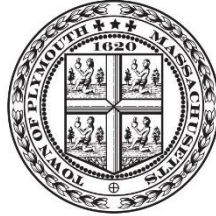


**TOWN OF PLYMOUTH  
PROCUREMENT DIVISION  
26 COURT STREET  
PLYMOUTH, MA 02360**



**INVITATION FOR BID 22147R  
WATER STREET SEWER INTERCEPTOR REPLACEMENT**

**Issued:** Wednesday, April 27, 2022

**Pre-Bid Meeting:** Thursday, May 5, 2022, at 11:30 a.m.

**Due:** Thursday, June 2, 2022, at 10:00 a.m.

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TOWN OF PLYMOUTH  
26 Court Street  
Plymouth, MA 02360

April 27, 2022

INVITATION FOR BIDS 22147R

**A. INVITATION**

**Sealed bids are sought by the Town of Plymouth for all labor, materials, equipment, services and construction for the Water Street Sewer Interceptor Replacement. The required completion date is June 30, 2023.**

Bids are to be submitted by **10:00 a.m. on Thursday, June 2, 2022**, at which time they will be publicly opened and read. Postmarks will not be considered. All bids must be sealed and made upon forms furnished by the Procurement Division. Bids submitted on any other form will not be accepted as valid bids. Envelopes should be clearly marked **BID 22147R, Water Street Sewer Interceptor Replacement**.

Specifications and bid forms are available to download by registering at <https://www.plymouth-ma.gov/bids-current>

A Pre-Bid Conference will be held on **Thursday, May 5, 2022, at 11:30 a.m.** in the Great Hall of Town Hall, located at 26 Court Street, Plymouth, MA. Any person interested in submitting a bid is encouraged to attend.

Bid Security in the form of a bid bond, certified check, treasurer's or cashier's check payable to the Owner, is required in the amount of five percent (5%) of the bid, in accordance with Section B, INSTRUCTIONS TO BIDDERS.

The selected contractor shall furnish a payment bond in an amount at least equal to fifty percent (50%) of the contract price as stipulated in Section B, INSTRUCTIONS TO BIDDERS.

This project is federally funded by the United States Department of the Treasury (USDT) American Rescue Plan Act (ARPA) and therefore is subject to the Federal laws and regulations associated with the program. Minority-owned Business Enterprise (MBE), Women-owned Business Enterprise (WBE) and Equal Employment Opportunity policies of the USDT are applicable to this Contract. The Bidder shall comply with all applicable laws and regulations pertaining to discrimination, equal opportunity and affirmative action, including without limitation executive orders and rules and regulations of federal and state agencies of competent jurisdiction. The Bidder shall make positive efforts to achieve: (1) a minority employee work force hour goal of 15.30 percent (15.3%), (2) a woman employee work force hour goal of 6.90 percent (6.90%), (3) a goal of 7.24 percent (7.24%) participation of Minority-owned Business Enterprise(s), and (4) a goal of 3.60 percent (3.60%) participation of Woman-owned Business Enterprise(s) within project contracts. All MBEs and WBEs shall be certified by the Commonwealth of Massachusetts under the provisions certified by the Supplier Diversity Office (SDO). At a minimum, the community should allow MBEs and WBEs the

maximum feasible opportunity to compete for sub-agreements performed under the project. Failure to comply with the requirements of this paragraph may be deemed to render a proposal nonresponsive. No waiver of any provision of this section will be granted unless approved by the Owner.

All bids for this project are subject to applicable bidding laws of M.G.L. c.30 §39M as amended, all applicable Federal Law, and these Bid and Contract Documents.

Prevailing Wage Rates as determined by the Director of Executive Office of Labor and Workforce Development under the provisions of M.G.L. c.149 §26 to 27H, as amended, apply to this project. It is the responsibility of the Bidder, before bid opening, to request if necessary, any additional information on Prevailing 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.

By submission of a bid, the Bidder agrees that this bid shall be good and may not be withdrawn for a period of sixty (60) days, Saturdays, Sundays and legal holidays excluded after the opening of bids.

The Owner reserves the right to waive any informalities in bids and to reject any or all bids.

## **B. INSTRUCTIONS TO BIDDERS**

### **1. Receipt and Opening of Bids**

The Town of Plymouth, Massachusetts, herein called the OWNER, acting by and through its Town Manager, will receive sealed Bids for the replacement of the sewer interceptor on Water Street, filed in the Procurement Office, Town Hall, 26 Court Street, Plymouth, MA, 02360.

One (1) original and one (1) copy of sealed bids addressed to the OWNER and endorsed Bid 22147R Water Street Sewer Interceptor Replacement, will be received at the Town of Plymouth Procurement Office, 26 Court Street, Plymouth, MA, 02360, until **10:00 a.m. prevailing time, on Thursday, June 2, 2022**, at which time and place said bids will be publicly opened and read. Envelopes should clearly be marked “Bid 22147R, Water Street Sewer Interceptor Replacement” along with the name and address of the bidder.

If the building at which bids are to be received is closed for any reason on the date and time that bids are due, receipt of bids by the Owner will be postponed until the next business day at the time originally stated for receipt of bids.

Any bid may be withdrawn prior to the above scheduled time for the opening of bids or authorized postponement thereof. Any bid received after the time and date specified will not be considered. By submission of a bid, the bidder agrees that this bid shall be good and may not be withdrawn for sixty (60) days.

### **2. Location and Work to Done**

The location, general characteristics, and principal details of the Work are indicated in the attached Drawings and Specifications.



Additional drawings showing details in accordance with which the Work is to be done may be furnished by addendum from time to time during the bidding period by the ENGINEER, and shall then become part of the Contract Documents.

The CONTRACTOR shall furnish all superintendence, labor, services, materials, equipment, plant, machinery, apparatus, appliances, tools, supplies, bailing, shoring, removal, and all other things necessary to do all work required for the completion of each item of the Work and as herein specified.

The Work to be done and paid for under any item shall not be limited to the exact extent mentioned or described but shall include all incidental work necessary or customarily done for the completion of that item.

3. Preparation of Bid

Each bid must be submitted on the Bid Forms. All blank spaces for bid prices must be filled in, in ink or typewritten, in both words and figures.

Each bid must be submitted in a sealed envelope bearing on the outside the name of the bidder, its address, and endorsed with the name of the project as specified in Receipt and Opening of Bids, above.

If forwarded by mail, the sealed envelope containing the bid must be enclosed in another envelope addressed as specified in Receipt and Opening of Bids, above.

4. Modification of Bids

Any bidder may modify its bid by written communication at any time prior to the scheduled closing time for receipt of bids.

The modification communication shall not reveal the bid price but shall provide the addition or subtraction or other modification so that the final prices or terms will not be known by the OWNER until the sealed bid is opened.

5. Obligation of Bidder

At the time of the opening of bids each bidder will be presumed to have inspected the site and to have read and to be thoroughly familiar with the Contract Documents (including all addenda). The failure or omission of any bidder to examine any form, instrument, or document shall in no way relieve any bidder from any obligation in respect of its bid.

6. Information not Guaranteed

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

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

It is further agreed and understood that no bidder or CONTRACTOR shall use or be entitled to use any of the information made available to it or obtained in any examination by it in any manner as a basis of or grounds for any claim or demand against the OWNER or ENGINEER, arising from or by reason of any variance which may exist between the information made available and the actual subsurface or other conditions, natural phenomena, existing pipes or other structures actually encountered during the construction work, except as may otherwise be expressly provided for in the Contract Documents.

7. Bid Security

Each bid must be accompanied by a certified check, bid bond, a treasurer's or cashier's check, payable to the OWNER, in the amount stated in Section A, INVITATION. Such deposits will be returned to all except the three (3) lowest responsible and eligible bidders within five (5) days, Saturdays, Sundays and legal holidays excluded, after the opening of bids, and the remaining deposits will be returned promptly after the OWNER and the accepted bidder have executed the Contract, or if no notice of intent to award has been presented the any bidder within 60 days, Saturdays, Sundays and legal holidays excluded, after the date of the opening of bids, upon demand of the bidder at any time thereafter.

8. Time for Completion

The successful general bidder must agree to commence work on or before a date to be specified in the written "Notice to Proceed" from the OWNER and to complete the project by June 30, 2023.

9. Addenda and Interpretations

No interpretation of the meaning of any plans, specifications or other pre-bid documents will be made to any bidder orally, and if provided orally, shall not be relied upon by the bidders unless confirmed in written addendum. All information given to bidders other than by means of the plans, specifications, or by addenda, as described below, is given informally and shall not be used as the basis of a claim against the OWNER or ENGINEER. Questions related to the bid process can be addressed to Sandra Strassel, Procurement Officer, at (508) 747-1620, ext. 10107.

Every request for such interpretation should be in writing (type, not handwritten) addressed to the OWNER and emailed to [sstrassel@plymouth-ma.gov](mailto:sstrassel@plymouth-ma.gov), and to be given consideration must be received at least five (5) working days prior to the date fixed for the opening of bids.

**Addenda:** If you received Bid Documents from the Town and provided the Town with an accurate email address for delivery of addenda, the Town intends to deliver notification of each addendum to you at such email address, but the Town shall not be responsible for any failure of a bidder to receive any addenda for any reason. All addenda will be available on the Town's website at [www.plymouth-ma.gov/bids-current](http://www.plymouth-ma.gov/bids-current).

Any and all such interpretations and any supplemental instructions will be in the form of written addenda to the specifications which, when issued, will be emailed to all prospective bidders to email addresses furnished by them for such purposes. Failure of any bidder to receive any such addendum or interpretation shall not relieve such bidder from any obligation under its bid as submitted. All addenda so issued shall become part of the Contract Documents.

#### 10. Bid Opening Procedure

The following list of requirements shall be met by each filed bid:

- Bids shall be filed at the place and before the time specified in Receipt and Opening of Bids, above.
- Properly executed bid security shall be placed in a sealed envelope and shall be attached to the outside of the envelope containing the bid.
- The bid and all accompanying documents so required shall be signed by the Bidder or its authorized representative before submission.
- All bidders shall include with their bids written acknowledgement of receipt of all addenda, on the Bid Form.
- The total dollar amount of each bid will be read, and the three (3) apparent lowest bids will be selected for further consideration. These three (3) apparent low bids will be read aloud for the benefit of the other bidders and the bid opening procedure will be closed. All bids submitted will be posted to the Procurement Department website.

#### 11. Comparison of Bids

Bids will be compared on the basis of the quantities and unit and lump sum prices stated in the bid forms.

In the event that there is discrepancy on the Bid Form between the lump sum or unit prices written in words and figures, the prices written in words will govern.

The OWNER agrees to examine and consider each Bid Form submitted in accordance with the terms and conditions set forth herein.

#### 12. Statutes Regulating Competitive Bidding

Any bid which does not comply with the provisions of M.G.L. c.30 §39M as amended need not be accepted and the OWNER may reject every such bid.

#### 13. Right to Reject Bid

The OWNER may consider informal any bid not prepared and submitted in accordance with the provisions hereof and may waive any informalities or reject any and all bids, should the OWNER deem it to be in the public interest to do so.

The OWNER may also reject bids which in its sole judgement are either incomplete, conditional, obscure or not responsive or which contains additions not called for, erasures not properly

initialed, alterations, or similar irregularities, and may reject bids for any other reason permitted by law, or the OWNER may waive such omissions, conditions or irregularities.

14. Ability and Experience of Bidder

No award will be made to any bidder who can not satisfy the OWNER that it has sufficient ability and experience in this class or work and sufficient capital and plant to enable it to prosecute and complete the work successfully within the time names. The OWNER's decision or judgement on these matters will be final, conclusive, and binding to the fullest extent permitted by law.

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

15. Conditions of Work

Each bidder must inform itself fully of the conditions relating to the construction of the project and the employment of labor thereon. Failure to do so will not relieve a successful bidder of its obligation to furnish all material and labor necessary to carry out the provisions of its contract. Insofar as possible the CONTRACTOR, in carrying out its work, must employ such methods or means as will not cause any interruption of or interference with the work of any other contractor.

16. Payment Bond

Simultaneously with delivery of the executed Contract, the CONTRACTOR shall furnish a surety bond for the payment of all persons performing labor and materials under this Contract in the amount of fifty percent (50%) of its bid. The surety on such bond shall be a surety company qualified to do business under the laws of the Commonwealth and satisfactory to the OWNER. The bond shall remain in force for one (1) year after final acceptance of the work by the OWNER, unless the OWNER, in writing, releases the CONTRACTOR from the obligation sooner.

17. Power of Attorney

Attorneys-in-fact who sign Contract bonds must file with each bond a certified and effectively dated copy of their power of attorney.

18. Laws and Regulations

Applicable provisions of Massachusetts General Laws and Regulations and 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 a conflict between Federal and State Laws and Regulations exists, the more stringent requirement shall apply.

The bidder's attention is directed to the fact that all applicable State laws, municipal ordinances or bylaws, and the rules and regulations of all authorities having jurisdiction over construction of the project shall apply to the Contract throughout, and they will be deemed to be included in the Contract the same as though herein written out in full.

In the event of any conflict between provisions of law or regulation quoted or paraphrased in the Contract Documents, the actual provisions of law or regulation shall control.

19. Liquidated Damages for Failure to Enter into Contract

The successful bidder, upon its failure or refusal to execute and deliver the Contract, Bonds and Certificates of Insurance required within 10 days after receipt of the notice of the acceptance of the bid, shall, except as otherwise provided by applicable law, forfeit to the OWNER, as liquidated damages for such failure or refusal, the security deposited with its bid, provided that the amount forfeited shall not exceed the difference between its bid price and the bid price or the next lowest responsible and eligible bidder. In case of death, disability, bona fide clerical or mechanical error of a substantial nature, or other similar unforeseen circumstances affecting the bidder, its bid deposit will be returned.

20. Indeterminate Items and Estimated Quantities

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

21. CONTRACTOR Records

The CONTRACTOR shall comply with the provisions of M.G.L. c.30 §39R, concerning CONTRACTOR records.

22. Bidder Certification – OSHA Training

All employees who work on Massachusetts public works construction sites, on projects estimated to cost more than \$10,000.00, must have no less than ten (10) hours of OSHA-approved safety and health training.

The Massachusetts Attorney General is authorized to restrain award of construction contracts to any contractor who is in violation of this requirement and to restrain the performance of these contracts by non-complying contractors.

Noncompliance with this law will disqualify contractors from bidding on public contracts.

23. Prevailing Wage Rates

Prevailing Wage Rates as determined by the Director of the Executive Office of Labor and Workforce Development under the provision of M.G.L. c.149 §26 to 27H, as amended, apply to this project. It is the responsibility of the bidder, before bid opening, to request if necessary, any additional information on Prevailing Wage Rates for those trades people who may be employed for the proposed work under this contract.

The Contractor is responsible for requesting up to date wage rates from the Owner prior to the one-year anniversary of the notice to proceed of this contract. The Owner shall obtain updated wage rates from the Director and provide them to the Contractor upon said request.

Applicable conditions 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 the Code of Federal Regulations and State Laws and Regulations exist, the more stringent requirement shall apply.

Federal Wage Rates as determined by the United States Department of Labor under the Davis-Bacon Act also apply to this project.

24. Price Adjustments

This Contract is subject to the provisions for material price adjustments in accordance with M.G.L. c.30 §38A.

25. Federal Participation Disclosure

The project will be funded with Federal funds from the United States Department of the Treasury's American Rescue Plan Act and therefore is subject to the Federal laws and regulations associated with that program.

26. Affirmative Action/Equal Employment Opportunity Laws and Regulations

The Town of Plymouth is an affirmative action/equal opportunity owner/purchaser. The bidder's attention is directed to all applicable State Laws, Town Bylaws, and rules and regulations regarding affirmative action/equal employment opportunity requirements. Failure of a bidder to comply with any such law, bylaw, rule or regulation shall constitute grounds for the Town to reject a bid or to otherwise reject or terminate the award of the contract pursuant to these contract documents.

27. Bid Status Information

**A register of Bids, when available,** will be posted on the Town's website at [www.plymouth-ma.gov/procurement-division/pages/bids-results](http://www.plymouth-ma.gov/procurement-division/pages/bids-results).

**Notification of award of contract** will be mailed to all bidders and/or posted on the Town's website.

**C. INSURANCE REQUIREMENTS**

1. The Contractor shall carry and continuously maintain until completion of the Contract, insurance as specified below and in such form as shall protect them performing work covered by this Contract, or the Town of Plymouth and its employees, agents and officials, from all claims and liability for damages of bodily injury, including accidental death, and for property damage which may arise from operations under this Contract. The Contractor covenants and agrees to hold the

Town and its employees, agents and officials harmless from loss or damage due to claims for personal injury and/or property damage arising from, or in connection with, operations under this Contract.

