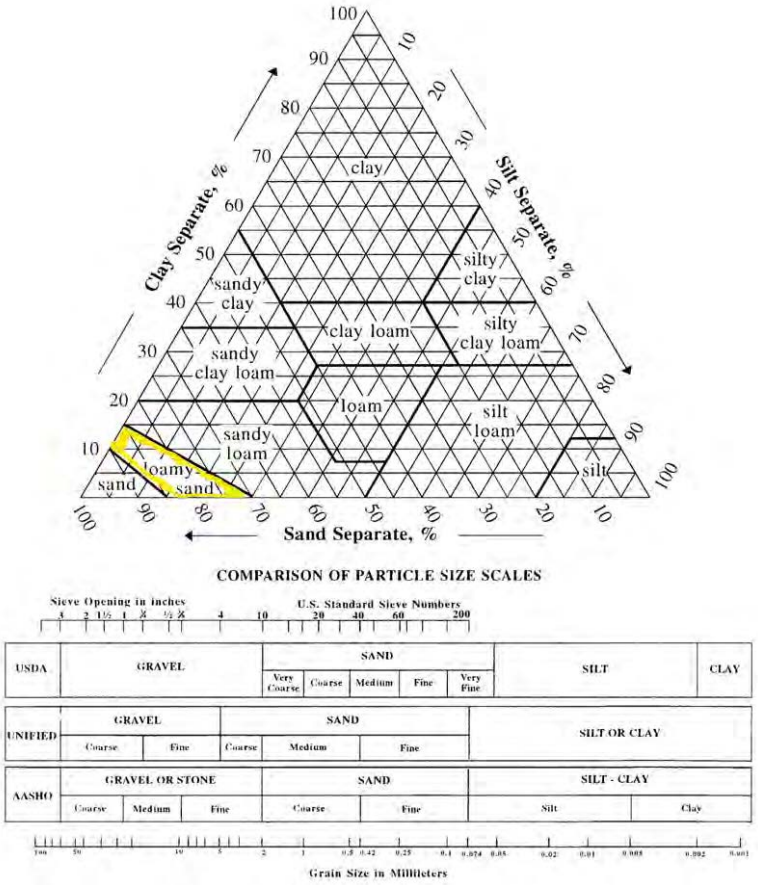


Figure 11 – US Department of Agriculture (USDA) Soil Types Defined by Sand, Clay, and Silt. Also known as the USDA soil textural triangle, with Loamy Sand (one of twelve soil types defined by USDA) indicated in yellow. Loamy Sand is defined as 70-85% sand, 10-15% clay, and the remainder (0-20%) silt.

- After the cobblestones were installed and individually driven, they were covered with sand, and repeated steps of wetting and ramming/compacting the entire cobbled surface with heavy tampers etc. were used to compact the entire surface repeatedly, and uniformly to maintain the desired cross sectional profile.
- Cross-sections to provide good drainage were critical to durability, although individual solutions to achieve good drainage varied (e.g., drainage to one side, both sides, or to the center). Longitudinal stone gutters were often used at the designed drainage areas (Figure 12).

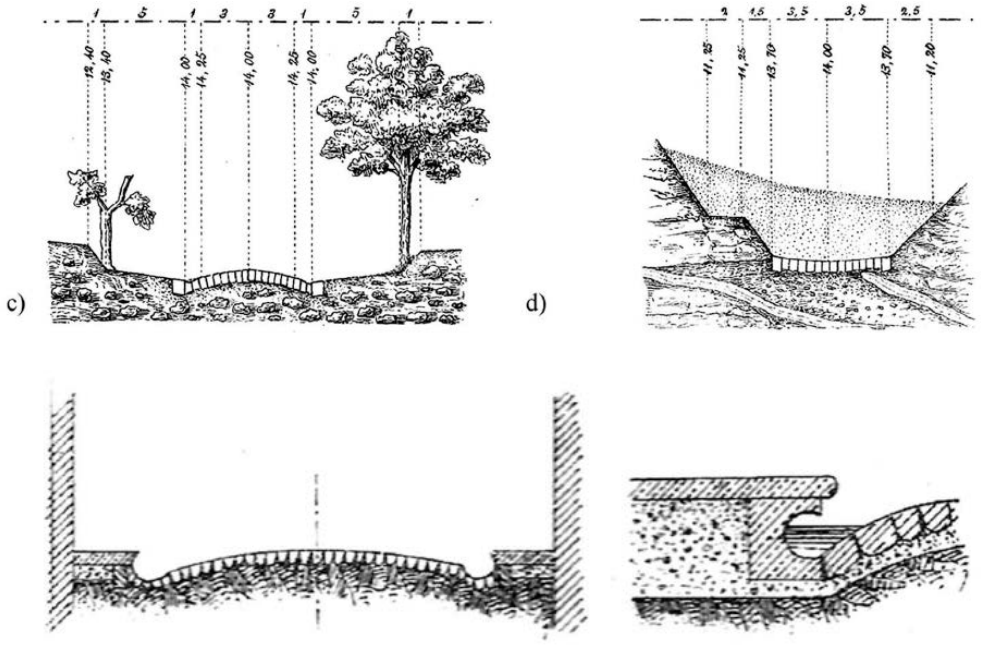


Figure 12 – Several Historic Cross Sections of Stone Pavements.
In Garilli and Giuliani, original period details from Cantalupi,[9] 1886 (top two images) Lanino, 1898 (bottom two images).

2.2 Stone Curbs

- **Materials and Installation Details**

  - **Stone Curb Materials**: Multiple eras and types of curbs are present on Nantucket's streets. While a historic materials survey and inventory is well beyond the scope of this engineering study, it is useful to at least draw some general distinction between the older historic stone curbs, and the modern non-historic curbs. For an excellent, detailed study of the historic curb and sidewalk paving materials in New England, see the *Archipedia*[10] article "Historic Paving and Sidewalks in New England" by Brian Pfeiffer, which includes a case study of Nantucket. Although many variations exist among the stone curbs of

Nantucket, most roughly fall into one of these four broad categories, generally listed from oldest to newest:

- Historic Schist Curbs: Hand-split and lightly dressed historic schist curbs with non-sharp (eased or worn) edges. These often bear visible marks (e.g., splayed wedge marks) from the individual crafts persons who hand-worked (e.g., split, or dressed) them (Figure13). These vary in age but primarily were installed in the 1830s. They vary in size but are generally narrower and less deep (often around 3 in. thick by 9 in. deep) than twentieth century curbs.



Figure 13 – Historic Schist Curbs with Visible Splayed Wedge Marks.

Historic Granite Curbs: Hand-worked historic granite curbs with non-sharp (hammered, dressed, eased or worn) edges. These often bear intentionally visible marks from the individual crafts persons who hand-worked (e.g., split, hammered, dressed, finished) these stones with hand tools. Many of these granite curbs were installed between the 1830s and 1890s, although some continued into the early twentieth century. They vary significantly in size, color, and finish – many are narrower than modern 6 in. wide granite curbs, while some are as wide or even wider (Figure 14).



Figure 14 – Example of Historic Granite Curbs.
A relatively wide example in a course-grained reddish granite, with a textured (e.g., dressed or hammered) top surface.

- Modern 6 in. Granite Curbs: Modern granite curbs with smooth, machine-sawn top surfaces, and sharp edges (e.g., as visible near the Ferry Terminal). These generally date from the mid-twentieth century to present, and tend to be approximately 6 in. thick by 18 in. deep. They tend to be of relatively fine-grained gray granite, and are generally similar to other modern curbs widely used throughout the Commonwealth.
- Modern 4 in. Granite Curbs: Modern granite curbs with a lightly textured top surface and eased edge, as visible on Judith Chase Lane. These are a very recent effort to make the new granite curbs more aesthetically compatible with the older historic curbs. They tend to be approximately 4 in. thick by 18 in. deep, of relatively fine-grained gray granite.



Figure 15 – Modern 4 in. Granite Curb (bottom), and Historic 4 in. Granite Curb (top).
A transition between new and old granite curbs on Judith Chase Lane.

- **Setting Materials and Installation**: From details prepared by Stantec for the recent Judith Chase Lane project, the below-grade setting detail for the curbs consists of setting the curb vertically on dense graded crushed stone, and casting unreinforced high early strength (H.E.S.) cementitious concrete on each side of the curb (Figure 16).

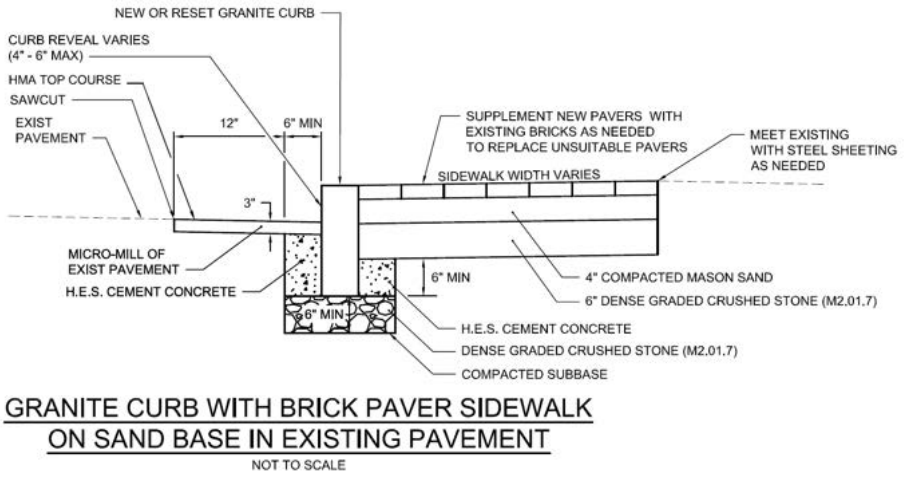


Figure 16 – Recent Nantucket Detail for Resetting Granite Curb.
From the drawing "Roadway and Sidewalk Construction Detail", Project 179410561, Prepared by Stantec, undated, but circa 2017-2020.

- **Durability**
    - **Schist**
        - Various types of schist vary widely in their durability, based on factors such as their mineral constituency, especially micaceous minerals, and the extent to which their microstructure was transformed by metamorphosis, and their varying degrees of fissility (the tendency to split along planes of weakness), which depends on the degree of foliation in the stone. The less fissile variants of schist, and those with lower content of aligned micaceous minerals are generally more durable. Some rocks that are commonly called “schist” by masons and quarries are in the eyes of a geologist really closer to finer-grained gneiss (like the Brimfield Schist in central Massachusetts and northern Connecticut, which is quite durable.)
        - For their roughly century or more of service, the schist curbstones on Nantucket have been subjected to relatively severe environment from the standpoints of climate (e.g., salt spray, freeze/thaw cycling), location (partially buried as curbstones, water draining toward them), and impact/loading (impact from wheels, snow removal, etc.).
        - From purely visual, macro-level examination of the schist curbstones, they appear to have held up well during their long-term in situ service as curbs. While I observed some cracking and chipping, as would be expected with relatively thin stone slabs used as curbs for roughly a century, I observed no widespread gross degradation, such as gross disaggregation, scaling, splitting, or “sugaring” of the stone. The schist curb stones I examined appeared hard and relatively sound and intact for their age and the harsh microclimate in which they have been installed.
        - Given the relatively good condition of the schist curb stones despite their long service life in a harsh microclimate, the schist curb stones appear to have a good track record of durability in this microclimate and use.
    - **Granite**
        - An intrusive igneous stone, the various types of New England granite are broadly well recognized as extremely durable stones, even in the harsh climate in New England. As such, granite has long been a preferred stone for the most torturous microclimates and uses in New England, such as curbs, paving, exterior steps, and the exposed foundation wall or watertable at grade on building walls and facades.
        - Similarly, the granite curbs I observed on Nantucket appear in good condition,and have a good track record of durability for their intended use.
- **Applied Forces and Behavior**: Curbs are subjected to multiple forces, which they must resist to avoid gross displacement (e.g., leaning):
    - Curbs act as low retaining walls, and thus are subjected to continuous backside pressure and overturning moments acting toward the street from the lateral soil pressure at the higher sidewalk side (in some cases compounded by the pressure exerted by the growth of tree roots on the sidewalk side).

- Additionally, curbs can be subjected to downward forces and overturning moments in both directions (both toward and away from the street from wheels when vehicles traverse the curbs, as they sometimes do in parallel parking with two wheels on the sidewalk, which appears relatively common on Nantucket), especially on narrower streets and on streets where the curbs are relatively low with respect to the street surface.
- To resist the forces described above, the curbs must essentially act as a vertical cantilever, with the embedded (below-grade) portion of the vertical cantilever tightly restrained on both sides by a material that is relatively stiff, strong, and with significant weight. The below-grade material restraining overturning must be very tight to the curb stone, so as not to allow displacement, but need not be adhesively bonded or adhered to the curb stone. The lesser depth (roughly half) of the historic schist curbs below grade as compared to modern curbs means that the schist curbs must rely even more on below-grade counterweight than the modern curbs to prevent gross rotational outward displacement (i.e., significant leaning).



Figure 17 – Rotationally Displaced (Outwardly Leaning) Historic Schist Curb.
On upper Main Street.

2.3 Brick and Flagstone Sidewalks

From discussions on my 14 July 2020 site visit, unlike the cobblestone streets, the primary issues and concerns with sidewalks are not primarily technical or engineering issues or questions concerning durability or loadings or applied forces, but primarily issues of how best to balance concerns (e.g., accessibility, historic, transportation) that at times are at odds, including those outlined below.

- **Sidewalk width**: Maintaining the historic width of the sidewalk and thereby its scale relative to the streetscape (Figure 18), versus widening sidewalks to better accommodate increased numbers of pedestrians and better provide for pedestrian safety (in areas where sidewalks are narrow and pedestrians competing for limited space might step out into the street to pass). On narrower side streets, away from Main Street, how best to balance an overall street width that is often too narrow to allow for ideal dimensions and widths of sidewalk, travel lane of street, and parallel parking on street (Figure 19).



Figure 18 – Wide Street and Sidewalk on Lower Main Street.



Figure 1619 – Narrow Street and Sidewalk on Judith Chase Lane.

- **Smoothness of sidewalk surface**: How best to improve surface smoothness and accessibility/traversability (e.g., not only for those in wheelchairs, but for elderly walkers with mobility or balance challenges, young children, baby strollers, etc.) while maintaining the health of historic trees, especially elms?

- **Tree root soils versus sidewalk subbase materials**: Ideally, sidewalks are set on a well-compacted dense base and subbase of granular materials (e.g., sand, stone dust, crushed stone, or gravel) that are free of organic materials. However, for the health of trees, they are ideally provided uncompacted, organic soil at their near-surface roots. How best to balance these conflicting ideals? Sidewalks are often not wide enough to allow for unpaved areas around trees while still allowing sufficient widths for pedestrians to pass, and near-trunk roots are often too high to allow for traversable tree grates (e.g., cast iron) even if such grates were found to be historically acceptable (Figures 20 and 21). Innovative new structural soils developed by soil scientists, in collaboration with landscape architects, may hold some promise and merit further exploration.

- **Cross slopes of sidewalks and threshold elevations**: Along the commercial section of lower Main Street, how best to accommodate the relatively steep longitudinal slope of the street and sidewalk, while meeting the door threshold heights of so many businesses, while creating a more reasonable cross slope that sheds water away from buildings and toward the street and curb, while not being so steep as to create an accessibility problem for a wheelchair traveling along the sidewalk.



Figure 20 – Flagstone Sidewalk Displaced by Tree Roots on Upper Main Street.



Figure 21 – Brick Sidewalk Displaced by Tree Roots on Upper Main Street.

3. CONCLUSIONS AND RECOMMENDATIONS

3.1 Cobblestone Street Paving

General Suitability for Contemporary Use on Nantucket

- Cobblestone street paving, when properly designed and constructed,
    - is suitable for the contemporary traffic loads on Nantucket, including truckloads, provided it has a dense, well-compacted, and adequately deep base and subbase.
    - can be at least as durable and low maintenance over the long-term as bituminous concrete paving.
    - is more sustainable than bituminous concrete paving in that:
        - it allows for greater reuse of existing materials, and fewer new materials, both in minor repair projects (e.g., repairing potholes), and in major rehabilitation projects (e.g., repaving or rehabilitating entire streets).
        - it uses little or no fossil fuel-based materials, while bituminous pavement uses significant asphalt.
        - it is significantly more permeable, allowing more rainwater to naturally drain back into the soil and recharge the ground water table.
- Given the relative scarcity of catch basins on Nantucket streets (as compared to other crowned roads with curbs and sidewalks across the Commonwealth), the permeability of cobblestone paving provides another distinct advantage over bituminous concrete pavement, in that the permeability of the cobblestone paving reduces the volume of water flowing to catch basins

Materials and Installation Procedures

- For the best long-term durability, and especially to minimize stones becoming loose or displaced on the surface, we recommend using oblong (rather than spherical) stone cobbles. Further, driving the cobbles into the ground oriented vertically (not on the flat), and with subsurface stone to stone contact, is essential to providing the greatest resistance to cobbles becoming dislodged.
- A dense, well-compacted, freely draining (permeable) base and subbase are also essential to a durable installation, and in particular to minimizing frost heave and potholes, and to accommodating heavy wheel loads from trucks without rutting or gross settlement.
- The specific materials used for the setting bed (the layer into which the cobbles are driven) and the surface dressing (the uppermost layer, visible at the surface between the stones) is a tricky choice, as a balance must be struck between:
    - A material that drains well and keeps the joints permeable and absorptive, and allows water to drain promptly through the joints from the street (minimizing puddles and ponding on the street surface after rain), and allows water to continue to drain promptly below-grade, so that saturated conditions do not occur

beneath the paving that could lead to frost heaves or freeze/thaw displacement of cobblestones and potholes. The well-draining criteria that, considered alone, would suggest a cohesionless highly porous material, such as clean, washed, uniformly graded sand; however, a highly porous cohesionless material would not be well suited to the additional criteria below.

- A material that will not easily be kicked loose or be blown or washed or swept loose from the joints at the surface, and can also be densely compacted and help restrain the below-grade portion of the vertically driven oblong cobbles. This criterion, considered alone, would suggest exactly the opposite of the above – avoid using a cohesionless material, such as clean, washed, uniformly graded sand, and instead use a cohesive material (such as clay).

- In recent years cobblestones on the island have been set in stone dust, with stone dust surface dressing. While stone dust compacts extremely well, and holds together well, our concern with the use of stone dust as a setting bed or surface dressing is that most stone dusts we have encountered for use in paving do not drain well. Although the permeability and porosity of stone dust (and hence its ability to drain water promptly) can vary depending upon particle size distribution, many readily available stone dusts that we have encountered on stone or brick paving projects in New England compact well, but do not drain well. Thus, our apprehension on the use of stone dust setting materials is that they will not drain water promptly, thus rendering the paving more prone to the accumulation of surface puddles, and to frost heaving and potholes.

In successfully striking a balance between these two main criteria outlined above for the setting bed and dressing materials, both the experience and practice in setting cobblestone on Nantucket (as described by Tom McGrath in 1947) during periods of great success with durable, low-maintenance cobblestone roadways, and technical literature from the turn of the last century (Morrison 1908, and Tillson, 1900) indicate that a loamy sand (aka “dirty sand” sand) with a minor fines content of clay and silt strikes a good balance in achieving both key criteria above for the material of the setting bed and the surface dressing.

- Some successful historic examples use a different material for the surface dressing as compared to the setting bed, with greater cohesive properties so that it can hold itself together to some degree and avoid being easily blown or washed from the joints. While the loamy (dirty) sand would appear to be a good material for both the setting bed and the surface dressing, thus simplifying installation and maintenance, a potential supplement or tweak to the design might be to encourage shallow vegetative growth in the joints or the surface dressing, as the vegetative growth tends to stabilize and hold the underlying sand or granular soil in place. Vegetative growth, presumably inadvertent, occurs in many localized areas of the cobblestone street paving on Nantucket, as seen below (Figure 22). With recessed surface dressing (recessed below, not flush with the crowns of the cobbles), as is traditional on round-topped cobbles, low vegetative growth could survive even in travel lanes. Additionally, loamy “dirty” sand (with silt and clay inclusions) could sustain vegetative growth. This vegetative growth would serve to further assist in holding that top surface of sand in place, minimizing erosion and loss or displacement from wind and water, while remaining permeable to precipitation. The

vegetative materials would need to be low growing, and also be tolerant of any deicing salts that are used on the island, although I understand that use of deicing salts on Nantucket streets is relatively low.



Figure 22 – Vegetative Growth in the Joints of Cobblestone Paving on Main Street.

- A key to achieving success will be determining and quantifying the ideal proportions of fines (clay and silt) in the sand, so those ideal proportions can be specified, checked, and maintained consistently. Dirty sand dug found on the island will vary from location to location, and will even vary when a pile is left outside uncovered, as the fines will tend to wash to the bottom of the pile, self-segregating. The key first step would seem to be conducting testing on readily available sources of the native “dirty” sand on Nantucket, to confirm behavior and properties (e.g., permeability and fines content) as that local native sand reportedly worked well during the original low maintenance period of Nantucket’s cobblestone paving (c. 1836 to 1900), and again during the renaissance period (c. 1931 to 1973). During my 14 July site visit, I observed a freshly dug hole at a house on upper Main Street and sampled the native dirty sand, and found that when I took a handful and squeezed it, it formed a ball in my hand that held itself together, as described by Tom McGrath (Figure 23).



Figure 23 – Native "Dirty Sand" (i.e., sand with inclusions of clay and silt).

On almost any project, testing and mockups are well advised. They are particularly critical on preservation projects, and projects that are highly dependent on materials or installation details/workmanship for their success, and the repair and resetting of Nantucket's cobblestone streets is all of the above.

- Thus, we recommend further testing of materials, and after that testing, installation of trial strips of roadway to better determine the ideal materials based on the considerations described above. We recommend installing several adjacent test strips, each across the full width of a street, to test several setting bed and surface dressing (including loamy "dirty" sand, in various proportions) as well as other candidate materials for the setting bed and dressing, and the recent materials (stone dust) as a control, and evaluating the test strips over several seasons of traffic with respect to durability, drainage, aesthetics, maintenance, etc.

3.2 Stone Curbs

- The historic schist curbs, as well as the historic granite curbs, are suitable for reuse, and can be maintained or removed and reinstalled during rehabilitation work unless there is obvious gross deterioration of an individual curbstone.

- The curbs require strong, direct contact support to resist the overturning loads to which they are subjected.

- Some other curb setting details we observed set curbs in a U-shaped concrete saddle, such that water could fill the "trough" of the U and created a sustained saturated condition at the base of the curb. We recommend avoiding such an installation detail with the historic curbs (schist and granite), as it may subject these stones to a more severe freeze/thaw environment that they have historically experienced.

- Given the durability and apparent strength and hardness of the historic schist and the historic granite, setting them with concrete on each side, and crushed stone below seems a sound engineering detail capable of resisting the applied loads that is unlikely to harm the stone, particularly since no U-shaped concrete trough is created, and any water can drain through the crushed stone base. As a minor tweak to improve reversibility and simplify reuse and resetting of curb stones in the future, we would suggest including a vapor permeable ("breathable"), biodegradable "slip sheet" such as brown kraft paper, between the historic stone curb and the freshly cast concrete. This thin sheet of inexpensive brown paper would prevent the newly cast concrete from bonding to the historic stone, but although the paper would degrade relatively quickly below grade after construction was completed, it would have served its intended purpose of preventing bond of the concrete to the historic stone. Nevertheless, the stone would still be tightly restrained by the concrete on both sides.

3.3 Brick and Flagstone Sidewalks

In balancing the multiple considerations for sidewalks (Figure 24), including sidewalk width versus street widths, historic trees (and their roots lifting sidewalks), versus accessibility, traditional historic width versus needs to accommodate contemporary pedestrian numbers, etc., there will be no one-size-fits-all solution on Nantucket, not even for a single street, as multiple solutions and approaches will need to be utilized along even a single street or block to accommodate varying existing conditions and constraints as they are encountered, such as a low entry threshold at a door abutting the sidewalk, the high roots of a historic American elm tree, etc.

- Based on the testing we recommended above for the setting bed materials for cobblestones, we recommend setting the brick sidewalks and flagstone sidewalks in a material demonstrated to drain water well, to minimize water retention in the setting bed, and consequent vulnerability to heaving of the sidewalk paving.

- We suggest developing a "tool kit" of potential options and design solutions, and deploying each where it makes the most sense along a street. For example, in one area

where nearby entrances are elevated on stoops, raising the entire sidewalk a few inches to eliminate gross offsets, tripping hazards, and accessibility impediments from rising tree roots may make sense. However, just a short distance down the street, where entrance doors and thresholds are right at grade, raising the sidewalk may not be a viable solution.

- Additionally, given that curb heights and cross sectional crowns of streets may also present either constraints or opportunities, we recommend undertaking design and rehabilitation of streets, curbs, and sidewalks in a unified manner, at the same time, which would allow the maximum opportunity for overall, comprehensive, integrated solutions. The Lidar survey undertaken by Preservation Institute Nantucket (PIN) would appear to be an extremely useful starting point of detailed elevational data for the design. We suggest starting with the fixed points that are impractical or impossible to change, such as the door threshold heights of adjacent buildings, as unchangeable “givens” for the design exercise of adjusting sidewalks heights, slopes and cross-slopes, curb heights, street elevations and crown, etc.



Figure 24– Overview of Streetscape along Upper Main Street

APPENDIX A

“A Cobblestone Gathers No Moss," by Hillary Hedges Rayport

A Cobblestone Gathers No Moss: A History of Nantucket's Cobble Paving
By Hillary Hedges Rayport

Nantucket loves its cobblestone Main Street. But this wasn't always the case – 100 years ago this year, Nantucket town resolved to pave Main Street with concrete, citing the pace of progress and the triumph of sensibility over sentiment. Few today would argue against the cobbles, and yet the road is now in extreme disrepair. Remedies on the table to fix it include a modern asphalt base, an idea that is stirring debate on Nantucket. As with all good old things that have lasted, the history, material, and function of this road lies at the root of the question. While favor for cobbles has waxed and waned, the record shows that from the 1930s through to the 1970s, Nantucket celebrated her cobblestone streets as "virtually maintenance free" and less expensive to maintain than blacktop. Prominent leaders – including the superintendent of streets – sought MORE cobblestone streets, not fewer. But since 1993, cobblestone Main Street has been a maintenance headache. The Nantucket Department of Public works is now seeking public comment regarding how best to fix it.

How did a maintenance-free street become a source of roadworker angst? A close read of our history reveals the story of a time-tested skill that was lost, then found, then lost again. Can we bring it back?

The Cobblestone Myth

Main Street and its surroundings were originally paved with cobblestones beginning in 1836, or possibly as early as 1834. Nantucket was a bustling and wealthy town, awash in commerce and able to afford the best materials of the time. While tour guides love to tell the beguiling tale that cobblestones came to Nantucket from Europe as ballast stones, this romantic story is an urban legend. Ships traversed the Atlantic filled with tradable goods, and most arrived in Salem or Gloucester before finding their way to Nantucket. Nantucket's cobblestones are in fact a geologic match to New England glacial "erratics" – stones and boulders dropped in place as glaciers retreated. Stones selected for paving had an oblong shape and flat tops. They may have been gathered from Tuckernuck, where similar stones can still be found today. They may have been a by-product from years of processing sand, which was collected and dumped over Nantucket's muddy roads before they were paved. They also might have been brought in, purchased from Gloucester or similar locations.

Whatever their origins, once they were laid down on Nantucket's Main Street, they didn't stay in place long. Rapidly modernizing Nantucket was constantly digging. Sewers – first brick and then, in the early 20th century, modern vitrified pipe – went in underneath the stones over successive years. Multiple excavations left the road with pits and divots -- Nantucket's Department of Sewerage put the road back together, but by the 1910s, the original architects of cobblestone Main Street were onto more lucrative pursuits, mainly building asphalt roads. Paving with cobblestones had become a neglected, if not a lost, profession.

A Cobblestone Gathers No Moss: A History of Nantucket's Cobble Paving
By Hillary Hedges Rayport

The Pace of Progress

As the cobblestone road conditions worsened, and buttery-smooth bituminous concrete beckoned, the pressure of progress was steady. One by one roads were being covered over – first Liberty, then India, Center, Federal, and Orange Street all were paved with asphalt. In 1919, the town proposed to lay asphalt over the wide, commercial section of Main Street, known as "Main Street Square." The outcry was swift and determined. The Civic League and a group of concerned summer residents opposed a 1920s initiative to pave Main Street with concrete.

The activists won the right to re-cobble the street, as long as it was on their own nickel and with their own labor. They were kindly permitted to use the town's tools. As no island contractors would bid on the controversial project, the group engaged a team from Brockton, Massachusetts. The workman discharged their duties expertly, but victory was fleeting. With Nantucket's modernization and growing appeal as a vacation destination, the cobbles were torn up repeatedly to make way for expanded gas, water, and sewer lines. A major excavation in 1926 did not proceed well. Cobbles were set in frozen ground that was poorly graded from the outset. In the end, there were hollows in the street. Many wondered if Main Street would ever be the same again.

As the hollows and bumps deepened, a few proposals to concrete the road came and went. But by this time, the downside of asphalt was being discovered – the black-top wore through to the cobbles or dirt below quickly, and expensive repairs were constant. Plus, after living with asphalt for a decade, the town was falling in love with the few beautiful cobblestone roads that remained.

In 1930, after the installation of a new water main, Water Company president Frank Gifford was in a position to fix Main Street right and he was not content to do it once over lightly. When all the island contractors declined the job, Gifford remarked that laying cobbles was a "lost art." Despite public pressure from disgruntled shop owners, whose customers entered their stores through piles of cobblestones the water company had left stacked down the side of the street, Gifford held firm – the cobbles would not be reset until he could source the right "expert paver" to come to Nantucket and do the job correctly and finally. His long laid plans were upset when the mason, scheduled to arrive the next day, failed to show up and ultimately refused the work. Ever self-reliant, Gifford and the selectmen decided it was time to bring the lost art of cobblestone work back to Nantucket. There was one company to look to: The John C. Ring Construction Company. John C. Ring was the largest road builder on Nantucket, but he had exited the cobblestone business decades before. There was more and easier money laying out new roads and covering the old with concrete and tar. But Nantucket had made the King of Concrete a very wealthy man, and now they demanded the cobbled streets be repaired. Employee Antone F. Sylvia stepped up.

A Cobblestone Gathers No Moss: A History of Nantucket's Cobble Paving
By Hillary Hedges Rayport

The Cobblestone Renaissance

Antone Sylvia was born in the Azores Islands and came to Nantucket at age 16 in 1882. After stints on the old paddle-boat "Island Home" and the Nantucket-Siasconset Railway, he settled into a career with John Ring Construction, where he worked for more than 50 years. Why Antone was chosen to be Nantucket's future expert mason is unknown, but we can speculate that his childhood memories may have had something to do with it. Most know about the strong connection between Nantucket and the Azores because of a common history of whaling – but there is another thing the two islands have in common – cobblestones.

However it happened, Antone Sylvia became a skilled mason, and quickly. In 1930s Nantucket, with the growing tourist trade, a cobblestone could never rest. They were up again in 1931, to make way for new utilities. Antone laid them back down. And in 1937, there was major sewer work. Antone laid them back down, and the *Inquirer and Mirror* reported "he promises he layed [sic] them right side up." Antone lived to be 95, and at the his death in 1961, his obituary read, "Mr. Sylvia helped plan and had charge of building most of the present roads on the island. He was particularly proud of a project he performed that is very much in evidence today, the laying of the cobblestones of Main Street." You can drop in to Sylvia Antiques at the foot of Main Street today and say hello to his great-grandson, antique dealer John Sylvia.

The Cobblestone Team

In the special skill of laying cobblestones, Antone was joined by Thomas McGrath Sr., also a wash-ashore. McGrath came to Nantucket from County Cork, Ireland, in 1924 at age 29. Thomas passed the skill onto his son, Tom Jr., and thereby the golden age of cobbles on Nantucket continued. For over 40 years, from 1931 until 1973, there was nary a complaint about hollows and holes on Main Street, other than an expected need for routine maintenance. The town appropriated modest funds in 1947 and 1957 for repair of cobblestones on Main Street – a grand total of $1,500 over the two years. By comparison, the bituminous concrete paving of McKinley Avenue in Siasconset in 1947 alone cost the town $2,500.

With the maintenance of cobbles no longer a lost art, the streets remained in good repair and fondness for cobblestones only increased. Though automobiles were rattling across Nantucket, its cobblestone streets were an oft-cited symbol of a quieter time in America. Visitors, wash-ashores, and natives alike came to thank the Civic League and the group of wise summer residents who, in 1921, had raised $2,500 and saved the cobbles of Main Street.

The preservation movement gained momentum and in 1955 the selectmen voted to establish Nantucket Town as a protected Historic District. The argument was won based on economics: tourism carried the day, and cobblestone streets and grey

shingled cottages were "Our Gold Mine," as described by preservationist Everett U. Crosby in the pamphlet of the same title. By 1967, Nantucket was a leading authority on the practical work of maintaining historic cobblestone streets. A reporter for *The Charleston Evening Post* interviewed mason Tom McGrath and Superintendent of Streets Michael Driscoll in an article that year called "Yankees Conquer Cobblestones."

> Tom McGrath…tells me that the proper bed for cobblestones is 3 to 4 inches of "dirty sand" i.e. sand with sufficient fine powdered material so that it will hold together when squeezed, but the mixture should not become muddy when wet...Driscoll says they have no problems with freezes. Water drains right through the sand before it freezes. The only problem is occasionally a motorist spinning a wheel and flipping out a stone. He says, however, that it is no more than a 15 minute job to replace a few like that and really the only trick is to put the most pointed end down. In other words, get the stone sunk as deep as possible into the dirty sand base with a relatively small area of each stone on the surface. This he says is much better than skimping on stones and having the largest side lying flat on top of the ground.

Under Tom's steady mallet, the cobblestone streetscape not only stayed put, it spread. Vulcanized tires and improvements in automobile suspension helped quell the chief complaints about cobblestones – that they were noisy and rough on cars. In 1966, the town voted to continue the cobbles all the way down Main Street to the waterfront. Water Street was repaved with Belgian block. A tar strip across Main Street at Pine Street was peeled up and restored. Cobblestone streets were beautiful, durable, low maintenance, and part of what made Nantucket Nantucket.