2. Except as otherwise stated, the amounts of such insurance shall be for each policy, not less than:
  - a. **General Liability** of at least one million dollars (\$1,000,000.00) Bodily Injury and Property Damage Liability, Combined Single Limit with a two million dollars (\$2,000,000.00) Annual Aggregate Limit. **The Town of Plymouth shall be named as “Additional Insured.”**
  - b. **Automobile Liability** of at least one million dollars (\$1,000,000.00) Bodily Injury and Property Damage per accident. **The Town of Plymouth shall be named as “Additional Insured.”**
  - c. **Worker’s Compensation Insurance** as required by law.
  - d. **Property Coverage** for materials and supplies being transported by the Contractor as the Town’s Property Contract provides coverage for personal property within 1,000 feet of the premises.
  - e. **Umbrella Liability** of at least three million dollars (\$3,000,000.00) per occurrence, three million dollars (\$3,000,000.00) aggregate. **The Town of Plymouth shall be named as “Additional Insured.”**
3. All policies shall be so written that the Town will be notified of cancellation or restrictive amendment at least thirty (30) days prior to the effective date of such cancellation or amendment. A certificate from the Contractor’s insurance carrier showing at least the coverage and limits of liability specified above and expiration date shall be filed with the Town before operations are begun.
4. Such certificates shall not merely name the type of policy provided, but shall specifically refer to this Contract and shall state that such insurance is required by the Contract. The Contractor shall make no claims against the Town of Plymouth or its officers for any injury to any of their officers or employees or for damage to their trucks or equipment arising out of work contemplated by this Contract.
5. The Contractor shall, to the maximum extent permitted by law, indemnify and save harmless the Town of Plymouth, its officers, agents and employees from and against any and all damages, liabilities, actions, suits, proceedings, claims demands, losses, costs and expenses (including reasonable attorney’s fees) that may arise out of or in connection with the work being performed or to be performed by the Contractor, its employees, agents, subcontractors or materialmen. The existence of insurance shall in no way limit the scope of this indemnification. The Contractor further agrees to reimburse the Town of Plymouth for damage to its property caused by the Contractor, its employees, agents, subcontractors or materialmen, including damages caused by use of faulty, defective or unsuitable material or equipment, unless the damage is caused by the Town of Plymouth’s gross negligence or willful misconduct.

## D. SAFETY & HEALTH REGULATIONS

The successful bidder shall comply with the Department of Labor Safety and Health Regulations for construction promulgated under the Occupational Safety and Health Act of 1970 (PS-91-596) and under §107 of the Contract Work Hours and Safety Standards Act (PL-91-54).

The successful bidder shall have a competent person or persons, as required under the Occupational Safety and Health Act, on the site to inspect the work and to supervise the conformance of the work within the regulations of the Act.

This project is subject to the Safety and Health Regulations of the United States Department of Labor and Industries, Division of Industrial Safety “Rules and Regulations for the Prevention of Accidents in Construction Operations (Industrial Bulletin No. 12).” Contractors shall know the requirements of these regulations.

The Contractor shall provide the following safety documents upon Contract award:

1. The Safety Acknowledgement Agreement Form (which will be issued with the Contract), and
2. The Company’s Health and Safety Manual.

For projects over one million dollars (\$1,000,000.00) the awarded Contractor shall submit a job specific Health and Safety Plan (HASP) to the Town’s Safety Compliance Officer for review, before commencing any portion of the work on site. The plan shall include the analysis of the significant hazards to life, limb, and property inherent in the performance of work, and plan for controlling these hazards.

The Contractor shall inform the permitting authority within **twenty-four (24) hours** if any accidents/incidents resulting in death, traumatic injury, occupational disease, or damage to property, materials, supplies or equipment that arises in connection with the work.

In any emergency affecting the safety of persons or property, the Contractor shall immediately act in the exercise of reasonable judgement to prevent threatened damage, injury or loss. The Contractor shall immediately notify the Town of such emergency.

Without limiting the Contractor’s responsibilities described in the Bid Documents, the Contractor shall take all reasonable precautions for the safety of, and the prevention of, injury or damage to all agents, employees and contractors on the project, and all other persons who may be affected thereby including the general public.



## **SPECIAL CONDITIONS**

**EQUIPMENT:** The Contractor shall furnish equipment which will be effective, 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 time stipulated in the Bid Documents. If at any time such equipment appears to the Town to be inefficient, inappropriate or insufficient for securing the quality of work required or for producing the rate of progress aforesaid, the Town may order the Contractor to increase the efficiency, change the character or increase the equipment, and the Contractor shall conform to such order. Failure of the Town to give such order shall in no way relieve the Contractor of their obligations to secure the quality of the work and rate of progress required.

**WORK HOURS:** Normal work hours will mean up to five (5) 8-hour days, Monday through Friday. In order to work hours not within this span for the Contractor's benefit, they shall request a written authorization to be approved by the Town. For work outside the normal day, work on Saturdays, Sundays or legal holidays, if any be performed, the Contractor will receive no extra payment, but compensation shall be considered as having been included in the prices as stipulated for the appropriate items of work as listed in the bid.

**APPROVAL OF MATERIALS:** Only new materials and equipment shall be incorporated in the work. All materials and equipment furnished by the Contractor shall be subject to the inspection and approval of the Town. No materials shall be delivered to the worksite without prior approval of the Town.

The Contractor shall submit data and samples sufficiently early to permit consideration and approval before materials are necessary for incorporation in the work. Any delay of approval resulting from the Contractor's failure to submit samples or data promptly shall not be used as a basis of a claim against the Town.

**SUBSTITUTES OF APPROVED "OR EQUAL" ITEMS:** Whenever materials or equipment are specified or described in the Contract Documents by using the name of a proprietary item or the name of a particular supplier, the naming of the item is intended to establish the type, function and quality required. Unless the name is followed by words indicating that no substitution is permitted, materials or equipment of other suppliers may be accepted by the Town if sufficient information is submitted by the Contractor to allow the Town to determine that the material or equipment proposed is equivalent or equal to that named. Requests for review of substitute items of material and equipment will not be accepted by the Town from anyone other than the Contractor. If the Contractor wishes to furnish or use a substitute item of material or requirement, the Contractor shall make a written application to the Town for acceptance thereof certifying that the proposed substitute will perform adequately similar and of equal substance to that specified and be suited to the same use as that specified. The application will state that the evaluation and acceptance of the proposed substitute will not prejudice the Contractor's achievement of substantial completion on time, whether or not acceptance of the substitute for us in the work will require a change in any of the Contract Documents (or in the provisions of any other direct contract with the Town for work on the project) to adapt the design to the proposed substitute and whether or not incorporation of use of the substitute in connection with the work is subject to payment of any license fee or royalty.

All variations of the proposed substitute from that specified will be identified in the application and available maintenance, repair and replacement service will be indicated. The application will also result directly or indirectly from acceptance of such substitute, including costs of redesign and claims of other contractors affected by the resulting change, all of which shall be considered by the Town in evaluating

the proposed substitute. The Town may require the Contractor to furnish, at the Contractor's expense, additional data about the proposed substitute.

If a specific means, method, technique, sequence or procedure of construction is indicated in or required by the Contract Documents, the Contractor may furnish or utilize a substitute means, method, sequence, technique or procedure of construction acceptable to the Town if the Contractor submits sufficient information to allow the Town to determine that the substitute proposed is equivalent to that indicated or required by the Contract Documents. The procedure for review by the Town will be similar to that stated previously.

The town will be allowed a reasonable time within which to evaluate each proposed substitute. The Town will be the sole judge of acceptability, and no substitute will be ordered, installed or utilized without the Town's prior written acceptance which will be evidenced by either a change order or an approved Shop Drawing. The Town may require the Contractor to furnish, at the Contractor's expense, a special performance guarantee or other surety with respect to any substitute. The Town will record time required by the Town and Town's consultants in evaluating substitutions proposed by the Contractor, and in making changes in the Contract Documents occasioned thereby. Whether or not the Town accepts a proposed substitute, the Contractor shall reimburse the Town for the charges of Town's consultants for evaluating each proposed substitute.

**TEMPORARY UTILITIES:** The Contractor shall make all arrangements for and furnish at their expense all water, electric, telephone or other utility required by them for construction purposes.

**LOCATION OF ALL UTILITIES:** The location of the existing utilities must be established and verified by the Contractor. The Contractor shall make arrangements with the appropriate utility companies to have all existing utilities marked along the course of this work by such means, as necessary. The Contractor shall preserve such marked locations until the work has progressed to the point where the encountered utility is fully exposed or protected as required. It shall be the Contractor's responsibility to notify the proper authorities or utility before interfering therewith.

**SAFETY CONTROL:** The Contractor shall provide and maintain all required safety equipment such as barricades, detour barriers and signs, lights, walkways, fences, and fire prevention equipment. If at any time before the commencement or during the progress of work, or any part of it, such methods and procedures as used appear to the Town as unsafe, insufficient or improper, the Town may order the Contractor to increase their safety of efficiency or to improve their character,, and the Contractor shall conform to such orders. Failure of the Town to give such an order to increase such safety, efficiency, adequacy or any improvements shall not release the Contractor from their obligation to secure the safe conduct and quality of work specified. Notwithstanding the foregoing, nothing herein obligates the Town to perform any review or inspection of any of the Contractor's methods or procedures.

**OCCUPATIONAL SAFETY AND HEALTH ACT:** The Contractor's particular attention is called to the rules and regulations included in Public Law 91-596, known as the "Occupational Safety and Health Act of 1970" (OSHA).

**MAINTENANCE OF TRAFFIC:** The Contractor shall be responsible for the maintenance of traffic with the maximum of safety and practicable convenience to such traffic during the life of the contract whether or not work thereon has been suspended temporarily. The work shall be carried on in such a manner as to provide safe passage at all times for public travel and with least obstruction to traffic.

The convenience of the general public and of the residents along and adjacent to the work shall be provided for in an adequate and satisfactory manner.

Portable barrier fences with appropriate signs shall be used for safety control in establishing traffic patterns (detours, etc.). These portable barrier fences shall meet the approval of the Director of Public Works or their designee, provided that any such approval or lack thereof shall not relieve the Contractor of their obligation to use appropriate barrier fences.

Roadways, driveways and foot paths closed to the traffic shall be protected by suitable barricades and warning signs, and the Contractor shall provide and maintain adequate lights and illumination. Therefore, they shall be held responsible for all damage to the work due to any failure of signs and barricades to protect the work properly from traffic, pedestrians, animal or other causes.

**POLICE DETAIL:** The Contractor shall coordinate with the Plymouth Police Department the number of traffic police required in either the appropriate traffic management plan (TMP) template (see MassDOT's website at [www.mass.gov/lists/construction-details](http://www.mass.gov/lists/construction-details)) or deemed necessary for the direction and control of traffic within the site.

The Contractor shall submit the requested and signed police detail schedule as called in and arranged directly with the Police Department on a weekly basis. Police details will be paid directly by the Contractor. The Contractor shall be responsible for scheduling and canceling police details if not needed. It is the Contractor's responsibility to cancel a detail(s) at a minimum of four (4) hours in advance of the start of the shift if conditions so warrant. Police details not cancelled in time shall be paid for by the Contractor.

**RESTORATION (WORK IN IMPROVED PROPERTY AREAS):** The Contractor, at their own expense, shall care for, replace and restore to good condition, satisfactory to the Town, and public or private property (i.e. shrubs, hedges, trees, public or private ways, sewer drains, water or other pipes, catch basins, wires, buildings, fences, posts, poles, mailboxes, stone walls or other structures) negligently damaged by their work, equipment, or employees, to a condition at least equal to that existing immediately prior to the beginning of operations.

The Contractor shall also restore to original condition, or better, any lawn or other planted area interfered with, including fertilizing, loaming, and seeding as required, once again at the Contractor's expense.

Suitable materials, equipment and methods shall be used for such restoration.

**BOUNDS AND PROPERTY MARKERS:** All bounds and property markers disturbed in the course of the work shall be replaced by the Contractor at their expense.

The Contractor shall employ a registered land surveyor to reset all bounds and property markers.

**TELEPHONE NUMBERS:** The telephone numbers of the following Town of Plymouth Departments are:

POLICE	(508) 830-4220 (business)
FIRE	(508) 830-4213 (business)
HIGHWAY	(508) 830-4162, ext. 12101
WATER	(508) 830-4162, ext. 12136

ENGINEERING (508) 747-1620, ext. 10120

SEWER (508) 830-4159

PUBLIC WORKS (508) 830-4162, ext. 12105

Town Office Building Hours:	Monday, Wednesday, Thursday	7:30 a.m. to 4:00 p.m.
	Tuesday	7:30 a.m. to 6:30 p.m.
	Friday	7:30 a.m. to 12:00 p.m.

**LEGAL REQUIREMENTS:** The Contractor shall keep themselves fully informed of, and comply with, all laws, ordinances and regulations of the Federal, State and municipal governments which may be in force during the life of the contract, and in any manner affecting their employees or the conduct of work of materials used on said work.

**PERSONAL SUPERVISION BY CONTRACTOR:** The Contractor or their duly authorized and approved representative shall give personal attention to the fulfillment of the contract. The Contractor shall have on the worksite, at all times, a competent representative authorized to receive and execute any order of direction of the Town.

The representative should also accept any notices given to the Contractor under the provisions of the contract.

**CLEANUP:** During the course of the work, the Contractor shall keep the site of their operations in as clean and neat a condition as possible. They shall dispose of all residue resulting from the construction work on a daily basis and, at the conclusion of work, they shall remove and haul away structures and other refuse remaining from the construction operations, and shall leave the entire site of the work in a neat and orderly condition.

## **SAMPLE AGREEMENT & ASSOCIATED DOCUMENTS**

THIS AGREEMENT, made this (#) day of (MONTH), 2022, by and between the TOWN OF PLYMOUTH, with an office at 26 Court Street, Plymouth, Plymouth County, Massachusetts, 02360, hereinafter called the “Owner”, and (CONTRACTOR NAME), with an office at (ADDRESS), hereinafter called the “Contractor”.

WITNESSETH, that the Owner and the Contractor, for the consideration hereafter named, agree as follows:

Article 1. SCOPE OF WORK: The Contractor shall perform all the work required by the Contract Documents for the Water Street Sewer Interceptor Replacement, as described in attached Bid Documents 22147R.

Article 2. TIME OF COMPLETION: The Contractor shall commence work under this Contract on the date specified in the written “Notice to Proceed” from the Owner and shall bring the work to full completion on or before June 30, 2023.

Article 3. CONTRACT SUM: The Owner shall pay the Contractor in current funds for the performance of the work, subject to additions and deductions by Change Order, the Contract Sum of (AMOUNT IN WORDS) (AMOUNT IN NUMBERS).

Article 4. CONTRACT DOCUMENTS: The following, together with this Agreement, form the Contract and all are as fully a part of the Contract as if attached to this Agreement or repeated herein; the advertisements, Bid Documents, Contract Forms, Specifications, Drawings, Addenda and Change Orders issued after execution of the Contract.

Notwithstanding anything to the contrary in the Contract Documents, in the event of any conflict or inconsistency in and among the provisions of the Contract Documents, the provisions resulting in the greater quantity and better quality of goods and services and greater liability protection for the Town, as reasonably determined by the Town, shall control.

“NOTICE TO PROCEED” AND PRE-CONSTRUCTION CONFERENCE:

A written “Notice to Proceed” shall be issued to the Contractor after receipt of all required documents. No work shall be performed by the Contractor until they have received the “Notice to Proceed” from the Town.

Prior to start of the work, the Contractor, all subcontractors, the project manager, and the Owner shall attend a Pre-Construction Conference. The Conference will serve to acquaint the participants with the general plan of Contract administration; and requirements under which the construction operation is to proceed. The date, time and place of the Conference will be furnished to the Contractor by the project manager.