From Blessing to Bane

It's often the case that you don't know what you've got 'til it's gone, and islanders likely did not know the true gift they had in Tom McGrath Jr. and his fellow masons. When McGrath suffered an untimely death from a heart attack in 1972, he had not apprenticed a successor and there was no one with the skill to maintain Nantucket's roads. This was fine for a while, but the cobbles were not truly maintenance free – not with the water, electrical, gas, sewer, and now cable companies poking holes in them every few years. The patches continued to hollow out over time, and soon the streets needed attention. When time came to fill the hollows the DPW contracted with Cape Cod & Island Construction for cobblestone repair. Work was minor enough and sufficiently reassuring that the enthusiasm for cobbles endured. Edouard A. Stackpole, president of the NHA, pushed mightily to convert more streets to cobble. As ever, there were advocates on both sides of the question – passionately in favor of cobbles for their beauty and durability, and passionately against, for their uneven surface. By the late 1970s, paving with bituminous

concrete was fast and efficient, and skilled masons were hard to find. Ultimately, the argument for keeping the paved streets in blacktop won out. As selectman Roger Young said: "the new machine just heats the tar that's there and puts in new tar." The fact that it buckled and needed constant patching seemed less important when you had a steady supply of materials and labor to get the job done.

A Last Stand for More Cobbles

Nantucket enjoyed the cobbles it had, but when a multi-year, $2 million road improvement project was launched in 1980, the selectmen saw an opportunity for the long-contemplated return to cobblestones, and engaged island contractor Walter Glowacki. North Water Street was re-paved with Belgian block; India Street and South Water Street from India to Main were cobbled. But the entire road project was fraught. Selectmen were yelling at contractors. The lead engineer was raked over the coals multiple times. Townspeople were pulling their hair out with traffic problems. A backhoe nearly ran over a car. The Belgian block was laid all wrong, people weren't paid, new consulting engineers were brought in. The town breathed a sigh of relief when the project was deemed complete, and no one wanted to talk about downtown roads, let alone cobblestones, for a while.

The next major project was in 1993, when all of Main Street was dug up to lay powerlines underneath. The primary motivation for this was aesthetic – people wanted to recreate the vision of Main Street as it was in the old photos, before power lines were strung overhead (how much was practical in this – no more downed powerlines) and they approved a rate increase to pay for it. But even at the time residents complained about the pitted surface, and the superintendent of the job reported the challenge of laying the stones in the frozen earth that chilly March. The problems on Main Street only built from there.

Today, the Department of Public Works is recommending historic Main Street be rebuilt, and exploring laying asphalt underneath the cobbles to support ever more traffic and ever heavier trucks. Those who oppose this idea are concerned with aesthetics, sustainability, the effects of excavation on 200-year-old houses, and the health of towering century-old American Elms. They advocate for setting the cobbles closely packed and well buried in gritty porous sand, as is traditional. Is cobblestone paving a lost art that can be found again, or was the editor of the *Inquirer and Mirror* correct back in 1919, when he wrote, "It may not be next year, or the year after, or the year after that, but it will be smoothed over some year – when the time arrives that common sense takes precedence over sentiment." 100 years later, sentiment is still holding out.

APPENDIX B

Circa 1980s Nantucket Specification

7. COBBLESTONE PAVEMENT

SCOPE

These specifications cover the construction of cobblestone pavements. The work shall consist of furnishing and setting granite cobblestone pavers on a stone dust setting bed over a gravel base course in accordance with these specifications and in close conformity with the lines and grades shown on the plans or established by the Engineer.

MATERIALS

Materials shall meet the requirements specified in the following descriptions and/or sub-sections of Division III of the Massachusetts Standard Specifications for Bridges and Highways.

Cobblestones. Cobblestones shall be granite, of fairly uniform shape and color, free from cracks and other structural imperfections or flaws which would impair its structural integrity, and of a smooth appearance. Natural color variations, characteristic of the deposit source will be permitted. Cobblestones shall be similar to existing cobblestones on various downtown streets. Samples shall be submitted for approval by the Nantucket Planning Board.

Sand Borrow. M1.04.0 Type A.

Portland Cement. M1.01.0

Stone Dust. Stone dust shall conform to the following gradation requirements:

Passing Sieve Size	Percentage Passing
No. 4	100
No. 50	90
No. 200	65

Gravel Borrow. M1.03.0 Type b

CONSTRUCTION METHODS

The subbase below the stone dust setting bed shall be fine graded and thoroughly compacted (as required under section 401. of the M.S.S.B.H).

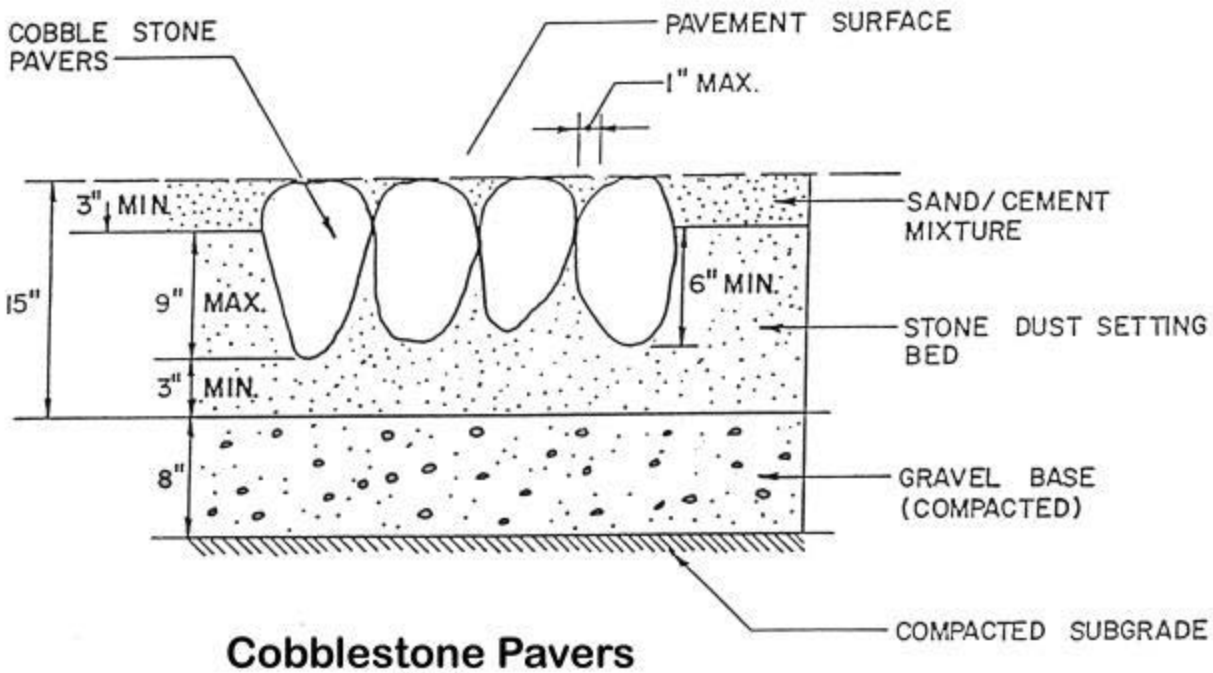
Cobblestones shall be carefully laid on a stone dust setting bed as shown on the plans, and shall be solidly rammed in position by hand.

The cobblestones shall be set with the long axis of each stone vertical to the roadway surface. The cobblestones shall be set such that each cobblestone is touching another cobblestone.

The cobblestones shall be compacted and tamped with a mechanical plate compactor or by another method approved by the Board or its Agent. After a sufficient area of pavement has been laid, the pavement surface shall be tested with a 10-foot straight edge and laid parallel with the centerline and any variations exceeding

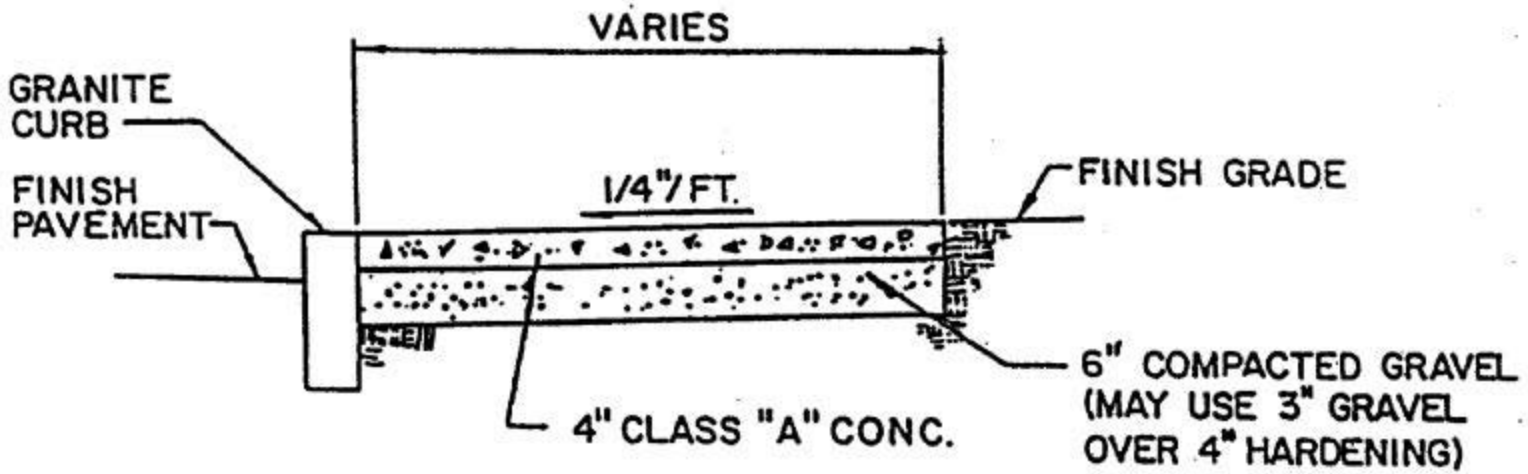
1/2 inch shall be corrected and brought to proper grade. Any stones that become cracked during these procedures shall be removed and replaced.

The cobblestones shall be swept with a sand/cement mixture (three parts dry sand, one part cement) and fogged with water. The pavement surface shall be vibrated with a lightweight plate compactor to insure compaction between the joints. Additional joint filler of sand/cement mixture shall be uniformly distributed as necessary to fill all of the voids. The process shall be repeated for a maximum of five days until all the joints are full.



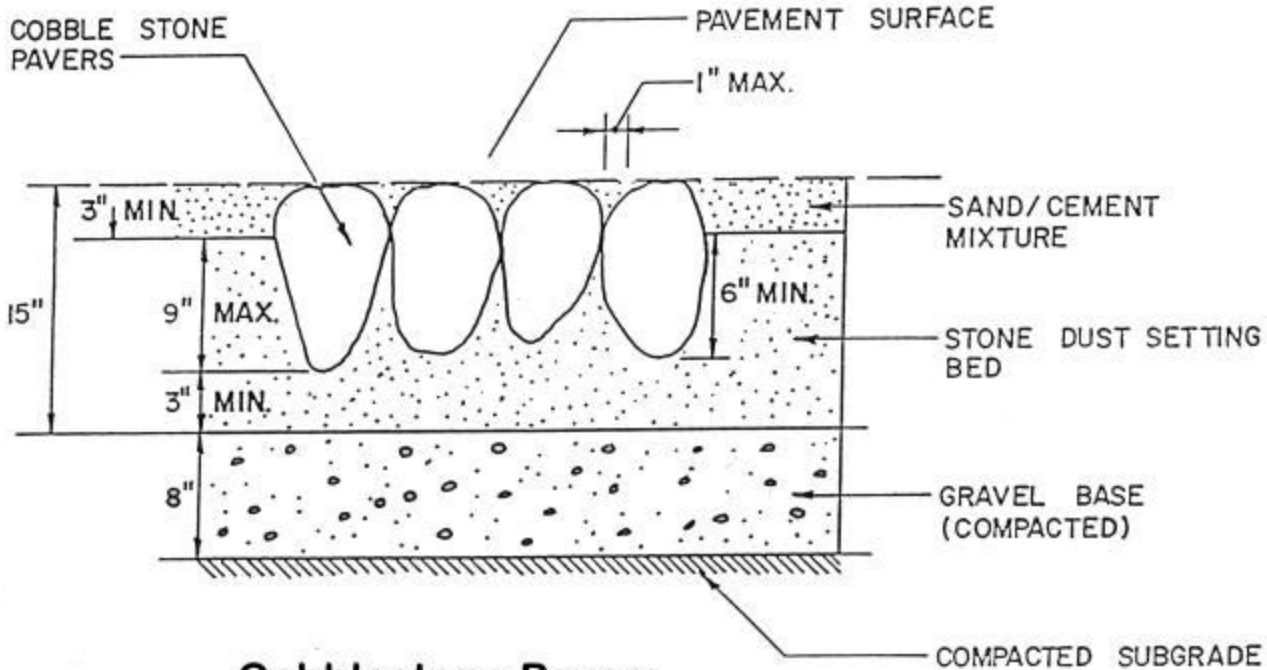
Cobblestone Pavers
(NTS)

Plate No. 8



Typical Concrete Sidewalk Section
(NTS)

Plate No. 9



Cobblestone Pavers
(NTS)

Plate No. 14

APPENDIX C

Circa 2014 Nantucket DPW Specification

7. COBBLESTONE PAVEMENT

SCOPE

These specifications cover the construction of cobblestone pavements. The work shall consist of furnishing and setting granite cobblestone pavers on a stone dust setting bed over a gravel base course in accordance with these specifications and in close conformity with the lines and grades shown on the plans or established by the Engineer.

MATERIALS

Materials shall meet the requirements specified in the following descriptions and/or sub-sections of Division III of the Massachusetts Standard Specifications for Bridges and Highways.

Cobblestones. Cobblestones shall be granite, of fairly uniform shape and color, free from cracks and other structural imperfections or flaws which would impair its structural integrity, and of a smooth appearance. Natural color variations, characteristic of the deposit source will be permitted. Cobblestones shall be similar to existing cobblestones on various downtown streets. Samples shall be submitted for approval by the Nantucket Planning Board.

Sand Borrow. M1.04.0 Type A.

Portland Cement. M1.01.0

Stone Dust. Stone dust shall conform to the following gradation requirements:

Passing Sieve Size	Percentage Passing
No. 4	100
No. 50	90
No. 200	65

Gravel Borrow. M1.03.0 Type b

CONSTRUCTION METHODS

The subbase below the stone dust setting bed shall be fine graded and thoroughly compacted (as required under section 401. of the M.S.S.B.H).

Cobblestones shall be carefully laid on a stone dust setting bed as shown on the plans, and shall be solidly rammed in position by hand.

The cobblestones shall be set with the long axis of each stone vertical to the roadway surface. The cobblestones shall be set such that each cobblestone is touching another cobblestone.

The cobblestones shall be compacted and tamped with a mechanical plate compactor or by another method approved by the Board or its Agent. After a sufficient area of pavement has been laid, the pavement surface shall be tested with a 10-foot straight edge and laid parallel with the centerline and any variations exceeding

1/2 inch shall be corrected and brought to proper grade. Any stones that become cracked during these procedures shall be removed and replaced.

The cobblestones shall be swept with a sand/cement mixture (three parts dry sand, one part cement) and fogged with water. The pavement surface shall be vibrated with a lightweight plate compactor to insure compaction between the joints. Additional joint filler of sand/cement mixture shall be uniformly distributed as necessary to fill all of the voids. The process shall be repeated for a maximum of five days until all the joints are full.

8. BRICK PAVEMENT

SCOPE

These specifications cover the construction of a Brick Paving Block Pavement. The work shall consist of furnishing and setting extruded fireclay Brick Paving Block pavement on a stone dust setting bed on a dense graded crushed stone and gravel base course in accordance with these specifications and in close conformity to the lines and grades shown on the plans.

MATERIALS

Materials shall meet the requirements specified in the following descriptions and/or subsections of Division III of the Massachusetts Standard Specifications for Bridges and Highways.

Brick Pavers. Brick Paving Block shall be for exterior paving, manufactured from extruded fireclay from shale and shall be fired to produce a dense paver and shall meet the requirements of ASTM C216-69-SW-FBS with water absorption not more than 5 percent with five-hour bail. Laminated brick will not be acceptable. Standard Face brick will not be acceptable.

All brick shall be batched type burned to provide the various colors by controlled atmosphere and temperature conditions, required to obtain a rustic blend (70 percent red and 30 percent brown to black). The brick shall be highly resistant to abrasion and shall have an average compressive strength of 8000 or more psi over a 100-cycle freeze-thaw test.

The brick shall be wire-cut to a size of 4 x 8 x 2.25 inches. Brick shall be delivered to the site on pallets. Samples shall be submitted for approval by the Nantucket Planning Board.

Sand Borrow. M1.04.0 Type A.

Portland Cement. M4.01.0

Stone Dust. Stone dust shall conform to the following gradation requirements:

Passing Sieve Size	Percentage Passing
No. 4	100
No. 50	95
No. 200	65

Dense Graded Crushed Stone. M2.01.7

Gravel Borrow. M1.03.0 Type b

CONSTRUCTION METHODS:

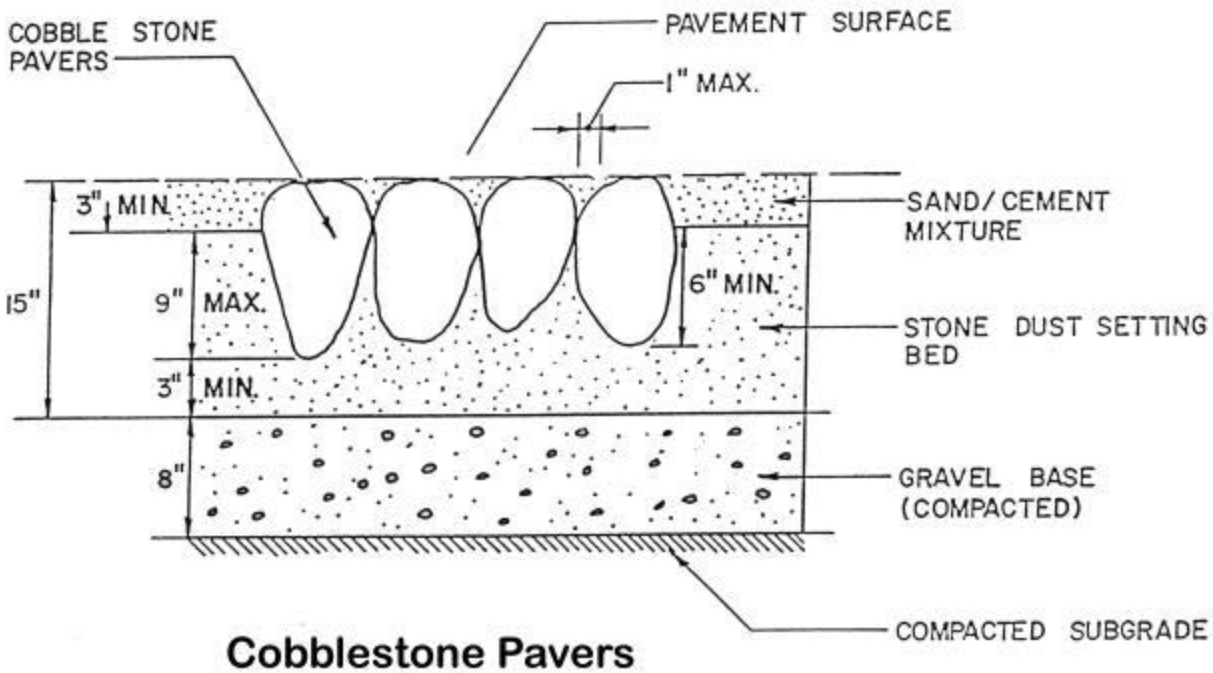
Each pavement layer shall be fine graded and thoroughly compacted (as required under Section 401. of the M.S.S.B.H.)

The Brick Pavers shall be laid true to lines and grades with joints of uniform thickness, all surfaces true and corners straight and plumb. Paving patterns shall be as shown on the plans or to match existing patterns, as directed by the Board or its Agent. Any patterns in which the alignment is not acceptable shall be promptly removed and reset.

The Brick Pavers shall be compacted and tamped with a lightweight mechanical plate compactor or by another method approved by the Board or its Agent. After a sufficient area of pavement has been laid, the pavement surface shall be tested with a 10-foot straight edge and laid parallel with the centerline and variations exceeding 1/2 inch shall be corrected and brought to proper grade. Any pavers which become damaged during these procedures shall be promptly removed and reset.

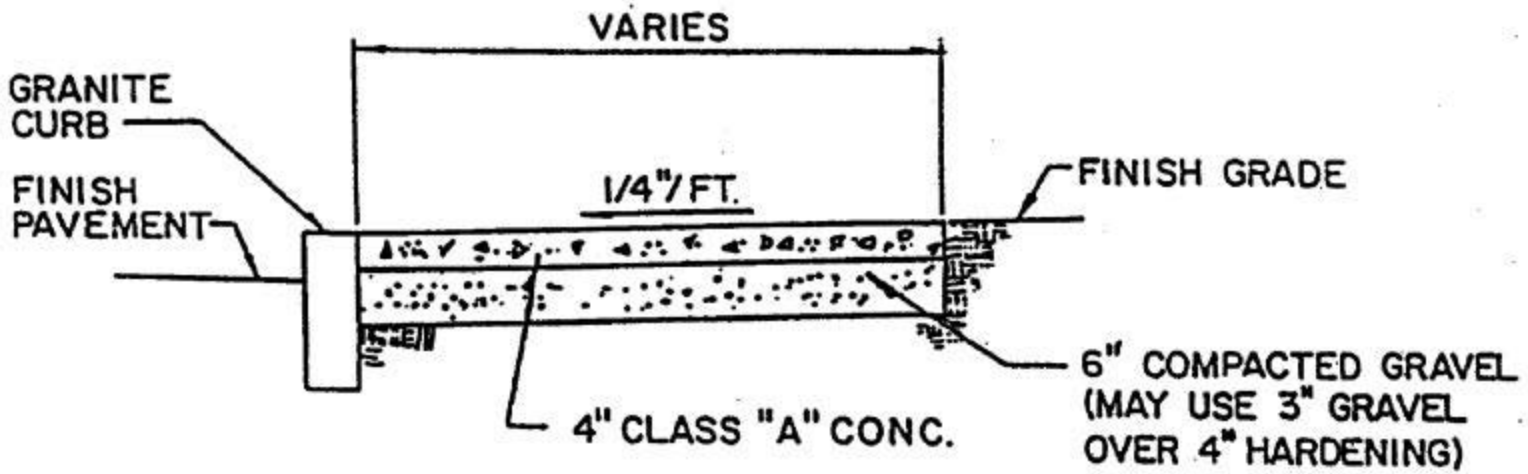
The Brick Pavers shall be swept with a dry sand/cement mixture (three parts dry sand, one part cement) and fogged with water.

The pavement surface shall be vibrated with a lightweight plate compactor to insure compaction between joints. Additional joint filler sand/cement mixture shall be uniformly distributed as necessary to fill all of the voids. The process shall be repeated for a maximum of five days until all the joints are full, and all pavers are stabilized.



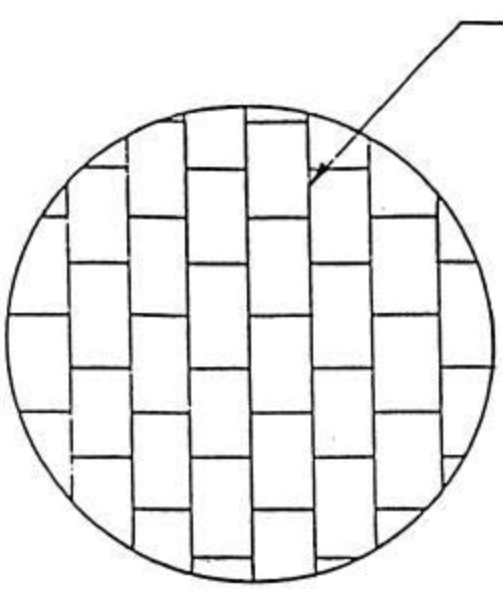
Cobblestone Pavers
(NTS)

Plate No. 8

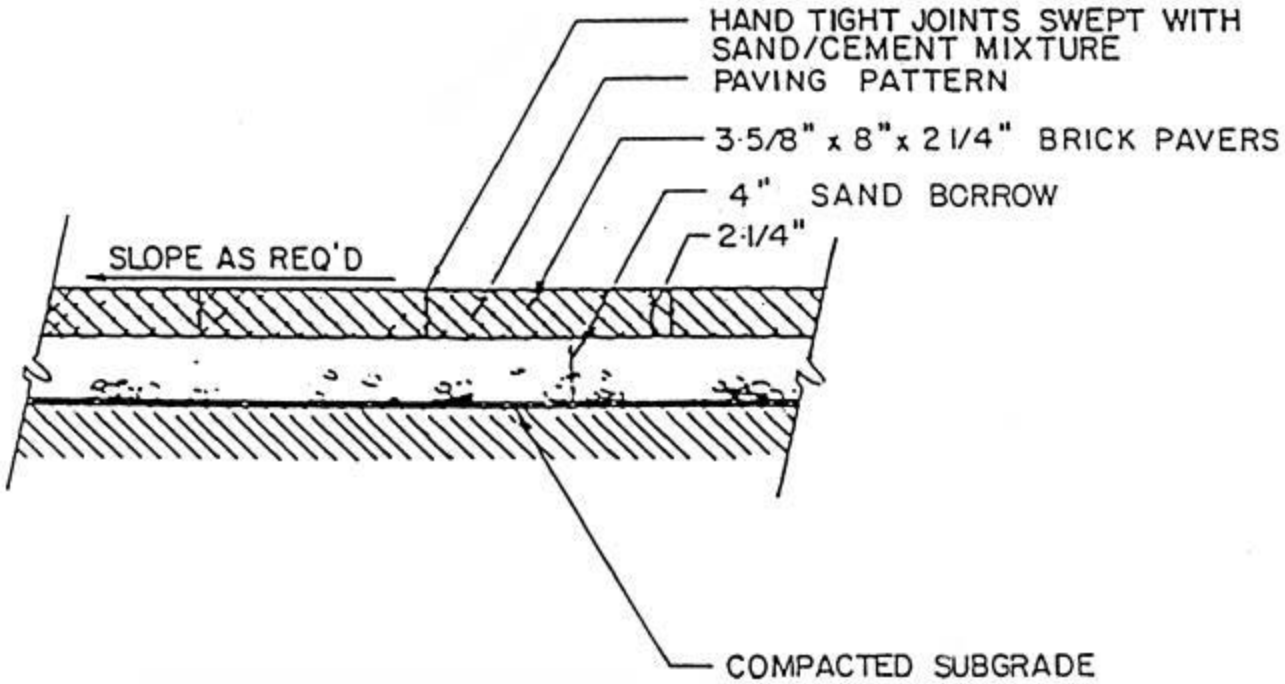


Typical Concrete Sidewalk Section
(NTS)

Plate No. 9

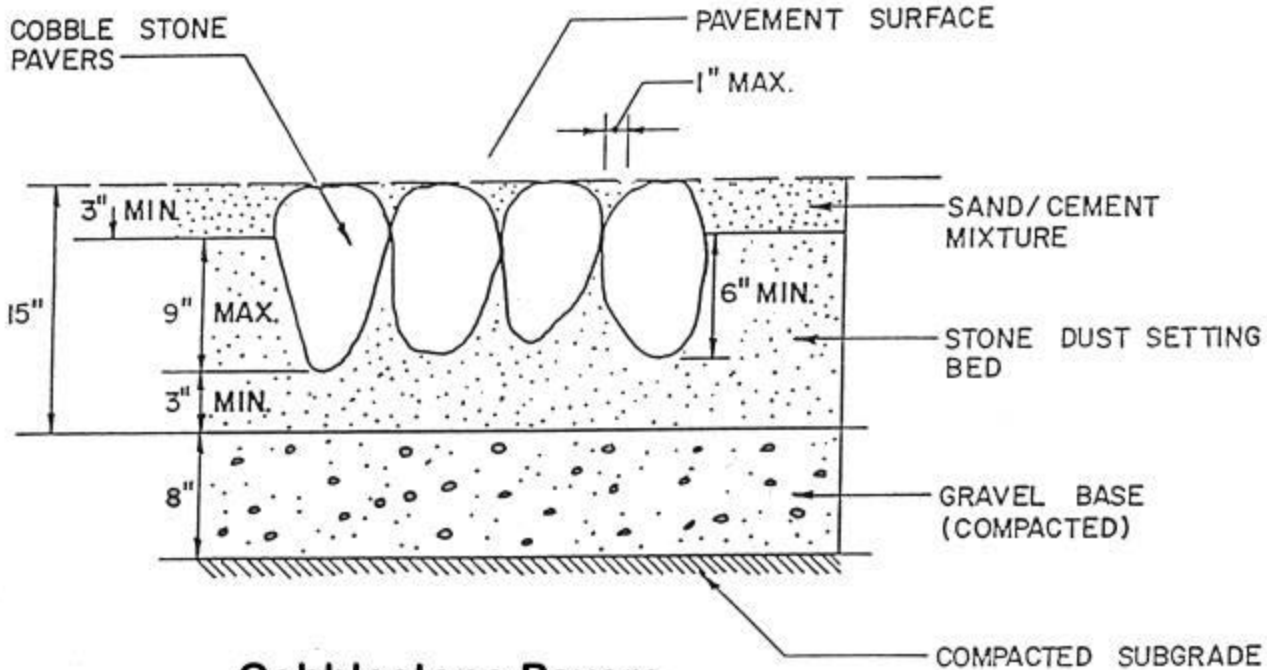


Paving Pattern Plan



Typical Section
Brick Walkway Pavers
NTS

Plate No. 10



Cobblestone Pavers
(NTS)

Plate No. 14

APPENDIX D
References

REFERENCES

1. Rayport, H. H., "A Cobblestone Gathers No Moss," *Archipedia*, http://www.archipedianewengland.org/wp-content/uploads/2019/09/a-cobblestone-gathers-no-moss-editing-final-8-23-19.pdf.

2. "The Issue of Cobbled Roadways," presented at the Seventeenth International Multidisciplinary Scientific Geoconference SGEM 2017, Associate Professor Ivana Mahldova of VSB –Technical University of Ostrava, Czech Republic.

3. Davis, C., "Setts and the City: Cobbles, setts, and the historic townscape," https://www.buildingconservation.com/articles/setts/setts.htm.

4. Garilli, E. and F. Giuliani, "Stone pavement materials and construction methods in Europe and North America between the 19th and 20th century," *International Journal of Architectural Heritage* (copy attached).

5. Lanino, L., 1898, *Corso Di Costruzioni Stradali E Idrauliche* (Torino: Unione Topografico-Editrice).

6. Morrison, C.E., Highway Engineering (New York: John Wiley & Sons, 1908).

7. Tillson, G. W., Street Pavements and Paving Materials. A Manual of City Pavements: The Methods and Materials of Their Construction (New York: John Wiley & Sons, 1900).

8. U.S. Department. of Agriculture website, soil textural classification, https://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/edu/?cid=nrcs142p2_054311.

9. Cantalupi, A., 1886, Trattato Pratico per La Costruzione Delle Strade E per La Loro Manutenzione, ed. B. Saldini (Milano: Prem. tipo-litografia degli ingegneri).

10. Pfeiffer, B., "Historic Paving and Sidewalks in New England," *Archipedia*, http://www.archipedianewengland.org/1600-1699/historic-paving-and-sidewalks-in-new-england/.

APPENDIX C

Asbestos Cement Form and Regulations

Commonwealth of Massachusetts
Executive Office of Energy & Environmental Affairs

Department of Environmental Protection
One Winter Street Boston, MA 02108 • 617-292-5500

Charles D. Baker
Governor

Karyn E. Polito
Lieutenant Governor

Matthew A. Beaton
Secretary

Martin Suuberg
Commissioner

ASBESTOS CEMENT PIPE GUIDANCE DOCUMENT AND CONDITIONAL ENFORCEMENT DISCRETION

June 2011, amended May 22, 2015

Prepared by the Bureau of Air and Waste

This information is available in alternate format. Call Michelle Waters-Ekanem, Diversity Director, at 617-292-5751. TTY# MassRelay Service 1-800-439-2370
MassDEP Website: www.mass.gov/dep

Printed on Recycled Paper

Contents

I. Background 3
II. Purpose 3
III. Conditional Enforcement Discretion 4
IV. Guidance Provisions 5
a. Pre-Demolition/Renovation Survey 5
b. Notification 6
c. Licensing and Training 7
d. Handling Practices 7
e. Packaging, Labeling, Disposal and Record Retention 8
f. Visual Inspection Requirement 9
Frequently Asked Questions About Asbestos Cement Pipe Removal 11
Template A: Pre-Demolition/Renovation Survey Documentation 22
Template B: Post-Abatement Visual Inspection Documentation 23

I. Background

The Massachusetts Department of Environmental Protection's (MassDEP's) asbestos regulation (310 CMR 7.15) protects public health and the environment by establishing safe handling practices for demolishing or renovating buildings and structures to prevent the release of asbestos fibers from asbestos-containing materials (ACM). MassDEP's regulations require notification as well as specific removal, handling, and disposal requirements for all ACM. These work practices include removing ACM prior to demolition or renovation activities, wetting the ACM before it is removed to prevent the release of asbestos dust, fully containing the work area (e.g., with plastic sheeting) and drawing air out of the containment through an air filtration unit equipped with a HEPA filter capable of capturing asbestos fibers, sealing the wetted Asbestos-Containing Waste Material (ACWM) in leak-tight containers with asbestos labeling, and properly disposing of the waste in a landfill permitted to accept ACM or ACWM.

Common materials that may contain asbestos include thermal insulation on boilers, ducts and pipes; vinyl floor tiles; ceiling tiles; various mastics (i.e. glues); and asbestos cement products, including asbestos cement pipes. Some of these materials are "friable" material that, when dry, can be crumbled, shattered, pulverized or reduced to powder by hand pressure (e.g., thermal system insulation) and some are "non-friable" material, that when dry, cannot be crumbled, shattered, pulverized or reduced to powder by hand pressure (e.g., vinyl floor tiles and asbestos cement pipes that are in good condition and have not deteriorated). MassDEP regulates non-friable ACM because, if these materials have deteriorated, are significantly damaged, and/or are mishandled, asbestos fibers may be released to the ambient air.

Asbestos cement pipes often are found in underground utility conduits and municipal water, sewer and drainage systems. Asbestos cement pipes buried below ground are considered non-friable if they are in good condition. It should be noted that active asbestos cement pipe that is exposed and is not intended to be replaced or removed and is not disturbed by repair or replacement activities may remain in place and be backfilled.

II. Purpose

This guidance document explains how to safely remove, repair and dispose of asbestos cement pipes that exist in underground operating system networks owned by public and private utilities (e.g. water, sewer, electricity and gas). Its main purpose is to prevent the release of asbestos fibers into ambient air and to protect public health, safety, and the environment while removing, repairing and disposing of asbestos cement pipes. This guidance has been developed in recognition of the unique aspects of projects involving repair and replacement of underground asbestos-cement pipe that make certain specific requirements of 310 CMR 7.15 infeasible and/or impractical: emergency repairs need to be facilitated to protect public health and safety and to allow trenches to be closed as quickly as possible, it is usually infeasible to have an asbestos inspector prepare a

complete written survey report before starting to repair or replace asbestos-cement pipe or pipe segments (particularly for emergency repairs), and some standard asbestos work practices (e.g., full containment and air cleaning) cannot be practically implemented in trenches. In order to qualify for the Conditional Enforcement Discretion that is described in Section III below, the Owner and Operator (including contractors) must follow all the provisions of this document.

This guidance document summarizes the requirements of the MassDEP Asbestos Regulation (310 CMR 7.15) that apply to removal, repair, replacement or other work on underground asbestos cement pipe or suspected asbestos cement pipe material, and also provides guidance on how MassDEP intends to exercise enforcement discretion where the specific asbestos abatement activities described herein are implemented.

This document does not constitute "final agency action," and is not "regulation" as that term is used in M.G.L. c.30A. It may not be relied upon to create rights, duties, obligations or defenses, implied or otherwise, enforceable by any party in any administrative proceeding with the Commonwealth. In addition, this guidance does not exempt anyone from complying with any other applicable local, state or federal law, including but not limited to: the United States Environmental Protection Agency (EPA) Asbestos National Emission Standards for Hazardous Air Pollutants (Asbestos NESHAP) regulation at 40 CFR part 61; the applicable United States Occupational Safety & Health Act (OSHA) standards at 29 CFR 1910 & 1926; and the Massachusetts Department of Labor Standards (DLS) regulation at 453 CMR 6.00.

III. Conditional Enforcement Discretion

A person who conducts the removal and associated abatement of asbestos cement pipe in accordance with the provisions of this guidance would not be subject to enforcement by MassDEP for violation of the following requirements of 310 CMR 7.15:

- The use of a DLS-certified asbestos inspector to prepare a written survey report that documents the types, amounts, condition and location of all ACM present in a utility conduit that will be subject to demolition or removal of cement pipe as required by 310 CMR 7.15(4);
- Establishment of full containment in accordance with "Work Area Preparation Requirements" 310 CMR 7.15 (7)(c);
- Implementation of air cleaning in accordance with "Work Area Ventilation System" requirements 310 CMR 7.15 (7)(e); and
- The use of a DLS-certified asbestos project monitor to perform a post-abatement visual inspection in accordance with 310 CMR 7.15(8).

IV. Guidance Provisions

a. Pre-Demolition/Renovation Survey

MassDEP's asbestos regulation establishes that owners and operators (including contractors) are responsible for determining whether cement pipe in a particular utility conduit that will be subject to demolition or renovation contains asbestos. The federal NESHAP regulation requires owners and operators to conduct a "thorough inspection" to determine the location of asbestos containing materials before starting demolition or renovation.[1]

If owners and operators follow this guidance, it will not be necessary to have a DLS-certified asbestos inspector prepare a written survey report for underground asbestos-cement pipe projects as required by 310 CMR 7.15(4). However, owners and operators (including utilities conducting pipe repair or replacement), must conduct a "thorough inspection" to determine the location of any asbestos-containing pipe, insulation or other materials. Owners and operators of underground cement pipes may satisfy this requirement with:

- As-built plans or other documents identifying the content of particular cement pipes or pipe segments and any other material in the conduit that may be affected by a removal or repair project, provided that the documentation has been updated to reflect any repairs or alterations; or
- Other measures that demonstrate that a "thorough inspection" has been completed to identify asbestos cement pipe that will be affected by a removal or repair project. These measures can include visual identification through field observations of the pipe to be worked on (e.g., the manufacturer's brand-label markings indicating transite material or the source of the pipe); or sampling and analysis of cement pipe material at a laboratory certified by DLS.

  Note: For projects that rely on a visual identification in the field, a "qualified" person must be present to observe the pipe when it is exposed and document in writing what features were used to identify the type of pipe to be removed/repaired/replaced. If relying on someone other than a DLS-certified asbestos inspector, a person is deemed "qualified" by having completed a DLS-approved training course specific to asbestos cement pipe worker safety (e.g., the "8 hour OSHA Class II Asbestos Training: Asbestos Cement Pipe (ACP) Worker Safety" course developed jointly by the Massachusetts Water Works Association (MWWA) and the Utility Contractors of New England

[1] The EPA Asbestos NESHAP regulation requires that the owner or operator shall, "…prior to the commencement of the demolition or renovation, thoroughly inspect the affected facility or part of the facility where the demolition or renovation operation will occur for the presence of asbestos…" 40 CFR part 61.145(a)

(UCANE), or another course similar in length and content that has been reviewed and approved in writing by DLS).

In addition, the owner or operator may presume that a pipe or pipe segment contains asbestos and manage any repairs or removals in accordance with this guidance and the other applicable requirements of 310 CMR 7.15.

The owner/operator of the utility system at which the asbestos cement pipe was removed, repaired or replaced must keep documentation of the pre-demolition/renovation survey, signed and dated by the person who conducted the inspection, for a minimum of two (2) years in the project file. The documentation must indicate what information was relied upon to determine whether the pipe contained asbestos. (See Attachment A for a Pre-Demolition/Renovation Survey Documentation template.)

b. Notification

A notification must be submitted to MassDEP for each asbestos-cement pipe project on an Asbestos Notification Form ANF-001/BWP AQ-04 in accordance with 310 CMR 7.15(6). The notification must be submitted at least ten (10) working days before starting asbestos cement pipe removal. The ANF-001/BWP AQ-04 and answers to frequently asked questions about filing notifications are available on MassDEP's web site at: http://www.mass.gov/eea/agencies/massdep/service/approvals/bwp-aq-04-anf-001.html . The easiest way to file an asbestos notification is to file it online via MassDEP's online filing system, eDEP: https://edep.dep.mass.gov/.

The ten-working day waiting period can be waived by obtaining an emergency waiver of this waiting period from MassDEP. Emergency waivers allow work to be performed right away. These waivers, which can be obtained by calling the MassDEP Regional Office that covers the town in which the work will be conducted, must be approved by MassDEP before the work starts. The MassDEP staff person who approves an emergency waiver will provide a project-specific waiver number that must be noted on the notification form. (See response to question number 27 in the "Frequently Asked Questions" section of this guidance document for appropriate MassDEP regional telephone numbers).

A notification fee, currently $100.00, is required when filing an ANF-001/BWP AQ-04. However, asbestos abatements at property owned by cities, towns, counties, districts of the Commonwealth, municipal housing authorities, federally recognized Indian tribe housing authorities, state agencies, the Massachusetts Bay Transportation Authority, and owners of owner-occupied residential properties with four or fewer units are exempt from this fee.

Owners and operators who are planning to remove or repair several pipe segments over a specific period of time may apply to MassDEP for approval of a "blanket notification", which would cover the entire project for a time period not to exceed one (1) year. While individual ANF-001/BW AQ-04 forms would still need to be submitted for each segment of the work, the blanket approval would eliminate the ten working day advance notification requirement for the individual filings. Information regarding asbestos blanket notifications may be found under the heading "BWP AQ 05 - Application for Asbestos Blanket - Form and Guidance" at the following link: http://www.mass.gov/eea/agencies/massdep/service/approvals/bwp-aq-05.html. An application fee of $200 is required for each application for a blanket notification approval.

c. Licensing and Training

DLS's regulation (453 CMR 6.00) establishes requirements for the use of contractors and other asbestos specialists who are licensed or certified by that Department. Please call DLS for all licensing and training questions. Contact information can be found in the response to Question 28 in the attached Frequently Asked Questions.

In lieu of hiring a DLS-licensed asbestos contractor, an owner or operator conducting asbestos abatement activity on underground asbestos cement piping may hire contractors or other entities who have completed the "8 hour OSHA Class II Asbestos Training: Asbestos Cement Pipe (ACP) Worker Safety" course developed jointly by the MWWA and UCANE, or a course similar in length and content reviewed and approved in writing by DLS, provided that the owner, operator and contractor comply with the provisions and procedures described in this guidance document.

d. Handling Practices

When repairing, removing or replacing asbestos cement pipe, it is important to handle the pipe in a manner that will minimize the risk of making it friable or releasing asbestos dust into the environment. Start by exposing the asbestos cement pipe with minimal disturbance. Excavate no closer than 6 inches of the pipe. Carefully uncover the remainder of the soil surrounding the pipe by hand or with a shovel. An assessment should then be made to determine if the pipe is damaged, cracked or broken.

i. Not Damaged Asbestos Cement Pipe (intact and not deteriorated):
    1. Place 6 mil (0.006 inch) thick polyethylene ("poly") sheeting under the asbestos cement pipe to prevent soil contamination.
    2. Adequately wet the asbestos cement pipe with amended water using surfactant or liquid soap before and during removal to avoid creating airborne dust.

3. Separate the asbestos cement pipe at the nearest coupling (bell or compression fitting).
4. Slide the pipe apart at the joints (no saw cutting) or use other methods that do not cause the pipe to break, become friable or otherwise create the potential to release asbestos fibers.
5. Wrap the wet asbestos cement pipe in two layers of 6 mil polyethylene sheeting, seal with duct tape and label in accordance with all applicable regulatory requirements. This can be done in the trench or adjacent to the trench.
6. If the trench is filled with water, the placement of polyethylene sheeting is not required.
7. Refer to Section "IV.e." of this guidance document for packaging, labeling, disposal, and record retention requirements.

ii. Damaged Asbestos Cement Pipe (deteriorated or not intact) or when cutting or mechanical breakage (e.g., with saws, snap or blade cutting, and/or tapping) is necessary:

1. Place 6 mil (0.006 inch) thick polyethylene ("poly") sheeting under the asbestos cement pipe to prevent soil contamination.
2. Adequately wet asbestos cement pipe with amended water where cutting or breaking will occur.
3. Saw cutting of asbestos cement pipe shall only be conducted with a HEPA-shrouded vacuum attachment or wet cutting equipment, unless it is conducted within a small enclosure that isolates the area in which the saw cutting is being conducted to prevent the release of asbestos fibers to ambient air, .
4. Wrap wet asbestos cement pipe in two layers of 6 mil polyethylene sheeting, seal with duct tape and label. This can be done either in the trench or adjacent to the trench.
5. Manage wrapped asbestos cement pipe, polyethylene sheeting and any other material contaminated with visible asbestos debris as ACWM in accordance with 310 CMR 7.15 and 310 CMR 19.061.
6. Refer to Section "IV.e." of this guidance document for packaging, labeling, disposal, and record retention requirements.

e. Packaging, Labeling, Disposal and Record Retention

All ACWM must be packaged, labeled, transported, stored and disposed of in accordance with requirements specified at 310 CMR 7.15(15): Asbestos-containing Waste Material Packaging Requirements, 310 CMR 7.15(16): Asbestos-containing Waste Material Transport Requirements, 310 CMR 7.15 (17): Asbestos-containing Waste Material Storage and Disposal Requirements, 310 CMR 7.15(18): Waste Shipment Records and Reports, and 310 CMR 19.061: Special Waste, including but not limited to the following:

i. Place properly wrapped and labeled ACWM pipe as well as all other containerized ACWM and debris in a roll-off container(s), or covered

trucks, trailers or vans that are lined with 2 layers of 6 mil polyethylene sheeting.

1. The container shall be an enclosed and sealed leak-tight container having proper labels and U.S. Department of Transportation placards as required.
2. If open-top roll-off containers are used, they must be properly sealed, labeled and secured inside a locked fenced area when they are not being loaded to prevent access by unauthorized personnel, and covered to prevent water accumulation.

ii. Package, transport and dispose of ACWM in accordance with local, state, and federal regulations.
iii. Complete waste shipment records must be retained for 2 years by the owner/operator of the facility that generated the ACWM.
iv. Dispose of ACWM at a landfill permitted to accept ACWM.

Please note: "Bulk Loading"[2] of ACWM is not permitted without written approval from MassDEP - via approval of a Non-Traditional Asbestos Abatement Work Practice Application. (See BWP AQ-36 "Application for Non-Traditional Asbestos Abatement Work Practice Approval" http://www.mass.gov/eea/agencies/massdep/service/approvals/bwp-aq-36.html for information about how to apply for this permit.) Loading operations involving waste generated from asbestos cement pipe removal that is handled, packaged, labeled, containerized and stored/disposed of in accordance with Sections IV.d. and IV.e. of this guidance are not considered bulk loading and do not require a Non-Traditional Asbestos Abatement Work Practice Approval.

f. Visual Inspection Requirement

310 CMR 7.15(8) requires that, upon the conclusion of each asbestos abatement activity, the owner/operator shall ensure that a visual inspection is performed by a DLS-certified asbestos project monitor. The DLS-certified asbestos project monitor must inspect all surfaces within the work area for visible debris and if any is found, the contractor must re-clean the work areas until there is no visible debris.

When asbestos cement pipe removal is performed using the methods specified in this guidance document, the final visual inspection may be performed by a person who is "qualified" to perform this inspection by having completed a DLS-approved training course specific to asbestos cement pipe worker safety (e.g., the "8 hour OSHA Class II Asbestos Training: Asbestos Cement Pipe (ACP) Worker Safety" course), or another course similar in length and content

[2] "Bulk Loading" means the placement of unconfined ACWM in a vehicle or container, such as a roll-off, dumpster or truck *in lieu* of packaging the ACMW in individual leak tight containers.[310 CMR 7.15(1) Definitions

that has been reviewed and approved in writing by DLS), in lieu of an asbestos project monitor, provided that the following conditions have been met:

i. The qualified person is physically present to conduct the final visual inspection of the work area prior to backfilling the trench;
ii. The qualified person documents in writing that there was no visible debris remaining in the excavation trench, in soil excavated from the trench, in the surrounding area adjacent to the trench after the removal of the asbestos cement pipe, and on any tools used during the removal/repair/replacement activities; and
iii. All ACWM has been removed for proper storage/disposal; and
iv. The qualified person signs and dates the documentation of the final inspection as evidence that the inspection was performed and that the condition of no remaining visible debris was met.

The owner/operator of the utility system at which the asbestos cement pipe was repaired, removed or replaced must keep the documentation of the post-abatement visual inspection, signed and dated by the person who conducted the inspection, for a minimum of two (2) years in the project file. (See Attachment B for an example of a Post-Abatement Visual Inspection template.)

Frequently Asked Questions About Asbestos Cement Pipe Removal

1. What is Asbestos? Is it hazardous to your health?

Asbestos is a naturally occurring fibrous mineral consisting of any one of a number of silicates. Asbestos has been and is still used in a variety of products because of its physical properties, which make it resistant to heat, fire, and many caustic chemicals. Asbestos has been used extensively as fireproofing, an insulating agent, and for decorative purposes, among many other uses.

The physical properties that give asbestos its resistance to heat and decay are linked with several adverse human effects. Asbestos tends to break into a dust of microscopic fibers. Because of their size and shape, these tiny fibers can remain suspended in the air for long periods of time and can easily penetrate bodily tissue when inhaled or ingested. Because of their durability, these fibers can remain in the body for many years.

Asbestos is known to cause asbestosis and various forms of cancer. **Asbestosis** is a chronic disease of the lungs that makes breathing progressively more difficult, and can lead to death. Cancer can result from breathing asbestos fibers and **lung cancer** is the most frequent. **Mesothelioma**, an incurable cancer of the chest and abdominal membranes, almost never occurs without exposure to asbestos. Asbestos-related diseases have a long latency period and may not show up until 10 to 40 years after exposure. Each exposure increases the likelihood of developing an asbestos-related disease.

2. How do I know whether cement pipes contain asbestos?

Cement pipes used for public drinking water, waste water, roof drains or underground conduits may contain asbestos and should be handled in accordance with MassDEP's asbestos regulation (310 CMR 7.15) and this guidance document unless the owner's documentation or testing has shown that they do not contain asbestos or a DLS-certified asbestos inspector has determined that they do not contain asbestos. It is the obligation of anyone removing or repairing materials that contain asbestos to handle them in accordance with applicable laws and regulations. Ignorance or avoidance of this responsibility does not remove this obligation.

Up-to-date as-built plans that accurately identify the material that pipes or pipe segments are made of can be relied on to satisfy this requirement. Another acceptable method for determining whether a pipe or pipe segment contains asbestos is through visual identification in the field at the time of excavation, when the pipe material is readily identifiable by observing the manufacturer's brand-label (e.g. Johns-Manville Transite) or other markings on the pipe (e.g., indicating its source). This

identification must be done by a person who is "qualified" to perform this visual identification is present to observe the pipe when it is exposed and documents in writing what features were used to identify the type of pipe to be removed/repaired. In lieu of a DLS-certified asbestos inspector, a person is deemed "qualified" to conduct a visual inspection to identify the presence of asbestos containing cement pipe by having completed a DLS-approved training course specific to asbestos cement pipe worker safety (e.g. the "8 hour OSHA Class II Asbestos Training: Asbestos Cement Pipe (ACP) Worker Safety" course) or another course similar in length and content that has been reviewed and approved in writing by DLS). If up-to-date as-built plans are not available and a definitive visual identification cannot be made, the owner/operator can either presume the cement pipe contains asbestos and handle it in accordance with this guidance, or have it sampled and analyzed by a DLS certified laboratory.

Material that contains 1% or more asbestos as determined by a laboratory using EPA-approved analytical methods is regulated by MassDEP as an ACM. You can hire an asbestos consultant or laboratory to collect a sample and have it analyzed. You also may collect the sample yourself and bring it to a certified laboratory for analysis. (Note that you may need to take several samples over the length of the pipe to ensure that you obtain representative samples and did not only test a repaired section that has been replaced with a newer, non-asbestos material.) Before collecting samples, consult with the laboratory on how to safely collect the sample and how large the sample needs to be. DLS licenses and certifies asbestos testing laboratories and other types of asbestos professionals. Visit DLS's website at http://www.mass.gov/lwd/labor-standards/asbestos-program/license-lists/ or call DLS at 617-626-6960 for a list of certified asbestos laboratories.

3. Does MassDEP have to be notified prior to beginning an asbestos cement pipe removal or repair project?

Yes, the owner/operator of a facility containing asbestos cement pipes must notify MassDEP ten working days before removing or repairing asbestos cement pipes. Notification is required no matter who is doing the removal/repair or how much asbestos cement pipe is being removed or repaired. Please note that notification is required for repairs of asbestos cement pipe using tools that are considered "non-destructive" or "fail-safe" such as metal compression patches, wet tapping, etc. (See response to Question number 4 below for how to satisfy the notification requirement in the case of an emergency situation.)

4. We have an emergency and the pipe(s) need to be repaired immediately. Can we make the necessary repairs prior to submitting notification to MassDEP?

Yes, if MassDEP grants you an "emergency waiver." Work can be performed right away by calling the appropriate regional MassDEP office and obtaining an emergency waiver of the ten (10) working day waiting period (see response to

question number 27 for the telephone numbers for the asbestos program in each MassDEP regional office).

If the emergency occurs after business hours or on a weekend, leave a detailed message including your contact information on voice mail for the MassDEP asbestos inspector's voice mail and proceed with the repairs as detailed in this document. You should then follow up with MassDEP on the following business day. You will still be required to submit an asbestos notification form ANF-001/BWP AQ-04 within 24 hours of the removal.

In addition, you can conduct the work without the required ten working day notification period if you have a MassDEP approved asbestos blanket notification. Information regarding asbestos blanket notifications may be found under the heading "BWP AQ 05 - Application for Asbestos Blanket - Form and Guidance" at the following link: http://www.mass.gov/eea/agencies/massdep/service/approvals/bwp-aq-05.html.

5. Is there a notification form I should use?

Notification for asbestos cement pipe removal must be made by completing and submitting to MassDEP the MassDEP-approved Asbestos Notification Form ANF-001 (also known as BWP AQ-04). The Asbestos Notification Form is available on MassDEP's web site at http://www.mass.gov/eea/agencies/massdep/service/approvals/bwp-aq-04-anf-001.html . The easiest way to file an asbestos notification is to file it online via MassDEP's website. See question number 10 below.

6. When must the notification be submitted?

The regulations require that the notification must be submitted at least ten working days in advance of the start of the asbestos cement pipe removal project. "Working days" do not include Saturdays, Sundays, or any day that MassDEP offices are closed for business, such as legal holidays.

7. When does the ten working day waiting period begin and end?

If you file electronically through eDEP, your 10 working day waiting period will start when you submit your form, and you will receive an automatic notification that the submittal was received.

If you file a paper notification form, your 10 working day waiting period starts on the day on which the submittal was postmarked or the day on which it was hand-delivered to MassDEP (by you or by a delivery service).

Please note that you must start work on the "start date" and end on the "end date" you indicate on the ANF-001. If you change the start date, you must revise your notification prior to the original start date indicated and allow for a full ten-day waiting period prior to the revised start date. If you need to start work sooner than ten days before the revised start date, call the MassDEP regional office to request an emergency waiver of the ten-day waiting period. (See MassDEP contact information found at FAQ no. 27.) If you start and end work on the dates indicated in the original notification, but work intermittently within that period, that does not require a revision - simply notify the MassDEP regional office which days will not be performing work.

8. Will I be notified when I can begin the work?

No. Unless MassDEP contacts you with a statement of deficiencies about your notification, you can begin work on the "project start date" you specified on the Asbestos Notification Form ANF-001. When completing the ANF-001, be sure that the "project start date" falls after the 10 working day waiting period.

MassDEP recommends that you keep a copy of the completed ANF-001 that you file online or, if you file a paper copy, a copy that shows the number on the notification decal sticker you attached to the notification form prior to submitting the form to MassDEP.

9. Is a fee required for filing an asbestos notification?

The notification fee required by MassDEP regulations (310 CMR 4.00: Timely Action Schedule and Fee Provisions) for asbestos removal is $100 per notification. A notification revision requires re-filing the notification and payment of a $35 fee.

Please note: owners of owner-occupied residential properties with four or fewer units, cities, towns, counties, districts of the Commonwealth, municipal housing authorities, federally recognized Indian tribe housing authorities, state agencies and the MBTA are not subject to the asbestos notification fee. However, state agencies are subject to fees greater than $100 (e.g., the $200 Blanket Notification Approval application fee).

10. How do I submit the ANF-001 to the MassDEP?

There are two ways to submit an Asbestos Notification Form ANF-001:

Electronic Filing: File the ANF-001 online via MassDEP's website. If you have not already done so, register online with eDEP Online Filing: http://www.mass.gov/dep/service/compliance. Select "New User" and complete the required steps. It should take no more than five minutes to complete the registration process, and you can begin online filing of your notifications right away. Filing through eDEP will ensure that your submitted form is complete, and you will receive an automatic message indicating that your notification has been accepted.

Paper Filing: When the ANF-001 is completely filled out, and the appropriate decal is affixed to the form (see below), use regular, certified or U.S. Postal Service Express mail, or a private mail or overnight service, to send the form to:

MassDEP
P.O. Box 4062
Boston, MA 02211

Forms are picked up from this P.O. Box every working day.

Please note: If you file a paper form, please be aware that MassDEP will return it if it is found to be incomplete, and your notification will not be valid until a completed form is re-submitted.

When filing online via eDEP, you will pay the fee online using a credit card. Notifications for jobs by an entity that is exempt from the fee may also be filed online.
Paper filers can pay the fee in two ways: 1) by purchasing a notification fee decal from MassDEP and affixing the decal to the Asbestos Notification Form ANF-001 before submitting it, or 2) by sending a check with their notification form to the P.O. Box above.

For paper notifications that are exempt from the fee, an EXEMPT decal must be obtained from MassDEP and affixed to the notification form, or you must ensure that Question 3 in Section A asking if the project is fee-exempt is answered as "Yes."

Fee decals may only be purchased in person at the reception area on the second floor of MassDEP's office at One Winter Street, Boston. For fee-exempt asbestos abatement jobs, EXEMPT notification decals may be picked up (free of charge) at the reception area of MassDEP's office at One Winter Street, Boston or at any MassDEP regional office. (Note: the "Regional Office Lookup by City/Town" tool can be accessed at the following URL:
http://www.mass.gov/eea/agencies/massdep/about/contacts/).

For decals requiring a payment, payment must be in the form of a check or money order made payable to "Commonwealth of Massachusetts." Cash and credit cards cannot be accepted.

Each notification decal contains a unique number that indicates that the fee has been paid.

11. Do I need to notify other government agencies in addition to the MassDEP?

You may be required to notify the local Building Department, Fire Department, or Board of Health in the city or town where the asbestos is being removed. Always contact local officials to ask what notification or permits are required. Submittal of a complete ANF-001 to MassDEP satisfies **state** (both MassDEP and MA DLS) and **federal** notification requirements (e.g., EPA Asbestos NESHAP) for projects that will remove or disturb asbestos-containing material.

12. Do I need to hire an asbestos contractor to repair and/or remove asbestos cement pipe?

DLS's regulation (453 CMR 6.00) establishes requirements for the use of contractors and other asbestos specialists who are licensed or certified by DLS. Please call DLS for all licensing and training questions. Contact information can be found in the response to Question 28 in the attached Frequently Asked Questions.

In lieu of hiring a DLS-licensed asbestos contractor, an owner or operator conducting asbestos abatement activity on underground asbestos cement piping may hire Contractors or other entities who have completed the "8 hour OSHA Class II Asbestos Training: Asbestos Cement Pipe (ACP) Worker Safety" course or a course similar in length and content reviewed and approved in writing by DLS, provided that the owner, operator and contractor comply with the provisions and procedures that are described in this guidance document.

13. Can I crush the asbestos cement pipe in the trench and place new pipe over it?

No, crushing an asbestos cement pipe and leaving it in the trench is prohibited under 310 CMR 7.15. Further, the EPA has determined that backfilling and burial of the crushed asbestos cement pipe would cause these locations to be considered active disposal sites and therefore subject to the "Standard for Active Waste Disposal Sites" (40 CFR 61.154).

14. Can I "ream" or "pipe burst" new water supply pipe through existing asbestos cement pipe?

No, this is not allowed because reaming or pipe bursting through an existing asbestos cement pipe would cause the existing asbestos cement pipe to become crushed and "friable" (see response to question number 13 above).

15. What if the trench is filled with water which prevents the placement of polyethylene sheeting below the asbestos cement pipe (as required in Section IV.d. – Handling Practices)?

If the trench is filled with water, the placement of polyethylene sheeting is not required, as stated in Section IV.d – Handling Practices. However, any visible debris must be managed in accordance with the requirements of Section IV.e. – Packaging, Labeling, Disposal and Record Retention and IV.f. – Visual Inspection Requirement.

16. What should I do with the water in the trench?

For work on the intact asbestos cement pipe(s), first try to pump the water out to a storm drain prior to any work. If there is substantial damage to the asbestos cement pipe and there are numerous pieces immersed in standing water, then the contaminated water should be pumped out and filtered through a 5 micron filter before the water is discharged.

17. Am I required to remove asbestos cement pipe that will not be disturbed by repair or replacement activities?

MassDEP only requires the removal of asbestos cement pipe that is exposed and will be disturbed during repair or replacement activities.

When a section of asbestos cement pipe is being repaired or replaced, the remaining portions of that pipeline are not required to be removed, provided that they are not exposed by excavation activity.

Additionally, if a section of asbestos cement pipe that is being actively used (e.g., a utility conduit) is exposed by excavation but will not be impacted by the repair or replacement work, it may be left in place and backfilled.

18. Where can I obtain the packaging and labeling materials?

The MassDEP-required asbestos warning labels and asbestos waste bags may be obtained from industrial supply houses, insulation supply houses, or may be purchased directly from licensed asbestos contractors. Polyethylene sheeting and duct tape are widely available from hardware, home supply and other stores.

19. Can I store waste asbestos cement pipe?

Asbestos cement pipe waste material that has been properly wetted, sealed and labeled can be temporarily stored for up to thirty (30) days at a secured location on property owned or controlled by the owner or operator of the utility system or at the place of business of the company/contractor removing asbestos-cement pipe from its site of origin. The storage location must be secured (e.g., storage in a locked fenced-

in area) and maintained in accordance with all federal, state and local requirements. Contact local officials to determine if temporary storage of asbestos cement pipes is allowed in your municipality.

20. Can I store unused "virgin" asbestos cement pipe?

Unused (i.e. "virgin") asbestos cement pipe that is still suitable for use is not considered an ACWM, and is therefore not subject to the ACWM storage limitations. Measures should be taken to ensure that stored virgin asbestos cement pipe does not become deteriorated by constant exposure to the elements. If virgin asbestos cement pipe deteriorates so that it is no longer suitable for use, then it would be considered ACWM and subject to all the applicable packaging, labeling, storage and disposal requirements at 310 CMR 7.15(15) – (18).

21. Can I dispose of the asbestos cement pipes with my other solid waste?

No. The asbestos cement pipes must be managed as a "Special Waste" (requiring proper packaging, labeling, and disposal) and in Massachusetts may only be disposed of at a facility that is permitted to accept ACWM under 310 CMR 19.061 ("Special Waste" regulation).

22. How can I find a place to dispose of the asbestos cement pipes?

The best option is to hire a waste hauler or asbestos contractor to transport the asbestos cement pipes to a disposal facility. Many waste haulers and asbestos contractors are familiar with various disposal facilities and frequently transport wastes to facilities permitted to accept ACWM.

You also can contact a landfill directly and arrange to transport the waste to the landfill yourself. ACWM can only be disposed at a solid waste landfill permitted to accept "Special Waste", which in Massachusetts must be operated in accordance with regulatory requirements specified at 310 CMR 19.061, or in another state, in accordance with the relevant "Special Waste" permit requirements. You should contact the facility in advance of transporting ACWM for disposal.

ACWM may not be sent to an incinerator or to a construction and demolition (C&D) debris processing facility in Massachusetts. Likewise, no Massachusetts transfer stations are permitted to accept ACWM.

23. How do I find an asbestos waste hauler?

Asbestos waste haulers may be located by using any available internet search engine or by looking this topic up in the Yellow Pages. Try entering/looking under topics such as "rubbish," "waste" or "asbestos." Any firm hauling ACWM must be

registered with the Federal Highway Administration's Motor Carrier Division. Call the nearest regional MassDEP office for additional help.

24. Can I transport the waste asbestos cement pipes myself?

Waste asbestos cement pipe that has been packaged and labeled in accordance with Section IV.e. – Packaging, Labeling, Disposal and Record Retention, may be transported in a covered truck, trailer or van to a secured, temporary storage location at property owned or controlled by the pipe owner or operator or at the place of business of the company/contractor that removed the asbestos-cement pipe from the excavation, as outlined in question 19. If a van is used, the waste asbestos cement pipe should be transported in a compartment separate from the driver or passenger seats. A pickup truck bed should be covered with an impermeable tarpaulin cover and secured so that it does not allow the accumulation of rain water. The waste containers should not be loaded above the side rails in any truck or trailer.

25. Is there any paperwork required for transporting the waste asbestos cement pipes?

Yes. 310 CMR 7.15(18): Waste Shipment Records and Reports requires that an asbestos Waste Shipment Record (WSR) document each shipment of ACWM. Waste hauling companies and/or asbestos removal companies can supply WSR forms. (A template for the WSR form is available on the MassDEP website at: http://www.mass.gov/eea/agencies/massdep/air/programs/asbestos.html) The WSR must be signed by each company or person involved with removal, transportation and disposal of the ACWM, including the facility owner or "generator" of the asbestos. The asbestos removal contractor may sign on behalf of the owner.

Pursuant to 310 CMR 7.15(18), if a completed copy of the WSR, signed by the disposal facility to acknowledge receipt of the waste shipment, is not received back by the generator within 35 days of the initial shipment, the generator must contact the transporter or disposal facility to determine the status of the waste shipment. This section of the regulation also requires a generator to notify the MassDEP regional office in writing if the generator does not receive a signed copy of the WSR from the disposal facility within 45 days of the date of shipment. The generator, the transporter, and the disposal facility must each retain a copy of the WSR signed by all the parties for at least two years. You do not need to send a completed copy of the WSR to any regulatory agency, but MassDEP may request a copy of the WSR from any of the parties in the event of an inspection.

Additionally, transportation of asbestos (which is designated as a hazardous material for transportation) is regulated by the U.S. Department of Transportation (US DOT), which has established requirements for shipping documents, packaging, labeling, and vehicle placarding (49 CFR 173.1090): asbestos must be loaded, handled and unloaded in a manner that will minimize occupational exposure to airborne asbestos fibers released during transit. US DOT also requires that transporters carry

identification papers for all quantities of asbestos greater than 1 pound. The Massachusetts state police enforce this requirement.

26. Does MassDEP have a document containing general information about asbestos?

Yes. The "Asbestos Information and Resource Guide" is available on MassDEP's website at http://www.mass.gov/eea/agencies/massdep/air/programs/asbestos.html under the heading "General Information." The guide includes contact information for various government agencies responsible for asbestos, a list of regulations governing asbestos, and general information about asbestos and asbestos removal.