## GENERAL CONDITIONS

1. Funding Source: This project is funded through a Town of Plymouth appropriation.
2. Contract Plans and Specifications: All plans, Specification and Addenda, hereinafter enumerated or referenced in this Contract, shall form part of this Contract and the provisions thereof shall be as binding upon the parties hereto as if they were herein set fully forth. The Table of Contents, titles, headings, running headlines and marginal notes contained herein and in said documents are solely to facilitate reference to various provisions of the Contract Documents and in no way affect, limit or cast light on the interpretation of the provisions of which they refer.
3. Additional Instructions and Detail Drawings: The Contractor will be furnished additional instructions and detail drawings as necessary to carry out the work included in the Contract. The additional drawings and instructions thus supplied to the Contractor will coordinate with the Contract Documents and will be so prepared that they can be reasonably interpreted as part thereof. The Contractor and the Director of Public Works will prepare jointly: (a) a schedule, fixing the dates at which special detail drawings will be required, such drawings, if any, to be furnished by the Director of Public Works in accordance with said schedule, and (b) a schedule fixing the respective dates for the submission of Shop Drawings, the beginning of manufacture, testing and installation of materials, supplies and equipment, and the completion of the various parts of the work; each such schedule to be subject to change from time to time in accordance with the progress of the work.
4. Shop or Setting Drawings: The Contractor shall submit promptly to the Director of Public Works two (2) copies of each Shop or Setting Drawing prepared in accordance with the schedule predetermined as aforesaid. After examination of such drawings by the Director of Public Works or their designee and the return thereof, the Contractor shall make such corrections to the drawings as have been indicated and shall furnish the Director of Public Works or their designee with two (2) corrected copies. If requested by the Director of Public Works or their designee, the Contractor must furnish additional copies. Regardless of corrections made in or approval given to such drawings by the Director of Public Works, the Contractor will nevertheless be responsible for the accuracy of such drawings and for their conformity to the plans and specifications, unless he notifies the Director of Public Works in writing of any deviations at the time he furnishes such drawings.
5. Materials, Services and Facilities:
  - a. It is understood that except as otherwise specifically stated in the Contract Documents, the Contractor shall provide and pay for all materials, labor, tools, equipment, water, light, power, transportation, superintendence, temporary construction of every nature and all other services and facilities of every nature whatsoever necessary to execute, complete and deliver the work within the specified time.
  - b. Any work necessary to be performed after regular working hours, on Sunday or legal holidays, shall be performed without additional expense to the Owner.
6. Contractor's Title to Materials: No materials or supplies for the work shall be purchased by the Contractor or by any subcontractor subject to any chattel mortgage or under a conditional sale contract or other agreement by which an interest is retained by the seller. The Contractor

warrants that they have good title to all materials and supplies used by them in the work, free from all liens, claims or encumbrances.

7. Title to Work: The title to all work completed and in the course of construction and of all material on account of which any payment has been made shall be in the Owner's name.
8. Inspection and Testing of Materials:
  - a. All materials and equipment used in the construction of the project shall be subject to adequate inspection and testing in accordance with accepted standards. The Owner will pay for all laboratory or inspection service direct, and not as part of the Contract.
  - b. Materials of construction, particularly those upon which the strength and durability of the structure may depend, shall be subject to inspection and testing to establish conformance with Specifications and suitability for uses intended.
9. Express Warranty: The Contractor guarantees to the Owner that all materials incorporated into the work will be new unless otherwise specified or agreed. The Contractor also guarantees that all work will be done in a workmanlike manner, free of defects, and in conformance with any Specifications mentioned in this Contract.
10. Maintenance and Guarantee: The Contractor hereby guarantees that the entire work constructed by them under the Contract will meet fully all requirements thereof as to quality of workmanship and of materials furnished by them. The Contractor hereby agrees to make, at their own expense, any repairs or replacements made necessary by defects in materials or workmanship supplied to them that become evident within one (1) year after the date of the final payment, and to restore to full compliance with the requirements set forth herein for any part of the work constructed hereunder, which during said one (1) year period is found to be deficient with the respect to any provisions of the Specifications. The Contractor also agrees to hold the Owner harmless from claims of any kin arising from damage due to said defects. The Contractor shall make all repairs and replacements promptly upon receipt of written orders for the same from the Owner. If the Contractor fails to make the repairs and replacements promptly, the Owner may do the work and the Contractor shall be liable to the Owner for the cost thereof.
11. "Or Equal" Clause: Whenever a material, article or piece of equipment is identified on the Plans or in the Specifications by reference to manufacturer's or vendor's trade names, catalogue numbers, etc., it is intended merely to establish a standard; and any materials, articles or equipment of other manufacturers and vendors will perform adequately the duties imposed by the general design will be considered equally acceptable provided the material, article or equipment so proposed is, in the opinion of the Director of Public Works, of equal substance and function. It shall not be purchased or installed by the Contractor without the Director's written approval.
12. Surveys, Permits and Regulations: The Town will provide a baseline survey. The Contractor shall be responsible for all additional surveys/layouts necessary for the execution of the work.

The Contractor shall procure and pay for all permits, licenses and approvals necessary for the execution of the Contract.

The Contractor shall comply will all laws, ordinances, rules, orders and regulations relating to performance of the work, the protection of adjacent property and the maintenance of passageways, guard fences or other protective facilities.

13. Contractor's Obligations: The Contractor shall and will, in good workmanlike manner, do and perform all work and furnish all supplies and materials, machinery, equipment, facilities and means, except as herein otherwise expressly specified, necessary or proper to perform and complete all the work required by this Contract, within the time herein specified, in accordance with the provisions of this Contract and said Specifications, and in accordance with the Plans and Drawings covered by this Contract, and any and all supplemental Plans and Drawings, and in accordance with the direction of the Director of Public Works as given from time to time during the progress of the work. The Contractor shall furnish, erect, maintain and remove such construction plant and such temporary works as may be required.

The Contractor shall observe, comply with, and be subject to all terms, conditions, requirements and limitations of the Contract and Specifications, and shall do, carry on and complete the entire work to the satisfaction of the Director of Public Works and the Owner.

14. Weather Conditions: In the event of temporary suspension of work, or during inclement weather, or whenever the Director of Public Works shall direct, the Contractor will, and will cause their subcontractors to, carefully protect their work and materials against damage or injury from the weather. If, in the opinion of the Director of Public Works or their designee, any work or materials shall have been damaged or injured by reason of failure on the part of the Contractor or any of their subcontractors to protect their work, such materials shall be removed and replaced at the expense of the Contractor.

15. Protection of Work and Property – Emergency: The Contractor shall at all times safely guard the Owner's property from injury or loss in connection with the Contract. They shall at all times safely guard and protect their own work, and that of adjacent property from damage. The Contractor shall replace or make good any such damage, loss or injury unless such be caused directly by errors contained in the Contract or by the Owner, or their duly authorized representatives.

In case of an emergency which threatens loss or injury of property, and/or safety of life, the Contractor will be allowed to act, without previous instructions from the Director of Public Works, in a diligent manner. The Contractor shall notify the Director of Public Works immediately thereafter. Any claim for compensation by the Contractor due to such extra work shall be promptly submitted to the Director of Public Works.

16. Inspection: The authorized representatives and agents of the Owner shall be permitted to inspect all work, materials, payrolls, records of personnel, invoices of materials and other relevant data and records.
17. Reports, Records and Data: The Contractor shall submit to the Owner such schedule of quantities and costs, progress schedules, payroll reports, estimates, records and other data as the Owner may request concerning work performed or to be performed under the Contract.
18. Superintendence by the Contractor: At the site of the work, the Contractor shall employ a construction superintendent or foreman who shall have full authority to act for the Contractor. It is understood that such representative shall be acceptable to the Director of Public Works, or designee, and shall be one who can be continued in that capacity for the particular job involved unless he ceases to be on the Contractor's payroll.



19. Changes in Work: No changes in the work covered by the approved Contract Documents shall be made without having prior written approval of the Owner. Charges or credits for the work covered by the approved change shall be determined by one (1) or a combination of the following methods:
- a. Unit bid prices previously approved
  - b. An agreed lumps um
  - c. The actual cost of:
    - i. Labor, including foremen
    - ii. Materials entering permanently into the work
    - iii. The ownership of rental cost of construction plant and equipment during the time of use on extra work
    - iv. Power and consumable supplies for the operation of power equipment
    - v. Insurance
    - vi. Wages to be paid.

To the cost under (c.) there shall be added a fixed fee to be agreed upon, but not to exceed fifteen percent (15%) of the actual cost of work. The fee shall be compensation to cover the cost of supervision, overhead, bond, profit and any other general expenses.

20. Time for Completion and Liquidated Damages: It is hereby understood and mutually agreed, by and between the Contractor and the Owner, that the date of beginning and the time for completion of the work to be done hereunder are ESSENTIAL CONDITIONS of the Contract; and it is further mutually understood and agreed that the work embraced in this Contract shall be commenced on a date to be specified in the “Notice to Proceed”.

The Contractor agrees that said work shall be prosecuted regularly, diligently and uninterruptedly at such rate of progress as will ensure full completion thereof within the time specified. It is expressly understood and agreed, by and between the Contractor and the Owner, that the time for the completion of the work described herein is a reasonable time for the completion of the same, taking into consideration the average climatic range and usual industrial conditions prevailing in this locality.

If the said Contractor shall neglect, fail or refuse to complete the work within the time herein specified, or any extension thereof granted by the Owner, then the Contractor does hereby agree, as a partial consideration for the awarding of this Contract, to pay the Owner the amount specified in the Contract, not as a penalty but as liquidated damages for such Breach of Contract as hereinafter set forth, for each and every calendar day the Contractor shall be in default after the time stipulated in the Contract for completing the work.

The said amount of liquidated damages is fixed and agreed upon by and between the Contractor and the Owner because of the impracticability and extreme difficulty of fixing and ascertaining the actual damages the Owner would sustain in such event and said amount shall be retained from time to time by the Owner from current periodic estimates.

It is further agreed that time is of the essence of each and every portion of this Contract and of any specifications wherein a definite and certain length of time is fixed for the performance of any act whatsoever; and where under the Contract as additional time is allowed for the completion of any work, the new time limit fixed by such extension shall be of the essence of this

Contract. Provided, that the Contractor shall not be charged with liquidated damages or any excess cost when the Owner determines that the Contractor is without fault and the Contractor's reasons for the time extensions are acceptable to the Owner; provided further, that the Contractor shall not be charged with liquidated damages or an excess cost when the delay in completion of the work is due to:

- a. *Any preference, priority or allocation order duly issued by the government*
- b. *Unforeseeable cause beyond the control and without fault of negligence of the Contractor, including, but not restricted to, acts of God or the public enemy, acts of the Owner, acts of another Contractor in the performance of a contract with the Owner, fires, floods, epidemics, quarantine restrictions, strikes, freight embargoes and severe weather*
- c. *Any delays of subcontractors or suppliers occasioned by any of the causes specified in subsections (a.) and (b.) of this article.*

Provided further, that the Contractor shall within ten (10) days from the beginning of such delay, unless the Owner shall grant a further period of time prior to the date of final settlement of the Contract, notify the Owner, in writing, of the causes of the delay, who shall ascertain the facts and extent of the delay and notify the Contractor within a reasonable time of its decision in the matter. The amount of liquidated damages for this project shall be Five Hundred Dollars (\$500.00) per consecutive calendar day.

21. Correction of Work: All work, all materials, whether incorporated in the work or not, all processes of manufacture, and all methods of construction shall be at all times and places subject to the inspection of the Director of Public Works or their designee, who shall be the final judge of the quality and suitability of the work, materials, processes of manufacture and methods of construction for the purposes for which they are used. Should they fail to meet the Director's approval, they shall be forthwith reconstructed, made good, replaced and/or corrected, as the case may be, by the Contractor at their own expense. Rejected materials shall immediately be removed from the site. If, in the opinion of the Director of Public Works, it is undesirable to replace any defective or damaged materials or to reconstruct or correct any portion of the work injured or not performed in accordance with the Contract Documents, the compensation to be paid to the Contractor hereunder shall be reduced by such amount as in the judgement of the Director shall be equitable.
22. Subsurface Conditions Found Different: Should the Contractor encounter subsurface and/or latent conditions in the site materially differing from those shown on the Plan or indicated in the Specifications, they shall immediately give notice to the Director of Public Works of such conditions before they are disturbed. The Director of Public Works will thereupon promptly investigate the conditions, and if they find that they materially differ from those shown on the Plans or indicated in the Specifications, will at once make such changes in the Plans and/or Specification as they may find necessary, any increase or decrease of cost resulting from such changes to be adjusted in the manner provided in Paragraph 19 of the General Conditions.
23. Right of the Owner to Terminate Contract: The Owner may terminate this Contract by providing the Contractor and the Surety with ten (10) days written notice specifying the reasons for termination as outlined below:
  - a. Violation of any of the provisions of this Contract by the Contractor or any of their subcontractors

- b. A determination by the Owner that the Contractor has engaged in fraud, waste, mismanagement, misuse of funds, or criminal activity with any funds provided by this Contract.
- c. Failure of the Contractor, for any reason, to fulfill in a timely and proper manner their obligations under this Contract, including compliance with applicable Federal, State and/or local law or regulations, and such procedures or guidelines as may be established.

In the event if any such termination, the Surety shall have the right to take over and perform the Contract; provided, however, that if the Surety does not commence performance within ten (10) days from the date of the mailing to such Surety of notice of termination, the Owner may take over the work and prosecute the same to completion at the expense of the Contractor, and the Contractor and their Surety shall be liable to the Owner for any excess cost occasioned by the Owner thereby, and in such event the Owner may take possession of and utilize in completing the work, such materials, appliances and plants as may be on the site of the work and necessary therefore.

If the Owner determines that a continuation of work on the project would endanger the life, health or safety of those working or living at or near the project site, or that immediate action is necessary to protect public funds and/or property, the Owner may suspend work or terminate this agreement by providing notice to the Contractor in the form of a telegram, mailgram, hand-carried letter, or other appropriate written means.

In addition, notwithstanding anything to the contrary in the Contract, the Owner may also terminate this Contract for its conveniences, including due to the lack of sufficient funds to complete the work. In such event, the Owner shall provide written notice of termination to the Contractor, and the Contractor shall thereupon cease all work other than work that is required to make the work and surrounding property safe, and the Owner shall pay the Contractor for all work performed in accordance with the terms of the Contract up to the date of the Contract, provided the Contractor shall not be entitled to any termination (or similar) damages or other costs and expenses that may be associated with a termination for convenience.

24. Payments to the Contractor:

- a. Not later than the tenth (10<sup>th</sup>) day of each calendar month, the Owner shall make a progress payment to the Contractor on the basis of a duly certified and approved estimate of the work performed during the preceding calendar month under this Contract, but to insure the proper performance of the Contract, the Owner shall retain five percent (5%) of the amount of each estimate until final completion and acceptance of all work covered by this Contract; provided that the Contractor shall submit their estimate not later than the first (1<sup>st</sup>) day of the month; provided further that on completion and acceptance of each separate building, public work or other division of the Contract, on which the price is stated separately in the Contract, payment may be made in full, including retained percentages thereon, less authorized deductions.
- b. In preparing estimates, the material delivered on the site and preparatory work done may be taken into consideration.

25. Indemnification: The Contractor shall comply with the requirements of all applicable laws, rules and regulations in connection with the services of the Contractor, and shall exonerate, indemnify and hold harmless the Owner's officers, agents, and all employees from and against them, and local taxes or contributions imposed or required under the Social Security, Worker's Compensation, and Income Tax laws. Further, the Contractor shall exonerate, indemnify and

hold harmless the Owner with respect to any damages, expenses or claims arising from or in connection with any of the work performed or to be performed under this Contract. This shall not be construed as a limitation of the Contractor's liability under the Contract or as otherwise provided by law.

26. Acceptance of Final Payment Constitutes Release: The acceptance by the Contractor of final payment shall be and shall operate as a release to the Owner of all claims and liability to the Contractor. No payment, however, final or otherwise, shall operate to release the Contractor or their Sureties from any obligations under the Contract or the performance and payment bond.
27. Insurance: The Contractor shall not commence work under this Contract until they have obtained all the insurance required in the Invitation to Bid and such insurance has been approved by the Owner, nor shall the Contractor allow any subcontractor to commence work on a subcontract until the insurance required of the subcontractor has been so obtained and approved.
28. Flood Disaster Protection: The Owner of land subject to acquisition or improvement under this Contract, and their successors or assigns, are hereby obligated to obtain and maintain, during ownership of the land which is the subject of this Contract, such flood insurance as required with respect to financial assistance of acquisition or construction purposes under §102 (a) of the Flood Disaster Protection Act of 1973. This obligation is binding notwithstanding the fact that construction on the land, which is the subject of this Contract, is not itself funded out of assistance provided under the Housing and Community Development Act of 1974.
29. Contract Security: The Contractor shall furnish a payment bond in an amount not less than fifty percent (50%) of the Contract Price or in a penal sum not less than that prescribed by State or local law, as security for the payment of all persons performing labor on the project under this Contract and furnishing materials in connection with the Contract.
30. Assignments: The Contractor shall not assign or subcontract the whole or any part of this Contract or any monies due or to become due hereunder without written consent of the Owner. In case the Contractor assigns all or part of any monies due or to become due under this Contract, the instrument of assignment shall contain a clause substantially to the effect that it is agreed that the right of the assignee in and to any monies due or to become due to the Contractor shall be subject to prior claims of all persons, firms and corporations of services rendered or materials supplied for the performance of the work called for in this Contract.
31. Authority of the Director of Public Works: The Director of Public Works or their designee shall give all orders and directions contemplated under this Contract and Specifications relative to the execution of the work. The Director or their designee shall determine the amount, quality, acceptability and fitness of the several kinds of work and materials which are to be paid for under the Contract and shall decide all questions which may arise in relation to said work and the construction thereof. The Director's estimates and decisions shall be final and conclusive, except as herein otherwise expressly provided. In case any question shall arise between the parties hereto relative to said Contract and Specifications, the determination or decision of the Director shall be a condition precedent to the right of the Contractor to receive any money or payment for work under this Contract affected in any manner or to any extent by such question.