27. How do I contact MassDEP for more information?

For more information on asbestos or other environmental issues, please visit MassDEP's website at www.mass.gov/dep/about/contacts.htm or contact the following MassDEP officials:

Boston:
For information about asbestos policy/regulation:
Mike Elliott – Asbestos Program Coordinator
Telephone: 617-292-5575 or e-mail: michael.elliott@state.ma.us

For information about filing asbestos notifications and fees:
Caroline McFadden – Asbestos Program Data Manager
Telephone: 617-292-5766 or email: caroline.mcfadden@state.ma.us

Central Region
Gregg Levins
Telephone: 508-767-2768 or e-mail: gregory.levins@state.ma.us

Northeast Region
John Macauley
Telephone: 978-694-3262 or e-mail: john.macauley@state.ma.us

Southeast Region
Cynthia Baran
Telephone: 508-946-2887 or e-mail: cynthia.baran@state.ma.us
Emergency Waiver Hotline: 508-946-2882

Western Region
Marc Simpson
Telephone: 413-755-2115 or e-mail: marc.simpson@state.ma.us

28. How do I contact Massachusetts DLS?

For more information on Massachusetts DLS asbestos training, certification and/or licensing requirements, please contact:

Massachusetts Department of Labor Standards/Asbestos Program
Charles Hurley Building
19 Staniford Street, 2nd Floor
Boston, MA 02114
Telephone: 617-626-6960 Fax: 617-626-6965 Web Site: www.mass.gov/dols

Template A: Pre-Demolition/Renovation Survey Documentation

1. Project Location:

_____
(Street address, GPS coordinates or other location identification)

City/Town: _____, MA

2. Pre-Demolition/Renovation Survey Survey Date: _____

MassDEP's asbestos regulation requires owners and operators (including contractors) to determine whether cement pipe in the utility conduit that will be disturbed contains asbestos. Please identify the information that was used to determine whether the pipe at this location contains asbestos by checking all applicable boxes:

☐ Accurate, up-to-date as-built plans or other utility network documents. Specify title and revision date of the as-built drawing or other documentation:

_____

☐ Visual identification/ field observations of exposed pipe. Specify manufacturer's brand-label marking (e.g. "Johns-Manville Transite") or other features used to identify composition/source of pipe:

_____

☐ I was physically present at the location described above and personally observed the pipe or pipe segment when it was exposed and before it was removed, replaced and/or repaired.

☐ Presumed that pipe contained asbestos.

☐ Collected representative samples that were analyzed at a certified laboratory.
Identify Laboratory and DLS certification number: _____

Date samples were collected: _____ Date of lab report: _____

Result of the analysis (% asbestos): _____

Does the pipe (or pipe segment) that will be disturbed contain asbestos? ☐ Yes ☐ No

If "Yes", what is the MassDEP Asbestos Notification Number (ANF-001 Form)? _____

3. Qualifications. Please check the applicable box:

☐ I have successfully completed the "8 hour OSHA Class II Asbestos Training: Asbestos Cement Pipe (ACP) Worker Safety" course approved by the Massachusetts Department of Labor Standards (DLS), or a course similar in length and content reviewed and approved in writing by DLS; or

☐ I am a DLS-certified Asbestos Inspector.

Name (please print): _____

Title/Company: _____

Signature: _____ Date: _____

Template B: Post-Abatement Visual Inspection Documentation

1. Project Location/Identification:

_____
(Street address, GPS coordinates or other location identification)

City/Town: _____ MA

MassDEP Asbestos Notification Number (ANF-001 Form): _____

2. Post-Abatement Visual Inspection Date of Visual Inspection: _____

When any repair/removal of an asbestos cement pipe or pipe segment is complete, a visual inspection must be done before the trench is backfilled to confirm that ALL of the following conditions have been met. Please check each condition below to document that the visual inspection confirmed:

☐ No visible debris was present in trench.

☐ No visible debris was present outside of the trench (e.g. in excavated soils and the immediately surrounding area).

☐ No visible contamination was seen on tools.

☐ All Asbestos Containing Waste Material has been removed from the area for proper disposal.

☐ I was physically present at the location described above and personally conducted this inspection while the pipe or pipe segment was exposed and before the trench was backfilled.

3. Qualifications. Please check the applicable box:

☐ I have successfully completed the ”8 hour OSHA Class II Asbestos Training: Asbestos Cement Pipe (ACP) Worker Safety” approved by the Massachusetts Department of Labor Standards (DLS), or a course similar in length and content reviewed and approved in writing by DLS; or

☐ I am a DLS-certified Asbestos Project Monitor.

Name (please print): _____

Signature: _____

Title/Company: _____

Date: _____

SAMPLE WASTE SHIPMENT RECORD

Generator

1. Work site name and mailing address	Owner's name	Owner's telephone no.
2. Operator's name and address		Operator's telephone no.
3. Waste disposal site (WDS) name, mailing address, and physical site location		WDS phone no.
4. Name, and address of responsible agency		
5. Description of materials	6. Containers No. Type	7. Total quantity m^3 (yd^3)
8. Special handling instructions and additional information		
9. OPERATOR'S CERTIFICATION: I hereby declare that the contents of this consignment are fully and accurately described above by proper shipping name and are classified, packed, marked, and labeled, and are in all respects in proper condition for transport by highway according to applicable international and government regulations.		
Printed/typed name & title	Signature	Month Day Year

Transporter

10. Transporter 1 (Acknowledgment of receipt of materials)		
Printed/typed name & title Address and telephone no.	Signature	Month Day Year
11. Transporter 2 (Acknowledgment of receipt of materials)		
Printed/typed name & title Address and telephone no.	Signature	Month Day Year

Disposal Site

12. Discrepancy indication space		
13. Waste disposal site owner or operator: Certification of receipt of asbestos materials covered by this manifest except as noted in item 12.		
Printed/typed name & title	Signature	Month Day Year

(Continued)

Figure 4. Waste Shipment Record

INSTRUCTIONS

Waste Generator Section (Items 1-9)

1. Enter the name of the facility at which asbestos waste is generated and the address where the facility is located. In the appropriate spaces, also enter the name of the owner of the facility and the owner's phone number.

2. If a demolition or renovation, enter the name and address of the company and authorized agent responsible for performing the asbestos removal. In the appropriate spaces, also enter the phone number of the operator.

3. Enter the name, address, and physical site location of the waste disposal site (WDS) that will be receiving the asbestos materials. In the appropriate spaces, also enter the phone number of the WDS. Enter "on-site" if the waste will be disposed of on the generator's property.

4. Provide the name and address of the local, State, or EPA Regional office responsible for administering the asbestos NESHAP program.

5. Indicate the types of asbestos waste materials generated. If from a demolition or renovation, indicate the amount of asbestos that is

   - Friable asbestos material
   - Nonfriable asbestos material

6. Enter the number of containers used to transport the asbestos materials listed in item 5. Also enter one of the following container codes used in transporting each type of asbestos material (specify any other type of container used if not listed below):

   DM - Metal drums, barrels
   DP - Plastic drums, barrels
   BA - 6 mil plastic bags or wrapping

7. Enter the quantities of each type of asbestos material removed in units of cubic meters (cubic yards).

8. Use this space to indicate special transportation, treatment, storage or disposal or Bill of Lading information. If an alternate waste disposal site is designated, note it here. Emergency response telephone numbers or similar information may be included here.

9. The authorized agent of the waste generator must read and then sign and date this certification. The date is the date of receipt by transporter.

NOTE: The waste generator must retain a copy of this form.

(continued)

Figure 4. Waste Shipment Record

Transporter Section (Items 10 & 11)

10. & 11. Enter name, address, and telephone number of each transporter used, if applicable. Print or type the full name and title of person accepting responsibility and acknowledging receipt of materials as listed on this waste shipment record for transport. Enter date of receipt and signature.

NOTE: The transporter must retain a copy of this form.

Disposal Site Section (Items 12 & 13)

12. The authorized representative of the WDS must note in this space any discrepancy between waste described on this manifest and waste actually received as well as any improperly enclosed or contained waste. Any rejected materials should be listed and destination of those materials provided. A site that converts asbestos-containing waste material to nonasbestos material is considered a WDS.

13. The signature (by hand) of the authorized WDS agent indicates acceptance and agreement with statements on this manifest except as noted in item 12. The date is the date of signature and receipt of shipment.

NOTE: The WDS must retain a completed copy of this form. The WDS must also send a completed copy to the operator listed in item 2.

Figure 4. Waste Shipment Record

Commonwealth of Massachusetts

Asbestos Notification Form ANF-001

Asbestos Project Number

☐ Project Revision

☐ Project Cancellation

A. Asbestos Abatement Description

Important:

When filling out forms on the computer, use only the tab key to move your cursor - do not use the return key.





Instructions:

1. All sections of this form must be completed in order to comply with MassDEP notification requirements of 310 CMR 7.15 and Department of Labor and Standards (DLS) notification requirements of 453 CMR 6.12

2. Submit Original Form to: Commonwealth of Massachusetts P.O. Box 4062 Boston, MA 02211

1. Facility Location:

Name of Facility | Street Address

City/Town | State | Zip Code | Telephone

Facility Contact Person Name | Facility Contact Person Title

Worksite Location:

Building Name, Wing, Floor, Room, etc.

2. Is the facility occupied? ☐ Yes ☐ No

3. Is this a fee-exempt notification (city, town, district, municipal housing authority, state facility or owner-occupied residential of four units or less?) ☐ Yes ☐ No

4. Blanket Permit Project Approval, if applicable:

Approval ID #

5. Non-Traditional Asbestos Abatement Work Practice Approval, if applicable:

Approval ID #

6. Asbestos Contractor:

Name | Address

City/Town | State | Zip Code | Telephone

DLS License # | Contract Type: ☐ Written ☐ Verbal

7. Name of Contractor's On-Site Supervisor/Foreman | DLS Certification #

8. Name of Project Monitor | DLS Certification #

9. Name of Asbestos Analytical Lab | DLS Certification #

10 Project Start Date (MM/DD/YYYY) | End Date (MM/DD/YYYY)

Work Hours - Monday Through Friday | Work Hours - Saturday & Sunday

11. What type of project is this?

☐ Demolition ☐ Renovation ☐ Repair ☐ Other - Please Specify:

12. Abatement procedures (check all that apply):

☐ Glove Bag ☐ Encapsulation ☐ Enclosure ☐ Disposal Only ☐ Cleanup ☐ Full Containment

☐ Other - Please Specify:

13. Job is being conducted: ☐ Indoors ☐ Outdoors

Commonwealth of Massachusetts

Asbestos Notification Form ANF-001

A. Asbestos Abatement Description (continued)

14. Total amount of each type of Asbestos Containing Materials (ACM) to be removed, enclosed, or encapsulated:

	Linear Feet (Lin. Ft.) / Square Feet (Sq. Ft.)		Square Feet (Sq. Ft.)
Boiler, Breaching, Duct, Tank Surface Coatings	Lin. Ft. / Sq. Ft.	Transite Pipe	Lin. Ft. / Sq. Ft.
Pipe Insulation	Lin. Ft. / Sq. Ft.	Transite Shingles	Lin. Ft. / Sq. Ft.
Spray-On Fireproofing	Lin. Ft. / Sq. Ft.	Transite Panels	Lin. Ft. / Sq. Ft.
Cloths, Woven Fabrics	Lin. Ft. / Sq. Ft.	Other - Please Specify:	
Insulating Cement	Lin. Ft. / Sq. Ft.		Lin. Ft. / Sq. Ft.

15. Describe the decontamination system(s) to be used:

16. Describe the containerization/disposal methods to comply with 310 CMR 7.15 and 453 CMR 6.14(2)(g):

17. For Emergency Asbestos Operations, the MassDEP and DLS officials who evaluated the emergency:

Name of MassDEP Official	Title of MassDEP Official
Date of Authorization (MM/DD/YYYY)	Waiver #
Name of DLS Official	Title of DLS Official
Date of Authorization (MM/DD/YYYY)	Waiver #

18. Do prevailing wage rates (per M.G.L. c. 149, § 26, 27 or 27A–F) apply to this project? ☐ Yes ☐ No

Continue to Next Page ►

Commonwealth of Massachusetts

Asbestos Notification Form ANF-001

B. Facility Description

1. Current or prior use of facility: _____

2. Is the facility owner-occupied residential with 4 units or less? ☐ Yes ☐ No

3. Facility Owner Name | Address
   City/Town | State | Zip Code | Telephone

4. Name of Facility Owner's On-Site Manager | Address
   City/Town | State | Zip Code | Telephone

5. Name of General Contractor | Address
   City/Town | State | Zip Code | Telephone
   Contractor's Worker's Compensation Insurer | Policy # | Expiration Date (MM/DD/YYYY)

6. What is the size of this facility?
   Square Feet | # of Floors

C. Asbestos Transportation & Disposal

Note:

Temporary storage of Asbestos containing waste material is only allowed at the place of business of a DLS licensed Asbestos contractor or a transfer station that is permitted by MassDEP and operated in compliance with Solid Waste Regulations 310 CMR 19.000

1. Transporter of asbestos-containing waste material from site of generation:

   ☐ Directly to Landfill or ☐ To Temporary Storage Location/Transfer Station

   Name of Transporter | Address
   City/Town | State | Zip Code | Telephone

2. If a temporary storage location/transfer station is used, list name of transporter of asbestos-containing waste material from temporary storage location/transfer station to final disposal site:

   Name of Transporter | Address
   City/Town | State | Zip Code | Telephone

3. Name and address of temporary storage location/transfer station for the asbestos containing waste material:

   Temporary Storage Location Name | Address
   City/Town | State | Zip Code | Telephone

Commonwealth of Massachusetts

Asbestos Notification Form ANF-001

C. Asbestos Transportation & Disposal (continued)

4. Name and location of final disposal site (asbestos landfill):

Final Disposal Site Name	Final Disposal Site Owner Name
Address	City/Town
State	State / Zip Code / Telephone

D. Certification

Note: Contractor must sign this form for DLS notification purposes

"I certify that I have personally examined the foregoing and am familiar with the information contained in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including possible fines and imprisonment. The undersigned hereby states that I have read the Commonwealth of Massachusetts regulations governing asbestos abatement (453 CMR 6.00 promulgated by the Department of Labor Standards and 310 CMR 7.15 promulgated by the Department of Environmental Protection), and that I am aware that this permit application or notification shall not be deemed valid unless payment of the applicable fee is made."

Name

Authorized Signature

Date (MM/DD/YYYY)

Position/Title

Representing

Address

City/Town / State / ZIP Code

Telephone / Email Address

453 CMR 6.00: THE REMOVAL, CONTAINMENT OR ENCAPSULATION OF ASBESTOS

Section

6.01: Authority, Purpose and Scope
6.02: Definitions
6.03: General Requirements
6.04: Administrative License and Certification Actions/Denial, Revocation, Suspension or Refusal to Renew a License or Certificate
6.05: Licensure of Asbestos Contractors
6.06: Certification of Asbestos Workers and Asbestos Supervisors
6.07: Certification of Consultants
6.08: Certification and Other Requirements for Asbestos Analytical Services
6.09: Certification and Other Requirements for Training Providers
6.10: Training Requirements
6.11: Recordkeeping
6.12: Notification of Asbestos Projects
6.13: Work Practices and other Requirements for Small-Scale Asbestos Projects, Asbestos-Associated Projects, and Work Operation Involving Non-Friable ACBM
6.14: Work Practices and Other Requirements for Asbestos Response Actions
6.15: Worker Protection Requirements
6.16: Cease and Desist Orders
6.17: Responsibility for Compliance; Penalties
6.18: Severability
6.19: The Removal, Containment or Encapsulation of Asbestos Appendix I
6.20: The Removal, Containment or Encapsulation of Asbestos Appendix II

6.01: Authority, Purpose and Scope

(1) Authority. 453 CMR 6.00 is promulgated in accordance with and under the authority of M.G.L. c. 149, '' 6 through 6F.

(2) Purpose. 453 CMR 6.00 shall establish and/or constitute:

(a) Requirements necessary to protect the health and safety of the general public and persons engaged in, or associated with, the removal, enclosure, encapsulation or disturbance of asbestos or asbestos-containing material and to prevent occupational diseases.

(b) Standards of competency for persons or entities engaged in or performing removal, enclosure or encapsulation of asbestos or asbestos-containing material.

(c) Minimum standards to be used by insurers in the inspection of risk, measurement of hazards and the determination of adequate and reasonable rates of insurance as prescribed by the provisions of M.G.L. c. 152, ' 65J.

(d) Standards for the licensure of persons, firms, corporations or other entities who or which enter into, engage in or work at the business of removal, enclosure or encapsulation of asbestos or asbestos-containing material, and for the certification of asbestos workers, supervisors, consultants, providers of asbestos analytical services, and others performing asbestos work.

(e) Standards for the certification of entities engaged in the business of training others, where such training is a condition of licensure or certification.

(3) Scope. 453 CMR 6.00 applies to all work, including construction, demolition, alteration, repair and maintenance involving any facility or location, where such work involves the use, handling or disposal of asbestos, asbestos-containing material or asbestos-contaminated waste. 453 CMR 6.00 also applies to asbestos training, consultation and/or analytical services, including but not limited to: asbestos inspection and hazard assessment services, the preparation of asbestos project designs, asbestos project oversight and/or monitoring, asbestos training required by 453 CMR 6.00 and asbestos analysis performed in connection with any of the above services.

(4) Exceptions. The Director of the Department of Labor and Workforce Development may grant exceptions to 453 CMR 6.00 in those instances where it is clearly evident that existing conditions prevent compliance, or where compliance will create an undue hardship, but only in circumstances in which granting the exception will maintain the protection of the health and

safety of workers and the general public. Requests for exceptions to 453 CMR 6.00, which shall be submitted in writing to the Director, shall specify those provisions of 453 CMR 6.00 for which exceptions are sought, the reasons for requesting the exceptions and any proposed alternatives to requirements of 453 CMR 6.00. Exceptions granted by the Director shall remain in force until rescinded in writing or until a certain date set at the time that the exception is granted.

(5) Alternative Methods. The Director shall have the authority to allow the use of newly developed techniques, methods, or equipment that provide a level of protection for workers and the general public which equals or exceeds that specified by 453 CMR 6.00.

(6) Right of Entry. Pursuant to M.G.L. c. 149, '' 10 and 17, the Director or the Director's authorized representative shall have the right of entry to any work site, place of employment or other location for the purpose of conducting investigations or inspections.

(7) Regulations Incorporated. The following rules and regulations of the United States Environmental Protection Agency are hereby incorporated by reference:

(a) Asbestos-Containing Materials in Schools Rule; 40 CFR Part 763, Subpart E, effective October 30, 1987; and

(b) Asbestos-Containing Materials in Schools Rule; 40 CFR Part 763, Appendix C to Subpart E, Asbestos Model Accreditation Plan, effective April 4, 1994.

6.02: Definitions

For the purpose of 453 CMR 6.00, the following definitions shall apply:

AHERA - The Asbestos Hazard Emergency Response Act, 15 U.S.C. 2646 *et seq*., and the regulations promulgated thereunder, including 40 CFR Part 763.

Amended Water - Water to which a wetting agent has been added.

Asbestos - The asbestiform varieties of chrysotile, crocidolite, cummingtonite-grunerite (amosite), anthophyllite, actinolite and tremolite.

Asbestos Abatement - Any activity which has as its principal purpose the removal, enclosure or encapsulation of asbestos or asbestos-containing material, including, but not limited to activity in connection with the renovation, repair or demolition of a facility and the replacement of furnaces or boilers that are covered or coated with asbestos-containing material.

Asbestos Analytical Services - Services which include, but are not limited to the counting or enumeration of asbestos fibers in the air (air monitoring analysis) and the identification and quantification of asbestos in materials (bulk sample analysis) in connection with any asbestos hazard assessment, building inventory, exposure measurement, abatement project or associated project.

Asbestos-Associated Project - A work operation involving the disturbance of three or fewer linear feet of asbestos surfacing located on pipes, ducts or wires or three or fewer square feet of asbestos surfacing located on structures or components other than pipes, ducts or wires and which does not have as its principal purpose the removal, enclosure or encapsulation of asbestos or asbestos-containing material. Such activity shall include but not be limited to general building maintenance, electrical and low voltage wiring, plumbing, carpentry, masonry, HVAC and heating service.

Asbestos-Associated Project Worker - Any person who has successfully completed the training specified at 453 CMR 6.10(4)(h).

6.02: continued

Asbestos Consultants - Persons who perform design, oversight or assessment functions in asbestos abatement or asbestos hazard control, including asbestos inspectors, management planners, project designers and project monitors, as defined herein.

Asbestos-Containing Material (ACM) - Any material containing more than one percent asbestos.

Asbestos Contractor - Any person, firm, corporation or other entity who or which has a valid license issued by the Commonwealth for the purpose of entering into or engaging in asbestos work.

Asbestos Inspector - A person who identifies, assesses the condition of, or collects pre-abatement samples of asbestos-containing materials.

Asbestos Laboratory Supervisor - A person so designated pursuant to 453 CMR 6.08(4)(a), who is jointly responsible, along with other responsible persons of a certified asbestos analytical service, if any, for the adherence to the applicable analytical protocols, the maintenance of proper quality control procedures and the accuracy of the analytical results.

Asbestos Management Planner - A person who uses data gathered by asbestos inspectors to assess asbestos hazards, determine appropriate response actions and develop implementation plans.

Asbestos Project Designer - A person who determines how asbestos abatement work should be conducted by preparing plans, designs, procedures, work scope or other substantive direction or criteria.

Asbestos Project Monitor - A person who:

(a) Collects air and bulk samples and performs visual inspections for the purpose of determining asbestos project completion;

(b) Collects environmental asbestos air samples for the purpose of assessing present or future potential for exposure to airborne asbestos; or

(c) Functions as the on-site representative of the facility owner or other persons by overseeing the activities of the asbestos contractor.

Asbestos Response Action - Any work operation involving the disturbance of more than three linear feet of friable asbestos on or in pipes, ducts or wires or more than three square feet of friable asbestos on or in structures or components other than pipes, ducts or wires.

Asbestos Supervisor - An individual or agent of an asbestos abatement entity having managerial or supervisory authority over asbestos workers or a foreperson with responsibility for the completion of asbestos response actions or portions thereof.

Asbestos Training Provider - Any entity which has been duly certified pursuant to 453 CMR 6.09 to provide asbestos training required by 453 CMR 6.10(1).

Asbestos Work - The business of removal, enclosure or encapsulation of asbestos or asbestos-containing material in any facility.

Asbestos Worker - A person not acting as a supervisor who performs asbestos work as an employee, or who performs such work under the direction and control of another, with or without compensation.

Category I Non-Friable Asbestos-Containing Building Material - Asbestos-containing packings, gaskets, resilient floor coverings, and asphalt roofing products containing more than 1% asbestos as determined using the method specified in Appendix A, subpart F, 40 CFR Part 763, section 1, Polarized Light Microscopy.

Category II Non-Friable Asbestos-Containing Building Material - Any material excluding Category I non-friable ACM containing more than 1% asbestos as determined using the method specified in Appendix A, subpart F, 40 CFR Part 763, section 1, Polarized Light Microscopy that when dry cannot be crumbled, pulverized or reduced to powder by hand pressure.

Cease and Desist Order - An order issued by the Director closing any work site where the Director determines that violations of a work place standard concerning the protection of the

occupational health and safety of workers and the general public or of any standard or requirement of licensure exist.

Certification - The issuance of a certificate pursuant to 453 CMR 6.00 authorizing an individual or entity to engage in activities pertaining to asbestos work.

Clearance Air Monitoring - Air monitoring conducted by a certified asbestos project monitor at the conclusion of an asbestos project which is used in combination with visual inspection to assess adequacy of cleanup and project completion.

Containment - As used in M.G.L. c. 149, ' 6B and 453 CMR 6.00, the word "containment" shall mean "enclosure", as defined herein.

Demolition - The wrecking or removal of any facility or portion thereof together with any related debris-handling operations.

Department - The Massachusetts Department of Labor and Workforce Development, Division of Occupational Safety.

Director - The Director of the Massachusetts Department of Labor and Workforce Development or his/her designee.

Emergency Project - Any asbestos project necessary to protect or preserve life or property from imminent harm, damage or deterioration, as determined by the Director.

Encapsulation - The application of a coating or liquid sealant to asbestos-containing material to reduce the tendency of the material to release fibers.

Enclosure - The covering or wrapping of friable asbestos-containing material in, under or behind air-tight barriers.

Entity - Any partnership, firm, association, corporation, sole proprietorship or any other business concern, state or local government agency or institution or political subdivisions or authorities thereof, or any religious, social or union organization, whether operated for profit or otherwise.

EPA - The United States Environmental Protection Agency.

Facility - Any private or public building or structure including but not limited to those used for institutional, residential (including single family homes), commercial or industrial purposes and vessels while ashore or in drydock.

Friable Asbestos-Containing Material (Friable ACM) - Any material containing more than one per cent asbestos, which when dry, may be crumbled, pulverized or reduced to powder by hand pressure. The term includes non-friable asbestos-containing material after such previously non-friable material becomes damaged to the extent that when dry it may be crumbled, pulverized or reduced to powder by hand pressure. The characteristic of friability shall apply to the asbestos material and is not influenced or affected by coverings, coatings or other means of separating asbestos materials by hand.

Glove Bag - A manufactured plastic bag-type of enclosure with built-in gloves, which is placed with an air-tight seal around an asbestos covering and which permits asbestos material contained by the bag to be removed without releasing asbestos fibers into the atmosphere.

HEPA Filtration - High efficiency particulate air filtration capable of filtering 0.3 micron particles with 99.97% efficiency.

Inspection - Any activity undertaken in a facility or location subject to the requirements of these regulations for the purpose of determining the presence, location and/or condition of friable or non-friable asbestos-containing material or suspected asbestos-containing material, whether by visual or physical examination, or by the collection of samples of such material. This term includes recordkeeping in connection with such asbestos inspection activities and reinspections

of friable and non-friable known or assumed asbestos-containing material which has been previously identified, but does not include the following:

(a) Periodic surveillance of the type described in 40 CFR Part 763.92(b) solely for the purpose of recording or reporting a change in the condition of known or assumed asbestos-containing material;

(b) Inspections performed by employees or agents of federal, state or local government solely for the purpose of determining compliance with applicable statutes; or

(c) Visual inspections of the type described in 40 CFR Part 763.90(i) solely for the purpose of determining completion of asbestos response actions.

Management Plans - Plans, including operations and maintenance plans, which detail specific response actions appropriate for the abatement of immediate and long term asbestos hazards.

Major Fiber Release Episode - Any uncontrolled or unintentional disturbance of asbestos-containing material which produces visible debris and which:

(a) involves the falling or dislodging of:

1. more than three linear feet of friable asbestos-containing material on or in pipes, ducts or wires; or

2. more than three square feet of friable asbestos-containing material on or in structures or components other than pipes, ducts or wires; or

(b) produces an amount of friable asbestos-containing material greater than that which can be contained by a single three-foot glove bag of conventional manufacture.

Minor Fiber Release Episode - Any uncontrolled or unintentional disturbance of asbestos-containing material which produces visible debris and which:

(a) involves the falling or dislodging of:

1. three or fewer linear feet of friable asbestos-containing material on or in pipes, ducts or wires; or

2. three or fewer square feet of friable asbestos-containing material on or in structures or components other than pipes, ducts or wires; and

(b) produces an amount of friable asbestos-containing material which can be contained by a single three-foot glove bag of conventional manufacture.

NIOSH - The National Institute of Occupational Safety and Health.

NIST - The National Institute of Standards and Technology.

Non-Friable Asbestos-Containing Building Materials (Non-Friable ACBM) - Materials used in the construction of facilities or structures which contain asbestos bound by a matrix which cannot, when dry, be crumbled, pulverized, or reduced to powder by hand pressure. The class of non-friable asbestos-containing building materials typically includes, but is not limited to: asbestos cement pipe, sheathing siding and shingles; vinyl asbestos building materials, such as floor tiles; and asphaltic asbestos building materials, including asphaltic asbestos shingles and felts.

Operations and Maintenance (O&M) Plan - A program of work practices designed to maintain asbestos-containing material in intact condition, ensure cleanup of asbestos fibers previously released, prevent further release by minimizing disturbance or damage to asbestos-containing material, and provide for long term surveillance of the facility with regard to renovation, maintenance, cleaning and general operations.

OSHA - The Occupational Safety and Health Administration of the United States Department of Labor.

Personal Exposure Monitoring - Air samples collected from the breathing zone of a person performing asbestos work which are analyzed according to standard protocols for the purpose of determining that person's level of exposure to airborne asbestos fibers.

Private Residence - Any facility used exclusively for residential purposes containing three or fewer living units.

Public Facility - Any facility or location to which the general public has access, including, but not limited to schools, office buildings, museums, airports, hospitals, stores and churches.
Renovation - Altering one or more components of a facility in any way.

Repair - The sealing, patching, enclosing or encapsulating of damaged asbestos-containing materials to prevent fiber release.

Responsible Person(s) - Person(s) having management control over the entity or employer. In the case of a corporation, the responsible person(s) shall be officers of the corporation and any other managing agent of such corporation. In the case of a sole proprietorship or a partnership, the responsible person(s) shall be the owners or partners and any other managing agent of such sole proprietorship or partnership.

Sampling - The process of obtaining representative portions of materials suspected of containing asbestos, including the taking of bulk portions of materials for analysis to determine composition, and the collection of air for the purposes of measuring asbestos content.

Small-Scale Asbestos Project - Any work operation involving the disturbance of:

(a) three or fewer linear feet of friable asbestos on or in pipes, ducts or wires or

(b) three or fewer square feet of friable asbestos on or in structures or components other than pipes, ducts or wires.

State - Commonwealth of Massachusetts.

TEM - Transmission electron microscopy.

Visible Debris - Any visually detectable particulate residue, such as dust, dirt or other extraneous material which may or may not contain asbestos.

Work Area - The area or location where asbestos abatement or asbestos-associated work is being performed, or such other areas of a facility which the Director determines may be hazardous to the health and safety of workers and the general public as a result of such asbestos work.

Work Practices - The minimum standards, procedures or actions taken or used for removal, enclosure or encapsulation of asbestos, or for renovation, demolition, maintenance or repair of facilities containing asbestos. This term also includes the minimum standards, procedures or actions taken or used by persons engaged in inspection, analysis, risk assessment or other activities relating to asbestos work.

6.03: General Requirements

(1) Administrative License and Certification Actions. As set forth at 453 CMR 6.04, the Director may deny, suspend, revoke or refuse to renew a license or certificate issued pursuant to 453 CMR 6.05 through 6.09 or take other administrative actions against a license or certificate holder for sufficient cause.

(2) General Requirement for Licensure of Asbestos Contractors. No person, firm, corporation or other entity shall enter into, engage in or work at the business of Asbestos Abatement unless such person, firm, corporation or other entity has been duly licensed in accordance with 453 CMR 6.05. For purposes of 453 CMR 6.00, the phrase "engage in . . . the business of Asbestos Abatement" includes, but is not limited to, advertising Asbestos Abatement services, and/or submitting bids for projects where the majority of the contract-value is represented by Asbestos Work.

(3) Requirement for Certification of Asbestos Workers and Asbestos Supervisors. All persons who perform the functions of Asbestos Workers and Asbestos Supervisors at worksites where Asbestos Response Actions are carried out shall be certified pursuant to the applicable sections of 453 CMR 6.06.

(4) Requirement for Certification of Asbestos Consultants. Persons who provide or work at the business of providing asbestos consultation services, including asbestos inspection, hazard

assessment, management planning, project designing and project monitoring services, shall be duly certified in the appropriate consultative discipline pursuant to 453 CMR 6.07 prior to engaging in such work. For the purpose of 453 CMR 6.00, the phrase Awork at the business of providing asbestos consultation services@ includes, but is not limited to advertising asbestos consultation services and submitting bids for work where the majority of the contract value of the project involves asbestos consultation work.

(5) Requirement for Certification of Providers of Asbestos Analytical Services. Persons who provide or work at the business of providing Asbestos Analytical Services shall be duly certified pursuant to 453 CMR 6.08 prior to engaging in such work and shall otherwise comply with the requirements of that section. For the purpose of 453 CMR 6.00, the phrase Awork at the business of providing Asbestos Analytical Services@ includes, but is not limited to, advertising Asbestos Analytical Services and submitting bids for work where the majority of the contract value of the project involves asbestos analysis work. Certified Asbestos Analytical Services shall be authorized to advertise and provide only those services for which separate approval is granted, as set forth at 453 CMR 6.08(1)(a) through (d).

(6) Requirement for Certification of Asbestos Training Providers. Persons who provide or work at the business of providing asbestos training required by 453 CMR 6.00 shall be duly certified pursuant to 453 CMR 6.09 prior to engaging in such work, and otherwise comply with the requirements of 453 CMR 6.09. For the purpose of 453 CMR 6.00, the phrase Awork at the business of providing asbestos training@ includes, but is not limited to advertising asbestos training services and submitting bids for work where the majority of the contract value of the project involves asbestos training.

(7) Requirement for Asbestos Training. All persons requiring asbestos training as a prerequisite for licensure or certification pursuant to 453 CMR 6.05, 6.06 or 6.07 or participation in Small-Scale Asbestos Projects shall be trained pursuant to 453 CMR 6.10.

(8) Recordkeeping Requirements. All Asbestos Training Providers, Asbestos Analytical Services, Asbestos Consultants, Asbestos Contractors, and Employers of Asbestos-Associated Project Workers shall maintain records as specified at 453 CMR 6.11.

(9) Notification Requirements. All persons or entities who carry out Asbestos Response Actions shall comply with the notification requirements of 453 CMR 6.12.

(10) Requirements for the Conduct of Small-Scale Asbestos Projects and Projects Involving Non-Friable ACBM.

(a) Small-Scale Asbestos Projects and Asbestos-Associated Projects. Persons, firms, corporations or other entities who carry out Small-Scale Asbestos Projects or Asbestos-Associated Projects and the owner of the facility where such work is conducted shall ensure that the requirements of 453 CMR 6.13(1) for such work are met.

(b) Projects Involving the Removal or Disturbance of Non-friable ACBM. Persons, firms, corporations or other entities who carry out projects involving the removal or disturbance of non-friable ACBM and the owner of the facility where such work is conducted shall ensure that the requirements of 453 CMR 6.13(2) for such work are met.

(11) Requirements for the Conduct of Asbestos Response Actions. Persons or entities in charge of carrying out an Asbestos Response Action and the owner of the facility where such Asbestos Response Action is carried out shall ensure compliance with the requirements of 453 CMR 6.14.

(12) Worker Protection. The requirements of the OSHA Asbestos Standard 29 CFR Part 1926.1101, including paragraphs (f), (h), (i) and (m), and other applicable OSHA standards shall apply to the personal protection and medical monitoring of employees other than employees of the Commonwealth or any of its political subdivisions who perform Asbestos Work, and in addition, in accordance with 453 CMR 6.11(3)(a), Asbestos Contractors shall maintain as records the results of all personal exposure monitoring, respirator fit testing and medical examinations required by 29 CFR Part 1926 and other applicable OSHA standards as a condition of licensure. The personal protection and medical monitoring of employees of the Commonwealth and its political subdivisions and other persons exempted from coverage by OSHA standards shall be in accordance with the provisions of 453 CMR 6.15. Responsibility

for compliance with such worker protection requirements shall rest with the employer and the Responsible Person(s) designated thereby.