The Director or their designee shall decide the meaning and intent of any portion of the Specifications and of any Plans or Drawings where the same may be found obscure or be in dispute.

32. Notice and Service Thereof: Any notice to any Contractor from the Owner relative to any part of this Contract shall be in writing and considered delivered and the service thereof completed when said notice is posted, by certified or registered mail, to the said Contractor at their last given address, or delivered in person to the said Contractor or their authorized representative on the work.
33. Subcontract: The Contractor will insert in any subcontracts the Federal Labor Standards Provisions and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts which they may enter into, together with a clause requiring this insertion in any further subcontracts that may in turn be made.
34. Interest of Member of or Delegate to Congress: No member of or delegate to Congress, or Resident Commissioner, shall be admitted to any share or part of this Contract or to any benefit what may arise therefrom, but this provision shall not be construed to extend to this Contract if made with a corporation for its general benefit.
35. Other Prohibited Interest: No official of the Town of Plymouth who is authorized in such capacity and on behalf of the Town to negotiate, make, accept or approve, or to take part in negotiating, making, accepting or approving any architectural, engineering, inspection, construction or material supply contract or any subcontract in connection with the construction of this project shall become directly or indirectly interested personally in this Contract or in any part thereof. No officer, employee, architect, attorney, engineer or inspector of or for the Town who is authorized in such capacity and on behalf of the Town to exercise any legislative, executive, supervisory or other similar functions in connection with the construction of the project, shall become directly or indirectly interested personally in this Contract or in any part thereof, any material supply contract, subcontract, insurance contract or any other contract pertaining to the project.
36. Suspension of Work: Notwithstanding anything to the contrary in the Contract and related documents:

Should the work be delayed in any manner, for any reason, and by whomever caused, including but not limited to, due to the lack or delay of funding, and/or should the Owner be prevented or enjoined from proceeding with work either before or after the start of construction by any reason, including the absence of sufficient funds to complete the work, or as a result of any litigation or any other reason whether within or beyond the control of the Owner, the Contract shall not be entitles to any additional compensation or any other damages on account of any such delays, and shall not make or assert claim for such compensation or damages, whether such claims are titled, claims for delay damages, out of sequence work, acceleration of the work, hindrance, or otherwise; but time for completion of the work will be extended to such reasonable time as the Town may determine will compensate for time lost by such delay with such determination to be set forth in writing, and this shall be the Contractor's sole remedy on account of any delay.

37. Access to Records: The Contractor shall maintain accounts and records, including personnel, property and financial records, adequate to identify and account for all costs pertaining to the

Contract and such other records as may be deemed necessary by the Town to assure proper accounting for all project funds, both CDBG and non-CDBG shares. These records will be made available for audit purposes to the Owner or any authorized representative, and will be retained for three (3) years after final MSCP audit.

38. Age Discrimination Act of 1975: No person in the United States shall, on the basis of age, be excluded from participation in, be denied the benefits of, or be subjected to discrimination from receiving Federal Financial Assistance.

The Contractor shall comply with the provisions of the Age Discrimination Act of 1975 (42 USC 6101 et seq.).

The Age Discrimination in Employment Act prohibits arbitrary age discrimination in employment.

39. Non-Discrimination: The Contractor shall adhere to the requirements set forth in Title VI of the Civil Rights Act of 1964 (Public Law 88-352), and the regulation issued pursuant thereto by HUD (24 CFR Part 1); Title VIII of the Civil Rights Act of 1968 (Public Law 90-284), as amended; §109 of the Housing and Community Development Act of 1974, and the HUD regulations issued pursuant thereto (24 CFR 570.601); Federal Executive Order 11063, as amended by Executive Order 12259 and the HUD regulations issued pursuant thereto (24 CFR 107); Executive Order 11246 and the rules, regulations and relevant orders of the U.S. Secretary of Labor, if applicable; the Age Discrimination Act of 1975 (42 USC 6101 et seq.); §402 of the Veterans of the Vietnam Era Act; §504 of the Rehabilitation Act of 1973 (29 USC 794); Massachusetts General Laws c.151B §1 et seq.; State Executive Order 74 as amended and revised by Executive Orders 116, 143 and 227, and EOCD regulation, procedures or guidelines; Title II of the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1979; and EOCD guidelines, procedures, or regulations.

The Contractor shall not discriminate against any employee or applicant for employment because of race, color, religion, sex, sexual orientation, age, handicap, or national origin. The Contractor shall take affirmative action to ensure that applicants for employment are employed, and the employees are treated during employment, without regard to their race, color, religion, sex, sexual orientation, age, handicap, 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; rate of pay or other forms of compensation; and selection for training, including apprenticeship. The Contractor shall post in conspicuous places, available to employees and applicants for employment, notices setting forth the provision of this non-discrimination clause. The Contractor shall state in all solicitations or advertisements for employees placed by or on behalf of the Contractor, that all qualified applicants will receive consideration for employment without regard to race, color, religion, sex, sexual orientation, age, handicap, or national origin. The Contractor shall incorporate the foregoing requirements of this paragraph in all contracts for work to be performed in this paragraph in all contracts for work to be performed in accordance with this Contract and will require all of its subcontractors to incorporate such requirements in all subcontracts for program work.

Contracts are subject to Federal Executive Order 11246, as amended, shall be subject to HUD Equal Employment Opportunity regulation at 24 CFR Part 130 applicable to HUD assisted construction contracts.

The Contractor shall send to each labor union or representative or workers with which they have a collective bargaining agreement or other contract or understanding, a notice advertising the said labor union or worker's representatives of the Contractor's commitment under this subsection and shall post copies of the notice in conspicuous places available to employees and applicants for employment.

In the event of noncompliance by the Contractor with the non-discrimination clauses of this Contract or with any such rules, regulations, or orders of the Secretary of Labor, the Contract may be cancelled, terminated or suspended in whole or in part, and the Contractor may be declared ineligible for further Government contract or Federally assisted construction contract procedures authorized in Executive Order 11246, or by rules, regulations or orders of the Secretary of Labor, as otherwise provided by law.

The Contractor shall include the provisions set forth herein in every subcontract or purchase order unless exempted by rules, regulations or orders of the Secretary of Labor issued pursuant to §204 of Executive Order 11245, so that such provisions will be binding upon each subcontractor or vendor. The Contractor will take such actions with respect to any subcontract or purchase order as HUD or EOCD may direct 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 interest of the United States.

40. Non-Federal Labor-Standards Provisions: The following Non-Federal Labor-Standards Provisions, including the provisions concerning maximum hours of work, minimum rates of pay, and overtime compensation, with respect to the categories and classifications of employees hereinafter mentioned are included in this Contract pursuant to the requirements of applicable State or local laws, but the inclusion of such provisions shall not be construed to relieve the Contractor or subcontractor from the pertinent requirements of any corresponding Federal Labor-Standard Provisions of this Contract. In case the minimum rates of pay set forth below shall be higher than the minimum rates of pay required by or set forth in the Federal Labor Standards Provisions of this Contract for corresponding classifications, the minimum rates of pay for such classifications. The limitations, if any, in these Non-Federal Labor-Standards Provisions upon the hours per day, per week or per month which employees engaged on the work covered by this Contract may be required or permitted to work thereon shall not be exceeded.
41. Schedule of Salaries and Wages: The minimum wage rates and health and welfare contributions applicable to this Contract as determined by the Commonwealth of Massachusetts Executive Office of Labor and Workforce Development Department of Labor Standards under the provisions of M.G.L. c.149 §26-27H, inclusive as amended are attached hereto and incorporated herein. The greater of Federal or State prevailing wages, when both are applicable, shall be paid under this Contract and reported as required.
42. Massachusetts Labor Provisions:
  - a. In the employment of mechanics and apprentices, teamsters, chauffeurs and laborers by the Contractor and subcontractors, preference shall first be given to citizens of the Commonwealth who have been residents of the Commonwealth for at least six (6) months at the commencement of their employment, who are male veterans as defined in M.G.L. c.4 §7

- 43<sup>rd</sup> Clause, and who are qualified to perform the work to which the employment relates; and secondly to citizens of the Commonwealth generally who have been residents of the Commonwealth for at least six (6) months at the commencement of their employment, and if they cannot be obtained in sufficient numbers, then to citizens of the United States, in accordance with M.G.L. c.149 §26.
- b. The minimum rates of wages to be paid mechanics and apprentices, chauffeurs, teamsters and laborers shall be set for in the schedule of rates of wages determined by the Massachusetts Department of Labor Standards.
  - c. In accordance with M.G.L. c.149 §34A, the Contractor shall, before commencing performance of the Contract, provide insurance for the payment of compensation and the furnishing of other benefits under c.152 to all persons to be employed under the Contract, and the Contractor shall continue such insurance in full force and effect during the terms of the Contract. Sufficient proof of compliance with this section must be furnished at the time of execution of this Contract. Failure to provide and continue in force such insurance as aforesaid shall be deemed a material breach of the Contract and shall operate as an immediate termination thereof. The attention of the Contractor is directed to that portion of M.G.L. c.149 §34A which provides that whoever violates any of its provisions shall be punished by a fine of not more than One Hundred Dollars (\$100.00) or by imprisonment for six (6) months, or both; and, in addition, any Contractor who violates any provision of this section shall be prohibited from contracting, directly or indirectly, with the Commonwealth or any political subdivision thereof for the construction, alteration, demolition, maintenance or repair of, or addition to, any public works or public building for a period of two (2) years from the date of conviction of said violation.
  - d. The Contractor shall pay to any reserve police officer employed by them the prevailing rate of wage paid to regular police officers, as required by M.G.L. c.149 §34B.
43. Interest of Contractor and Employees: The Contractor covenants that he presently has no interest and shall not acquire interest, direct or indirect, in the study area or any parcels therein or any other interest which would conflict in any manner or degrees with the performance of their services hereunder. The Contractor further covenants that in the performance of the Contract, no person having any such interest shall be employed. Further, the Contractor shall adhere to the provisions of the Hatch Act (5 USC 1501 et seq.), which limits political activities by employees whose principal employment is in connection with an activity which is financed in whole or in part by Federal funds.
44. Severability: If any provision of this Contract is held invalid, the remainder of the Contract shall not be affected thereby, and all other parts of this Contract shall nevertheless be in full force and effect.
45. Confidentiality: The Contractor will protect the privacy of, and respect the confidentiality of, information provided by program participants, consistent with applicable Federal and State regulations, including M.G.L. c.66 §10, regarding access to public records.



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### CONTRACTUAL LIABILITY

To the fullest extent permitted by Laws and Regulations, CONTRACTOR shall indemnify, and hold harmless OWNER and its consultants, agents and employees from and against all claims, damages, losses and expenses, direct, indirect or consequential (including but not limited to fees and charges of designers, architects, attorneys and other professionals and court and arbitration costs) arising out of or resulting from performance of the work, provided that any such claim, damage, loss or expense(s) 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 and (b) is caused in whole or in part by any negligent act or omission of CONTRACTOR, any subcontractor, any person or organization directly or indirectly employed by any of them to perform or furnish any of the work or anyone for whose acts any of them may be liable, regardless of whether or not it is caused in part by a party indemnified hereunder or arises by or is imposed by Law and Regulations regardless of the negligence of any such party.

In any and all claims against OWNER or any of its consultants, agents or employees by any employee of CONTRACTOR, and subcontractor, any person or organization directly or indirectly employed by any of them to perform or furnish any of the work or anyone for whose acts any of them may be liable, the indemnification obligation under the above paragraph 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 or other person or organization under workers' or workmen's compensation acts, disability benefit acts or other employee benefits acts.

Policies for General Liability, Automobile Liability, Workers' Compensation Insurance, and Umbrella Liability shall remain in effect during the one year correction period.

Such insurance as is herein certified applies to all operations of the insured in connection with, and necessary and incidental to, the work herein described at the locations stated.

It is hereby understood and agreed that the above policies will not be restrictively amended, materially changed nor canceled without 30 days advance notice by registered mail to OWNER.

SAMPLE – DO NOT SIGN

SAMPLE – DO NOT FILL IN

---

Authorized Representative Signature  
(Include Evidence of Authorization)

---

Address

**TOWN OF PLYMOUTH  
CONTRACTOR SAFETY ACKNOWLEDGEMENT FORM**

**Contractor Company Name:** SAMPLE – DO NOT FILL IN  
**Bid Number / Assigned Work:**  
**Location(s):**

*Please initial each item:*

\_\_\_\_\_ 1. Contractor, subcontractor, and any/all laborer(s) have been trained in the general safe work practices applicable to their trade.

\_\_\_\_\_ 2. Any Contractor personal or property accidents or cases of job-related injuries/illnesses must be immediately reported to the Safety Compliance Officer.

\_\_\_\_\_ 3. Contractors shall know the location of the nearest fire extinguisher, pull station alarm and first aid equipment.

\_\_\_\_\_ 4. Contractor work will be periodically monitored by management to ensure adherence to Town of Plymouth work requirements.

\_\_\_\_\_ 5. Depending on the nature of the Contractor’s activities, the following permits must be issued prior to beginning work: Confined Space Entry Permit, Hot Work Permit, Roof-Top/Ceiling Permit and/or Excavation/Trenching.

All Contractors are required to sign, in agreement that they have received the Contractor Safety Acknowledgement and Agreement Form and have read and fully understand its contents. This form must be returned to Procurement, to be forwarded to the Safety Compliance Officer, and will be kept on file.

The undersigned Contractor represents and warrant that they shall comply with all applicable Federal, State and local laws, regulations and rules while engaged to perform services for the Town of Plymouth, Massachusetts. Any Contractors who violate these rules may be precluded from conducting work for the Town. The Contractor is also responsible for ensuring that all employees and subcontractors comply with the Town of Plymouth’s safe work practices.

**Contractor/Subcontractor**

<u>SAMPLE</u> Print Name	<u>SAMPLE</u> Signature	_____ Date
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**Safety Compliance Officer or Designee**

<u>SAMPLE</u> Print Name	<u>SAMPLE</u> Signature	_____ Date
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*All injuries/incidents must be reported to the Safety Compliance Officer, Michelle Newell, at (508) 747-1620, ext. 10123.*

**ATTACHMENT 1**

**TECHNICAL SPECIFICATIONS**

DIVISION 1

GENERAL REQUIREMENTS

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## 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 on Water Street in the Town of Plymouth, 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 and testing of approximately 1,300 linear feet of new 30-inch diameter SDR26 PVC gravity sewer interceptor.
  - 2. Furnishing all labor, services, equipment, and materials for removal and legal disposal of existing gravity sewer mains and installation and testing of approximately 180 linear feet of new 8-inch, 12-inch, and 24-inch SDR26 PVC gravity sewer mains.
  - 3. Cleaning and CCTV inspection of the existing 30” RCP Sewer Interceptor. Cutting and capping of the existing 30” RCP Sewer Interceptor following completion of cleaning and CCTV inspection. Removing and legally disposing of existing Sewer Interceptor manhole frames, covers, and concentric top sections. Plugging, flow filling, and abandoning existing Sewer Interceptor manholes in place.
  - 4. Furnishing all labor, services, equipment, and materials for the removal and legal disposal of existing gravity sewer services and installation of new C900 PVC (vertical chimneys) and SDR26 PVC (horizontal) gravity sewer services and cleanouts up to the property line. Confirm all existing non-capped sewer services have been reconnected at the property line.
  - 5. Furnishing, installation, testing, operation, and maintenance of sewer bypass pumping system and appurtenances to maintain uninterrupted sewer service throughout the duration of construction.

6. 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 and appurtenances including watertight frames and covers.
7. Furnishing all labor, services, equipment, and materials for the installation of impervious clay dams.
8. Preparing of soil management plans and furnishing all labor, services, equipment, and materials required for removal and legal disposal of contaminated materials including asbestos cement and other hazardous materials.
9. Performing test pits as shown on the Contract Drawings and reporting all results to the Engineer.
10. 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.
11. Restoration of public and private property to pre-construction conditions and elevations including, but not limited to, granite curbing, brick paths and sidewalks, concrete sidewalks, lawns, plantings, and other surficial features.
12. Coordination and scheduling of police details.
13. 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.
14. Furnishing all materials, labor and equipment for the relocation, protection, or temporary disturbance of existing utilities (i.e. water, gas, drain, telecommunications, electric) to permit construction activities.
15. Installation of environmental protection systems at the site for erosion and sediment control within the limits of work.
16. Designing, furnishing and installing a dewatering system capable of lowering the water table to a minimum of 2 feet below the lowest point of the excavation, increasing the stability of the excavated slopes, preventing loss of material from beneath the bottom of excavation, and preventing rupture of heaving and boil over conditions of the bottom of the excavation including treatment and proper disposal and discharge of ground water.
17. Maintenance and repair of all work for a period of one (1) year following the

issuance of the Certificate of Substantial Completion.

- 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 shall be submitted to the Engineer.
  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. Coordination with other entities owning infrastructure within the limits of work, in particular natural gas, potable water, and appurtenances.
  12. Obtaining necessary permits and licenses, maintaining all items required by applicable permits, compliance with existing permits, and payment of fees.
- B. 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.
- C. 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 Plymouth Department of Public Works.
- 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 Plymouth.

#### 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 management, removal and proper disposal of any other hazardous materials encountered during construction activities. Payment shall be in accordance with Section 01024 as approved by the Engineer.
3. The cost for the coordination of uniformed police officers during construction. Payment shall be in accordance with Section 01024 as approved by the Engineer.
4. The cost for the coordination to maintain continuity and support of existing 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
13a	Removal and Disposal of Unforeseen Asbestos	\$50,000.00
13b	Removal and Disposal of Other Hazardous Materials	\$50,000.00
17	Uniformed Police Officer Detail	\$200,000.00
19	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 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 13a and 13b), handling of water, and any required earth support, shoring or bracing for compliance with OSHA regulations.
- F. The prices for all pipe items shall constitute full compensation for pipe bedding, furnishing, laying, jointing, cleaning, backfilling, compaction and testing of pipe; 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 Water Street Sewer Interceptor Replacement 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. The Site is defined as including Water Street and the intersections of the following roadways with Water Street: Town Wharf, Memorial Drive, Chilton Street, Howland Street, Brewster Street, and Winslow Street.
- 2. Payment for the 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, and the remaining fifty percent shall be paid upon demobilization from the site.
- 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: Preconstruction Video and Photographs

- 1. Under the lump sum for Item 2, 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 Item 2 shall be by lump sum. Fifty 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.
- C. Item 3: Clean and CCTV Inspect Existing 30” RCP Sewer Interceptor
1. The unit price for Item 3 shall include furnishing all labor, materials, tools, equipment, and all other incidentals required to perform heavy cleaning and CCTV inspection of the Existing 30” RCP Sewer Interceptor, prepare inspection report with digital color USB copies, and maintain bypass pumping and blocking of flow as required. Cleaning of the pipeline may require additional passes to ensure the pipe is thoroughly clean and free of deposits. The unit price for this Item shall also include transport and legal disposal of the solid waste byproduct to the Water Street Pump Station located at #197 Water Street, Plymouth, MA.
  2. Payment for this Item shall be made per the actual linear foot of inspection and cleaning performed by the Contractor and accepted by the Engineer. Length shall be measured from inside face of the upstream manhole to inside face of the downstream manhole.
- D. Item 4: Cut and Cap Existing 30” RCP Sewer Interceptor
1. The number of Cut and Caps to be paid for under Item 4 will be measured as the number of brick-and-mortar caps actually furnished, installed, and completed as indicated on the Contract Drawings and as accepted by the Engineer.
  2. Payment for cutting and capping the existing 30” RCP sewer interceptor will be made for the quantity as above determined at the contract price per each, which price and payment shall be full compensation for excavation, cleanly cutting the existing 30” sewer interceptor by power saw, capping each open end of the main by installing a brick and mortar cap on each side, removal of excess excavated materials, surface restoration, clean up and all else incidental thereto for the satisfactory completion of the work. All brick-and-mortar caps required for capping will be included for payment under Item 4. Contractor shall cut and cap existing sewer interceptor in accordance with all state and federal regulations including proper disposal and procedures.
- E. Item 5: Remove and Legally Dispose of Existing Sewer Main (Item 5a through 5c)
- Item 5a – Remove and Legally Dispose of Existing 24” RCP Sewer Main  
Item 5b – Remove and Legally Dispose of Existing 15” VC Sewer Main  
Item 5c – Remove and Legally Dispose of Existing 8” PVC Sewer Main



1. The unit prices for Items 5a, 5b, and 5c shall be considered full compensation for all labor, equipment, tools, and materials necessary to remove and legally dispose of existing sewer main infrastructure in accordance with all local, state and federal regulations. Unit price shall also include legal disposal and transport of all solids and liquids removed from the pipe to the Water Street Pump Station located at #197 Water Street, Plymouth, MA.
  2. Payment for Items 5a, 5b, and 5c will be made per linear foot of existing gravity sewer main removed as directed and measured by the Engineer.
- F. Item 6: Furnish and Install SDR26 PVC Gravity Sewer Pipe (Items 6a through 6d)

Item 6a – Furnish and Install 30” SDR26 PVC Pipe and Fittings via Open Cut  
Item 6b – Furnish and Install 24” SDR26 PVC Pipe and Fittings via Open Cut  
Item 6c – Furnish and Install 12” SDR26 PVC Pipe and Fittings via Open Cut  
Item 6d – Furnish and Install 8” SDR26 PVC Pipe and Fittings via Open Cut

1. 30-inch SDR26 PVC, 24-inch SDR26 PVC, 12-inch SDR26 PVC, and 8-inch SDR26 PVC gravity sewer pipe under Items 6a, 6b, 6c, and 6d respectively, 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 6 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.
3. Payment under Item 6 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 SDR26 PVC pipe 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 14b); support of excavation; bedding with crushed stone for pipe; backfilling with suitable excavated material; compaction as shown on the trench detail; filter fabric; joint wrapping; restoring the trench surface to grade needed for trench pavement and sub-base; daily placement of 2” temporary asphalt cold patch; protection or temporary removal and replacement of existing utilities and structures; laying; jointing; cleaning; post-installation closed circuit television (CCTV) inspection; testing the 30-inch, 24-inch, 12-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; wood markers at the end of service pipe; insulation; temporary connections to existing gravity sewer mains; fittings and restrained joints; connections to

existing sewers including couplings; access to compacted backfill for compaction testing; temporary sewer flow bypass; 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.

4. Payment will include the cleaning and CCTV inspection of completed sewers to be paid for under Items 6a, 6b, 6c, and 6d. 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.
5. For Items 6a through 6d 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. No proportional payment shall be made for pipe on the site but not yet installed. SDR35 PVC pipe installed but not successfully tested will be paid for at a maximum of 75 percent of the unit prices bid under Items 6a, 6b, 6c, and 6d, respectively, of the form. The remaining 25 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.

G. Item 7: Remove and Legally Dispose of Existing Interceptor Manhole Frame, Cover, and Concentric Top Section

1. The unit price for Item 7 shall be considered full compensation for all labor, equipment, tools, and materials necessary to remove and legally dispose of the frames, covers, and concentric top sections of existing interceptor manholes within the intertidal zone of Plymouth Harbor as shown on the Contract Drawings, in accordance with all local, state and federal regulations.
2. Payment for Item 7 will be made per each manhole frame, cover, and concentric top section removed and legally disposed of, as directed and approved by the Engineer.

H. Item 8: Plug, Flow Fill, and Abandon Existing Interceptor Manholes

1. The unit price for Item 8 shall be considered full compensation for all labor, equipment, tools and materials necessary to plug, flow fill, and abandon the existing interceptor manholes within the intertidal zone of Plymouth Harbor, as shown on the Contract Drawings in accordance with all local, state and federal regulations.
2. Payment for Item 8 will be made per each manhole plugged, flow filled, and abandoned, as directed and accepted by the Engineer.

- I. Item 9: 6" C900 PVC Gravity Sewer Chimney and 6" SDR26 PVC Gravity Sewer Service and Cleanout
1. 6-inch C900 PVC gravity sewer chimneys and 6" SDR26 PVC gravity sewer services and cleanouts under Item 9 will be measured on a per each 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 9 will be made at the Contract unit price stated in the Bid Form for the quantities as measured in place on a per each 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 cutting and removing existing pavement; trench excavation (except rock excavation covered in Item 14b); support of excavation; bedding with crushed stone for pipe; furnishing and installing 30"x6" Protecto 401 Epoxy coated ductile iron chimney tees, backfilling with suitable excavated material; compaction as required and as shown on the trench detail; compaction testing; filter fabric; joint wrapping; restoring the trench surface to grade needed for trench pavement and sub-base; daily placement of 2" temporary asphalt cold patch; protection or temporary removal and replacement of existing utilities and structures; laying; jointing; cleaning; 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 sewer 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 9, 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. 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 75 percent of the unit prices bid under Item 9 of the form. The remaining 25 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.

J. Item 10: 5' Diameter Precast Gravity Sewer Manholes

1. Precast concrete gravity sewer manholes under Item 10 will be measured by each manhole furnished, installed, completed, tested, and accepted in place. Measurement shall be by actual number of manholes completed and installed.
2. Payment for providing 5-ft diameter precast gravity sewer manholes complete in place will be made for the quantity determined at the price per each (EA) manhole for Item 10 in the Bid Form. This price and payment shall be full compensation for providing all excavation (except rock excavation covered under Item 14b), manhole bypassing, support of excavation and utilities; sheeting; shoring; bedding; backfilling; precast sections and bases, subbase, all forms, reinforcing, concrete and masonry materials including brick inverts; dampproofing; drop connection piping as shown on Contract Drawings, including controlled density fill; pipe boots; brick for grade adjustments; connections to all existing and proposed inlet and outlet pipes; manhole steps; all required testing and acceptance procedures; associated fittings and hardware; 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 manholes.
3. Sewer manholes installed but not successfully tested will be paid for at a maximum of 75 percent of the unit price bid under Item 10 of the form. The remaining 25 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.

K. Item 11: Gravity Sewer Manhole Frame and Cover

1. Gravity Sewer Manhole Frames and Covers under Item 11 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.
2. Under Item 11, the unit price for this item shall constitute compensation for each traffic rated watertight frame and cover set as measured by actual amount of traffic rated watertight locking frame and cover sets furnished, installed, and accepted in place. Unit price shall include all equipment, material and labor associated with brick adjustment courses, hardware, and grout to install frames and covers on new sewer manholes at the locations and grades indicated on the Contract Drawings.

L. Item 12: Impervious Clay Dam

1. Impervious Clay Dams under Item 12 will be measured on a per each basis.
2. Under Item 12, the unit price for this item shall constitute compensation for each impervious clay dam furnished, installed, and accepted in place. Unit price

shall include all equipment, material and labor associated with installation of impervious clay dams at the locations indicated on the Contract Drawings.

M. Item 13: Contaminated Material Management (Items 13a through 13c)

Item 13a – Removal and Disposal of Unforeseen Asbestos

Item 13b – Removal and Disposal of Other Hazardous Materials

1. Under Bid Item 13a, 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).
2. Under Bid Item 13b, 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 contaminated/hazardous materials, including the timely and required notification of all encounters. Subcontractor invoices and Contractor expenses will be reimbursed at cost without markup (profit).

Item 13c: Soil Management Plans

1. The preparation of soil management plans shall be covered under Item 13c. 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.
2. Payment for Item 13c shall be made based on the percentage of the established lump sum price represented by incremental work progress completed, as determined by the Engineer.

N. Item 14: Exploratory Excavation and Rock Excavation (Items 14a and 14b)

Item 14a: Exploratory Excavation (Test Pit)

1. Under the unit price bid for Item 14a, 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 15).

Item 14b: Rock Excavation

1. Under the unit price bid for Item 14b, 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.
2. 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.

O. Item 15: Pavement (Items 15a through 15c)

Item 15a: 12" Processed Gravel Subbase

1. Measurement for payment under Item 15a 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 15a shall be equal to the number of square yards of 12" of processed gravel actually placed in

roadways. The unit price shall also include full compensation for removal and legal disposal of temporary backfill materials installed under the 4-inch Temporary Trench Pavement (Item 15a) 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 19-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 15b: 7" Permanent Trench Pavement

1. Under Item 15b, 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 15b 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 15a. 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 15b 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 15c: 1.5" Mill and Overlay

1. The quantity of 1.5-inch mill and overlay placed to be paid for under Bid Item 15c 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 1.5-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.
2. Also included for payment under Item 15c 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.
3. Mill and overlay shall be scheduled as approved by the Town and the Engineer. Tentatively, mill and overlay is scheduled to be performed in the Fall of 2022.

P. Item 16: Restoration (Items 16a through 16c)

Item 16a: Remove and Reset Brick Sidewalk

1. The measurement for removing and resetting brick sidewalks to be paid for under Item 16a, 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 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, 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 16b: Remove and Reset Granite Curb

1. Measurement for payment under Item 16b 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, cleanup, 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 16c: Remove and Replace Concrete Sidewalk

1. The measurement for Item 16c shall constitute full compensation for removing existing concrete sidewalk and installing new concrete sidewalk to the depth as specified in the Drawings. The unit price shall include clearing and grubbing, saw-cutting pavement, excavation, and disposal of existing 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, cleanup, and all other incidental Work relative thereto and not specifically paid for under other items of Work.
2. Payment for Item 16c shall be based on the square yards (SY) of concrete sidewalks installed and accepted by the Engineer.

Q. Item 17: Uniformed Police Detail

1. Payment for uniformed police officers will be made for expenses billed to the Contractor by the Police Department in the normal course of providing supervision for traffic control during construction operations. Traffic control when required by the Chief of Police will be paid under Item 17. Allowance is approximate, and the actual amount to be paid may be more or less but shall match the actual amount paid to the traffic police as authorized by the Engineer. The Contractor shall record the actual amount paid to traffic police and at the end of each month he shall submit the total amount paid during the month, in four copies, to the Engineer who will review such amounts, when verified, in monthly payment requests from the Contractor to the Owner.
2. If the police expenses are greater than the stated allowance, the Contractor will be reimbursed the difference in the actual costs as billed. Any unexpended amount will remain with the Owner as a credit on the total base bid.
3. No mark-up for Item 17 will be allowed. Only documented police invoice amounts will be reimbursed to the Contractor. No payment will be allowed for police details ordered but not utilized due to cancellation of work crews.

R. Item 18: Traffic Management and Controls

1. Measurement for payment for Traffic Management and Controls 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 Plymouth 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; ordering and coordinating police details; 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.

S. Item 19: 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.

T. Item 20: Environmental Protection Measures (Items 20a and 20b)

Item 20a: 12” Diameter Filter Sock

1. The unit price for this Item 20a 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 and accepted by the Engineer.

Item 20b: Silt Sacks

1. Measurement for payment under Item 20b 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 20b 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.

U. Item 21: 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, re-infiltration, 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.

V. Item 22: 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 20 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.

W. Item 23: 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 22. 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. Overhead items, including performance and surety bonds, insurance, supervision, record keeping, administration, and permitting.
  - o. Daily site management including soils management.
  - p. Contract closeout.
  - q. All other project related direct and indirect costs not described above.
  
1. 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. Recheck 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 enter or occupy private land outside of temporary access agreements and construction easements, except by permission of the landowner.

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.
- I. If, in the opinion of the Engineer, permanent relocation of a utility owned by the Owner is required, he/she may direct the Contractor, in writing, to perform the work. Work so ordered will be paid for at the Contract unit prices, if applicable, or as extra work under Article 11 of the Supplementary 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 the Utility and shall have no claim for delay due to such relocation. The Contractor shall notify all utility companies in writing at least 72 hours (excluding Saturdays, Sundays and Legal holidays) before excavating in any public way. Contractor shall also notify Massachusetts Dig Safe, telephone 1-800-322-4844 at least 72 hours prior to start of work.

#### 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 jointing 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.
- C. Open trenches must be backfilled at the end of the workday.

## 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.

## 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 Contractor shall make all arrangements in obtaining the manpower and all invoices for policing.
- F. 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.
- G. 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.
- H. 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.
- I. 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 Plymouth Parks Forestry Division.
- 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 Plymouth 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 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). Several Town departments will also be invited to attend the Pre-Construction meeting including Police, Fire, School, Planning, Conservation, and utility companies (Electric, Gas and Telephone). Any proposed detours will be reviewed with all parties at the Pre-Construction Meeting. If any additional detours are considered after the Pre-Construction Meeting, the Contractor must first get approval from the Engineer.
- B. The Contractor shall attend a Site Meeting with the Town of Plymouth 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 B).
- C. The Contractor will immediately notify the utility owner of any utility main breaks. In the case of Owner water, the emergency contact number for the Plymouth Public Works Department during business hours is (508) 830-4162 x12105.
- D. The Contractor will be required to reimburse the Owner for the actual cost of the services of Department Personnel required outside of 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 by the Contractor.
- E. The Contractor shall notify the Plymouth Public Works Department at least 72 hours prior to the construction of any public improvement so that the Owner can have an inspector present if work requires inspection. In general, inspection will be required:
  - 1. For Road Construction:
    - a. When the subgrade is established,
    - b. while placing gravel,
    - c. when final grade of base course is established, and
    - d. during paving operations.
  - 2. For Sewer and Water Construction:
    - a. While laying pipe, but before backfilling, and
    - b. during backfilling operations.
    - c. Pressure and leakage tests will be monitored by the Engineer.
    - d. Disinfection testing will be monitored by the Engineer.
    - e. During paving operations.
- 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.
- H. The Contractor shall assume full responsibility for the protection of all buildings, structures, and utilities, public or private, including poles, signs, services to buildings, utilities in the street, gas pipes, water pipes, hydrants, sewers, drains, curbing, electric and telephone cables, whether or not they are shown on the Drawings. The Contractor shall carefully support and protect all such structures and utilities from injury of any kind. Any damage resulting from the Contractor's operations shall be repaired by him/her at his/her expense.
- I. The Contractor, however, shall bear full responsibility for obtaining all locations of underground structures and utilities (including existing water services, drain lines and sewers). Services to buildings shall be maintained, and all costs or charges resulting from damage thereto shall be paid by the Contractor.
- J. Protection and temporary removal and replacement of existing utilities and structures as described in this Section shall be a part of the work under the Contract and all costs in connection therewith shall be included in the Total Price Bid in the Bid Form.
- K. The Contractor shall coordinate the removal and replacement of traffic loops and signals, if required for the performance of the work, at no additional cost to the Owner.