(13) Requirements for the Use of Personnel. The following shall apply to the use of personnel for Asbestos Work:

(a) Persons engaged in Asbestos Work shall only perform or be assigned to perform those tasks authorized by 453 CMR 6.00. Performance of unauthorized tasks or functions shall be cause for revocation or suspension of certificates or the Asbestos Contractor License.

(b) Persons must be at least 18 years of age to perform any Asbestos Work or to receive certification in any asbestos-related discipline pursuant to 453 CMR 6.00.

(14) Presentation of Certificates. All persons engaged in Asbestos Work for which certification is required by 453 CMR 6.00 shall keep their certification identification cards at the job site and shall present them to the Director or the Director's representative upon request.

(15) Effective Dates. 453 CMR 6.00 shall be effective June 26, 1998, except as noted at 453 CMR 6.03(15)(a) and (b).

(a) The specific initial and refresher training course requirements for certification of Asbestos Project Monitors, as set forth at 453 CMR 6.10(4)(g) shall be effective 180 days after June 26, 1998. In the interim, the initial and refresher training courses specified for Asbestos Supervisors at 453 CMR 6.10(4)(c) may be used to satisfy the applicable training requirements for certification of Asbestos Project Monitors pursuant to 453 CMR 6.07.

(b) The requirements of 453 CMR 6.08(4)(e)4. shall be effective 365 days after June 26, 1998.

6.04: Administrative License and Certification Actions/Denial, Revocation, Suspension or Refusal to Renew a License or Certificate

(1) General Administrative Proceedings. The Director may deny, revoke, suspend or refuse to renew a license or certificate issued pursuant to 453 CMR 6.00 upon finding of sufficient cause. License or certificate applicants or holders shall be advised by the Director in writing of the proposed denial, revocation, suspension or refusal to renew and the reasons therefore. Said parties shall have the right to appeal the Director=s determination through an administrative hearing in accordance with the provisions of M.G.L. c. 30A and 801 CMR 1.00 by submitting a written request for such hearing within 14 calendar days of receiving notice of such administrative action.

(2) Sufficient Cause. The following shall be sufficient cause for the Director=s denial, revocation, suspension or refusal to renew a license or certificate issued pursuant to 453 CMR 6.00:

(a) False statements in the application.

(b) Omission or falsification of documentation or information required to be submitted to the Director pursuant to any provisions of 453 CMR 6.00.

(c) Failure to comply with the applicable provisions of M.G.L. c. 149 or 111F, 453 CMR 6.00, M.G.L. c. 111, ' ' 189A through 199B, or rules or orders issued thereunder.

(d) Failure to comply with laws, rules and regulations relating to occupational or public safety and health.

(e) Failure to maintain records required by 453 CMR 6.11 or make them available to the Director upon request.

(f) In the case of certified Asbestos Training Providers, or applicants for certified Asbestos Training Provider status, the following shall also constitute sufficient cause:

1. Failure to demonstrate the ability to provide the training courses for which the applicant seeks to be certified in compliance with the requirements of 453 CMR 6.09;
2. Failure to provide or maintain the standards of training required by 453 CMR 6.09(3); or
3. Failure to provide minimum instruction required by 453 CMR 6.10.

(g) In the case of certified Asbestos Consultants or applicants for certification in one or more of the consultant categories listed at 453 CMR 6.07(1)(a) through (d), the following shall also constitute sufficient cause:

1. Gross technical errors or errors of judgment.
2. Failure to properly execute authorized consultative activities.

(h) In the case of certified providers of Asbestos Analytical Services, or applicants for

certification as providers of Asbestos Analytical Services, the following shall also constitute sufficient cause:

1. Failure to maintain successful participation in required proficiency testing programs.
2. Gross technical errors or errors of judgment relating to activities covered by the certification.
3. Loss of professional accreditation or license, where such is a required qualification.

(i) Any other cause affecting the responsibility of the license or certificate holder which the Director determines to be of such serious and compelling nature as to warrant denial, suspension, revocation or refusal to renew.

(3) Probation. The Director may place the license or certificate holder on probation for sufficient cause for a period of three months or longer.

(4) Suspension Prior to Hearing. The Director may summarily suspend a license or certificate on an emergency basis, if, in his/her determination, the actions of the license or certificate holder show willful disregard for the health, safety or welfare of the public or workers. If a license or certificate is summarily suspended, the affected party may appeal the summary action in accordance with 453 CMR 6.04(1). If an appeal is filed, the matter shall be set down for hearing at the earliest possible time. At such hearing the Director must establish that the summary action is factually supported and that there is a substantial likelihood of sustaining the suspension in a full evidentiary hearing. The summary action shall continue against the affected party unless the hearing officer determines that the Director did not meet his/her burden under the standard specified herein. Summary suspensions may be issued in conjunction with license or certificate revocations or refusals to renew.

6.05: Licensure of Asbestos Contractors

(1) Application for Licensure. Applicants for licensure as Asbestos Contractors shall submit the following to the Director:

(a) A completed application form with attachments as prescribed by the Director, which shall, at a minimum, include the following:

1. A list of all names, acronyms or other identifiers by which the applicant does or has done business, the address(es) and telephone number(s) of the business.
2. A list of the states in which the applicant holds a current license, certification, accreditation, or other approval for Asbestos Work.
3. A list of the names and addresses of all Asbestos Abatement firms or entities in which the Responsible Persons of the applicant have or have had a financial interest or management responsibility.
4. Corporate Articles of Organization and a Certificate of Good Standing issued by the Massachusetts Secretary of State or a DBA (doing business as) certificate for the asbestos contracting firm of the applicant issued by the city or town where the business is located.
5. A certified and notarized statement by a Responsible Person of the applicant that the applicant has paid all tax obligations current and due to the Commonwealth as of the date of application.
6. Evidence that Asbestos Work to be performed by the applicant is covered under a current workers' compensation policy or self-insurance program acceptable to the Commonwealth.
7. A list of all occupational safety and health-related citations or notices of violation, including notices of noncompliance, notices of responsibility, notices of intent to assess an administrative penalty, orders, consent orders and court judgements, received by the Responsible Persons of the applicant in the two years prior to the date of application, and the issuing agency or department and final disposition of such citation or notice.
8. A statement made under the penalties of perjury by a Responsible Person of the applicant that all employees to be engaged in Asbestos Work are certified, or will be certified prior to any work being performed by them, pursuant to the requirements of 453 CMR 6.00.
9. A list of the names and addresses of all Responsible Persons and managers of the applicant who have primary responsibility for, and control over, Asbestos Work of the applicant.
10. A written respirator program evidencing compliance with 29 CFR Part 1910.134.
11. Written procedures for complying with OSHA or EPA personal monitoring

requirements.

12. A written description of a medical monitoring program evidencing compliance with 453 CMR 6.15(4) or 29 CFR 1926.1101, as applicable.

(b) Asbestos training certificates or legible copies thereof, indicating that a Responsible Person or manager of the applicant listed pursuant to 453 CMR 6.05(1)(a)9. has successfully completed the applicable initial and refresher training requirements for Asbestos Supervisors specified by 453 CMR 6.10(2), 6.10(4)(c) and/or 453 CMR 6.10(5).

(c) Such other information as the Director may reasonably require.

(d) A money order or certified bank check payable to the Commonwealth of Massachusetts in the amount of the entire annual fee of $2,000, or any other amount established for such license pursuant to M.G.L. c. 7. ' 3B. If the Director denies, revokes, suspends or refuses to renew the License for reasons specified in 453 CMR 6.04, the fee payment is not refundable.

(2) Renewal of an Asbestos Contractor License. An Asbestos Contractor license is valid for a period of one year. The Director may renew an Asbestos Contractor license upon written application for renewal by the license holder. Renewal applications should be submitted to the Department of Labor and Workforce Development no later than 30 calendar days before the expiration of the current license. The submission of a renewal application later than 30 days before the expiration of the current license may result in renewal after the expiration of the current license. Said application for renewal shall include submission of the items referenced at 453 CMR 6.05(1)(a) through (d), including a current certificate of training indicating that a Responsible Person or manager of the applicant listed pursuant to 453 CMR 6.05(1)(a)9. has successfully completed the refresher training requirements for Asbestos Supervisors specified by 453 CMR 6.10(5).

6.06: Certification of Asbestos Workers and Asbestos Supervisors

(1) Application for Certification as an Asbestos Worker. Applicants for certification as Asbestos Workers shall appear in person at one of the Division of Occupational Safety offices listed in 453 CMR 6.19: *Appendix I*, and submit the following:

(a) A completed application form with attachments as prescribed by the Director.

(b) Asbestos training certificates, or legible copies thereof, indicating that the applicant has successfully completed the applicable initial and refresher training requirements specified by 453 CMR 6.10(2), 6.10(4)(b), and/or 453 CMR 6.10(5).

(c) A list of all occupational safety and health-related citations or notices of violation, including notices of noncompliance, notices of responsibility, notices of intent to assess an administrative penalty, orders, consent orders and court judgements, received by the applicant in the two years prior to the date of application, and the issuing agency or department and final disposition of such citation or notice.

(d) Such other information as the Director may reasonably require.

(e) A money order or certified bank check payable to the Commonwealth of Massachusetts in the amount of the entire annual fee of $25.00, or any other amount established for such certificate pursuant to M.G.L. c. 7, ' 3B. If the Director denies, revokes, suspends or refuses to renew a certificate for reasons specified in 453 CMR 6.04, the fee payment is not refundable.

(2) Renewal of an Asbestos Worker Certificate. An Asbestos Worker certificate is valid for a period of one year. The Director may renew an Asbestos Worker certificate, provided the current certificate holder appears in person at one of the Division of Occupational Safety offices listed in 453 CMR 6.19: *Appendix I*, and makes written application for renewal. Application for renewal should be made no later than seven calendar days before the expiration of the current certificate. The submission of a renewal application later than seven days before the expiration of the current certificate may result in renewal after the expiration of the current certificate. Said application for renewal shall include submission of the items referenced at 453 CMR 6.06(1)(a) through (e), including a current certificate of refresher training specified by 453 CMR 6.10(5).

(3) Application for Certification as an Asbestos Supervisor. Applicants for certification as Asbestos Supervisors shall appear in person at one of the Division of Occupational Safety offices listed in 453 CMR 6.19: *Appendix I*, and submit the following:

(a) A completed application form with attachments as prescribed by the Director.

(b) Asbestos training certificates or legible copies thereof, indicating that the applicant has

successfully completed the applicable initial and refresher training requirements specified by 453 CMR 6.10(2), 6.10(4)(c), and/or 453 CMR 6.10(5).

(c) A list of all occupational safety and health-related citations or notices of violation, including notices of noncompliance, notices of responsibility, notices of intent to assess an administrative penalty, orders, consent orders and court judgments, received by the applicant in the two years prior to the date of application, and the issuing agency or department and final disposition of such citation or notice.

(d) Such other information as the Director may reasonably require.

(e) A money order or certified bank check payable to the Commonwealth of Massachusetts in the amount of the entire annual fee of $100.00, or any other amount established for such certificate pursuant to M.G.L. c. 7, ' 3B. If the Director denies, revokes, suspends or refuses to renew a certificate for reasons specified in 453 CMR 6.04, the fee payment is not refundable.

(4) Renewal of an Asbestos Supervisor Certificate. An Asbestos Supervisor certificate is valid for a period of one year. The Director may renew an Asbestos Supervisor certificate, provided the current certificate holder appears in person at one of the Division of Occupational Safety offices listed in 453 CMR 6.19: *Appendix I*, and makes written application for renewal. Application for renewal should be made no later than seven calendar days before the expiration of the current certificate. The submission of a renewal application later than seven days before the expiration of the current certificate may result in renewal after the expiration of the current certificate. Said application for renewal shall include submission of the items referenced at 453 CMR 6.06(3)(a) through (e), including a current certificate of refresher training specified by 453 CMR 6.10(5).

6.07: Certification of Asbestos Consultants

(1) Scope of Certifications. Persons performing the asbestos consulting functions listed in 453 CMR 6.07(1)(a) through (d) shall be certified in the appropriate discipline prior to engaging in such work. Persons performing the work of more than one Asbestos Consultant discipline shall be separately certified, except that a person who is certified as an Asbestos Management Planner may perform the functions of an Asbestos Inspector without being separately certified.

(a) Asbestos Inspector. Certification as an Asbestos Inspector authorizes the consultant to review building records, perform visual inspections, collect samples, prepare written inventories and conduct other forms of investigation necessary to determine and document the presence and condition of known or suspect ACM in facilities. Certified Asbestos Inspectors shall apply current concepts and state-of-the-art knowledge to evaluate the conditions and accessibility of ACM and shall otherwise conduct their activities according to procedures described in current EPA guidance documents or applicable federal laws or rules and regulations.

(b) Asbestos Management Planner. Certification as an Asbestos Management Planner authorizes the consultant to utilize information developed from facility inspections to assess potential hazards of ACM, to develop O&M plans, and to select and recommend asbestos hazard control and abatement actions.

(c) Asbestos Project Designer. Certification as an Asbestos Project Designer authorizes the consultant to design Asbestos Response Actions through preparation of job specifications, bidding documents, architectural drawings and schematic representations of material locations. Except as mandated by AHERA for Asbestos Response Actions conducted in school facilities, the preparation of asbestos project designs is not required by 453 CMR 6.00. Where asbestos project designs are prepared, such preparation shall only be performed by persons certified as Asbestos Project Designers pursuant to 453 CMR 6.07.

(d) Asbestos Project Monitor. Certification as an Asbestos Project Monitor authorizes the consultant to function as the on-site representative of the facility owner or other persons, interpret project specifications or asbestos management plans and monitor and evaluate contractor or employee compliance with applicable rules, regulations, or specifications, including collection of the air samples at asbestos project sites. Certification as an Asbestos Project Monitor or in any other Asbestos Consultant discipline is not required for persons collecting only (asbestos) personal air monitoring samples.

(2) Qualifications for Certification. Asbestos Consultants shall possess the applicable prerequisites for certification listed at 453 CMR 6.07(2)(a) through (d).

(a) Asbestos Inspectors. Applicants shall have successfully completed the training requirements set forth at 453 CMR 6.10(4)(d) and shall have, at a minimum:

1. A high school diploma and a minimum of six months experience in an occupation comparable to that of asbestos inspection or two months field experience under the direct supervision of a certified Asbestos Inspector or Management Planner; or

2. A combination of education and experience equivalent to that set forth in 453 CMR 6.07(2)(a)1., as determined by the Director.

(b) Asbestos Management Planners. Applicants shall have successfully completed the training requirements set forth at 453 CMR 6.10(4)(e) and shall have, at a minimum:

1. a. An associate degree or certificate in project planning, management, environmental sciences, engineering, construction, architecture, industrial hygiene, occupational health, or a related scientific field; and

b. Six months experience in the asbestos abatement field, including experience in asbestos management; or

2. A combination of education and experience equivalent to that set forth in 453 CMR 6.07(2)(b)1., as determined by the Director.

(c) Asbestos Project Designers. Applicants shall have successfully completed the training requirements set forth at 453 CMR 6.10(4)(f) and shall have, at a minimum:

1. A bachelor's degree in industrial hygiene, occupational health, or environmental, biological or physical science;

2. Current status as a registered architect or engineer with a minimum of 12 months experience in asbestos abatement fields; or

3. A combination of education and experience equivalent to that set forth in 453 CMR 6.07(2)(c)1. and 2., as determined by the Director.

(d) Asbestos Project Monitors. Applicants shall have successfully completed the training requirements set forth at 453 CMR 6.10(4)(g) and shall have, at a minimum:

1. Two years of college credit or an associate or technical degree or equivalent; and

a. six months employment experience in the asbestos abatement field or

b. two months field experience under the direct supervision of a certified Asbestos Project Monitor; or

2. A combination of education and experience equivalent to that set forth in 453 CMR 6.07(2)(d)1. as determined by the Director.

(3) Application for Certification as an Asbestos Consultant. Applicants for certification in one or more of the consultant disciplines shall appear in person at one of the Division of Occupational Safety offices listed in 453 CMR 6.19: *Appendix I*, and submit the following:

(a) A completed application form with attachments, as prescribed by the Director.

(b) Asbestos training certificates, or legible copies thereof, indicating that the applicant has successfully completed the applicable initial and refresher training requirements for the Asbestos Consultant discipline for which certification is sought, as set forth in 453 CMR 6.10(2), 6.10(4)(d) through (g) and/or 453 CMR 6.10(5).

(c) Documentation demonstrating fulfillment of the qualifications listed at 453 CMR 6.07(2)(a) through (d).

(d) A list of all occupational safety and health-related citations or notices of violation, including notices of noncompliance, notices of responsibility, notices of intent to assess an administrative penalty, orders, consent orders and court judgements, received by the applicant in the two years prior to the date of application, and the issuing agency or department and final disposition of such citation or notice.

(e) Such other information as the Director may reasonably require.

(f) A money order or certified bank check payable to the Commonwealth of Massachusetts in the amount of the entire annual fee of $300.00, or any other amount established for such certificate pursuant to M.G.L. c. 7, ' 3B. A person applying for certification as an Asbestos Inspector and as an Asbestos Management Planner at the same time need pay only one $300.00 fee. If the Director denies, revokes, suspends or refuses to renew a certificate for reasons specified in 453 CMR 6.04, the fee payment is not refundable.

(4) Renewal of an Asbestos Consultant Certificate. An Asbestos Consultant certificate is valid for a period of one year. The Director may renew an Asbestos Consultant certificate, provided the current certificate holder appears in person at one of the Division of Occupational Safety offices listed in 453 CMR 6.19: *Appendix I*, and makes written application for renewal. Application for renewal should be made no later than seven calendar days before the expiration

of the current certificate. The submission of a renewal application later than seven days before the expiration of the current certificate may result in renewal after the expiration of the current certificate. Said application for renewal shall include submission of the items referenced at 453 CMR 6.07(3)(a) through (f), including a current certificate of refresher training in the discipline for which certification is sought, as specified at 453 CMR 6.10(5).

(5) Delivery of Services. Because of the highly diversified, technical nature of asbestos consulting, comprehensive requirements for the conduct of the work are not set forth in 453 CMR 6.00. Asbestos Consultants shall perform the functions authorized at 453 CMR 6.07(1)(a) through (d), as applicable, in accordance with the requirements of 453 CMR 6.00, applicable EPA asbestos standards and protocols, including 40 CFR Part 763, Subpart E, other applicable federal standards and in accordance with professional standards generally recognized as Astate-of-the-art@ by the asbestos consulting industry and asbestos professional associations, and in accordance with current practices taught by Certified Training Providers.

6.08: Certification and Other Requirements for Asbestos Analytical Services

(1) Scope of Services. Applicants for certification as providers of Asbestos Analytical Services shall receive separate approval to provide the services listed at 453 CMR 6.08(1)(a) through (d).

(a) Class A Certificate holders shall be authorized to use polarized light microscopy (PLM) for the analysis of bulk asbestos samples originating in all facilities and locations subject to the requirements of 453 CMR 6.00, including school buildings and other facilities subject to the requirements of AHERA.

(b) Class B Certificate holders shall be authorized to use polarized light microscopy (PLM) for the analysis of bulk asbestos samples originating in all facilities and locations subject to the requirements of 453 CMR 6.00, except school buildings and other facilities subject to the requirements of AHERA.

(c) Class C Certificate holders shall be authorized to use phase contrast microscopy (PCM) for the analysis of air samples originating in all facilities and locations subject to the requirements of 453 CMR 6.00, including school buildings and other facilities subject to the requirements of AHERA.

(d) Class D Certificate holders shall be authorized to use transmission electron microscopy (TEM) for the analysis of air and bulk asbestos samples originating in all facilities and locations subject to the requirements of 453 CMR 6.00, including school buildings and other facilities subject to the requirements of AHERA.

(2) Application for Certification as a Provider of Asbestos Analytical Services. Applicants for certification as providers of Asbestos Analytical Services shall submit the following to the Director:

(a) A completed application form with attachments as prescribed by the Director, which shall, at a minimum, include the following:

1. A list of all names, acronyms or other identifiers by which the applicant does or has done business, and the address(es) and telephone number(s) of the business.
2. The type(s) of approval/certification listed at 453 CMR 6.08(1)(a) through (d) for which the applicant is applying.
3. Corporate Articles of Organization and a Certificate of Good Standing issued by the Massachusetts Secretary of State or a DBA (doing business as) certificate for the Asbestos Analytical Service of the applicant issued by the city or town where the business is located.
4. A certified and notarized statement by a Responsible Person of the applicant that the applicant has paid all tax obligations current and due to the Commonwealth as of the date of application.
5. Evidence that the Asbestos Analytical Services to be performed by the applicant are covered under a current workers' compensation policy or self-insurance program acceptable to the Commonwealth.
6. A list of all occupational safety and health-related citations or notices of violation, including notices of noncompliance, notices of responsibility, notices of intent to assess an administrative penalty, orders, consent orders and court judgements, received by the Responsible Persons of the applicant in the two years prior to the date of application, and the issuing agency or department and final disposition of such citation or notice.
7. A list of the names and addresses of all persons designated as Asbestos Laboratory

Supervisors of the Asbestos Analytical Service pursuant to 453 CMR 6.08(4)(a).

(b) A copy of the laboratory standard operating procedures manual for asbestos analysis used by the applicant, which shall minimally include:

1. A listing of all Responsible Persons and employees of the applicant who will be performing asbestos analysis.

2. Legible copies of certificates of training or other training records for all persons listed at 453 CMR 6.08(2)(b)1., indicating that each such person has fulfilled the applicable asbestos analytical training required by 453 CMR 6.08(4)(d).

3. Copies of all applicable analytical protocols and procedures referenced at 453 CMR 6.08(4)(f).

4. An inventory of the analytical equipment used by the applicant, with a description of associated equipment calibration and maintenance procedures and schedules.

5. A description of chain of custody procedures, including handling, storage and disposal procedures for asbestos samples.

6. A description of the quality control procedures and programs utilized by the applicant.

(c) Results indicating proficiency in the two most recent rounds of the applicable quality control program(s) required by 453 CMR 6.08(4)(e). Documentation shall be in the form of legible copies of official correspondence or certificates from the provider of the applicable quality control program. Applicants from within the Commonwealth seeking certification as Class B or Class C Asbestos Analytical Services may submit the single most recent quality control round result, but their receipt of certification and approval pursuant to 453 CMR 6.08(2) may be contingent upon the results of a laboratory inspection at the discretion of the Director.

(d) A money order or certified bank check payable to the Commonwealth of Massachusetts in the amount of the entire annual fee of $350.00, or any other amount established for such certificate pursuant to M.G.L. c. 7, ' 3B. If the Director denies, revokes, suspends or refuses to renew a certificate for reasons specified in 453 CMR 6.04, the fee payment is not refundable.

(e) Such other information as the Director may reasonably require.

(3) Renewal of an Asbestos Analytical Service Certificate. A certificate as a provider of Asbestos Analytical Services is valid for a period of one year. The Director may renew an Asbestos Analytical Service certificate upon written application for renewal by the certificate holder. Renewal applications should be submitted to the Department of Labor and Workforce Development no later than 30 calendar days before the expiration of the current certificate. The submission of a renewal application later than 30 days before the expiration of the current certificate may result in renewal after the expiration of the current certificate. Said application for renewal shall include submission of the items referenced at 453 CMR 6.08(2)(a) through (e). The Director may waive the requirement for resubmission of the information specified at 453 CMR 6.08(2)(b) where there has been no substantive change in the information submitted with a previous application, and the applicant attests to such.

(4) Operating Requirements for Asbestos Analytical Services. Because of the highly diversified, technical nature of asbestos analysis, comprehensive requirements for the conduct of the work are not set forth in 453 CMR 6.00. Certified providers of Asbestos Analytical Services shall conduct asbestos analytical work in accordance with officially recognized methodologies and generally accepted industrial hygiene laboratory practices. Providers of Asbestos Analytical Services shall minimally adhere to the following operating requirements, as a condition of certification:

(a) Designation of Asbestos Laboratory Supervisor. Applicants for certification as providers of Asbestos Analytical Services shall designate a qualified Asbestos Laboratory Supervisor, who shall be jointly responsible with other Responsible Persons of the certified Asbestos Analytical Service, if any, for the adherence to the applicable analytical protocols, the maintenance of proper quality control procedures and the accuracy of the analytical results.

(b) Use of Personnel. The Asbestos Laboratory Supervisor and the Responsible Persons of the certified Asbestos Analytical Service shall ensure that no person shall perform, or be directed to perform, any asbestos analysis in the direct business interest of an Asbestos Analytical Service unless that person is a Responsible Person or an employee of said Asbestos Analytical Service.

(c) Possession of Adequate Equipment and Supplies. Asbestos Analytical Services shall possess all equipment and supplies necessary to perform the services offered. Equipment shall be calibrated and maintained as specified by the analytical protocols used or generally accepted industrial hygiene practices.

(d) Training. All employees and Responsible Persons of an Asbestos Analytical Service who perform any asbestos analysis shall have successfully completed appropriate training, as specified at 453 CMR 6.08(4)(d)1.through 3.:

1. Training Requirements for Class A and Class B Certificates. All employees and Responsible Persons of Class A and Class B Asbestos Analytical Services shall have successfully completed an approved course of training in the techniques and procedures for identification of asbestos in bulk samples (*e.g*. McCrone Research Institute Asbestos Bulk Analysis course, or an equivalent course acceptable to the Director).
2. Training Requirements for Class C Certificates. All employees and Responsible Persons of Class C Asbestos Analytical Services shall have successfully completed the NIOSH #582 Course, "Sampling and Evaluating Airborne Asbestos" or an equivalent course acceptable to the Director.
3. Training Requirements for Class D Certificates. All employees and Responsible Persons of Class D Asbestos Analytical Services shall have successfully completed an approved course of training in the techniques and procedures for identification of asbestos in air samples using TEM (*e.g*. McCrone Research Institute Asbestos Analysis by Transmission Electronic Microscopy course), or an equivalent course acceptable to the Director.

(e) Required Participation in Quality Control Testing Programs. All certified Asbestos Analytical Services shall participate and maintain proficiency or accreditation in official quality control testing programs, as specified at 453 CMR 6.08(4)(e)1. through 5.:

1. Certified Class A Asbestos Analytical Services shall maintain accredited status in the National Voluntary Laboratory Accreditation Program of the NIST.
2. Certified Class B Asbestos Analytical Services shall:
   a. Maintain accredited status in the National Voluntary Laboratory Accreditation Program of the NIST or
   b. Maintain proficiency in the Bulk Asbestos Quality Assurance Program of the American Industrial Hygiene Association or in an equivalent quality assurance program acceptable to the Director.
3. Certified Class C Asbestos Analytical Services shall:
   a. Participate and maintain proficiency in the Proficiency Analytical Testing (PAT) Program of the American Industrial Hygiene Association or
   b. Ensure that all analysts performing such testing for said analytical service are listed in the Asbestos Analysts Registry (AAR) of the American Industrial Hygiene Association and maintain proficiency in the Asbestos Analysis Testing (AAT) Program of the American Industrial Hygiene Association.
4. (Effective June 26, 1999) Additionally, the Asbestos Laboratory Supervisor and Responsible Persons of certified Class C Asbestos Analytical Services shall ensure that all analysts who perform field analysis of asbestos air samples using phase contrast microscopy are listed in the Asbestos Analysts Registry (AAR) of the American Industrial Hygiene Association and maintain proficiency in the Asbestos Analysis Testing (AAT) Program of the American Industrial Hygiene Association.
5. Certified Class D Asbestos Analytical Services shall maintain accredited status in "Airborne Asbestos Fiber Analysis" in the National Voluntary Laboratory Accreditation Program(NVLAP) of the NIST.

(f) Required Use of Official Analytical Protocols. In performing asbestos analysis, certified Asbestos Analytical Services shall use official protocols, as set forth at 453 CMR 6.08(4)(f)1. through 3.:

1. Certified Class A and Class B Asbestos Analytical Services shall use the "Interim Method for the Determination of Asbestos in Bulk Insulation Samples" found at Appendix A to Subpart F of 40 CFR Part 763 or the "Method for the Determination of Asbestos in Bulk Building Materials" (EPA/600/R-93/116) for the analysis of bulk asbestos samples by polarizing light microscopy.
2. Certified Class C Asbestos Analytical Services shall use the NIOSH Method 7400 for the determination of asbestos in clearance air monitoring samples and air samples collected to assess environmental asbestos exposures. Analytical services may use either the NIOSH Method 7400 or the OSHA Reference Method (29 CFR Part 1910.1001,

Appendix A, 51 FR No. 119, 22739, June 20, 1986) for the analysis of personal air monitoring samples.

3. Certified Class D Asbestos Analytical Services shall use the "Interim Transmission Electron Microscopy Methods - Mandatory and Nonmandatory - and Mandatory Section to Determine Completion of Response Actions," referenced at 40 CFR Part 763, Appendix A, for airborne asbestos analysis by TEM.

(g) Asbestos Analytical Services shall maintain records, as provided by 453 CMR 6.11(4).

6.09: Certification and Other Requirements for Training Providers

(1) Application for Certification as an Asbestos Training Provider. Applicants for certification as an Asbestos Training Provider shall submit the following to the Director:

(a) A completed application form with attachments as prescribed by the Director, which shall, at a minimum, include the following:

1. A list of all names, acronyms or other identifiers under which the applicant intends to conduct training and the address(es) and telephone number(s) of the business.

2. A list of those training course(s) set forth in 453 CMR 6.10 which the applicant intends to offer.

3. Corporate Articles of Organization and a Certificate of Good Standing issued by the Massachusetts Secretary of State or a DBA (doing business as) certificate for the Asbestos Training Provider issued by the city or town where the business is located.

4. A certified and notarized statement by a Responsible Person of the applicant that the applicant has paid all tax obligations current and due to the Commonwealth as of the date of application.

5. Evidence that asbestos training services to be performed by the applicant are covered under a current workers' compensation policy or self-insurance program acceptable to the Commonwealth.

6. A list of all occupational safety and health-related citations or notices of violation, including notices of noncompliance, notices of responsibility, notices of intent to assess an administrative penalty, orders, consent orders and court judgements, received by the Responsible Persons of the applicant in the two years prior to the date of application, and the issuing agency or department and final disposition of such citation or notice.

7. A sample agenda for each training course which the applicant intends to offer, which shows topics covered and the amount of time to be given to each topic.

8. A copy of the training manual and all printed material to be distributed in each course.

9. A description of the teaching methods to be employed, including audio-visual aids.

10. A description of the hands-on training to be provided (where required), including facilities, training methods, numbers of students to be accommodated, and ratio of students to instructors.

11. A description of the equipment that will be used in both classroom lectures and in hands-on training.

12. A list of the names and qualifications of the persons who will provide the training in each course, including their education, training, and experience.

13. An example of the written examination to be given in each course.

14. A list of the tuition or other fees required.

15. A copy of the certificate of completion to be given to participants.

16. A list of all states and federal agencies which have certified, accredited or given other forms of approval to the applicant to provide asbestos training, including the name, address and telephone number of the person, department, or agency giving such approval, and copies of all such written approvals received.

17. A statement made under the penalties of perjury by a Responsible Person of the applicant that the applicant will comply with the applicable requirements of 453 CMR 6.00.

(b) Such other information as the Director may reasonably require.

(c) A money order or certified bank check payable to the Commonwealth of Massachusetts in the amount of the entire annual fee of $850.00, or any other amount established for such certificate pursuant to M.G.L. c. 7, ' 3B. If the Director denies, revokes, suspends or refuses to renew a certificate for reasons specified in 453 CMR 6.04, the fee payment is not refundable.

(2) Renewal of an Asbestos Training Provider Certificate. A certificate as an Asbestos Training Provider is valid for a period of one year. The Director may renew an Asbestos Training Provider certificate upon written application for renewal by the certificate holder. Renewal applications should be submitted to the Department of Labor and Workforce Development no later than 30 calendar days before the expiration of the current certificate. The submission of a renewal application later than 30 days before the expiration of the current certificate may result in renewal after the expiration of the current certificate. Said application for renewal shall include submission of the items referenced at 453 CMR 6.09(1)(a) through (c). The Director may waive the requirement for resubmission of information specified at 453 CMR 6.09(1)(a) where there has been no substantive change in the information submitted with a previous application, and the applicant attests to such.

(3) Requirements for Certified Training Providers. Certified Asbestos Training Providers shall perform the following as a condition of certified status:

(a) Notify the Director, in writing, at least ten days prior to the commencement of any asbestos training course for which certification is required by 453 CMR 6.00, with the course title, location and anticipated start and end dates of said course.

(b) Notify the Director, in writing, of any changes in the course content, training methods, facilities, *etc*., which would alter the course of instruction from that originally submitted for certification. (Minor changes in agenda, such as guest speakers, if otherwise qualified, and course schedule, are excepted.)

(c) Issue serially-numbered certificates to all students who successfully complete asbestos training courses. The numbered certificates shall include the name of the student and the course completed, the dates of the course and the examination, and a statement that the student passed any examination required. The certificate shall include an expiration date that is one year from the date on which the student successfully completed the course.

(d) Maintain the training records required by 453 CMR 6.11(2).

(e) Utilize and distribute information or training materials furnished by the Department.

(f) Provide written course materials, oral instruction and written examinations only in language in which each student is fluent.

(g) Provide to the Director within 30 calendar days after the conclusion of each initial and refresher training course, the title of the course, the date(s) on which the course was provided and the name, address, and Social Security number of each student who successfully completed the course.

(h) Subsequent to reasonable notice, permit up to two representatives of the Director to attend each course and to take the written examination without cost to the Department.

(i) Allow auditing inspections of approved training courses by the Director or his or her representative. Applicants from outside the Commonwealth shall, at the Department's option, bear the costs to the Department for one course audit per year for each course for which approval is granted pursuant to 453 CMR 6.09. Said costs shall include two-way travel and food and lodging expenses for one individual for the entire length of each course.

6.10: Training Requirements

(1) Persons Requiring Training. All persons seeking certification as Asbestos Supervisors, Asbestos Workers, Asbestos Inspectors, Asbestos Management Planners, Asbestos Project Designers and/or Asbestos Project Monitors shall have successfully completed the applicable initial and refresher training for the discipline in which they wish to be certified, as set forth at 453 CMR 6.10(2), 6.10(4)(a) through (g) and/or 453 CMR 6.10(5). All Asbestos-Associated Project Workers shall have successfully completed the applicable initial training as set forth in 453 CMR 6.10(4)(h). Only asbestos training which has been provided by a certified Asbestos Training Provider or which meets the reciprocity requirements of 453 CMR 6.10(2) shall be allowable for the purposes of 453 CMR 6.10.

(2) Allowance for Prior Training Courses.

(a) Any person who has successfully completed the applicable initial and refresher training for certification as an Asbestos Worker, Asbestos Supervisor, Asbestos Inspector, Asbestos Management Planner, Asbestos Project Designer or Asbestos Project Monitor prior to the effective date of 453 CMR 6.00 shall not be required to take another initial training course to fulfill his or her training requirements for certification in that discipline pursuant to 453 CMR 6.00, provided that said training was:

1. Supplied by an EPA-approved provider of asbestos training;

2. Approved by a state asbestos licensing and/or accreditation program with applicable asbestos training requirements no less stringent than those set forth in Appendix C to Subpart E of 40 CFR Part 763; or

3. Approved by the Director; and provided that said course was substantially equivalent in length and content to the applicable asbestos training course specified at 453 CMR 6.10(4).

(b) Any person who had successfully completed Asbestos-Associated Project Worker training required by 453 CMR 6.10(4)(h) and 453 CMR 6.13(1)(a) prior to June 26, 1998, shall not be required to take another training course to fulfill his or her training requirements for participation in Asbestos-Associated Project Work or Small-Scale Asbestos Projects, provided that said training course meets one of the criteria set forth at 453 CMR 6.10(2)(a)1. through 3.. The refresher training requirements of the OSHA Asbestos Standard 29 CFR Part 1926.1101 shall also apply to the the training of Asbestos-Associated Project Workers.

(c) Where an initial or refresher training certificate has expired, the holder shall have a grace period of one year from the date of expiration of said training certificate in which to take another refresher training course in the same discipline in lieu of re-taking the applicable initial course of training.

(3) Determination of Course Equivalency. The Director shall determine whether courses and examinations are equivalent to the training and examination requirements of 453 CMR 6.00.

(4) Training Curriculum. Training courses required for licensure or certification pursuant to 453 CMR 6.05 through 6.07 or work on an Asbestos-Associated Project or a Small-Scale Asbestos Project shall be conducted by training providers certified pursuant to 453 CMR 6.09, except as provided in 453 CMR 6.10(2) and at a minimum, meet the following criteria of duration, subject matter and examination:

(a) General.

1. Courses of instruction required by 453 CMR 6.10(1) and (4) shall be specific for each of the disciplines as set forth in 453 CMR 6.10(1). The topics or subjects of instruction which a person must receive to meet the training requirements must be presented through a combination of lectures, demonstrations, and field trips or hands-on practice, as appropriate.

2. Courses requiring hands-on training must be presented in an environment suitable to permit participants to have actual experience performing tasks associated with asbestos abatement. Demonstrations not involving individual participant participation shall not substitute for hands-on training. Hands-on training sessions shall maintain a student-to-instructor ratio of not greater than 10:1. The Division of Occupational Safety recommends that lecture sections of asbestos training courses have a student to instructor ratio no higher than 25:1.

3. For purposes of 453 CMR 6.00, one training day shall consist of eight-hours of actual classroom instruction, hands-on training and field trips, or combinations thereof, including lunch and breaks.

4. Asbestos-Associated Project Worker training may be given on non-consecutive days, provided that the entire course of instruction is given within a two-week period. Asbestos training for the asbestos disciplines requiring certification pursuant to 453 CMR 6.00 shall be given on consecutive days, except as authorized by the Director in writing.

5. The Director reserves the right to administer a proficiency examination to any person applying for certification pursuant to 453 CMR 6.00.

(b) Asbestos Workers. Persons seeking certification as Asbestos Workers shall successfully complete an approved four-day training course specified below or the course required under 453 CMR 6.10(4)(c). The training course shall include lectures, demonstrations, at least 14 hours of hands-on training, including respirator fit testing, course review, and a written examination consisting of 50 multiple choice questions. Successful completion of the course shall be demonstrated by achieving a score of at least 70% on the examination. The course shall adequately address the requirements of 453 CMR 6.00 applicable to Asbestos Workers and the topics specified for Asbestos Workers in Appendix C to subpart E of 40 CFR Part 763, as set forth in 59 FR 5236-5260, February 3, 1994, which are listed in 453 CMR 6.20: *Appendix II*.

(c) Asbestos Supervisors. Persons seeking certification as Asbestos Supervisors shall successfully complete an approved five-day training course as specified below. The training course shall include lectures, demonstrations, at least fourteen hours of hands-on training,

respirator fit testing, course review, and a written examination consisting of 100 multiple choice questions. Successful completion of the course shall be demonstrated by achieving a score of at least 70% on the examination. The course shall adequately address the requirements of 453 CMR 6.00 applicable to Asbestos Supervisors and the topics specified for Contractors/Supervisors in Appendix C to subpart E of 40 CFR Part 763, as set forth in 59 FR 5236-5260, February 3, 1994, which are listed in 453 CMR 6.20: *Appendix II*.

(d) Asbestos Inspectors. Persons seeking certification as Asbestos Inspectors shall successfully complete an approved three-day training course as specified below. The training course shall include lectures, demonstrations, at least four hours of hands-on training, including respirator fit testing, course review and a written examination consisting of 50 multiple choice questions. Successful completion of the course shall be demonstrated by achieving a score of at least 70% on the examination. The course shall adequately address the requirements of 453 CMR 6.00 applicable to Asbestos Inspectors and the topics specified for Asbestos Inspectors in Appendix C to subpart E of 40 CFR Part 763, as set forth in 59 FR 5236-5260, February 3, 1994, which are listed in 453 CMR 6.20: *Appendix II*.

(e) Asbestos Management Planners. Persons seeking certification as Asbestos Management Planners shall successfully complete the training program as described in 453 CMR 6.10(4)(d), plus an approved two-day management training course as specified below. The Asbestos Management Planner course shall include lectures, demonstrations, course review and a written examination consisting of 50 multiple choice questions. Successful completion of the course shall be demonstrated by achieving a score of at least 70% on the examination. The course shall adequately address requirements of 453 CMR 6.00 applicable to Asbestos Management Planners and the topics specified for Management Planners in Appendix C to subpart E of 40 CFR Part 763, as set forth in 59 FR 5236-5260, February 3, 1994, which are listed in 453 CMR 6.20: *Appendix II*.

(f) Asbestos Project Designers. Persons seeking certification as Asbestos Project Designers shall successfully complete an approved three-day training course. The training course shall include lectures, demonstrations, a field trip, course review, and a written examination consisting of 100 multiple choice questions. Successful completion of the course shall be demonstrated by achieving a score of at least 70% on the examination. The course shall adequately address the requirements of 453 CMR 6.00 applicable to Asbestos Project Designers and the topics specified for Project Designers in Appendix C to subpart E of 40 CFR Part 763, as set forth in 59 FR 5236-5260, February 3, 1994, which are listed in 453 CMR 6.20: *Appendix II*.

(g) Asbestos Project Monitor. Persons seeking certification as Asbestos Project Monitors shall successfully complete an approved five-day training course. The training course shall include lectures, demonstrations, at least six hours of hands-on training, a course review and a written examination consisting of 100 multiple choice questions. Successful completion of the course shall be demonstrated by achieving a score of at least 70% on the examination. The course shall adequately address the requirements of 453 CMR 6.00 applicable to Asbestos Project Monitors and the topics specified for Project Monitors in Appendix C to subpart E of 40 CFR Part 763, as set forth in 59 FR 5236-5260, February 3, 1994, which are listed in 453 CMR 6.20: *Appendix II*.

(h) Asbestos-Associated Project Workers. Persons seeking designation as Asbestos-Associated Project Workers shall successfully complete an approved two-day training course. The training course for Asbestos-Associated Project Workers shall include lectures, demonstrations, and a minimum of four hours of hands-on training. An examination is not required. The course shall adequately address the following subjects:

1. Background information on asbestos.
2. Potential health effects related to asbestos exposure.
3. Recognition of damage, deterioration and delamination of asbestos material.
4. Employee personal protective equipment.
5. Personal hygiene.
6. Proper methods of handling asbestos material.
7. Relevant federal, state and local regulatory requirements.
8. Hands-on training.

(5) Refresher Training. Annual refresher training is required for Asbestos Workers, Asbestos Supervisors and all Asbestos Consultant disciplines as a condition of maintaining certification. Annual refresher training is recommended but not required for Asbestos-Associated Project Workers. Satisfactory completion of such training shall be a condition of certification renewal

and evidence of satisfactory completion shall be included in the annual renewal application. Training providers shall determine successful completion of a refresher course by conducting a written examination consisting of 25 questions at the conclusion of the course. A score of 70% or higher shall be considered passing.

(a) Refresher training for all disciplines except Asbestos Inspectors shall be of one-day duration. Refresher training for Asbestos Inspectors shall be 2 day in length. Asbestos Management Planners shall attend the Asbestos Inspector refresher course plus an additional 2 day on management planning.

(b) The refresher curriculum for all disciplines shall include a review of changes in applicable state and federal laws, regulations, policies and guidelines; developments or changes in state-of-the-art procedures and equipment; and the key areas of initial training specific to each discipline.

6.11: Recordkeeping

(1) Maintenance, Submission and Retention of Records. Certified Training Providers, Asbestos Contractors, Asbestos Analytical Services, Asbestos Consultants and employers of Asbestos Associated Project Workers shall maintain the records as indicated at 453 CMR 6.11(2) through (6) and make said records available to the Director upon request. Entities whose principal place of business is outside of the Commonwealth of Massachusetts shall provide photocopies of such records or documents within ten business days of receipt of a written request from the Director. Records and documents required to be kept by 453 CMR 6.11 shall be retained for a period of 30 years from the date of project or activity completion, except that records required to be kept by 453 CMR 6.11(2) shall be kept for a period of at least 15 years. Entities or persons ceasing to do business, or relocating the principal place of business shall so notify the Director in writing within 30 days of such event. The Director, on receipt of such notification may instruct that the records be surrendered to the Department, or may specify a repository for such records. The entity or person shall comply with the Director's instructions within 60 days.

(2) Certified Training Providers. Certified Training Providers shall maintain the following records:

(a) Copies of all written materials required to be submitted with the application for certification and course approval by 453 6.09(1).

(b) Copies of all pre-course notifications required to be filed by 453 CMR 6.09(3)(a) with applicable course agendas.

(c) Copies of all post-course notifications required by 453 CMR 6.09(3)(g), including the name, address, telephone number, Social Security Identification Number and final examination score of each person who completed each course.

(d) A copy of the certificate of completion of each student passing the course.

(e) The name, business address and telephone number of the person(s) who proctored the examinations.

(3) Asbestos Contractors.

(a) Central Location. The following records and documents shall be maintained by Asbestos Contractors at the principal place of business:

1. Copies of all written materials required to be submitted for Asbestos Contractor licensure pursuant to 453 CMR 6.05.

2. Name, address, telephone number and dates of employment or affiliation of every Asbestos Worker and Supervisor employed by or included within the corporate structure of the Asbestos Contractor.

3. Copies of all asbestos training certificates required by 453 CMR 6.10 and all Asbestos Worker and Supervisor/Foreperson certifications issued by the Department pursuant to 453 CMR 6.06 for every Asbestos Worker and Supervisor/ Foreperson employed by or included within the business structure of the Asbestos Contractor.

4. Copies of all notifications made by the Asbestos Contractor pursuant to 453 CMR 6.12.

5. Receipts and documentation of disposal of asbestos waste, showing dates, locations and amounts of asbestos waste disposed, including the identification of the source of the asbestos waste and the transporter (company name or driver name, if an employee of the contractor).

6. Copies of all asbestos analysis and exposure monitoring reports in the possession of

the Asbestos Contractor relating to past or present Asbestos Work, including clearance air monitoring reports required by 453 CMR 6.14(5)(b).

7. Copies of all contracts awarded for Asbestos Work.

8. All records and documents required by 29 CFR 1910.134 and 1926.1101 and any other applicable federal, state or local law, regulation or ordinance.

9. Copies of all records required to be maintained on-site by 453 CMR 6.11(3)(b).

(b) On-site. The following records and documents shall be maintained by the Asbestos Contractor at the Asbestos Project worksite for the duration of the project:

1. A current copy of 453 CMR 6.00.

2. A copy of all contract, project design or technical specifications governing the project in the possession of the Asbestos Contractor.

3. A listing of each of the contractors, sub-contractors and consultants on the project.

4. A listing of every employee or person within the business structure of the contractor at the worksite and a legible copy of the Massachusetts certification card of each Asbestos Worker and each Asbestos Supervisor on site.

5. A daily sign-in/out log which includes the printed and signed name and the Massachusetts Asbestos Certification Number (where applicable) of each person who enters the Asbestos Work Area, with the times of entry and exiting.

6. Records of all on-site air monitoring pertaining to the project in the possession of the Asbestos Contractor.

7. A written respirator program which conforms to requirements of 29 CFR 1910.134(b).

(4) Certified Analytical Services. Certified Asbestos Analytical Services shall maintain the following records:

(a) Copies of all documents required for certification pursuant to 453 CMR 6.08, including quality control results.

(b) Records of all analyses performed, including the identity of the sender, the laboratory identification number, the date collected, the location from which the sample was collected and the analytical results.

(c) Persons who perform on-site phase contrast analysis of clearance air monitoring samples and are required to be listed in the Asbestos Analyst Registry(AAR) of the American Industrial Hygiene Association by 453 CMR 6.08(4)(e)4. shall keep photocopies of such listing at each such work site.

(5) Certified Asbestos Consultants. Certified Asbestos Consultants shall maintain all documentation pertaining to inspections, assessments, management plans, project designs sampling, project monitoring, or other asbestos consultation performed by them within the scope of each consultant discipline set forth at 453 CMR 6.07. Said records shall include an identification of the client, the dates and locations of service and the results or conclusions. Logs for completed projects shall be maintained at the consultant's principal place of business. Logs for current projects shall be kept at the asbestos project worksite.

(6) Employers of Asbestos-Associated Project Workers. Employers of Asbestos-Associated Project Workers shall maintain at the place of employment copies of each worker's Associated-Project Worker training certificate issued by a certified Asbestos Training Provider and any and all documents required to be kept by 29 CFR Part 1926.1101.

6.12: Notification of Asbestos Projects

An Asbestos Contractor or operator of an Asbestos Response Action shall notify the Director before engaging in any Asbestos Response Action which involves more than three linear feet of asbestos on or in pipes, ducts or wires or more than three square feet of asbestos on or in structures or components other than pipes, ducts or wires. Notification shall be on forms jointly prescribed by the Director and the Department of Environmental Protection. Notification shall be postmarked, hand-delivered or Faxed at least ten days before the project start date, or, in the case of an Emergency Project, within one working day after the project start date. Fulfillment of the notification requirements of 453 CMR 6.12 shall not relieve the Asbestos Contractor, operator of the project or facility owner of the responsibility for making written notification as may be required by any other municipality, agency of the Commonwealth, or any agency of the federal government.

6.13: Work Practices and other Requirements for Small-Scale Asbestos Projects, Asbestos-Associated Projects and Work Operations Involving Non-Friable ACBM

(1) Requirements for Small-Scale Asbestos Projects and Asbestos-Associated Projects.

(a) Exemption from Licensing and Certification Requirements; Requirements for Training. Persons or entities who carry out Small-Scale Asbestos Projects need not be licensed as Asbestos Contractors or certified as Asbestos Workers or Asbestos Supervisors, provided that all persons participating in the work have received the Asbestos Associated Project Worker training specified by 453 CMR 6.10(4)(h), the Asbestos Worker training specified at 453 CMR 6.10(4)(c) or the Asbestos Supervisor training specified at 453 CMR 6.10(4)(c) and provided that the work is conducted in accordance with the applicable provisions of 453 CMR 6.13.

(b) Personal Protection. All employees who perform Small-Scale Asbestos Projects shall be provided with personal protection in accordance with the requirements of 453 CMR 6.03(12).

(c) Work Practice Requirements. Persons or entities carrying out, or having supervisory authority over, Small-Scale Asbestos Projects or Asbestos-Associated Projects shall ensure that the work practice requirements of 453 CMR 6.13(1)(c) are met.

1. All persons not directly involved in the work shall be excluded from the Work Area. Physical barriers shall be used as necessary to limit access to the Work Area for the duration of the project.

2. Dust-tight barriers shall be constructed to insure that asbestos fibers released during work activities are contained within the Work Area. Glove bags and prefabricated mini-enclosures are permitted in place of constructed barriers.

3. Before any ACM is disturbed it shall be wet with Amended Water, and it shall be kept wet throughout the work operation until properly containerized.

4. Any friable ACM exposed as a result of the work operation shall be suitably enclosed or encapsulated as specified by 453 CMR 6.14(4)(d)4. or 6.14(4)(d)5.

5. HEPA vacuuming or wet cleaning shall be used to decontaminate the Work Area and any equipment used in the work operation until all surfaces are free of visible debris.

6. Asbestos-containing waste shall be containerized, transported, and disposed as specified at 453 CMR 6.14(4)(d)2. and 6.14(4)(h).

(d) Clearance Inspections. All surfaces within the Work Area shall be visually inspected for dust, debris and other particulate residue by the owner of the facility or by persons who have been trained pursuant to 453 CMR 6.10(4)(b), (c), (g) or (h). The Work Area shall be repeatedly cleaned by the Contractor or other entity carrying out the work operation until the no visible debris criterion is achieved.

(2) Requirements for Asbestos Projects Involving Non-Friable ACBM.

(a) Applicability of Standards.

1. The requirements of 453 CMR 6.13(1) for Small-Scale Asbestos Projects shall apply to work operations which involve the sanding, grinding, cutting (by sawing), chipping or abrading of three or fewer linear feet of Category I or Category II non-friable ACBM, where the material covers, or is contained within, pipes, ducts or wires, or three or fewer square feet of Category I or Category II non-friable ACBM, where the material covers, or is contained within, structures other than pipes, ducts or wires.

2. The requirements of 453 CMR 6.14 for Asbestos Response Actions shall apply to work operations which involve the sanding, grinding, cutting (by sawing), chipping or abrading of greater than three linear feet of Category I or Category II non-friable ACBM, where the material covers, or is contained within, pipes, ducts or wires, or greater than three square feet of Category I or Category II non-friable ACBM, where the material covers, or is contained within, structures other than pipes, ducts or wires.

3. The requirements of 453 CMR 6.13(1) for Small-Scale Asbestos Projects shall apply to work operations which involve the breaking, shearing, or slicing of three or fewer linear/square feet of Category II non-friable ACBM, where the work operation results in the production of asbestos dust or the material becoming friable.

4. The requirements of 453 CMR 6.14 for Asbestos Response Actions shall apply to work operations which involve the breaking, shearing, or slicing of greater than three linear/square feet of Category II non-friable ACBM, where the work operation results in the production of asbestos dust or the material becoming friable.

5. Work operations which involve the breaking, shearing, or slicing of Category I or Category II non-friable ACBM shall not be subject to the requirements of 453 CMR 6.00, where such work does not result in the production of asbestos dust or the material becoming friable.

(b) Disposal Requirements. Asbestos debris shall be disposed in accordance with 310 CMR 7.00 and 19.00 and the EPA National Emission Standard for Asbestos (NESHAP) as contained in 40 CFR Part 61, Subpart M and other applicable state and federal standards.

6.14: Work Practices and Other Requirements for Asbestos Response Actions

(1) Required Use of Licensed Asbestos Contractors. Except as allowed by 453 CMR 6.14(1)(a), only Asbestos Contractors licensed pursuant to 453 CMR 6.03(2) and 6.05 shall carry out Asbestos Response Actions.

(a) Exception to Licensing Requirement for Entities Conducting Response Actions in their Own Facilities. Persons, firms, corporations or other entities who carry out Asbestos Response Actions at their own property or usual place of business or employment using their own regular employees or Responsible Persons need not be licensed as Asbestos Contractors, provided that the requirements of 453 CMR 6.14(2) and (3) are met, and the work is otherwise conducted in accordance with the applicable requirements of 453 CMR 6.00.

(2) Requirement for On-Site Supervisor. The Responsible Persons of the licensed Asbestos Contractor or other entity carrying out an Asbestos Response Action shall ensure that a certified Asbestos Supervisor who is an employee or Responsible Person of said Asbestos Contractor or entity is present at the worksite and in control of the work at all times when work is in progress.

(3) Requirement for Use of Certified Asbestos Workers. The Responsible Persons of the licensed Asbestos Contractor or other entity carrying out an Asbestos Response Action shall ensure that all persons who perform the functions of Asbestos Workers in the Work Area are Responsible Persons or employees of said Asbestos Contractor or entity and that said persons are certified pursuant to 453 CMR 6.03(3).

(4) Required Work Practices. Asbestos Contractors, Asbestos Supervisors and others carrying out, or having supervisory authority over, Asbestos Response Actions shall ensure that the work practice requirements of 453 CMR 6.14(4) are met.

(a) Work Area Preparation.

1. Exclusion of Persons from the Work Area. All persons not directly involved in the work operation shall be excluded from the Work Area.

2. Sign In/Out Log. The Asbestos Contractor or other entity carrying out an Asbestos Response Action shall ensure that each person entering or leaving the Work Area individually completes the appropriate entries in the sign-in/out log referenced at 453 CMR 6.11(3)(b)5., including printed name, signature, Massachusetts Certification Number, where applicable, and the time of each entry or exiting.

3. Posting of Warning Signs. Warning signs meeting the specifications set forth in 29 CFR Part 1926.1101 (k)(6)(i) shall be posted at all approaches to the Work Area. Signs shall be posted a sufficient distance from the Work Area to permit a person to read the sign(s) and take precautionary measures to avoid exposure to asbestos.

4. Shutdown of HVAC Systems. The facility heating, ventilation and air-conditioning (HVAC) systems of the Work Area shall be shut down, locked out and isolated.

5. Removal of Moveable Objects. All moveable objects shall be removed from the Work Area. Items to be reused which may have been previously contaminated with asbestos shall be decontaminated by HEPA vacuuming and/or wet cleaning prior to their being removed from the Work Area. All other contaminated items which are not to be reused shall be disposed as asbestos waste.

6. Covering of Non-Moveable Objects. All non-moveable or fixed objects remaining within the Work Area shall be wrapped or covered with six mil thick (minimum) plastic sheeting. Plastic sheet coverings shall be completely sealed with duct tape or equivalent.

7. Isolation of Work Area. The Work Area shall be isolated by sealing all openings, including but not limited to, windows, doors, ventilation openings, drains, grilles, and grates with six mil thick (minimum) plastic sheeting and duct tape or the equivalent. For Asbestos Response Actions performed in Public Facilities, large openings such as open doorways, elevator doors, and passageways shall be first sealed with solid construction,

such as plywood over studding, which shall constitute the outermost boundary of the asbestos Work Area. All cracks, seams and openings in such solid construction shall be caulked or otherwise sealed, so as to prevent the movement of asbestos fibers out of the Work Area.

8. Covering of Floor and Wall Surfaces. Except as allowed by 453 CMR 6.14(4)(a)7.a. through c., floor and wall surfaces shall be covered with plastic sheeting. All seams and joints shall be sealed with duct tape or equivalent. Floor covering shall consist of at least two layers of six mil plastic sheeting, with the edges up-turned to cover at least the bottom 12 inches of the adjoining wall(s). Wall covering shall consist of a minimum of two layers of four mil plastic sheeting. Wall covering shall extend from ceiling to floor and overlap the up-turned floor coverings without protruding onto the floor. Duct tape shall be used to seal the seams in the plastic sheeting at the wall-to-floor joints.

a. Exception to Covering Requirement Where Surfaces Are Impervious. Compliance with 453 CMR 6.14(4)(a)7. is optional where floors and walls are covered by ceramic tile or other impervious materials that are free from holes, drains, cracks, fissures or other openings and which may be thoroughly decontaminated by washing at the conclusion of the work, provided that such action does not result in the passage of asbestos fibers from the Work Area.

b. Exception to Covering Requirement For Abatement Surfaces. Compliance with 453 CMR 6.14(4)(a)7. is not required for those floor and wall surfaces from which asbestos coverings are removed.

c. Exception to Wall Surface Covering Requirement Where Glovebags are Used. Covering of wall surfaces is optional for Asbestos Response Actions where Glovebags are used as the sole means of removal or repair. Where Glovebags are used, the floor of the Work Area shall be covered with a minimum of one layer of six mil-thick plastic sheeting.

8. GFCI Protection. All sources of electric power for the Work Area shall be ground fault circuit interrupter (GFCI) protected.

(b) Use of Decontamination Facilities.

1. Requirement for Use. Except as allowed by 453 CMR 6.14(4)(b)2., Asbestos Contractors and others carrying out Asbestos Response Actions shall supply and ensure the use of a three-compartment decontamination facility, as prescribed by 29 CFR Part 1926.1101(j)(1). Except as may be required during emergencies which endanger life or health, the decontamination facility shall be the sole means through which the isolated work space is accessed while work is in progress.

2. Exception to Decontamination System Requirement for Work Less Than 25 Linear/Ten Square Feet. A change room may be used in lieu of the three- compartment decontamination facility specified by 453 CMR 6.14(4)(b)1. on projects which involve the disturbance of less than 25 linear feet of asbestos on or in pipes, ducts or wires, or less than ten square feet of asbestos on or in structures or components other than pipes, ducts or wires. Where a change room is used it shall be constructed and operated in accordance with OSHA Asbestos Regulations 29 CFR Part 1926.1101(j)(2).

3. Warm Water Required. Warm water shall be supplied to the showers of the decontamination facility required by 453 CMR 6.14(4)(b)1.

4. Decontamination of Personnel Required. No employees shall leave the Work Area without first decontaminating their persons by showering, wet washing or HEPA vacuuming to remove all asbestos debris.

5. Location of Decontamination Facilities. Where feasible, decontamination facilities shall be contiguous with the Work Area. Where such location is not feasible, a remote decontamination facility shall be sited as closely as possible to the Work Area. Persons using such a remotely- sited decontamination facility shall remove visible debris from their persons by HEPA vacuuming prior to donning clean disposable coveralls while still in the Work Area, and then proceed directly to the remote decontamination system to shower and change clothes.

6. Equipment Decontamination. No equipment, supplies, or materials (except properly containerized waste material) shall be removed from an asbestos Work Area unless such equipment, supplies or materials have been thoroughly cleaned free of asbestos debris. Where decontamination is not feasible, such materials shall be wrapped in a minimum of two layers of six mil polyethylene sheeting with all joints, seams and overlaps sealed with tape or containerized in a metal, plastic or fiber drum with a locking lid. Said wrapped equipment, supplies or materials shall be labeled as being asbestos-

contaminated prior to removal from the Work Area. HEPA vacuums shall be emptied of contents prior to removal from the Work Area. Air filtration devices shall have used pre-filters removed and replaced with fresh filters prior to removal from the Work Area. Used HEPA filters and prefilters shall be disposed of as asbestos waste.

(c) Requirement For Work Area Ventilation System. Except as allowed by 453 CMR 6.14(4)(c)1. and 2., a HEPA-filtered Work Area ventilation system shall be used to maintain a reduced atmospheric pressure of at least -0.02 column inches of water pressure differential within the contained Work Area. The system shall be in operation at all times from the commencement of the asbestos project until the requirements of 453 CMR 6.14(5)(b) have been met. The ventilation equipment utilized shall be of sufficient capacity to provide a minimum of four air changes per hour. Ventilation units shall be operated in accordance with Appendix J of EPA Guidance Document EPA 560/5-85-024)and 29 CFR Part 1926.1101(g)(5)(i). Make-up air entering the Work Area shall pass through the decontamination system whenever possible. Exhaust air shall be HEPA-filtered before being discharged outside of the Work Area. Exhaust air tubes or ducts associated with the Work Area ventilation system shall be free of leaks. In all cases where feasible exhaust air shall be discharged to the outside of the building. If access to the outside is not available, exhaust air shall be discharged to an area within the building, but in no case shall exhaust air be discharged into occupied areas of the building or into areas of the building which contain exposed or damaged asbestos. When exhaust air is discharged to the interior of a building, the outflow shall be sampled and analyzed at least once per day per machine using sampling and analysis methods prescribed by the NIOSH Analytical Method 7400 referenced at 40 CFR Part 763, Appendix A. If at any time fiber levels in the exhausted air exceed 0.01 fibers/cc the work operation shall stop immediately, and the corresponding ventilation unit(s) shall be shut off and repaired or replaced before the Asbestos Response Action is resumed.

1. Exception to Work Area Ventilation System Requirement for Work Less than 25 Linear/Ten Square Feet. Compliance with 453 CMR 6.14(4)(c) is optional for Asbestos Response Actions which involve the removal, encapsulation or enclosure of 25 or fewer linear feet of asbestos on or in pipes, ducts or wires or ten or fewer square feet of asbestos on or in structures or components other than pipes, ducts or wires.

2. Exception to Work Area Ventilation System Requirement where Glovebags are Used. Compliance with 453 CMR 6.14(4)(c) is optional for Asbestos Response Actions where Glovebags are used as the sole means of removal or repair.

(d) Work Procedures.

1. Wetting of Asbestos. Prior to removal, ACM shall be thoroughly wetted with Amended Water. Water shall not be applied in amounts that will cause run-off or leakage of the water from the Work Area. Once removed, ACM shall be kept wet until containerized pursuant to 453 CMR 6.14(4)(d)2.

2. Containerization of Asbestos. Removed ACM and asbestos-contaminated debris within the Work Area shall be promptly cleaned up and containerized. Containerized ACM shall be removed from the Work Area at least once each working shift. Waste not containing components with sharp edges shall be containerized in double-thickness plastic bags (six mil minimum thickness each bag) or in metal, plastic or fiber drums with locking lids. ACM with sharp-edged components shall be contained in metal, plastic or fiber drums with locking lids. Large components removed intact shall be wrapped in a minimum of two layers of six mil polyethylene sheeting with all joints and seams sealed with duct tape, and labeled as ACM prior to removal from the contained Work Area.

3. Material Deposition. ACM shall not be dropped or thrown from heights greater than 15 feet. Materials that must be lowered from greater than 15 feet must be transported through a dust-tight chute, or containerized prior to lowering to the ground or floor.

4. Enclosure. Where friable ACM is enclosed during an Asbestos Response Action, the following provisions shall also apply:

a. Enclosures over pipes, ducts, tanks, boilers or other objects shall be labeled as containing ACM and identified on building records.

b. Enclosure systems shall be constructed to be dust tight.

5. Encapsulation. Where friable ACM is encapsulated during an Asbestos Response Action, encapsulant shall not be applied to severely damaged or deteriorating ACM.

6. Demolition. The notification provisions 453 CMR 6.12 and the provisions of 453 CMR 6.14 shall apply to any planned demolition of any facility containing ACM. Such

work must also be performed in conformance with Massachusetts Department of Environmental Protection regulations, 310 CMR 7.00, 18.00 and 19.00 and the requirements of the EPA National Emission Standard for Asbestos (NESHAP), as contained in 40 CFR Part 61, Subpart M.

7. Enclosure or Encapsulation of Exposed ACM. Any friable ACM that has been exposed as a result of an Asbestos Response Action shall be suitably enclosed or encapsulated in accordance with 453 CMR 6.14(4)(d)4. and/or 6.14(4)(d)5.

(e) Specific Work Practice Requirements for Glove Bag Operations. Asbestos Contractors and others having supervisory authority over Asbestos Response Actions involving glove bag use shall ensure that the following work practice requirements are met:

1. Glove bags shall be installed so as to form an airtight covering over the structure to which they are applied. Any friable ACM in the immediate area of glove bag attachment shall be wrapped and sealed in two layers of six mil plastic sheeting or otherwise rendered intact prior to glovebag installation. All openings in the glove bag shall be sealed against leakage with duct tape or equivalent material.

2. ACM shall be wet with Amended Water prior to its removal and maintained in a wet condition inside the glove bag.

3. Any ACM that has been exposed as result of the glove bag operation shall be suitably encapsulated or enclosed so as to prevent the leakage of asbestos fibers prior to the removal of the glove bag.

4. All surfaces from which ACM has been removed inside the glove bag and the upper portions of the glove bag itself shall be cleaned free of visible debris prior to removal of the glovebag.

5. Debris shall be isolated in the bottom of the glove bag by twisting the bag so as to form a closure in the middle. This closure shall then be taped around with duct tape or equivalent material. Air in the glove bag shall be exhausted with a HEPA vacuum cleaner prior to its removal.

6. Following removal from the structure the glove bag and its contents shall be containerized in accordance with 453 CMR 6.14(4)(d)2. and disposed of in accordance with 453 CMR 6.14(4)(h).

(f) Clean-up. Following an Asbestos Response Action, the Asbestos Contractor or entity performing the work shall decontaminate all contaminated surfaces within the Work Area using HEPA vacuuming and/or wet cleaning techniques. All equipment and materials used and all surfaces from which ACM has been removed shall be decontaminated. An inch of soil shall be removed from dirt floors and disposed of as asbestos waste. All cleanup materials shall be disposed of as asbestos waste. Clean-up shall be to the level of no visible debris.

(g) Clearance Monitoring. Following the cleanup required by 453 CMR 6.14(4)(f), the facility owner, Asbestos Contractor or entity conducting the Asbestos Response Action, and/or the Asbestos Project Monitor employed to oversee the work operation shall ensure that the clearance monitoring requirements of 453 CMR 6.14(5) are met. Until these conditions are achieved all Work Area barriers shall remain in place, Work Area ventilation systems (if required) will remain in operation, respirators and other personal protective equipment shall be worn and all other work practice controls, as required by 453 CMR 6.14(4) shall remain in effect.

(h) Disposal Requirements.

1. Waste. Any ACM removed from a facility must be handled and disposed of as an asbestos waste in conformance with EPA NESHAPS Regulations at 40 CFR Part 61 and Massachusetts Department of Environmental Protection (DEP) Regulations 310 CMR 7.00, 18.00 and 19.00.

2. Transport. Only asbestos waste which has been properly containerized pursuant to 453 CMR 6.14(4)(d)2. shall be transported from the point of generation. Transport shall be in covered vehicles or locked containers. Transportation of asbestos waste shall be in conformance with EPA NESHAP Regulations at 40 CFR Part 61 and applicable standards of the US Department of Transportation, OSHA and the Massachusetts Department of Environmental Protection.

(5) Clearance Monitoring Procedures. The clearance monitoring procedures specified by 453 CMR 6.14(5)(a) and (b) shall be performed only by a certified Asbestos Project Monitor who is not an employee or Responsible Person of the Asbestos Contractor or entity which conducted the work. The Asbestos Contractor shall not subcontract with an Asbestos Project Monitor to

perform the visual inspection required by 453 CMR 6.14(5)(a) or the clearance air monitoring required by 453 CMR 6.14(5)(b) for an Asbestos Response Action conducted in a facility subject to the requirements of AHERA.