#### 1.15 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 Plymouth 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 Plymouth 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. 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.
- B. 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.
- C. The Contractor is advised that the disposal of excess excavated material in wetlands, stream corridors and plains is strictly prohibited even if the permission of the property owner is obtained. Any violation of this restriction by the Contractor or any person employed by him, will be brought to the immediate attention of the responsible regulatory agencies, with a request that appropriate action be taken against the offending parties. Therefore, the Contractor will be required to remove the fill at his/her own expense and restore the area impacted.
- D. Outdoor burning of rubbish and waste material on the Site will not be permitted.
- E. 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.
- F. 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. Residential notification cards shall be obtained from the Sewer or Water Department Office. It shall be the Contractor's responsibility to request and obtain the Residential notification cards from the Departments.
- C. A list of all recipients of notices will be provided to the Departments immediately.
- D. Failure to comply with notification requirements may result in temporary termination of work until such time that notification is issued. Such termination of work will not be reason for extending contract time limits (see Articles 3 & 7 of the Agreement).
- E. The 72 hour notice requirement is for planned interruptions. Unplanned interruptions require immediate notification of the Plymouth Public Works Department (508) 830-4162 x12105. 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 Water Street.
- 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; list and description of on-site improvements; 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 Water Street Sewer Interceptor Replacement Alignment on Water Street.
  - 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 and shall include the following information:
    - a. The location of all new utilities and invert elevations of all new structures and pipe inlets and outlets. The location of all new sewer services and sewer service cleanouts.
    - b. The information obtained from this survey shall be professionally drafted on 22" x 34" sheets, using a scale of 1"=40' and shall be based on the NAVD 88 vertical datum, and using the Massachusetts Coordinate System Horizontal Datum.
  3. The Contractor shall submit the record drawing as an AutoCAD drawing file, meeting the Town of Plymouth'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 and Coastal Bank
- a. Erosion control lines shall be staked out for inspection and approval by the Engineer and Town of Plymouth Conservation Agent prior to the installation of erosion controls and environmental protections. Refer to Appendix B.
  - 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. Refer to Section 01010 – Summary of Work and Contract Drawings for additional work sequence requirements.

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, guywires, 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.

## 1.8 WORK HOURS AND SITE ACCESS

- A. 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. 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 Roebbling 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
AI	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.

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

(Material is usually first published in the "Federal Register")  
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 Plymouth, Department of Public Works  
Telephone: (508) 830-4162 Ext. 12105

## 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 Town of Plymouth Conservation Commission.
- G. The proposed work along Water Street is located in a drainage course. The Contractor shall pay particular attention to the drainage and protection of the drainage structures on Water Street, and the sedimentation and erosion control in this area.
- H. Contractor shall be responsible for maintenance of the erosion control structures and devices and replacing as needed to maintain the required protection and performance.
- I. 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.
- J. 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. Refer to Appendix B of the Contract Specifications.

### 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 Plymouth 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 (Appendix B) 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. Filter sock as shown on the Drawings to be used for run-off control to protect nearby surface waters and resource groups.
- 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 <sup>-1</sup>	4.81

C. 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.

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.

## 2.2 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/ft <sup>2</sup> /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.
- F. 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.
- G. An adequate stockpile of erosion control materials shall be on-site at all times for emergency or routine replacement.

### 3.3 PROTECTION OF STREAMS, WETLAND RESOURCE AREAS, AND SURFACE WATER

- A. Care shall be taken to prevent, or reduce to a minimum, any disturbance to the adjacent wetlands, retention areas, surface water body, storm drain or sewer from pollution by debris, sediment or other material, or from the manipulation of equipment and/or materials in or near the Plymouth Harbor. 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, Plymouth Harbor, 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. All dewatering discharges shall also include energy dissipation to prevent scouring.

- 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. Contractor shall submit two copies (2) of approved contingency drawings or plans to the Engineer.
- D. Equipment refueling operations must take place in a supervised area with appropriate secondary containment measures in place and spill response materials accessible on-site for the duration of construction.
- E. 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 that 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 by placing boards, planks, or poles around them. 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 and 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 Plymouth Public Works Department notification in this regard within one hour of such notice by calling (508) 830-4162 x12105 during normal working hours or the Plymouth Police Department (508) 830-4218 after hours. Upon being advised by the Town of Plymouth Public Works Department 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 five hundred dollar (\$1,500.00)** fine for each failure to respond as indicted in 1.3.C. 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 Owner 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 Owner, solely at the discretion of the Owner.
- 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 Plymouth Sewer Department 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 Plymouth 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 Plymouth Police Department 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.
- B. The Work of this Contract requires installation of a new sewer interceptor, 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.
- C. Operation of the existing sewer, drain, water and other utilities must be maintained

throughout the duration of the Project.

- D. 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.
- E. 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 DISRUPTION OF WATER SERVICE

- A. The Contractor shall interrupt water services and disrupt the normal functioning of the distribution system as little as possible. The impacted homeowners shall receive written notification a minimum of 72-hours prior to any interruption of service.
- B. The Contractor shall notify the Engineer sufficiently in advance, but at no time less than 72-hours, of any required interruption to normal service or isolation of the water main. Necessary arrangements will be made with the Town.

#### 1.10 PAVING REQUIREMENTS

- A. All streets shall receive full 2-inches of temporary asphalt cold patch trench pavement and 7-inches of permanent trench pavement.
- B. The Contractor shall maintain all trench pavements for the duration of the Contract and ensure that the roadway has a uniform surface passable for all traffic until final paving is complete.
- C. The project area shall be swept following installation of temporary pavement.



- D. Contractor shall take appropriate measures to protect bypass system from damage, and have sufficient additional quantities of necessary materials to replace or supplement the temporary facilities as needed or required.
- E. Contractor shall be responsible for performing 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.

#### 1.11 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

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](http://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.

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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 shopwork manufacturing instructions, custom templates, special wiring diagrams, Coordination Drawings, individual system or equipment inspection and test reports including performance curves and certifications, as applicable to the Work.
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. Number of submittals 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.

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. Number of copies shall be as directed by the Engineer but shall not exceed 6.

#### 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:
  - 1. Measured horizontal and vertical locations of underground utilities and appurtenances, including fire hydrants, gate valves, and service boxes, referenced to permanent surface structures.
  - 2. Field changes of dimension and detail.
  - 3. Details not on original Contract drawings.
  - 4. 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 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 bearing 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.

#### 1.13 CERTIFICATE OF INSURANCE

- A. Refer to Section 00700 - Standard General Conditions of the Construction Contract - Article 5 for Certificate of Insurance submittal requirements.

#### 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 75%/25% for install/test, separate into two items

(75%/25% 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 AND VIDEO

#### 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. Provide digital construction photographs and video pertinent to the Contract work during the Contract period as specified and as directed by the Engineer.

- B. Related Sections include the following:

- 1. Division 0 – Bidding and Contract Requirements
  - 2. Division 1 – General Requirements

##### 1.3 SUBMITTALS

- A. Submit the following in accordance with the Conditions of the Contract and Division 1 Specification Sections and as specified herein:

- 1. Proposed Photographer/Videographer

- i. Several different samples of work by proposed photographer/videographer on construction photography/videography of similar nature to the work under this Contract.
    - ii. Proposed photographer's/videographer's experience and qualifications in similar work. Include copies of references and any certification acquired.
    - iii. Information for techniques, materials and equipment proposed to be used.
    - iv. Information shall be submitted electronically in accordance with Section 01300.

- 2. Two copies of USBs containing all digital construction photos submitted on a monthly basis, each identified as specified. Photos may also be submitted electronically via document management service or secure file sharing site.

- 3. Prior to the start of construction, two copies of USBs containing a report and video survey documenting the general conditions of the public roadways in the Town of Plymouth within the limits of work that will be utilized by construction vehicles.

4. Post construction, two copies of USBs containing a report and video survey documenting the general conditions of the public roadways in the Town of Plymouth within the limits of work.

#### 1.4 QUALITY ASSURANCE

- A. Photographer/Videographer proposed to be approved by Engineer.
- B. Photographer's/Videographer's experience and qualifications:
  1. Not less than 2 accumulated years of experience with similar construction photography/videography.
- C. Photographer/Videographer to use techniques, material and equipment capable of producing photographs and video of high quality and resolution.
- D. Photographer/Videographer to be available on call on one day notice when requested by Engineer and be prepared to respond on shorter notice in unusual or unexpected conditions.
- E. Dates for photography/videography at site to be coordinated with Engineer and Engineer to be present during these periods at site unless approved otherwise by Engineer.
- F. Contractor to make and retain detailed records of all photographs and videos by photographer/videographer under this Contract:
  1. The records to be in sufficient detail to support any attestation that may be required of photographer/videographer.
  2. Photographer/videographer to retain such records for a period not less than two years from the final acceptance of entire work under this Contract.

#### 1.1 DELIVERY, STORAGE, AND HANDLING

- A. Provide in accordance with Section 01610 – Delivery, Storage, and Handling

#### 1.2 COORDINATION

- A. Provide in accordance with Section 01040 – Project Coordination

### 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.

## 2.2 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. Contractor shall notify Engineer at least 5 days in advance of any photographic/video sessions.
- B. Photographer/videographer to furnish additional prints/copies beyond the number specified when requested by Engineer at commercial rates applicable at time of purchase.
- C. 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. Site before commencement of any construction. Provide photos and documentation of all private and public property structures (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 activities. Photos of any month need show only new work performed during month.
  - 3. Sewer 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.
  - 5. Upon completion of all Contract work.

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.

3.3 CONTRACT CLOSEOUT

- A. Provide in accordance with Section 01700 – Contract Closeout

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 – Contract Documents: Intent, Amending, Reuse, of 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 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.
- C. 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.
- D. 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.
- E. Temporary Water: Water for drinking purposes and other usage will be provided by the Contractor at his own expense.
- 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.

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 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 Plymouth.

B. Related Sections include the following:

1. Division 0 – Bidding and Contract Requirements
2. Division 1 – General Requirements

### 1.3 HOURS OF OPERATION

- A. Refer to Section 01630 Miscellaneous Requirements for work hour requirements.
- B. Daily restricted hours of operation shall be between 7:00 a.m. and 5:00 p.m. Monday through Friday. Construction shall be coordinated around other nearby construction projects and 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.

- C. Construction during any time outside the work hours outlined above cannot be performed without permission from the Owner and/or the Engineer.

#### 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 from the Owner and/or Engineer, it will be the Contractor's 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 Plymouth 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 consist 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 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. Contractor shall pay for accepted Police Details under the uniform police officer allowance item in the Bid Form.
- 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 45° 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 markings 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

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02700	Asbestos-Cement Pipe Removal and Disposal	02700-1
02901	Miscellaneous Work and Cleanup	02901-1
02920	Topsoil	02920-1
02945	Turf	02945-1



## 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. Massachusetts Erosion and Sediment Control Guidelines for Urban and Suburban Areas, May 2003.
3. Order of Conditions issued by the Plymouth Conservation Commission (Appendix B).

## 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 trenched 3-5 inches into the ground.
- D. Fiber Rolls shall be placed a minimum of 1 foot back from drain inlets.

### 2.2 SILT FENCING

- 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. GEOTEX 2130 as manufactured by Propex, Chattanooga, TN.
  2. 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 <sup>-1</sup>	4.81

2.3 TEMPORARY SEED COVER

- A. If required, seed mixture for temporary cover by hydroseeding application shall conform to the following:

<u>Quantity per 1000 sq. ft. Coverage</u>	<u>Material</u>
27-1/2 lb.	Wood Fiber Mulch
4 lb.	Seed
1/2 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 weekly and after heavy rain. Silt shall be removed if greater than 6 in. deep.
  2. Condition of erosion control devices shall be checked daily. 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 stabilized and/or vegetated or restored, at which time they shall be inspected and removed upon approval from the Engineer and Conservation Commission. After removal, areas disturbed by these devices shall be regraded and seeded as needed.
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 Contractor.
  - 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

##### 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. The Contractor shall carefully coordinate the work of this Section with all other work and shall provide shoring, bracing, and supports, as required. The Contractor shall insure that structural elements are not overloaded or compromised and shall be responsible for increasing structural supports or adding new supports as may be required as a result of any cutting, removal, or demolition work performed under any part of this Contract. The Contractor shall remove all temporary protection when the work is complete.
- 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, 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.
- C. Review and finalize demolition, modification and abandonment schedule and verify availability of materials, labor, equipment, and facilities needed to make progress and avoid delays.

## 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.
- B. Bituminous Concrete
  - 1. Pavement shall be replaced in accordance with Section. 02576 – Pavement Repair and Resurfacing

### 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.

### 3.2 PREPARATION FOR WORK

- A. Verify that utilities have been disconnected and capped, shut-off, or bulk headed. Survey existing conditions and correlate with requirements indicated to determine extent of demolition, modification and abandonment required. Inventory and record the condition of items to be removed and reinstalled and items to be removed and salvaged.
- B. When unanticipated mechanical, electrical, or structural elements that conflict with intended function or design are encountered, investigate and measure the nature and extent of conflict. Promptly submit a written report to Engineer.
- C. Engage a professional engineer to survey condition of structures to determine whether removing any element might result in structural deficiency or unplanned collapse of any portion of structure or adjacent structures during demolition operations.
- D. Perform surveys as the Work progresses to detect hazards resulting from demolition activities.
- E. Dangerous Materials: Drain, purge, or otherwise remove, collect, and dispose of wastewater, chemicals, gases, explosives, acids, flammables, or other dangerous materials before proceeding with demolition, modification, and abandonment operations.

### 3.3 SITE ACCESS, TEMPORARY FACILITIES AND PROTECTION

- A. Conduct demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used utilities, structures, properties or facilities.
- B. Do not close or obstruct streets, walks, walkways, or other adjacent occupied or used facilities without permission from Owner. Provide alternate routes around closed or obstructed traffic ways if required by governing regulations.
- C. Erect temporary protection, such as walks, fences, railings, canopies, and

covered passageways, where required by authorities having jurisdiction.

- D. Protect existing site improvements, appurtenances, and landscaping to remain.
- E. Erect a plainly visible fence around drip line of individual trees or around perimeter drip line of groups of trees to remain.
- F. Temporary Facilities: Provide temporary barricades and other protection required for demolition security and to prevent injury to people and damage to adjacent utilities, structures, properties and facilities to remain.
- G. Provide protection to ensure safe passage of people around the area.
- H. Temporary Shoring: Provide and maintain in accordance with Section 02160 – Temporary Excavation Support Systems.
- I. Strengthen or add new supports when required during progress of demolition.
- J. Existing landscaping materials, structures, pipes and appurtenances, which are not to be removed/abandoned shall be protected and maintained as directed by the Engineer and as specified.

#### 3.4 POLLUTION CONTROL

- A. Water sprinkling, temporary enclosures, and other suitable methods shall be used to limit dust and dirt rising and scattering in the area. Comply with government regulations pertaining to environmental protection. Water shall not be used when it creates hazardous or objectionable conditions such as ice, flooding, or pollution.
- B. Disposal: Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.

#### 3.5 CLEANING

- A. During and upon completion of work, the Contractor shall promptly remove unused tools and equipment, surplus materials, rubbish, debris, and dust and shall leave areas affected by work in a clean, approved condition.
- B. All areas shall be cleaned of dust, dirt, and debris caused by demolition, modification, or abandonment and adjacent areas returned to conditions existing prior to start of work.

#### 3.6 UTILITY SERVICES

- A. Existing Utilities: Maintain services indicated to remain and protect them against damage during demolition, modification and abandonment operations.

- B. Do not interrupt existing utilities serving occupied or operating facilities unless authorized in writing by Owner and authorities having jurisdiction. Provide temporary services during interruptions to existing utilities, as acceptable to Owner and to authorities having jurisdiction.
- C. Provide at least 72 hours notice to Owner if shutdown of service is required during changeover.
- D. Utility Requirements: Locate, identify, disconnect, and seal or cap off indicated utilities serving areas to be demolished or abandoned.
- E. If utility services are required to be removed, relocated, or abandoned, before proceeding with demolition provide temporary utilities that bypass area of demolition, relocation or abandonment, and that maintain continuity of service.