(a) Visual Inspections. A certified Asbestos Project Monitor shall inspect all surfaces within the Work Area for dust, debris and other particulate residue. Should any Visible Debris be found in the Work Area, it shall be repeatedly cleaned by the Asbestos Contractor or entity performing the work in accordance with 453 CMR 6.14(4)(f) until the no visible debris criterion is achieved. Where clearance air monitoring is required by 453 CMR 6.14(5)(b), the achievement of the no visible debris criterion shall precede the collection of clearance air monitoring samples.

(b) Clearance Air Monitoring. The clearance air monitoring requirements of 453 CMR 6.14(5)(b) shall be met for all Asbestos Response Actions except those conducted in facilities not subject to the requirements of AHERA where the Glove Bag is used as the sole means of removal or repair.

1. Clearance Air Monitoring Requirements for Larger Asbestos Response Actions Conducted in School Facilities Subject to AHERA. For Asbestos Response Actions conducted in school facilities subject to AHERA which involve the removal, encapsulation or enclosure of greater than 160 square feet or 260 linear feet of friable ACM, clearance air monitoring samples shall be collected and analyzed by transmission electron microscopy(TEM) as prescribed by Appendix A to Subpart E of 40 CFR part 763.

a. In addition to adhering to the above, the certified Asbestos Project Monitor shall use a rotameter or other appropriate flow measuring device, the calibration of which is traceable to a primary standard, to measure the air flow in the sampling train immediately prior to and immediately following the collection of the clearance air monitoring samples.

b. Air samples shall be collected using the aggressive sampling methods described in Appendix A of 40 CFR Part 763, Subpart E.

c. The analysis of all clearance air monitoring samples collected pursuant to the requirements of 453 CMR 6.14(5)(b)1. shall be analyzed by Asbestos Analytical Services certified and approved pursuant to 453 CMR 6.08.

d. Where clearance air monitoring samples are collected and analyzed pursuant to the requirements of 453 CMR 6.14(5)(b)1. an Asbestos Response Action shall be considered complete when the average concentration of asbestos in five air samples collected within the work area and analyzed by the TEM protocol described in Appendix A of 40 CFR Part 763, Subpart E, is not statistically different, as determined through application of the Z-test calculation found in that Appendix A, from the average asbestos concentration of five air samples collected at the same time outside the work area and analyzed in the same manner, and the average asbestos concentration of the three field blanks described in the same Appendix A of Subpart E, of 70 structures per square millimeter.

e. An action may also be considered complete if the volume of air drawn for each of the five samples collected within the work area is equal to or greater than 1,199 L of air for a 25 mm filter or equal to or greater than 2,799 L of air for a 37 mm filter, and the average concentration of asbestos as analyzed by the TEM method in Appendix A of 40 CFR Part 763, Subpart E, for the five air samples does not equal the filter background level of 70 structures per square millimeter.

f. Should the work area fail the clearance air testing requirements of 453 CMR 6.14(5)(b)1.d. or e., as applicable, it shall be repeatedly cleaned by the Asbestos Contractor or other entity performing the work as prescribed by 453 CMR 6.14(4)(f) until the requirements of 453 CMR 6.14(5)(b)1.d. or e. are met.

2. Clearance Air Monitoring Requirements for Smaller Asbestos Response Actions Conducted in School Facilities and Asbestos Response Actions of All Sizes Conducted in Non-School Facilities. For Asbestos Response Actions conducted in school facilities subject to AHERA which involve the removal, encapsulation or enclosure of 160 square feet (or less) or 260 linear feet (or less) of ACM, and for all Asbestos Response Actions conducted in all non-school facilities, clearance monitoring samples shall be collected and analyzed using either: (1) the transmission electron microscopy (TEM) method prescribed by 453 CMR 6.14(5)(b)1. or (2) the phase contrast microscopy method, NIOSH Analytical Method 7400. Where the TEM method of analysis is elected, the

sampling, analysis, and clearance level requirements shall be as prescribed at 453 CMR 6.14(5)(b)1. and Appendix A to Subpart E of 40 CFR Part 763. Where the phase contrast microscopy method, NIOSH Method 7400, is used, clearance air monitoring samples shall be collected and analyzed as prescribed by the NIOSH 7400 Method and 453 CMR 6.14(5)(b)2.a. through d.

a. In addition to adhering to the above, the certified Asbestos Project Monitor shall use a rotameter or other appropriate flow measuring device, the calibration of which is traceable to a primary standard, to measure the air flow in the sampling train immediately prior to and immediately following the collection of the clearance air monitoring samples.

b. Air samples shall be collected using the aggressive sampling methods described in Appendix A of 40 CFR Part 763, Subpart E.

c. For facilities subject to the requirements of AHERA at least five samples, or one sample per room, whichever is greater, shall be collected and analyzed. For non-AHERA facilities at least one sample for each 500 linear/1000 square feet of asbestos or portion thereof, or one sample per room, whichever is greater, shall be collected and analyzed. The collection and analysis of all samples shall be in accordance with the NIOSH 7400 Method.

d. Where clearance air monitoring samples are collected and analyzed using phase contrast microscopy pursuant to this subsection, an Asbestos Response Action shall be considered complete when the concentration of asbestos in each of the air samples collected inside the contained work space is less than or equal to 0.010 fibers per cubic centimeter of air.

e. Should the work area fail the clearance air testing requirements of this subsection, it shall be repeatedly cleaned by the Asbestos Contractor or other entity performing the work as prescribed by 453 CMR 6.14(4)(f) until the requirements of 453 CMR 6.14(5)(b)2.d. are met.

f. All analyses of clearance air monitoring samples by phase contrast microscopy pursuant to 453 CMR 6.14(5)(b)2. shall be performed by an Asbestos Analytical Service certified and approved pursuant to 453 CMR 6.08(1)(c).

6.15: Worker Protection Requirements

(1) Personal Exposure Monitoring. The employer shall conduct personal exposure monitoring on all employees involved in asbestos projects in accordance with OSHA Asbestos Regulations at 29 CFR Part 1926.1101 or EPA Asbestos Regulations at 40 CFR Part 763, Subpart G, as applicable.

(2) Respiratory Protection.

(a) The employer shall provide respiratory protection as specified at 29 CFR Part 1926.1101(h).

(b) Where respirators are used, a supply of charged replacement batteries, HEPA filters and flow test meters shall be available in the clean room for use with powered air-purifying respirators.

(c) Person(s) performing glove bag work and cleanup of Minor Fiber Release Episodes shall wear a half mask dual-cartridge HEPA-filtered respirator as the minimum level of respiratory protection.

(d) When negative air pressure respirators are used they shall be properly fit tested in accordance with OSHA Asbestos Regulations 29 CFR Part 1926.1101 using protocols detailed in Appendix C of that document.

(3) Protective Clothing and Equipment.

(a) The employer shall provide all employees involved in asbestos projects with full body disposable clothing, including head, body, and foot coverings consisting of material impenetrable by asbestos fibers, and equipment as required by OSHA Asbestos Regulations at 29 CFR Part 1926.1101 or EPA Asbestos Regulations at 40 CFR, Part 763, Subpart G, as applicable.

(b) Non-skid footwear shall be provided to employees where slipping hazards exist. Disposable protective clothing shall be adequately sealed to the footwear to prevent contamination.

(c) Employees shall be provided with eye protection, gloves and hard hats, as required.

(4) Medical Monitoring. The employer shall provide employees engaged in asbestos projects with the medical monitoring specified by OSHA Asbestos Regulations at 29 CFR Part 1926.1101(m). Physical examinations shall be given by a board eligible/certified occupational health physician or by a licensed physician with known expertise in occupational health. Persons other than licensed physicians who administer the pulmonary function testing shall have completed a training course in spirometry sponsored by an appropriate academic or professional institution. Roentgenograms shall be interpreted and classified only by a B-reader.

6.16: Cease and Desist Orders

(1) General. The Director, upon determination that there is a violation of any work place standard which compromises the protection of the general public or the occupational health and safety of workers, or of any standard or requirement for licensure, may order any worksite to be closed by way of the issuance of a cease and desist order enforceable in the appropriate courts of the Commonwealth. For purposes of such cease and desist orders, the worksite may include the area where asbestos-related work is being performed and other areas of the facility which the Director determines may be hazardous to the health and safety of workers and the general public as a result of such asbestos work.

(2) Form and Content of Order. Cease and Desist Orders shall be in writing and shall, at a minimum, contain the following:

(a) A description of the premises or work area to which the order applies;
(b) Violations serving as the basis for issuing the order; and
(c) Any conditions that must be met or remedial action to be taken before the order can be lifted.

(3) Issuance of Cease and Desist Orders. A cease and desist order shall be effective immediately upon delivery in hand or by certified mail to any Responsible Person or agent of the contractor or entity performing the work. A copy of the order shall also be delivered in hand or by certified mail to the facility owner or his or her agent. A party objecting to such order must comply with such order but may make a written request for a hearing pursuant to M.G.L. c. 30A within ten days following service of the order.

(4) Posting of the Work Site. At the time the cease and desist order becomes effective, the Director shall cause the work site to be conspicuously posted, such posting to contain the content of the cease and desist order and any other information the Director determines necessary to secure the work site and to adequately warn of hazards. Notices shall remain posted until the order is lifted.

(5) Access to Closed Work Site. Access to the work site closed by a cease and desist order shall be restricted to persons authorized by the Director.

6.17: Responsibility For Compliance; Penalties

(1) Any person, firm, corporation, or other entity performing work subject to the requirements of 453 CMR 6.00, including, without limitation, Asbestos Contractors, Asbestos Workers, and Asbestos Supervisors, shall be responsible for compliance with the provisions thereof.

(2) Any person, firm, corporation, or other entity who or which violates the provisions of 453 CMR 6.00 shall be subject to the administrative sanctions specified herein and any civil penalty allowed by the laws of the Commonwealth, and, pursuant to M.G.L. c.149, ' 6F, may be punished by a fine of not less than $500 and not more than $1500 for each offense.

6.18: Severability

If any provision of 453 CMR 6.00 shall be held inconsistent with the laws of the Commonwealth, or held unconstitutional, either on its face, or as applied, the inconsistency or unconstitutionality shall not affect the remaining provisions.

6.19: The Removal, Containment or Encapsulation of Asbestos Appendix I

THE COMMONWEALTH OF MASSACHUSETTS
DEPARTMENT OF LABOR & WORKFORCE DEVELOPMENT
DIVISION OF OCCUPATIONAL SAFETY
MAIN AND DISTRICT OFFICES

BOSTON OFFICE
100 CAMBRIDGE ST., 11TH FLR
BOSTON, MA 02202
TEL: (617) 727-7047
TEL: (617) 727-3452
FAX: (617) 727-7568

HAVERHILL OFFICE
4 SUMMER STREET
HAVERHILL, MA 01830
TEL: (978) 372-9797
FAX: (978) 372-9998

NEW BEDFORD OFFICE
181 HILLMAN STREET
BLDG. 2, 2ND. FLOOR
NEW BEDFORD, MA 02740
TEL: (508) 984-7718
FAX: (508) 984 -3562

PITTSFIELD OFFICE
333 EAST STREET
PITTSFIELD, MA 01201
TEL: (413) 448-8746
FAX: (413) 784-1163

SPRINGFIELD OFFICE
165 LIBERTY STREET
SPRINGFIELD, MA 01102
TEL: (413) 747-7192
FAX: (413) 784-1144

WEST NEWTON OFFICE
1001 WATERTOWN STREET
WEST NEWTON, MA 02165
TEL: (617) 969-7177
FAX: (617) 727-4581

Note: Licensing days and times for all of the Division=s Offices may be obtained by calling 1-800-425-0004, within Massachusetts, or 1-617-727-7047.

6.20: The Removal, Containment or Encapsulation of Asbestos Appendix II

453 CMR 6.20: *Appendix II* describes the course content for asbestos training as set forth at 40 CFR Part 763, Appendix C to Subpart E - Asbestos Model Accreditation Plan.

1. **Workers.**

...The training course shall adequately address the following topics:

(a) Physical characteristics of asbestos. Identification of asbestos, aerodynamic characteristics, typical uses, and physical appearance, and a summary of abatement control options.

(b) Potential health effects related to asbestos exposure. The nature of asbestos-related diseases; routes of exposure; dose-response relationships and the lack of a safe exposure level; the synergistic effect between cigarette smoking and asbestos exposure; the latency periods for asbestos-related diseases; a discussion of the relationship of asbestos exposure to asbestosis, lung cancer, mesothelioma, and cancer of other organs.

(c) Employee personal protective equipment. Classes and characteristics of respirator types; limitations of respirators; proper selection, inspection; donning, use, maintenance, and storage procedures for respirators; methods for field testing of the face piece-to-face seal (positive and negative-pressure fit checks); qualitative and quantitative fit testing procedures; variability between field and laboratory protection factors that alter respiratory fit (*e.g*., facial hair); the components of a proper respiratory protection program; selection and use of personal protective clothing; use, storage, and handling of non-disposable clothing; and regulations covering personal protective equipment.

(d) State-of-the-art work practices. Proper work practices for asbestos abatement activities, including descriptions of proper construction; maintenance of barriers and decontamination enclosure systems; positioning of warning signs; lock-out of electrical and ventilation systems; proper working techniques for minimizing fiber release; use of wet methods; use of negative pressure exhaust ventilation equipment; use of high-efficiency particulate air (HEPA) vacuums; proper clean-up and disposal procedures; work practices for removal, encapsulation, enclosure, and repair of ACM; emergency procedures for sudden releases; potential exposure situations; transport and disposal procedures; and recommended and prohibited work practices.

(e) Personal hygiene. Entry and exit procedures for the work area; use of showers; avoidance of eating, drinking, smoking, and chewing (gum or tobacco) in the work area; and potential exposures, such as family exposure.

(f) Additional safety hazards. Hazards encountered during abatement activities and how to deal with them, including electrical hazards, heat stress, air contaminants other than asbestos, fire and explosion hazards, scaffold and ladder hazards, slips, trips, and falls, and confined spaces.

(g) Medical monitoring. OSHA and EPA Worker Protection Rule requirements for physical examinations, including a pulmonary function test, chest X-rays, and a medical history for each employee.

(h) Air monitoring. Procedures to determine airborne concentrations of asbestos fibers, focusing on how personal air sampling is performed and the reasons for it.

(i) Relevant Federal, State and local regulatory requirements, procedures, and standards. With particular attention directed at relevant EPA, OSHA, and State regulations concerning asbestos abatement workers.

(j) Establishment of respiratory protection programs.

(k) Course review. A review of key aspects of the training course.

2. **Contractor/Supervisors**.

. . .The contractor/supervisor training course shall adequately address the following topics:

(a) The physical characteristics of asbestos and asbestos-containing materials. Identification of asbestos, aerodynamic characteristics, typical uses, physical appearance, a review of hazard assessment considerations, and a summary of abatement control options.

(b) Potential health effects related to asbestos exposure. The nature of asbestos-related diseases; routes of exposure; dose-response relationships and the lack of a safe exposure level; synergism between cigarette smoking and asbestos exposure; and latency period for diseases.

6.20: continued

(c) Employee personal protective equipment. Classes and characteristics of respirator types; limitations of respirators; proper selection, inspection, donning, use, maintenance, and storage procedures for respirators; methods for field testing of the face piece-to-face seal (positive and negative-pressure fit checks); qualitative and quantitative fit testing procedures; variability between field and laboratory protection factors that alter respiratory fit (*e.g.*, facial hair); the components of a proper respiratory protection program; selection and use of personal protective clothing; and use, storage, and handling of non-disposable clothing; and regulations covering personal protective equipment.

(d) State-of-the-art work practices. Proper work practices for asbestos abatement activities, including descriptions of proper construction and maintenance of barriers and decontamination enclosure systems; positioning of warning signs; lock-out of electrical and ventilation systems; proper working techniques for minimizing fiber release; use of wet methods; use of negative pressure exhaust ventilation equipment; use of HEPA vacuums; and proper clean-up and disposal procedures. Work practices for removal, encapsulation, enclosures, and repair of ACM; emergency procedures for unplanned releases; potential exposure situations; transport and disposal procedures; and recommended and prohibited work practices. New abatement-related techniques and methodologies may be discussed.

(e) Personal hygiene. Entry and exit procedures for the work area; use of showers; and avoidance of eating, drinking, smoking, and chewing (gum or tobacco) in the work area. Potential exposures, such as family exposure, shall also be included.

(f) Additional safety hazards. Hazards encountered during abatement activities and how to deal with them, including electrical hazards, heat stress, air contaminants other than asbestos, fire and explosion hazards, scaffold and ladder hazards, slips, trips and falls, and confined spaces.

(g) Medical monitoring. OSHA and EPA Worker Protection Rule requirements for physical examinations, including a pulmonary function test, chest X-rays and a medical history for each employee.

(h) Air monitoring. Procedures to determine airborne concentrations of asbestos fibers, including descriptions of aggressive air sampling, sampling equipment and methods, reasons for air monitoring, types of samples and interpretation of results. EPA recommends that transmission electron microscopy (TEM) be used for analysis of final air clearance samples, and that sample analysis be performed by laboratories accredited by the National Institute of Standards and Technology=s (NIST) National Voluntary Laboratory Accreditation Program (NVLAP).

(i) Relevant Federal, State, and local regulatory requirements, procedures, and standards, including:

1. Requirements of TSCA Title II.
2. National Emissions Standards for Hazardous Air Pollutants (40 CFR part 61), Subparts A (General Provisions) and M (National Emission Standard for Asbestos).
3. OSHA standards for permissible exposure to airborne concentrations of asbestos fibers and respiratory protection (29 CFR 1910.134).
4. OSHA Asbestos Construction Standard (29 CFR 1926.58).
5. EPA Worker Protection Rule, (40 CFR part 763, Subpart G).

(j) Respiratory Protection Programs and Medical Monitoring Programs.

(k) Insurance and liability issues. Contractor issues; worker's compensation coverage and exclusions; third-party liabilities and defenses; insurance coverage and exclusions.

(l) Recordkeeping for asbestos abatement projects. Records required by Federal, State, and local regulations; records recommended for legal and insurance purposes.

(m) Supervisory techniques for asbestos abatement activities. Supervisory practices to enforce and reinforce the required work practices and discourage unsafe work practices.

(n) Contract specifications. Discussions of key elements that are included in contract specifications.

(o) Course review. A review of the key aspects of the training course.

3. **Inspector.**

. . .The inspector training course shall adequately address the following topics:

(a) Background information on asbestos. Identification of asbestos, and examples and discussion of the uses and locations of asbestos in buildings; physical appearance of asbestos.

6.20: continued

(b) Potential health effects related to asbestos exposure. The nature of asbestos-related diseases; routes of exposure; dose-response relationships and the lack of a safe exposure level; the synergistic effect between cigarette smoking and asbestos exposure; the latency periods for asbestos-related diseases; a discussion of the relationship of asbestos exposure to asbestosis, lung cancer, mesothelioma, and cancer of other organs.

(c) Functions/qualifications and role of inspectors. Discussions of prior experience and qualifications for inspectors and management planners; discussions of the functions of an accredited inspector as compared to those of an accredited management planner; discussion of inspection process including inventory of ACM and physical assessment.

(d) Legal liabilities and defenses. Responsibilities of the inspector and management planner; a discussion of comprehensive general liability policies, claims-made and occurrence policies, environmental and pollution liability policy clauses; state liability insurance requirements; bonding and the relationship of insurance availability to bond availability.

(e) Understanding building systems. The interrelationship between building systems, including: an overview of common building physical plan layout; heat, ventilation and air conditioning (HVAC) system types, physical organization, and where asbestos is found on HVAC components; building mechanical systems, their types and organization, and where to look for asbestos on such systems; inspecting electrical systems, including appropriate safety precautions; reading blueprints and as-built drawings.

(f) Public/employee/building occupant relations. Notifying employee organizations about the inspection; signs to warn building occupants; tact in dealing with occupants and the press; scheduling of inspections to minimize disruptions; and education of building occupants about actions being taken.

(g) Pre-inspection planning and review of previous inspection records. Scheduling the inspection and obtaining access; building record review; identification of probable homogeneous areas from blueprints or as-built drawings; consultation with maintenance or building personnel; review of previous inspection, sampling and abatement records of a building; the role of the inspector in exclusions for previously performed inspections.

(h) Inspecting for friable and non-friable ACM and assessing the condition of friable ACM. Procedures to follow in conducting visual inspections for friable and non-friable ACM; types of building materials that may contain asbestos; touching materials to determine friability; open return air plenums and their importance in HVAC systems; assessing damage, significant damage, potential damage, and potential significant damage; amount of suspected ACM, both in total quantity and as a percentage of the total area; type of damage; accessibility; material's potential for disturbance; known or suspected causes of damage or significant damage; and deterioration as assessment factors.

(i) Bulk Sampling/documentation of asbestos. Detailed discussion of the "Simplified Sampling Scheme for Friable Surfacing Materials (EPA 560/5-85-030a October 1985)"; techniques to ensure sampling in a randomly distributed manner for other than friable surfacing materials; sampling of non-friable materials; techniques for bulk sampling; inspector=s sampling and repair equipment; patching or repair of damage from sampling; discussion of polarized light microscopy; choosing an accredited laboratory to analyze bulk samples; quality control and quality assurance procedures. EPA=s recommendation that all bulk samples collected from school or public and commercial buildings be analyzed by a laboratory accredited under the NVLAP administered by NIST.

(j) Inspector respiratory protection and personal protective equipment. Classes and characteristics of respirator types; limitations of respirators; proper selection, inspection, donning, use, maintenance, and storage procedures for respirators; methods for field testing of the face piece-to-face seal (positive and negative-pressure fit checks); qualitative and quantitative fit testing procedures; variability between field and laboratory protection factors that alter respiratory fit (*e.g.*, facial hair); the components of a proper respiratory protection program; selection and use of personal protective clothing; use, storage, and handling of non-disposable clothing.

6.20: continued

(k) Recordkeeping and writing the inspection report. Labeling of samples and keying sample identification to sampling location; recommendations on sample labeling; detailing of ACM inventory; photographs of selected sampling areas and examples of ACM condition; information required for inclusion in the management plan required for school buildings under TSCA Title II, section 203 (i)(1). EPA recommends that States develop and require the use of standardized forms for recording the results of inspections in schools or public or commercial buildings, and that the use of these forms be incorporated into the curriculum of training be conducted for accreditation.

(l) Regulatory review. The following topics should be covered: National Emission Standards for Hazardous Air Pollutants (NESHAP; 40 CFR part 61, Subparts A and M); EPA Worker Protection Rule (40 CFR part 763, Subpart G); OSHA Asbestos Construction Standard (29 CFR Part 1926.58); OSHA respirator requirements (29 CFR Part 1910.134); the Friable Asbestos in Schools rule (40 CFR Part 763, Subpart F); applicable State and local regulations, and differences between Federal and State requirements where they apply, and the effects, if any, on public and non-public schools or commercial public buildings.

(m) Field trip. This includes a field exercise, including a walk-through inspection; on-site discussion about information gathering and the determination of sampling locations; on-site practice in physical assessment; classroom discussion of field exercise.

(n) Course Review. A review of key aspects of the training course.

4. **Management Planner.**

. . .The management planner training course shall adequately address the following topics:

(a) Course overview. The role and responsibilities of the management planner; operations and maintenance programs; setting work priorities; protection of building occupants.

(b) Evaluation/interpretation of survey results. Review of TSCA Title II requirements for inspection and management plans for school buildings as given in section 203(i)(1) of TSCA Title II; interpretation of field data and laboratory results; comparison of field inspector's data sheet with laboratory results and site survey.

(c) Hazard assessment. Amplification of the difference between physical assessment and hazard assessment; the role of the management planner in hazard assessment; explanation of significant damage, damage, potential damage, and potential significant damage; use of a description (or decision tree) code for assessment of ACM; assessment of friable ACM; relationship of accessibility, vibration sources, use of adjoining space, and air plenums and other factors to hazard assessment.

(d) Legal Implications. Liability; insurance issues specific to planners; liabilities associated with interim control measures, in-house maintenance, repair, and removal; use of results from previously performed inspections.

(e) Evaluation and selection of control options. Overview of encapsulation, enclosure, interim operations and maintenance, and removal; advantages and disadvantages of each method; response actions described via a decision tree or other appropriate method; work practices for each response action; staging and prioritizing of work in both vacant and occupied buildings; the need for containment barriers and decontamination in response actions.

(f) Role of other professionals. Use of industrial hygienists, engineers, and architects in developing technical specifications for response actions; any requirements that may exist for architect sign-off of plans; team approach to design of high-quality job specifications.

(g) Developing an operations and maintenance (O&M) plan. Purpose of the plan; discussion of applicable EPA guidance documents; what actions should be taken by custodial staff; proper cleaning procedures; steam cleaning and HEPA vacuuming; reducing disturbance of ACM; scheduling O&M for off-hours; rescheduling or canceling renovations in areas with ACM; boiler room maintenance; disposal of ACM; in-house procedures for ACM-bridging and penetrating encapsulant; pipe fittings; metal sleeves; polyvinyl chloride (PVC), canvas, and wet wraps; muslin with straps; fiber mesh cloth; mineral wool, and insulating cement; discussion of employee protection programs and staff training; case study in developing an O&M plan (development, implementation process, and problems that have been experienced).

6.20: continued

(h) Regulatory review. Focussing on the OSHA Asbestos Construction Standard found at 29 CFR 1926.58; the National Emission Standard for Hazardous Air Pollutants (NESHAP) found at 40 CFR part 61 Subparts A (General Provisions) and M (National Emission Standard for Asbestos); EPA Worker Protection Rule found at 40 CFR part 763, Subpart G; TSCA Title II; applicable State regulations.

(i) Recordkeeping for the management planner. Use of field inspector's data sheet along with laboratory results; on-going recordkeeping as a means to track asbestos disturbance; procedures for recordkeeping. EPA recommends that States require the use of standardized forms for purposes of management plans and incorporate the use of such forms into the initial training course for management planners.

(j) Assembling and submitting the management plan. Plan requirements in TSCA Title II section 203(I)(1); the management plan as a planning tool.

(k) Financing abatement actions. Economic analysis and cost estimates; development of cost estimates; present costs of abatement versus future operations and maintenance costs; Asbestos School Hazard Abatement Act grants and loans.

(l) Course review. A review of key aspects of the training course.

5. **Project Designer.**

. . . The abatement project designer training course shall adequately address the following topics:

(a) Background information on asbestos. Identification of asbestos; examples and discussion of the uses and locations of asbestos in buildings; physical appearance of asbestos.

(b) Potential health effects related to asbestos exposure. Nature of asbestos-related diseases; routes of exposure; dose-response relationships and the lack of a safe exposure level; the synergistic effect between cigarette smoking and asbestos exposure; the latency period for asbestos-related diseases; a discussion of the relationship between asbestos exposure and asbestosis, lung cancer, mesothelioma, and cancers of other organs.

(c) Overview of abatement construction projects. Abatement as a portion of a renovation project; OSHA requirements for notification of other contractors on a multi-employer site (29 CFR 1926.58).

(d) Safety system design specifications. Design, construction, and maintenance of containment barriers and decontamination enclosure systems; positioning of warning signs; electrical and ventilation system lock-out; proper working techniques for minimizing fiber release; entry and exit procedures for the work area; use of wet methods; proper techniques for initial cleaning; use of negative- pressure exhaust ventilation equipment; use of HEPA vacuums; proper clean-up and disposal of asbestos; work practices as they apply to encapsulation, enclosure, and repair; use of glove bags and a demonstration of glove bag use.

(e) Field Trip. A visit to an abatement site or other suitable building site, including on-site discussions of abatement design and building walk-through inspection. Include discussion of rationale for the concept of functional spaces during the walk-through.

(f) Employee personal protective equipment. Classes and characteristics of respirator types; limitations of respirators; proper selection, inspection; donning, use, maintenance, and storage procedures for respirators; methods for field testing of the face piece-to-face seal (positive and negative-pressure fit checks); qualitative and quantitative fit testing procedures; variability between field and laboratory protection factors that alter respiratory fit (*e.g.*, facial hair); the components of a proper respiratory protection program; selection and use of personal protective clothing; use, storage, and handling of non-disposable clothing.

(g) Additional safety hazards. Hazards encountered during abatement activities and how to deal with them, including electrical hazards, heat stress, air contaminants other than asbestos, fire, and explosion hazards.

(h) Fiber aerodynamics and control. Aerodynamic characteristics of asbestos fibers; importance of proper containment barriers; settling time for asbestos fibers; wet methods in abatement; aggressive air monitoring following abatement; aggressive air movement and negative-pressure exhaust ventilation as a clean-up method.

(i) Designing abatement solutions. Discussions of removal, enclosure, and encapsulation methods; asbestos waste disposal.

6.20: continued

(j) Final clearance process. Discussion of the need for a written sampling rationale for aggressive final air clearance; requirements of a complete visual inspection; and the relationship of the visual inspection to final air clearance. EPA recommends the use of TEM for analysis of final air clearance samples. These samples should be analyzed by laboratories accredited under the NIST NVLAP.

(k) Budgeting/cost estimating. Development of cost estimates; present costs of abatement versus future operation and maintenance costs; setting priorities for abatement jobs to reduce cost.

(l) Writing abatement specifications. Preparation of and need for a written project design; means and methods specifications versus performance specifications; design of abatement in occupied buildings; modification of guide specifications for a particular building; worker and building occupant health/medical considerations; replacement of ACM with non- asbestos substitutes.

(m) Preparing abatement drawings. Significance and need for drawings; use of as-built drawings as base drawings; use of inspection photographs and on-site reports; methods of preparing abatement drawings; diagraming containment barriers; relationship of drawings to design specifications; particular problems related to abatement drawings.

(n) Contract preparation and administration.

(o) Legal/liabilities/defenses. Insurance considerations; bonding; hold-harmless clauses; use of abatement contractor's liability insurance; claims made versus occurrence policies.

(p) Replacement. Replacement of asbestos with asbestos-free substitutes.

(q) Role of other consultants. Development of technical specification sections by industrial hygienists or engineers; the multi-disciplinary team approach to abatement design.

(r) Occupied buildings. Special design procedures required in occupied buildings; education of occupants; extra monitoring recommendations; staging of work to minimize occupant exposure; scheduling of renovation to minimize exposure.

(s) Relevant Federal, State and local regulatory requirements, procedures and standards, including, but not limited to:

1. Requirements of TSCA Title II.
2. National Emission Standards for Hazardous Air Pollutants, (40 CFR part 61) subparts A (General Provisions) and M (National Emission Standard for Asbestos).
3. OSHA Respirator Standard found at 29 CFR 1910.134.
4. EPA Worker Protection Rule found at 40 CFR part 763, subpart G.
5. OSHA Asbestos Construction Standard found at 29 CFR 1926.58.
6. OSHA Hazard Communication Standard found at 29 CFR 1926.59.

(t) Course Review. A review of key aspects of the training course.

6. **Project Monitor**.

. . . EPA recommends that the project monitor training course adequately address the following topics:

(a) Roles and responsibilities of the project monitor. Definition and responsibilities of the project monitor, including regulatory/specification compliance monitoring, air monitoring, conducting visual inspections, and final clearance monitoring.

(b) Characteristics of asbestos and asbestos-containing materials. Typical uses of asbestos; physical appearance of asbestos; review of asbestos abatement and control techniques; presentation of the health effects of asbestos exposure, including routes of exposure, dose-response relationships, and latency periods for asbestos-related diseases.

(c) Federal asbestos regulations. Overview of pertinent EPA regulations, including: NESHAP, 40 CFR part 61, subparts A and M; AHERA, 40 CFR part 763, subpart E; and the EPA Worker Protection Rule, 40 CFR part 763, subpart G. Overview of pertinent OSHA regulations, including Construction Industry Standard for Asbestos, 29 CFR 1926.1101; Respirator Standard, 29 CFR 1910.134; and the Hazard Communication Standard, 29 CFR 1926.59. Applicable State and local asbestos regulations; regulatory interrelationships.

(d) Understanding building construction and building systems. Building construction basics, building physical plan layout; understanding building systems (HVAC, electrical, *etc*.); layout and organization; where asbestos is likely to be found on building systems; renovations and the effect of asbestos abatement on building systems.

6.20: continued

(e) Asbestos abatement contracts, specifications, and drawings. Basic provisions of the contract; relationships between the principal parties, establishing chain of command; types of specifications, including means and methods, performance, and proprietary and nonproprietary; reading and interpreting records and abatement drawing; discussion of change orders; common enforcement responsibilities and authority of project monitor.

(f) Response actions and abatement practices. Pre-work inspections; pre-work considerations, precleaning of the work area, removal of furniture, fixtures, and equipment; shutdown/modification of building systems; construction and maintenance of containment barriers, proper demarcation of work areas; work area entry/exit, hygiene practices; determining the effectiveness of air filtration equipment; techniques for minimizing fiber release, wet methods, continuous cleaning; abatement methods other than removal; abatement area clean-up procedures; waste transport and disposal procedures; contingency planning for emergency response.

(g) Asbestos abatement equipment. Typical equipment found on an abatement project; air filtration devices, vacuum systems, negative pressure differential monitoring; HEPA filtration units, theory of filtration, design/construction of HEPA filtration units, qualitative and quantitative performance of HEPA filtration units, sizing the ventilation requirements, location of HEPA filtration units, qualitative and quantitative tests of containment barrier integrity; best available technology.

(h) Personal protective equipment. Proper selection of respiratory protection; classes and characteristics of respirator types, limitations of respirators; proper use of other safety equipment, protective clothing selection, use, and proper handling, hard/bump hats, safety shoes; breathing air systems, high pressure v. low pressure, testing for Grade D air, determining proper backup air volumes.

(i) Air monitoring strategies. Sampling equipment, sampling pumps (low v. high volume), flow regulating devices (critical and limiting orifices), use of fibrous aerosol monitors on abatement projects; sampling media, types of filters, types of cassettes, filter orientation, storage and shipment of filters; calibration techniques, primary calibration standards, secondary calibration standards, temperature/pressure effects, frequency of calibration, recordkeeping and field work documentation, calculations; air sample analysis, techniques available and limitations of AHERA on their use, transmission electron microscopy (background to sample preparation and analysis, air sample conditions which prohibit analysis, EPA's recommended technique for analysis of final air clearance samples), phase contrast microscopy (background to sample preparation, and AHERA's limits on the use of phase contrast microscopy), what each technique measures; analytical methodologies, AHERA TEM protocol, NIOSH 7400, OSHA reference method (non-clearance), EPA recommendation for clearance (TEM); sampling strategies for clearance monitoring, types of air samples (personal breathing zone v. fixed-station area) sampling location and objectives (pre-abatement, during abatement, and clearance monitoring), number of samples to be collected, minimum and maximum air volumes, clearance monitoring (post-visual-inspection) (number of samples required, selection of sampling locations, period of sampling, aggressive sampling, interpretations of sampling results, calculations), quality assurance; special sampling problems, crawl spaces, acceptable samples for laboratory analysis, sampling in occupied buildings (barrier monitoring).

(j) Safety and health issues other than asbestos. Confined-space entry, electrical hazards, fire and explosion concerns, ladders and scaffolding, heat stress, air contaminants other than asbestos, fall hazards, hazardous materials on abatement projects.

(k) Conducting visual inspections. Inspections during abatement, visual inspections using the ASTM E1368 document; conducting inspections for completeness of removal; discussion of "how clean is clean?"

(l) Legal responsibilities and liabilities of project monitors. Specification enforcement capabilities; regulatory enforcement; licensing; powers delegated to project monitors through contract documents.

(m) Recordkeeping and report writing. Developing project logs/daily logs (what should be included, who sees them); final report preparation; recordkeeping under Federal regulations.

6.20: continued

(n) Workshops (six hours spread over three days). Contracts, specifications and drawings: This workshop could consist of each participant being issued a set of contracts, specifications, and drawings and then being asked to answer questions and make recommendations to a project architect, engineer or to the building owner based on given conditions and these documents.

Air monitoring strategies/asbestos abatement equipment: This workshop could consist of simulated abatement sites for which sampling strategies would have to be developed (*i.e.*, occupied buildings, industrial situations). Through demonstrations and exhibition, the project monitor may also be able to gain a better understanding of the function of various pieces of equipment used on abatement projects (air filtration units, water filtration units, negative pressure monitoring devices, sampling pump calibration devices, *etc*.).

Conducting visual inspections: This workshop could consist, ideally, of an interactive video in which a participant is Ataken through@ a work area and asked to make notes of what is seen. A series of questions will be asked which are designed to stimulate a person=s recall of the area. This workshop could consist of a series of two or three videos with different site conditions and different degrees of cleanliness.

REGULATORY AUTHORITY

453 CMR 6.00: M.G.L. c. 149, ' ' 6A through 6F.

(PAGES 81 THROUGH 86 ARE RESERVED FOR FUTURE USE.)

7.08: continued

(l) No person shall cause, suffer, allow, or permit the operation of any hazardous waste incinerator unless said operation is in conformance with the following:

1. During start-up and shutdown, hazardous waste shall not be fed into the incinerator unless the incinerator is operating within the conditions of operation as specified in the Department's approval; and
2. Fugitive emissions from the combustion zone shall be controlled by:
   a. keeping the combustion zone totally sealed against fugitive emissions; or
   b. maintaining a combustion zone pressure lower than atmospheric pressure; or
   c. an alternative means of fugitive emissions control equivalent to maintenance of combustion zone pressure lower than atmospheric pressure as approved by the Department; and
3. Each hazardous waste incinerator shall be equipped with a functioning system to automatically cease operation of the incinerator when change(s) in waste feed, incinerator design, or operating conditions exceed limits as designated in a Department approval. Each such systems, and each alarm associated therewith, shall be tested at least weekly to verify operability; and
4. At least once each day during which it is operated, each hazardous waste incinerator and associated equipment (*e.g.* pumps, valves, conveyors, and pipes) shall be subjected to thorough visual inspection for leaks, spills, fugitive emissions, and signs of tampering; and
5. All monitoring and inspection data shall be recorded and the records shall be placed in the operating log required by 310 CMR 30.542.

(m) No incinerator for the burning of polyhalogenated aromatic hydrocarbons shall be constructed, substantially reconstructed, altered, or operated except in compliance with the following requirements:

1. Polyhalogenated aromatic hydrocarbons may be burned only after the Department has expressly and in writing approved the burning of such material, and only to the extent and only while such approval is in effect. The application to the Department for such approval shall expressly state that approval is sought to burn polyhalogenated aromatic hydrocarbons.
2. The burning of polyhalogenated aromatic hydrocarbons shall achieve a destruction and removal efficiency, as determined pursuant to 310 CMR 7.08(4)(h)1., of 99.9999% for each POHC, based on burning materials more difficult to burn than tetra-, penta-, and hexachlorodibenzo-p-dioxin and dibenzofurans.

7.09: U Dust, Odor, Construction, and Demolition

(1) No person having control of any dust or odor generating operations such as, but not limited to asphalt batching plants, asphalt roofing materials manufacturing plants, asphalt blowing plants, foundries, chemical products manufacturing plants, incinerators, fuel utilization facilities, petroleum products manufacturing plants, aggregate manufacturing plants, food preparation or processing facilities, wood products plants, dry cleaning establishments, paint and varnish manufacturing plants, paper manufacturing plants, leather manufacturing plants, concrete batching plants, metal coating and treating plants, land clearing operations, construction work, dump operations, agricultural operations and street sweeping shall permit emissions therefrom which cause or contribute to a condition of air pollution.

(2) No person responsible for any construction or demolition of an industrial, commercial, or institutional building or residential building with 20 or more dwelling units, shall cause, suffer, allow, or permit emissions therefrom which cause or contribute to a condition of air pollution. Said person shall notify the Department in writing ten working days prior to the initiation of said construction or demolition operation. The ten working day advance notice period will be waived in the event of emergency demolition necessary to prevent a public health or safety hazard.

7.09: continued

(3) No person responsible for an area where construction or demolition has taken place shall cause, suffer, allow, or permit particulate emissions therefrom to cause or contribute to a condition of air pollution by failure to seed, pave, cover, wet, or otherwise treat said area to prevent excessive emissions of particulate matter.

(4) No person shall cause, suffer, allow, or permit the handling, transportation, or storage of any material in a manner that results or may result in emissions therefrom which cause or contribute to a condition of air pollution.

(5) No persons responsible for any construction or demolition of a structure that contains friable asbestos material shall fail to comply with 310 CMR 7.09(2) and 310 CMR 7.02. (National Emission Standards for Hazardous Pollutants)

(6) No person shall cause, suffer, allow, or permit the operation of mechanized street sweeping equipment that is not equipped with a suitable dust collection or dust suppression system which is maintained in good operating condition and is operated continuously while the street sweeping equipment is in use to prevent conditions of air pollution.

(7) 310 CMR 7.09(1) through 7.09(4) and 7.09(6) are subject to the enforcement provisions specified in 310 CMR 7.52.

7.10: U Noise

(1) No person owning, leasing, or controlling a source of sound shall willfully, negligently, or through failure to provide necessary equipment, service, or maintenance or to take necessary precautions cause, suffer, allow, or permit unnecessary emissions from said source of sound that may cause noise.

(2) 310 CMR 7.10(1) shall pertain to, but shall not be limited to, prolonged unattended sounding of burglar alarms, construction and demolition equipment which characteristically emit sound but which may be fitted and accommodated with equipment such as enclosures to suppress sound or may be operated in a manner so as to suppress sound, suppressible and preventable industrial and commercial sources of sound, and other man-made sounds that cause noise.

(3) 310 CMR 7.10(1) shall not apply to sounds emitted during and associated with:
(a) parades, public gatherings, or sporting events, for which permits have been issued provided that said parades, public gatherings, or sporting events in one city or town do not cause noise in another city or town;
(b) emergency police, fire, and ambulance vehicles;
(c) police, fire, and civil and national defense activities;
(d) domestic equipment such as lawn mowers and power saws between the hours of 7:00 A.M. and 9:00 P.M.

(4) 310 CMR 7.10(1) is subject to the enforcement provisions specified in 310 CMR 7.52.

7.11: U Transportation Media

(1) Motor Vehicles.
(a) All motor vehicles registered in the Commonwealth shall comply with pertinent regulations of the Registry of Motor Vehicles relative to exhaust and sound emissions.
(b) No person shall cause, suffer, allow, or permit the unnecessary operation of the engine of a motor vehicle while said vehicle is stopped for a foreseeable period of time in excess of five minutes. 310 CMR 17.11 shall not apply to:
1. vehicles being serviced, provided that operation of the engine is essential to the proper repair thereof, or

7.13: continued

(d) to be summarized and submitted to the Department with analyses and report within such time as agreed to in the approved test protocol.

(2) Any person having control of a facility, relative to which the Department determines that stack testing (to ascertain the mass emission rates of air contaminants emitted under various operating conditions) is necessary for the purposes of regulation enforcement or determination of regulation compliance shall cooperate with the Department to provide:

(a) entrance to a location suitable for stack sampling,
(b) sampling ports at locations where representative samples may be obtained,
(c) staging and ladders to support personnel and equipment for performing the tests,
(d) a suitable power source at the sampling location for the operation of sampling equipment, and
(e) such other reasonable facilities as may be requested by the Department.

7.14: U Monitoring Devices and Reports

(1) Upon request by the Department through direct communication or public notice, any person who owns or operates a stationary emission source of a category and class specified by the Department:

(a) shall install, maintain, and use emission monitoring devices, of a design and installation approved by the Department, and

(b) shall make periodic reports to the Department on the nature and amounts of emissions from said source which the Department shall review and correlate for its use in emissions control and exhibit for public in- formation.

(2) Any person who owns or operates an emission source as described in 40 CFR, Part, 51, Appendix P, as amended, shall comply with the minimum requirements for continuous emission monitoring, recording, and reporting as set forth therein for opacity, nitrogen oxides emissions, sulfur dioxide emissions, and oxygen or carbon dioxide.

(3) The monitoring and recording required in 310 CMR 7.14(2) shall begin by August 6, 1988.

7.15: U Asbestos

(1) Standards for Demolition/Renovation

(a) Applicability. No person shall cause, suffer, allow, or permit the demolition/renovation, installation, reinstallation, handling, transporting, storage, or disposal of a facility or facility component that contains asbestos, asbestos-containing material, or asbestos-containing waste material in a manner which causes or contributes to a condition of air pollution.

(b) Notification. Each owner/operator of a demolition/renovation operation involving asbestos-containing material shall:

1. Provide the Department with all information required on a Department-approved form with respect to the intended demolition/ renovation operation of a facility or facility component. A waiver to the notification provisions contained in 310 CMR 7.15(1)(b)2.a. and b., may be granted by the Department in the case of an emergency.
2. Postmark or deliver all required information to the applicable Department regional office:
   a. at least ten working days before a demolition/renovation operation begins, or
   b. within one working day prior to the beginning of an emergency demolition/renovation operation unless a waiver is granted by the Department, or if less than one working day, notification shall be made initially by telephone with written follow-up, or

7.15: continued

c. where an owner/operator receives written Department approval of a planned demolition/renovation operation occurring during a 12 month period, provide revised information as required by the Department in writing, and a monthly report of updated information for actual work performed.

3. Include but not be limited to the following information on the Department-approved form:

a. Name, address, and telephone number of the facility owner, operation manager, if any, contractor, and subcontractor, if any, contractor's or subcontractor's Massachusetts asbestos removal certification and licensing number, if any;

b. Description of the facility being demolished and renovated, including the address, worksite location or locations as described in 7.15(1)(b)2.c., size, age, and prior and current use of the facility;

c. Estimate (in linear feet or square feet) of the approximate amount of asbestos-containing materials to be handled under this application with a description of the techniques used for the estimation;

d. Scheduled start-up and completion dates of the demolition/renovation operation, transportation, storage at a refuse transfer station facility (if applicable), and disposal at a sanitary landfill site of the asbestos-containing waste material; if the demolition/renovation start-up or completion date changes or is cancelled ensure that notification is made in writing at least one working day prior to the originally-scheduled start date of the operation;

e. Description of proposed demolition/renovation operation and procedures to be used;

f. Name, address, and telephone number of the transporter company(s) responsible for transporting asbestos-containing waste material from the demolition/renovation site to storage site, if any, and to final disposal site;

g. Name, address, and telephone number of the refuse transfer station facility and owner responsible for storing the asbestos-containing waste material prior to final transport and disposal at a sanitary landfill site;

h. Name, address, and telephone number of the sanitary landfill facility and owner where the asbestos-containing waste material will be disposed;

i. For a facility described as an emergency demolition/renovation operation, the name, title, and authority of the state or local government official who evaluated the emergency and ordered the operation;

j. Date and signature of the facility owner/operator or facility owner's designee and date and signature of the contractor.

4. Separate notification will be required, except as to 310 CMR 7.15(1)(b)2.c., when:

a. demolition/renovations are scheduled for widely-spaced geographical locations on the same facility;

b. demolition/renovations are scheduled for a single facility, but are separated by a time period of greater than one week; or

c. when a demolition/renovation is postponed more than 30 days from the date on the initial notification.

(c) Procedures for Asbestos Emission Control. Each owner/operator shall comply with the following procedures to prevent visible or particulate emissions to the ambient air space:

1. Remove any asbestos-containing material from a facility or facility component prior to demolition/renovation operations if such operations will cause asbestos emissions, or will render the asbestos-containing material friable, or will prevent access to the asbestos-containing material for subsequent containment and removal;

2. When a facility component covered or coated with asbestos-containing material is being removed as units or in sections:

a. Adequately wet asbestos-containing material exposed during the removal operations;

b. Lower the units or sections to the ground level so as to not cause airborne emissions of asbestos; and

c. Ensure no release of asbestos to the ambient air space during removal of asbestos from these units or sections handled so as to ensure:

7.15: continued

i. maintaining adequate wetness of the asbestos-containing material, and

ii. sealing the work area and using a local exhaust ventilation and collection system designed and operated to capture particulate asbestos material. This system must exhibit no visible or particulate emissions to the outside air and be designed and operated in accordance with the requirements of 7.15(1)(d), Air Cleaning;

3. When asbestos-containing material is being removed from a facility component the following procedures shall be performed:

a. Ensure that such material is adequately wet;

b. Contain the material *in situ* of the facility component;

c. Lower the contained material carefully to the ground so as to prevent emissions;

d. Ensure no release of asbestos emissions by methods of capture and containment of fugitive dust such as work area seal and air cleaning, as described in 310 CMR 7.15.

4. Once the asbestos-containing material have been removed and wetted, ensure that the material remains wet until and after it is sealed into a container for disposal.

(d) Air Cleaning. The owner/operator using air cleaning at a facility shall properly install, use, operate, and maintain all air-cleaning equipment authorized by 310 CMR 7.15(1)(d). Bypass devices may be used only during upset or emergency conditions and then only for so long as it takes to shut down the operation generating the particulate asbestos-containing material. Each owner/operator shall use one of the following air cleaning systems or their equal:

1. Use fabric filter collection devices and perform the following:

a. operate the fabric filter collection devices at a pressure drop of no more than four inches water gauge, as measured across the filter fabric;

b. ensure that the air flow permeability, as determined by ASTM Method D737-75, does not exceed 350 $ft^3/min/ft^2$ for felted fabrics;

c. ensure that felted fabric weighs at least 14 ounces per square yard and is at least 1/16 inch thick throughout; and

d. avoid the use of synthetic fabrics that contain fill yarn other than that which is spun; or

2. Use portable, high efficiency particulate air (HEPA) filtered power exhaust units equipped with negative air pressure systems with operational alarm system capable of indicating the unit is working properly, and utilizing a clean filter specified for the unit and capable of filtering 0.3 micron particles with 99.97% efficiency; or

3. In the event that the use of an air cleaning system causes a fire or explosion hazard, the Department may authorize as a substitute

a. the use of wet collectors designed to operate with a unit contracting energy of at least 40 inches water gauge pressure; or

b. the use of filtering equipment other than that described in 310 CMR 7.15, if the owner/operator demonstrates to the Department's satisfaction that it is as efficient in filtering particulate asbestos material.

(e) Waste Disposal. Each owner/operator shall:

1. Discharge no visible or particulate emissions to the ambient air during the collection, processing, packaging, transporting, transferring, or disposing of any asbestos-containing waste material, and use the disposal methods specified in 310 CMR 7.15(1)(e) such that the asbestos-containing material is non-friable;

a. adequately wet asbestos-containing waste material obtained from air cleaning equipment or from removal operations and, while wet, containerize and seal the asbestos-containing waste material in leak-tight containers, labeled

7.15: continued

CAUTION
Contains Asbestos
Avoid Opening or
Breaking Container
Breathing Asbestos is Hazardous
to your Health

or, use warning labels specified by Occupational Safety and Health Standards of the Department of Labor, Occupational Safety and Health Administration (OSHA), or

b. process asbestos-containing waste material into non-friable form such as pellets or other shapes; or

c. use an alternative processing method that has received prior approval by the Department.

2. Store at a refuse transfer station facility permitted to manage asbestos waste in accordance with 310 CMR 19.061: *Special Waste*.

3. Dispose of asbestos-containing waste material at an approved sanitary landfill special waste site. If within Massachusetts, such sites must be operated in accordance with 310 CMR 19.000. Outside Massachusetts, such sites must be operated in accordance with applicable state and federal asbestos laws.

(f) Spraying. No owner/operator of a facility shall spray on any facility or facility component any asbestos-containing material.

(g) Insulating Material. No owner/operator of a facility may install or reinstall on a facility or facility component asbestos-containing insulating materia1.

(2) Enforcement Provisions. 310 CMR 7.15 is subject to the enforcement provisions in 310 CMR 7.52, except as to 310 CMR 7.15(1)(b).

7.16: U Reduction of Single Occupant Commuter Vehicle Use

(1) Commencing with the effective date of 310 CMR 7.16 each affected facility (except as provided below) shall diligently and expeditiously implement and thereafter continuously maintain the following mandatory measures which are designed to achieve a goal of reducing the number of single occupant commuter vehicles customarily commuting daily to each employment facility as of its base date by 25% or as adjusted pursuant to 310 CMR 7.16(7):

(a) making available to commuters any pass program offered by the area transit authority, if any commuter to the facility uses the public transit facilities of such Authority as part of his daily commuting trip, including making all administrative arrangements for commuters to purchase the pass and thereby participate in the pass program and encouraging commuters to participate by such means as publicizing the availability of the pass program and the cost advantages thereof.

(b) posting in a conspicuous place or places the schedules, rates and routes of every bus which serves the facility including the services offered by the area transit authority and any privately or publicly operated services which may exist in the immediate vicinity of the employer.

(c) providing incentives for bicycle commuting such as secure locking facilities and removal of restrictive rules against bicycle usage at the facility.

(d) negotiating with authorities in charge of bus lines serving the facility for improved service to the facility including providing information on the location and density of employees' residences and commuting times to be used for route planning by local transit authorities.

(e) conducting a carpooling program (either alone or in cooperation with neighboring facilities) which:

1. matches on a regularly recurring basis (not less often than once every 12 months) the names, addresses, and suitable contact information of all commuters who commute in single-occupant commuter vehicles or carpool to a facility or group of neighboring facilities and who express interest in carpooling, so that such commuters with similar daily travel patterns are informed and aware of each other for the purpose of forming carpools;

19.060: continued

2. Location. If the Department determines during the pre-application review that the location of the beneficial use activity must be identified in order to manage risks posed by the beneficial use activity, a U.S.G.S. 7.5 minute topographic map or smaller scale equivalent map clearly marking the location(s) of the beneficial use activities.

3. End of Use Management. A description of how the proposed secondary material may be managed when removed or processed during its lifecycle.

(d) Property Owner Notification. The Applicant shall prepare and record, when required by permit term or condition, a record in the Registry of Deeds, Land Court, or other permanent record approved by the Department that shall:

1. Provide notice to holders of any interest(s) in a property or a portion thereof (including without limitation, owners, lessees, tenants, mortgagee, and holders of easement rights) of the existence and location of the secondary material at such property and the conditions for continued beneficial use and ultimate disposal, if applicable;

2. Outline management options if removed, modified, or processed during its lifecycle to prevent adverse impacts and significant risks to public health, safety and the environment, including, but not limited to, nuisance conditions; and

3. Provide reference to the Department beneficial use application file by including the permit application transmittal number and file location.

(17) Category 4 -- Use of Secondary Material in Unrestricted Applications.

(a) Applicability. Secondary materials that are beneficially used in applications that do not limit exposure to potential human or environmental receptors from secondary material constituents are reviewed in accordance with 310 CMR 19.060(17) when constituents have the potential to adversely impact or create a risk to public health, safety, or the environment, including, but not limited to, nuisance conditions when improperly stored, treated, transported, disposed of, used, or otherwise managed.

(b) Demonstrating Compliance With the Reuse Criteria. Compliance with the Reuse Criteria shall be made on the basis of provisions detailed in 310 CMR 19.060(16)(b), using conservative, unrestricted general exposure assumptions (*e.g.* residential exposures including sensitive receptors) in order to protect public health, safety and the environment.

(c) Application Requirements. In addition to the general permit application requirements identified at 310 CMR 19.060(5) the application shall include characterization information, the scope and level of effort of which shall depend on the proposed secondary material, the beneficial use, and the general exposure assumptions identified with this category of use. The characterization shall be of sufficient scope and adequately documented to demonstrate compliance with 310 CMR 19.060(13): *Reuse Criteria*.

19.061: Special Waste

(1) General. No solid waste management facility shall receive, store, process, treat or dispose of a special waste unless said solid waste management facility:

(a) is operated and maintained in compliance with a valid site assignment, plan approval or permit and any authorizations issued by the Department;

(b) has received written approval from the Department to handle the specific special waste pursuant to 310 CMR 19.061(5) and operates in compliance with the conditions of the approval, if required herein; and

(c) manages the waste in accordance with the requirements of 310 CMR 19.061(6).

(2) Classification of Special Wastes. A solid waste is classified as a special waste if:

(a) the waste is a special waste listed in 310 CMR 19.061(3); or

(b) the waste will require special management to ensure protection of public health, safety or the environment based upon the physical, biological, or chemical properties of the waste.

(3) Listed Special Wastes. Solid wastes that the Department has classified as listed special wastes include:

(a) asbestos waste;

(b) infectious wastes, except as specified in 310 CMR 19.061(6)(c)4.;

(c) sludges, including but not limited to wastewater treatment sludges, drinking water treatment sludges and industrial process wastewater treatment sludges.

19.061: continued

(4) Application to Manage Special Wastes.

(a) General.

1. Solid waste management facilities shall use the application procedures described in 310 CMR 19.061(4), to apply to the Department for approval to manage a special waste.

2. The application shall include such information, data and descriptions as required by the Department to fully assess the nature of the special waste, its handling requirements and the capability of the facility to properly manage the waste.

(b) Filing. An application for approval to manage a special waste shall be filed with the Department. At the time of application to the Department, a copy of the application shall be filed with the board of health in whose jurisdiction the facility is located.

(c) Application for Special Wastes Other than Asbestos and Infectious Wastes. Except for asbestos waste and infectious waste as specified in 310 CMR 19.061(4)(d), applications to manage special wastes shall include the information specified in 310 CMR 19.061(4)(c). Data submitted on the physical, chemical or biological properties of the waste shall be generated from analyses of representative samples of the waste for each source of the waste. The application shall include:

1. identification of the solid waste management facility;

2. identification of the generator(s) of the waste and the specific source or sources of the waste;

3. a general description of the nature of the waste;

4. a description of the industrial or other process which generates the waste;

5. the quantity of the waste to be disposed and frequency of disposal (volume and/or tonnage per month or year);

6. a detailed description of the physical properties of the waste including, but not limited to size, density and percent solids;

7. a detailed description of the chemical properties of the waste including, but not limited to ph, reactivity, leachability and total metals;

8. a demonstration that the waste is not a hazardous waste pursuant to 310 CMR 30.000;

9. the biological properties of the waste, if applicable, including, but not limited to pathogens;

10. identification of special waste handling procedures to be employed by the facility to ensure proper management of the special waste; and

11. other information about the waste or the solid waste management facility as required by the Department in order to classify the waste or to determine the ability of the facility to handle the material.

(d) Applications for Asbestos Wastes and Infectious Wastes. Applications to manage asbestos wastes or infectious wastes shall include:

1. identification of the solid waste management facility;

2. the quantity of the waste to be handled or disposed (volume and/or tonnage per month or year);

3. identification of special waste handling procedures to be employed by the facility to ensure proper management of the special waste; and

4. other information about the waste as required by the Department in order to determine the ability of the facility to handle the special waste.

(5) Department Approval to Manage Special Wastes.

(a) Classifications. When the waste is not a listed special waste, the Department shall determine whether the waste is classified as a special waste. The Department's determination shall be based upon the quantity of waste, the physical, biological and chemical properties of the waste and whether the waste will require special management to ensure protection of public health, safety or the environment.

(b) Decision. The Department shall determine whether a facility shall receive approval to manage the special waste identified in the application. The Department shall base its decision on whether the facility can safely manage the special waste.

(c) Issuance of a Decision. The Department shall issue a written decision for all wastes for which it receives a request conforming with the requirements set forth in 310 CMR 19.061(4).

19.061: continued

(d) Conditions. The Department may issue an approval to manage a special waste subject to any conditions the Department deems necessary to protect public health, safety or the environment. The approval may also contain a condition prohibiting the applicant from accepting the special waste for a period of not less than 14 days, to allow the Department to review comments from the board of health submitted pursuant to 310 CMR 19.061(5)(f), unless the Department determines that an adverse impact would result from a delay in disposal.

(e) Permit Modification. If the Department determines that the handling of a waste at a facility shall cause a deviation from the approved plan or permit, the operator shall submit an application for permit modification in accordance with 310 CMR 19.039.

(f) Board of Health Notification and Comment Period.

1. The board of health shall be notified of the Department's decision on an application to manage a special waste.

2. Within 14 days of receiving such notification the board of health may request the Department to rescind or modify an approval to manage a special waste where the board of health deems that the handling of the special waste would have an adverse impact.

(g) Modification or Recision. The Department shall modify or rescind, as appropriate, an approval to accept special waste if the board of health demonstrates to the satisfaction of the Department, in the request filed in accordance with 310 CMR 19.061(5)(f), that the acceptance of the special waste under the conditions which may have been imposed by the Department is likely to result in an adverse impact.

(6) Management Requirements for Special Wastes.

(a) General Requirements. The following conditions shall apply to any solid waste management facilities handling special wastes:

1. the operator shall keep a copy of the approval to manage a special waste on file at the facility and make available said approval letter upon request by Departmental representatives; and

2. the operator shall instruct and train employees in proper handling procedures for any special waste approved to be managed by the facility.

(b) Requirements for Handling Asbestos Wastes. In addition to the requirements at 310 CMR 19.061(6)(a), all asbestos waste, except as specified in 310 CMR 19.061(6)(b)3., shall be managed in accordance with 310 CMR 19.061(6)(b)1. and 2.

1. All facilities shall observe the following requirements for handling asbestos waste:

a. Asbestos waste shall not be accepted for disposal at solid waste combustion facilities.

b. Asbestos waste that has not been properly wetted, containerized and labelled according to 310 CMR 7.15 shall not be accepted at any solid waste management facility.

c. Asbestos waste that has been properly wetted, containerized and labelled in accordance with 310 CMR 7.15 shall not be accepted at any solid waste facility unless that facility has received approval from the Department in accordance with 310 CMR 19.061 to accept asbestos waste.

d. Asbestos waste that has been properly wetted, containerized and labelled shall be managed so as to maintain the integrity of its containers and to prevent emissions of asbestos fibers to the ambient air.

2. Landfill Specific Requirements. In addition to the requirements in 310 CMR 19.061(6)(b)1., landfills that have received approval from the Department to accept asbestos waste shall observe the following operational requirements:

a. Asbestos waste shall be immediately disposed in the landfill and shall not be stored at the landfill prior to placement in the landfill.

b. Asbestos waste shall be placed in the landfill in such manner as to prevent the release of asbestos fibers to the air during placement.

c. Asbestos waste shall be placed in the landfill using a method approved by the Department. The approved method shall be as described in 310 CMR 19.100 through 19.204 in Department guidance or in a Department approval or permit. All such approved placement methods shall include requirements that the asbestos waste is covered by sufficient amounts of either solid waste that does not contain asbestos and/or daily cover material to assure that no asbestos fibers are released to the air during or subsequent to compaction.

19.061: continued

d. Accurate records of the surveyed location in the landfill of all asbestos waste shall be maintained. Locations of asbestos deposition shall be noted in the Record Notice of Landfill Operation pursuant to 310 CMR 19.100 through 19.204. Locations of asbestos deposition shall also be included whenever information regarding the property is recorded on the property deed pursuant to M.G.L. c. 111, § 150A.

e. Areas of the landfill containing asbestos shall be clearly marked by the operator.

f. Areas of the landfill containing asbestos waste shall not be excavated.

3. Requirements for Certain Classes of Asbestos Wastes. The following asbestos wastes are not subject to the provisions of 310 CMR 19.061 except as specified at 310 CMR 19.061(6)(b)1.a.:

a. intact and unbroken vinyl asbestos tile (VAT);

b. asphaltic asbestos-containing siding products and asphaltic asbestos-containing roofing materials such as roofing felts and roofing shingles (Note: This does not include other asbestos containing roofing shingles and siding products such as those containing a cementitious binding characterized as being hard and brittle.); and

c. other asbestos waste so designated by the Department in writing.

(c) Requirements for Handling Infectious Waste. In addition to the requirements at 310 CMR 19.061(6)(a), infectious waste shall be handled in accordance with the following:

1. In addition to the requirements of 310 CMR 19.000, infectious waste shall be treated, packaged, labeled and disposed of in accordance with 105 CMR 480.000.

2. Landfills. Infectious waste shall not be disposed in a solid waste landfill unless the waste is processed and managed to meet the requirements of 310 CMR 19.061(6)(c)4.

3. Facilities Other than Landfills. Infectious waste (which has not been rendered non-infectious) shall not be accepted at a solid waste management facility unless that facility has received approval under 310 CMR 19.061 to manage infectious waste.

4. Infectious waste that has been rendered non-infectious in accordance with 105 CMR 480.000 and is packaged, labeled and otherwise managed in accordance with 105 CMR 480.000 is not subject to 310 CMR 19.061 and may be accepted at any solid waste facility.

(d) Requirements for Handling Sludges. In addition to the requirements at 310 CMR 19.061(6)(a), sludges shall be handled in accordance with the following:

1. General Requirements. Disposal of all types of sludges shall comply with the following requirements.

a. Sludges accepted at a solid waste facility shall not contain free draining liquids.

b. Sludges disposed at landfills shall contain a minimum of 20% solids.

c. Odor control methods, acceptable to the Department, shall be employed at all landfills accepting odor-producing sludges.

2. Requirements for Sewage Treatment and Water Treatment Sludges. In addition to the requirements set forth at 310 CMR 19.061(6)(d)1., sewage treatment and water treatment sludges shall comply with the following requirements.

a. Sewage treatment and water treatment sludges shall be incorporated into the active face of a landfill in a 3:1 mixture of solid waste to sludge or placed in a designated area and covered immediately.

b. Sewage treatment sludges may be accepted at a solid waste landfill only after land application and composting options have been investigated by the applicant or by the generator of such sludge and determined by the Department not to be feasible, provided that said investigation of options may be deferred for a reasonable time upon a determination by the Department that adverse impacts may occur as a result of delaying disposal of the sludge.

c. Sewage treatment sludges containing pathogens that have not been stabilized using methods approved by the Department shall not be disposed at an unlined landfill, unless specifically approved by the Department on a temporary basis.

3. Requirements for Industrial Wastewater Treatment Sludges. In addition to the requirements set forth at 310 CMR 19.061(6)(d)1., industrial wastewater treatment sludges shall comply with the following requirements.

The solid waste management facility operator shall provide data, descriptions and other information required at 310 CMR 19.061(4) to the Department for each separate source of industrial wastewater treatment sludge prior to acceptance at the landfill.

19.061: continued

(7) Reclassification. The Department may reclassify a waste in accordance with 310 CMR 19.061(5) or place further conditions on an approval to manage a special waste in accordance with 310 CMR 19.061 should such action be deemed necessary. Any such reclassification or conditions shall be in writing.

19.062: Demonstration Projects or Facilities

(1) Applicability. Any person who wishes to establish a demonstration project at a permitted solid waste management facility or establish a demonstration solid waste management facility for the purpose of demonstrating the effectiveness and utility of a new or innovative solid waste management technology shall submit an application to the Department for a demonstration project permit and notify the board of health of jurisdiction.

(2) Application Requirements. An application for a demonstration project permit shall include:

(a) a detailed description of the proposed activity, including:

1. a discussion of the objectives of the project;
2. a discussion of the purposes for undertaking the project;
3. an analysis indicating the benefits of the proposed new technology;
4. a description of the applicability of the new technology to solid waste management in general;
5. a description of how the applicant intends to provide for the receipt and treatment or disposal of those types and quantities of solid waste proposed to be necessary for purposes of determining the efficiency and performance capabilities of the technology or process; and
6. a technical analysis indicating environmental, public health and safety benefits and risks from the proposed new technology;

(b) a set of plans which shall include:

1. a site plan indicating the location of the project or facility;
2. an operational plan outlining operational details of the project or facility, the particular types of equipment required for proper operation and a discussion of measures to be taken to ensure the protection of public health, safety or the environment;
3. a corrective action plan which indicates how conventional solid waste management technology shall be utilized in the event of failure of the proposed technology; and
4. a data collection and analysis plan which outlines all data collection and analysis procedures, protocols and reporting formats required to document and evaluate whether the demonstration project has achieved its objectives.

(c) a project timetable; and

(d) such other descriptions, plans or information as the Department deems necessary to review the demonstration project.

(3) Department Review of an Application. The Department shall not grant a permit for a demonstration project unless:

(a) the application is complete and accurate;

(b) the facility has a valid site assignment where required pursuant to the Site Assignment Regulations at 310 CMR 16.00;

(c) the facility has a valid permit and necessary authorizations issued by the Department, if applicable;

(d) the project can be adequately accommodated at a permitted facility without interfering with or disrupting normal operations of the facility, where the project is to be located at a permitted facility;

(e) the demonstration project or facility has merit and seeks to improve operational aspects of a facility, produce significant cost savings or serve to increase protection of human health and the environment;

(f) the proposed demonstration project will not cause or contribute to pollution of the air, water or other natural resources of the Commonwealth; and

(g) the applicant has provided adequate proof of financial assurance as specified in 310 CMR 19.062(5).

ENVIRONMENTAL PARTNERS

1900 Crown Colony Drive, Suite 402
Quincy, MA 02169
P: 617.657.0200 F: 617.657.0201

envpartners.com