### 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. All solids shall be transported to and legally disposed of at the Water Street Pump Station located at #197 Water Street, Plymouth, MA.
- C. Existing pipe and structures shall be removed where designated on the drawings or where necessary to install new pipe or structures. When existing pipe is removed, the Contractor shall plug all resulting abandoned connections whether or not shown. Where removed piping is exposed, the remaining piping shall be fitted with a removable cap or plug, or bulk headed. Where existing pipe is to be abandoned, the Contractor shall cut back the abandoned pipe for a distance of 5 feet from any connecting structures to remain. All holes at the existing structures shall be repaired.
- D. 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 2 feet below final grade. The Contractor shall check that all pipe penetrations and any other holes have been capped, plugged or bulkheaded, and shall fill abandoned manholes with flowable fill or, alternatively, shall put a minimum of four, 2-inch diameter drainage holes in the invert of each structure then backfill the structure with compacted sand borrow. Backfill around the structure to existing grade in accordance with Section 02200 – Earthwork.

- E. Permanent plugs shall be constructed of Class B concrete, brick and mortar, or other material approved by the engineer. Brick shall be installed into the pipe to a distance equal to the diameter of the pipe being plugged.
- F. 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.
- G. 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 Contractor 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.
- B. Promptly repair damage to adjacent construction caused by demolition operations.
- C. Repairs: Where repairs to existing surfaces are required, patch to produce surfaces suitable for new materials.
- D. Where feasible, test and inspect patched areas after completion to demonstrate integrity of installation.

END OF SECTION 02050

## SECTION 02080

### SOIL AND WASTE MANAGEMENT

#### PART 1 – GENERAL

##### 1.1 SUMMARY OF WORK

- A. In general, the Work under this Section shall include all labor, materials, equipment, supervision and supplies necessary for the loading, handling, transportation, and stockpiling of Suspect soil; and transportation and off-site disposal of Contaminated and Hazardous soil as directed by the Engineer.
- B. Laboratory testing of soil within the project limit has not been conducted. A review of online records at the MassDEP's website identifies known release sites proximate to the project area. These records may be used to identify areas of Suspect soil.

##### 1.2 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.

##### 1.3 EXISTING CONDITIONS

- A. The following documents are available for review and appended to these Technical Specifications.
  - 1. Appendix C – Boring Reports and Soil Test Results
- 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.

##### 1.4 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: Soils that 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.

## 1.5 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 Contractor if groundwater potentially impacted by OHM is identified. Refer to Section 02140 – Dewatering and Discharge.

1.6 RELATED WORK

- A. Section 01024 - Measurement and Payment
- B. Section 01350 - Health and Safety Plan
- C. Section 01500 - Temporary Facilities and Controls
- D. Section 02040 – Demolition, Modification, and Abandonment
- E. Section 02140 – Dewatering and Discharge
- F. Section 02220 – Earthwork
- G. Section 02700– Asbestos Cement Pipe Removal and Disposal

1.7 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 Plymouth 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.

## 1.8 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 within 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 02220 - 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 he/she has satisfied himself/herself 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 himself/herself with all available information concerning these conditions will not relieve him/her 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 02115

### GEOTECHNICAL INSTRUMENTATION

#### PART 1 – GENERAL

##### 1.1 SUMMARY

- A. The Work of this Section includes setting survey and monitor points, surveying, furnishing, installing, protecting and removing monitor points required for the existing structures and utilities during the Work.
- B. The Contractor shall furnish, install and protect monitoring points described herein, as shown on the Contract Drawings and as directed by the Engineer. The Contractor shall provide personnel to record, reduce, interpret and report monitor point data. The Contractor shall locate and provide the initial elevations for all monitor points.
- C. The Contractor shall have qualified personnel on its staff or retained to develop monitor point data. The qualifications of personnel are subject to review and approval by the Engineer. There shall be one (1) contact person employed by the Contractor with overall responsibility and accountability. This person shall be a Registered Land Surveyor in the Commonwealth of Massachusetts who shall be retained to oversee, install and monitor the survey points and instrumentation at the site.
- D. The purpose of this program is to monitor the existing structures and utility movements at the site prior to and throughout the Work.
- E. The Contractor shall coordinate with other contractors on-site including, but not limited to, earthwork contractors, utility contractors and demolition contractors. It shall be the responsibility of these contractors to keep the existing structure and utility movements produced by their operations within acceptable and specified limits.

It is the responsibility of the Contractor to communicate the results of the monitoring program with the other contractors and to notify the Engineer and other contractors immediately in the event that any excessive structure or utility movement is detected or if there are any other signs of damage, distress or movement to nearby structures and utilities.

The Contractor shall work with the Engineer and other contractors on-site to develop alternatives and corrective action to assure that movements are kept within acceptable limits and that damage is minimized or prevented.

- F. The scope of the Contractor's Work in connection with the program shall include, but not necessarily be limited to, the following:
  - 1. Provide a Registered Land Surveyor for optical survey, layout and periodic monitoring of all monitor point locations and elevations. The Surveyor shall

monitor and record any movement and settlement at the designated locations before, during and following construction operations, as specified.

2. Purchase/rent instruments and equipment, as required to perform the work.
3. Install and remove settlement pins, as required.
4. Install surface settlement points, as required.
5. Install settlement points within the construction area on existing utilities, as required.
6. Install protective boxes, covers and guard pipes for all utility monitor points, as required.

#### G. Monitor Point Layout

1. The approximate locations of the monitoring points to be installed are subject to change based on the detailed construction sequence adopted by the Contractor and the locations of existing structural elements in the field.
2. Monitor points to be furnished and installed by the Contractor include:
  - a. Settlement Pins. Installed in and on components of adjacent buildings, retaining walls, utilities and other elements to monitor movements.
  - b. Surface Settlement Points. Installed at the ground surface, in existing masonry, bituminous asphalt surfaces and manhole structures located adjacent to earthwork construction to monitor movements.

#### H. Coordination with Utility Company and Agencies

The Contractor shall follow Dig-Safe procedures prior to performing any excavations and shall obtain permission from the Owner and Engineer prior to setting points on or performing other items of the Work required by the Specifications.

### 1.2 RELATED SECTIONS

- A. Drawings and general provisions of the Contract. Other specification sections that directly relate to work of this section include, but are not limited to:
  1. Section 02200 – Earthwork
  2. Section 02140 – Dewatering and Discharge
  3. Section 02160 – Temporary Excavation Support Systems

### 1.3 USE OF DATA

- A. Data developed by the Contractor shall be made available to the Engineer and other contractors on-site as soon as practicable, but in no event longer than the times specified herein or as may be otherwise established by the Engineer. The Engineer or

representatives of other contractors on-site may observe readings at any time or take their own supplementary readings from any monitor point the Contractor has installed.

#### 1.4 MONITOR POINT PROTECTION

- A. The Contractor shall protect all monitor points and appurtenant fixtures as specified under Part 3.7 herein, and erect and maintain witness stakes, barriers and barricades as necessary and as approved to protect monitor points. Provide plans of the locations of all monitor points and meet in the field with the Engineer prior to the commencement of construction and meet periodically with the personnel of other on-site contractors to inform them of the detailed location of monitor points and to develop methods for protection.
- B. The Contractor shall repair all damaged monitor points as soon as practicable, but generally not more than 24 hours, or less if the monitor points are in areas critical to the Work schedule, as determined by the Engineer.

#### 1.5 SCHEDULING

- A. The Contractor shall provide a safe means of access to all monitor points and allow the Engineer, other on-site contractors, surveyors, etc. to read the monitor points at any time.
- B. Surface settlement points and settlement pins shall be installed and initial surveys completed a minimum of five (5) working days prior to any earthwork construction activity within 100 feet of the points to be surveyed. Monitor points shall be in-place and operable on all structures specified herein prior to the commencement of any earthwork activity.
- C. Plans at a maximum scale of one (1) inch = 40 feet showing surveyed locations and elevations of all monitor points shall be submitted to the Engineer within five (5) working days after installation.

#### 1.6 OPTICAL SURVEYS

- A. Initial location surveys for all monitor points and establishing surface elevations shall be made using second order survey procedures.
- B. Initial Survey
  - 1. The Surveyor shall conduct an initial survey to establish "as installed" locations and elevations of all monitor points within the accuracy designated in Part 3.2 herein. A detailed plan shall be submitted to the Engineer to show monitor point locations referenced to survey ties to the existing structures and a tabulation of monitor point elevations.
  - 2. The Contractor shall submit the detailed location plan to the Engineer a minimum of five (5) working days prior to any earthwork construction activity.

3. The Contractor shall notify the Engineer a minimum of 24 hours prior to the initial survey so that the Engineer or representatives of other contractors on site may be present during the initial readings.

C. Benchmarks and Offset Reference Points

The Contractor or Surveyor retained by the Contractor shall establish reference points for settlement and movement measurements at locations outside the influence of construction activities. The reference points shall be shown on a location plan showing the limits of each construction area. The locations of the reference points shall be submitted to the Engineer for approval. As a guideline, the reference points shall be established a minimum of 200 feet from any construction zone.

- D. Monitoring of points by survey methods shall be performed in accordance with the schedule specified herein.

E. Data Submittal:

1. All survey data shall be submitted to the Engineer on the first workday following the survey. Data shall be submitted in graphical and tabular form as required by the Engineer. Duplicate copies of survey data shall be provided to all other on-site contractors working in the area and as directed by the Engineer.
2. If, in the opinion of the Engineer, there appears to be excessive movement, the Contractor's construction means and methods shall be re-evaluated and, the monitor points shall be surveyed by the Contractor or its Surveyor as often as deemed necessary by the Engineer.

## 1.7 FACILITIES TO BE MONITORED

A. General

1. The Contractor shall notify Dig-Safe and all affected utility companies and agencies.
2. The Contractor shall perform test pits where specified and as required to establish monitor points on utilities and structures, as required.

B. Monitor Points

1. Locations of monitoring points shall be determined in the field by the engineer.
2. Survey monitoring of points shall be performed whenever any earthwork construction or activity causing vibrations is performed in proximity to existing structures or utilities, as specified herein and as directed by the Engineer.

## 1.8 SUBMITTALS



- A. The Contractor shall submit to the Engineer the qualifications and relevant experience of the Registered Land Surveyor responsible and in charge of the geotechnical instrumentation for approval.
- B. The Contractor shall submit to the Engineer detailed locations of all (initial) instrumentation for approval. The Contractor shall describe, in detail, the locations of all instrumentation by dimensioned sketches, the type of instrumentation to be installed, the method of instrumentation installation/application and the sequence for monitoring.

## PART 2 – PRODUCTS

### 2.1 MATERIALS

- A. All monitor point hardware, protective covers, equipment and materials necessary to conduct the monitoring program shall be furnished by the Contractor. Prior to installation, all materials and equipment shall be available for inspection by the Engineer to ensure compliance with the intent of these specifications.
- B. Grout
  - 3. Cement: Portland, Type I or II.
  - 4. Water: Potable from public water supply or other approved source
  - 5. Epoxy grouts may be used as an alternative as approved.
- C. Settlement Pins
  - 1. The Contractor shall use masonry expansion anchors 3/8-inch by sixteen (16) threads with a minimum length of 1-9/16 inch as approved by the Engineer.
  - 2. The pins shall be 2-inch by 3/8-inch by sixteen (16) thread stainless steel buttonhead screws.
  - 3. Settlement pins affixed to the top of utility lines and pipes shall be set in waterproof epoxy cement. Drilling into utility conduits and pipelines is not permitted.
  - 4. Access to settlement pins or utility conduits shall be maintained by a casing or guard pipe positioned plumb and centered on the pin.
- D. Surface Settlement Points

The points shall consist of chiseled marks, survey masonry "PK" type nails (or equivalent) or other suitable mark, as approved.

## PART 3 – EXECUTION

### 3.1 GENERAL REQUIREMENTS FOR EQUIPMENT INSTALLATION

- A. The Contractor shall notify, cooperate and coordinate with the Engineer and other on-site contractors to allow the Owner's representatives access to the work area at all times for the purpose of observing monitor point installation and acquisition of data.

- B. The Contractor shall install and verify the integrity of all monitor points a minimum of five (5) working days prior to construction activities specified herein.
- C. The Contractor shall submit detailed installation logs including, but not limited to, the elevation and location of each settlement pin and surface monitor point, the depths and lengths of casing or guard pipe installed and the date installed.
- D. The Contractor shall provide and install additional equipment of the types described herein, beyond that shown on the Contract Drawings, when directed by the Engineer.
- E. The Contractor shall be responsible for any and all damage to public and private property incurred during installation of monitor points. Monitor point locations may be altered slightly to avoid obstructions, with the approval of the Engineer. The Contractor shall be responsible for maintaining the flow of traffic around the monitor point areas at all times.
- F. The Contractor shall maintain a record of the locations of all monitor points, methods of installation and methods of repair or restoration as may be required upon disturbance of the monitor points.

### 3.2 OPTICAL SURVEY ACCURACY

- A. All monitor point locations and elevations shall be referenced to existing benchmarks and survey ties to existing structures.
- B. The Contractor shall vertically establish the elevations for all monitor points to a minimum accuracy of 0.005 feet.
- C. The Contractor shall horizontally locate all monitor points by survey ties to permanent topographic features to a minimum accuracy of 0.01 foot.

### 3.3 SETTLEMENT PINS

- A. Settlement pins shall be installed by the Contractor at specified locations as determined by the engineer.
- B. The installation procedure shall generally be as follows:
  - 1. The Contractor shall drill a hole at the designated location, sized to accept the anchor.
  - 2. The Contractor shall set the anchor as recommended by the Manufacturer.
  - 3. The Contractor shall install the buttonhead screw such that the head of the screw is flush with the surrounding surface when fully screwed into the anchor.

### 3.4 SURFACE SETTLEMENT POINTS

- A. Surface settlement points shall be installed by the Contractor using generally accepted survey methods, at specified locations and as directed. Should the specified location be

unsuitable to retain the point, the point may be moved to an alternative location acceptable to the Engineer.

### 3.5 QUALITY ASSURANCE

- A. Installation of all monitor points shall be performed by personnel having demonstrated experience in the installation procedures as specified herein. The Contractor shall provide evidence of the experience of the personnel ten (10) days prior to installation.
- B. All monitor points shall be surveyed by a Registered Land Surveyor who shall also read and record the data during the course of the Work. No monitor point installation or similar activities shall be conducted without prior notification to the Engineer to allow the Engineer to be present. Work completed without the Engineer present shall not be accepted.

### 3.6 MONITORING POINT SURVEY

- A. The Contractor shall provide qualified and approved personnel to survey the monitor points. It shall be the responsibility of the Contractor to keep the existing structures and utility movement produced by its operations within specified limits or other limits that may be established by the Engineer based upon observed readings and the performance of the existing structures and utilities.
- B. The Contractor shall work with the Engineer and other contractors on-site to develop alternatives and corrective action to assure that utility and structure movement is kept within acceptable limits and that damage is minimized or prevented. Any costs associated with revised construction means and methods to keep structure and utility movement to acceptable levels shall be borne by the Contractor.
- C. The measured maximum monitor point movement shall not exceed the following Limiting Values or such values as directed by the Engineer and the requirements of adjacent structures and utilities. Monitoring point data shall be evaluated by the Engineer to determine whether the response to construction activities is reasonable. Interpretation shall include making correlations between monitor point data and specific construction activities. The following Threshold and Limiting Values have been developed for monitoring point movement:

Facility	Threshold Values	Limiting Values
All Utilities and Manhole Structures	0.24-inch	0.50-inch
All Buildings and Other Structures	0.12-inch	0.24-inch

- D. It is the responsibility of the Contractor to communicate the results of the monitoring program with the other contractors and to notify the Engineer and other contractors immediately in the event that any excessive movements are observed.
- E. If a Threshold Value is reached, the Contractor shall:

1. Meet with the Engineer to discuss the need for response action. If a response action is requested by the Engineer, the Contractor shall submit a specific plan of action within 24 hours and implement the approved plan of action within 48 hours so that the Limiting Value is not exceeded.
  2. Install additional monitoring points if directed by the Engineer.
- F. The Contractor shall take all necessary steps so that the Limiting Value is not exceeded, and may be directed to suspend activities in the affected area with the exception of those actions necessary to avoid exceeding the Limiting Value.
- G. If a Limiting Value is reached, the Contractor shall cease work, and submit revised construction means and methods to perform the work. The Contractor shall submit a specific plan of action within 24 hours and implement the approved plan of action within 48 hours so that the Limiting Value is not exceeded.
- H. The measures set forth herein are considered to be the minimum acceptable. It shall be the responsibility of all contractors on-site to assure the stability and safety of all adjacent buildings, structures and utilities and to assure public safety. The Contractor shall undertake additional measures as necessary to see that all public and private property and the Work are protected.
- I. Monitor points within 100 feet of earthwork construction and other work areas where vibration causing activities are in progress, shall be surveyed by the Contractor at a minimum of once every week or as directed by the Engineer.
- J. Monitor points within 50 feet of earthwork construction and other work areas where vibration causing activities are in progress shall be surveyed by the Contractor at a minimum of three (3) times per week, Monday, Wednesday and Friday or as directed by the Engineer.
- K. If, at any time, detectable movement is occurring, the Engineer and all contractors on-site shall be immediately notified by the Contractor and the frequency of surveys shall be increased to such additional intervals and times as directed by the Engineer. The Engineer may elect to decrease the frequency of surveys based upon observed construction activity and reviewed monitoring data.
- L. Following completion of the Work within the distances specified above, the frequency of monitoring can be reduced to once weekly until the Engineer authorizes that the monitoring be discontinued.

### 3.7 PROTECTION AND MAINTENANCE OF MONITORING POINTS

- A. The Contractor shall provide for the protection of both existing and newly installed monitoring points, appurtenant fixtures and other components of the monitoring systems from damage due to construction operations, weather, traffic and vandalism. Except as specified above, should a monitoring point become damaged or rendered nonfunctional, it shall be the Contractor's responsibility to replace the damaged monitoring point with

another of good operating condition to the satisfaction of the Engineer and at no additional cost to the Owner.

- B. Damaged monitoring points shall be replaced, relocated and fully operational prior to performing any earthwork or vibration causing work in the vicinity.
- C. The Contractor shall maintain operation and protection of monitoring points as specified above until the completion of the Contract or such other time as directed by the Engineer.

### 3.8 REMOVAL OF MONITOR POINTS

- A. Prior to completion of the Contract, the Contractor shall remove all monitoring points installed under this Contract. The Contractor shall protect and maintain all monitoring points until written approval by the Engineer authorizes removal.
- B. Removal of monitoring points shall include removing and disposing of protective covers, grouting of casings, backfilling of excavations and restoring the surfaces of pavements, columns, walls, steps and all other surfaces disturbed by the monitoring point installations, to their original condition or to such other condition as acceptable to the Owner.
- C. All monitoring point hardware removed by the Contractor shall become the property of the Contractor.

END OF SECTION 02115

## 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, install, test, operate, monitor, 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 of excavation and prevent surface water runoff from entering or accumulating in excavations, allow work to be performed under dry and stable conditions, and comply with all applicable permit and other regulatory requirements.
  - 2. The temporary dewatering system as specified in these specifications shall be the minimum system required for controlling groundwater, regardless of source. The installed system shall be capable of lowering and maintaining the groundwater to at least 2-feet below the bottom of the excavation and until the required utilities are installed. Within these limits, the Contractor shall be responsible for the design of the entire temporary dewatering system and shall make whatever modifications and additions to the system as may be required for the system to fulfill its requirements.
  - 3. Work to be done as part of dewatering includes, but is not limited to:
    - a. Lower the groundwater level.
    - 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.
4. 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, municipal sewer system, or surface water bodies will not be allowed.
  5. Dewatering methods include, but are not limited to, sump pumping, deep wells, well points, vacuum well points or any combinations thereof.
  6. 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.

Surface flow that could lead to off-site discharge is not permitted. If ground infiltration 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). If neither ground infiltration nor surface water discharge is 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.

7. 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 C

## 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.
- E. Provide cement grout having a water cement ratio of 1 to 1 by volume.

## 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.
- H. Surface water and groundwater shall be controlled such that excavation to final grade is made in-the-dry, the bearing soils are maintained undisturbed and softening or instability of, or disturbance to, the subgrade due to the presence or seepage of water does not occur.
- I. All work shall be protected from flotation.
- J. The impact of anticipated subsurface soil/water conditions shall be factored into the selection of methods of excavation and proposed dewatering and drainage systems. Where groundwater levels are above the proposed bottoms of excavations, it is expected that some type of pumped dewatering system will be required for pre-drainage of the soils prior to excavation to final grade and for maintaining the lowered groundwater level until construction has been completed to such an extent that the foundation,

structure, pipe, conduit, or fill will not be floated or otherwise damaged. It is further expected that the type of system, spacing of dewatering units, and other details of the work will vary depending on soil/water conditions at a particular location.

### 3.2 SURFACE WATER CONTROL

- A. Surface water control measures shall be constructed to prevent flow of surface waters into excavations. Such measures may include dikes, ditches, and sumps.

### 3.3 EXCAVATION DEWATERING

- A. Provide and maintain adequate equipment and facilities to remove promptly and dispose of properly all water entering excavations. Excavations shall be kept in-the-dry, so as to maintain an undisturbed subgrade condition throughout construction below grade, including backfill and fill placement.
- B. Water entering excavations from precipitation or surface runoff shall be collected in shallow ditches around the perimeter of the excavation, drained to sump, and pumped from the excavation to maintain in-the-dry conditions.
- C. Pipe and conduit shall not be laid in water or allowed to be submerged prior to backfilling. Pipe and conduit which becomes submerged shall be removed and the excavation dewatered and restored to proper conditions prior to reinstalling the pipe and conduit.
- D. Excavations for manholes and structures shall be maintained in-the-dry for the duration of the structure installation. In no event shall water be allowed to enter an excavation and rise to cause unbalanced pressure on foundations and structures until the concrete or mortar has set at least 24 hours.
- E. Dewatering and drainage operations shall at all times be conducted in such a manner as to preserve the natural undisturbed bearing capacity of the subgrade at the bottom of the excavation. If the subgrade becomes disturbed for any reason, the unsuitable subgrade material shall be removed and replaced with concrete, compacted granular fill, or other approved material to restore the bearing capacity of the subgrade to its natural undisturbed condition.
- F. Dewatering and drainage operations shall be conducted in a manner which does not cause loss of ground or disturbance to the pipe bedding or soil which supports overlying or adjacent structures.
- G. If conventional dewatering methods are not adequate to ensure dry and stable conditions, the Contractor shall be required to use special dewatering techniques as necessary to complete the work.
- H. Special dewatering techniques may consist of one or two-stage well point systems, deep wells, or educator and ejector type systems. The contractor shall utilize a system which provides proper construction conditions and prevents settlement at time of installation and upon backfilling.

- I. In areas requiring special dewatering, the Contractor shall lower the groundwater level to a minimum of 2 feet below the bottom of the excavation grade prior to any installation and maintain that groundwater level until the excavation has been backfilled. The groundwater levels shall be monitored by the Contractor's on-site representative to ensure conformance with the requirements of these specifications. Construction will not be allowed until the Engineer and the Owner are satisfied that the above provisions are met.

### 3.4 DEWATERING DISCHARGE

- J. Install and monitor recharge systems when specified and/or indicated and in accordance with the submitted dewatering plan.
- K. 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.
- L. 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.
- M. 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
- N. 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.
- O. Provide separately controlled pumping lines.
- P. 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.
- Q. The Contractor shall not discharge silty water in the wetland resource area or surface water body.
- R. 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.

### 3.5 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.

### 3.6 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 02220.
- C. All dewatering wells shall be abandoned upon completion of the work, and completely backfilled with cement grout.



3.7 DISPOSAL OF DRAINAGE

- A. All water discharged from temporary dewatering and drainage systems shall be disposed of in accordance with approved sedimentation and control plans and methods. Sanitary sewer systems or private on-site septic systems shall not be used to dispose of drainage.

3.8 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 02115 – Geotechnical Instrumentation

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 C 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 AWWA 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 Section 02115 – Geotechnical Instrumentation. 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 Section 02115 – Geotechnical Instrumentation
- 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 not 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 rehandling, 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 and Manholes
  - 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. If requested by the Engineer, submit a grain size analysis and a constant head permeability result in accordance with ASTM D422 and ASTM D2434 respectively for each proposed source of the drainage sand for review by the Engineer.

- D. Controlled Density Fill: Proposed Mix Designs for the type(s) of Controlled Density Fill shall be submitted for review and approval by the engineer.
- E. If requested by the Engineer, submit a controlled density fill (CDF) mix design showing the proportions and gradations of all materials.
- F. 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.
- G. 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.
- H. 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 in accordance with Section 02160 – Temporary Excavation Support Systems.
- 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:

<u>Sieve Designation</u>	<u>Percentage Passing</u>
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. 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:

<u>Sieve Designation</u>	<u>Percent Passing</u>
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. Screened gravel 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. Crushed stone 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. 3/4-inch 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:

<u>Sieve Size</u>	<u>% Passing by Weight</u>
1"	100
3/4"	95 -100
1/2"	35 - 70
3/8"	0 - 25

### **Dense Graded Stone**

- F. Dense Graded Stone for brick sidewalk sub-base shall be hard, durable stone of proper size and gradation, unfrozen and substantially free from vegetation, roots, loam and other organic matter, clay, snow, frozen particles and other fine or harmful substances. Dense Graded Stone shall conform to the MassDOT Standard Specs, Section M2.01.7 "Dense Graded Crushed Stone for for Sub-Base"

### **Mason Sand**

- G. Sand borrow for placement under brick pavers shall conform to the Massachusetts Highway Department Standard Specifications, Section M1.04.0 Type A "Sand Borrow."

## 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.

## 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 in a safe manner. 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, curbsings, 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 recompacted 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 broomed 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 25 lin. ft. per lift.
  - b. Trenches in areas without structures or roadways: Every 25 lin. ft. per alternate lift.
  - c. Paved Roadways: Every 25 lin. ft. per lift.
  - d. Paved Areas: 250 sq. ft. per lift.
  - e. Under Structure/Manhole: 1 test per each structure/manhole
  - 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.

### 3.3 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.

### 3.8 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.

### 3.9 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., Type 1E and 2E, 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. In addition to adhering to all the laws and ordinances relating to the handling and storage of explosives, 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 Plymouth. 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 Plymouth Fire Department shall be made by the Contractor.

##### 1.3 RELATED WORK

- A. Section 02200 - Earthwork
- B. Section 01110 - Environmental Protection Measures

##### 1.4 DEFINITIONS

- A. Typical of materials classified as rock are boulders 2.0 cu. yd. or more in volume, solid rock, rock in ledges, and rock-hard cementitious aggregate deposits. Intermittent

drilling, blasting 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 <sup>-1</sup>	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. All solids shall be transported to and legally disposed of at the Water Street Pump Station located at #197 Water Street, Plymouth, MA.
- 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 Contractor 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 and Manholes

### 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.
- B. 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.
- C. 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.
- D. 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.
- E. 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. 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.
- C. 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.

## 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 Plymouth 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 conditions.

### 3.7 CONTRACT CLOSEOUT

- A. Provide in accordance with Section 01700 – Contract Closeout.

END OF SECTION 02538

## SECTION 02570

### SEWERS AND MANHOLES

#### PART 1 - GENERAL

##### 1.1 SUMMARY OF WORK

- A. This Section specifies requirements for the proposed sewer interceptor, gravity sewer mains, manhole structures, and associated items.
- B. The work includes furnishing and installing sewer pipes, fittings, manholes, 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 02140 – Dewatering and Discharge
  - 2. Section 02160 – Temporary Excavation Support Systems
  - 3. Section 02200 – Earthwork

##### 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, precast concrete sewer manholes and frames and covers, and component construction, features, configuration, and dimensions.
- C. Anti-flotation/buoyancy calculations for all sewer manholes proposed to be within the groundwater table.

##### 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 Owner'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 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. ASTM D695 – Test Method for Compressive Properties of Rigid Plastics
  - 2. ASTM D790 – Test Method for Flexural Properties of Non-Reinforced and Reinforced Plastics and Electrical Insulating Materials
  - 3. ASTM D2412 - Standard Test Method for Determination of External Loading Characteristics of Plastic Pipe by Parallel-Plate Loading

## 1.6 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 Sewer and Interceptor Pipe: Gravity pipe shall be push-on joint SDR 26 PVC. Pipe shall comply with ASTM D3034 for sizes 8-inch and 12-inch. Pipe shall

comply with ASTM F679, latest record for sizes 24-inch and 30-inch. Pipe color shall be in accordance with the Uniform Color Code established by the APWA Utility Location and Coordination Council (adopted September 2000). All gravity pipe shall be installed with external joint wrap, as specified.

- B. Gravity Fittings: Fittings, couplings and adaptors shall be manufactured by Romac Industries Inc., or approved equal for gravity sewer main connections. Connections to existing gravity sewer services shall be made with a Strongback coupling.
- C. 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.
- D. Gasketed joins shall meet the requirements of ASTM D3212.
- 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. Sewer Chimneys: Utilize C900 PVC chimneys as shown on the Drawings. C900 PVC sewer chimneys 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. Ductile iron t-wye fitting 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. All ductile iron t-wyes shall have a bituminous outside coating in accordance with AWWA C151 and C110, respectively, latest edition. All t-wyes shall have an inside coating of Protecto 401™ Ceramic epoxy as specified by Induron Protective Coatings.
- G. Insulation: Insulation for piping shall be waterproof, FoamGlas, Gilsulate 500XR, or approved equal.
- F. 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 clearly marked "SEWER". Cleanouts shall include a removable water-tight 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.
- G. External Joint Wrap for Gravity Sewer Main/Services: double-wrapped, 6" wide, 10-mil PVC Pipe Wrap Tape by Shurtape or Engineer approved equal. Pipe tape shall be centered on the joint, with a minimum 20 mil thickness on the pipe.

## 2.2 PRECAST CONCRETE MANHOLES

### A. Precast Units:

1. Sewer Interceptor Manholes: All precast concrete manholes shall conform to ASTM C478. 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), or flat top as required, and one pour monolithic base section conforming to ASTM C478. All units shall be designed for HS-20 loading. Manhole wall thickness shall be 6 inches, minimum for 5' diameter manholes. Flattop manhole tops will be permitted with approval from the Engineer.
2. Precast Unit Joint Seals: Butyl Rubber section joint conforming to ASTM C443.
3. 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 and adjusting manholes to grade shall be Grade SS conforming to ASTM C32. Hard red brick courses shall be used to bring manhole rim to required elevation. Red clay sewer brick shall be used for the inverts, unless specified as void, which shall be cement concrete.

All 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. Watertight Manhole Frame and Cover: Watertight 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 neoprene 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.), or an approved equal.
- D. Pipe Connections: Connections to precast concrete manholes shall be made by one of the methods as follows:
6. LOCK JOINT Flexible Manhole Sleeve cast into the manhole base. Stainless steel strap and exposed sleeve shall be protected with bitumastic coating.
  7. PRESS WEDGE II gasket cast into the manhole base. The rubber wedge shall be driven into the V slot from the manhole exterior.
  8. RES-SEAL compression ring with exposed metal protected by bitumastic coating.
  9. 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 Carbolite 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 26 PVC and shall be secured with anchor straps. Drop piping shall be encased with controlled density fill. Drop manhole riser support bracket shall be 10 gauge, type 304, No. 3 finish stainless steel.

G. Bentonite Dams:

1. The bentonite clay shall be granular and high swelling. High swelling is defined as the ability for 2 grams of the base bentonite, when mechanically reduced to 100 mesh, to swell in water to a volume of 16 cc or greater, when added to 100 cc distilled water.
2. The sand shall be a fine aggregate consisting of natural sand, manufactured sand or combination thereof. The sand shall be free of injurious amounts of organic impurities and shall conform to ASTM C33, Concrete aggregate.

### 2.3 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 up grade 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 such that the pipe joints are placed as far away from the crossing as possible and the pipe crossing shall be encased in control density fill for a distance of 10 feet on all sides of the crossing.

H. Bentonite Dams: Bentonite dams shall be installed at the locations shown on the Contract Drawings. The dams shall extend from undisturbed material at the bottom of the trench excavation to three feet below the final finished grade or as directed by the Engineer. The dam shall extend the full width of the trench and the length of the dam shall be a minimum of 1.5 feet along the laying length of the pipe.

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. 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 24-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.

- A. 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 courses of eight inch brick to be used as risers 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.
- B. 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.
- B. Sewer manholes shall be constructed with interior drop connections when the proposed invert of the connection is at least two feet (2') above the manhole invert. Drop connections for differences of less than two feet (2') shall also be provided if approved by the Engineer.
- C. Each manhole pipe connection shall begin with a five-foot (5') stub prior to laying a full section of pipe. Pipe stubs for future connections shall be installed in the

locations shown on the drawings and the stub ends shall be sealed with a watertight plug.

### 3.7 PRESSURE TESTING OF SEWER GRAVITY MAIN (Gravity Sewers with Active Services)

- A. Gravity sewers, including laterals, shall be air tested for leakage after backfilling and compaction to the road sub-grade has been completed. The Contractor shall furnish all labor and equipment for testing. No sewers will be accepted by the Engineer until all testing is completed to the satisfaction of the Engineer.
- B. 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.
- C. 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.

### 3.8 MANHOLE LEAKAGE TESTS

- A. Leakage tests shall be made by the Contractor, and observed by the Engineer on each manhole. The Contractor shall be responsible for providing all labor and equipment

required to complete the tests. 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. Individual manholes shall be tested by plugging all inlet and outlet piping and placing an approved vacuum base at the top of the manhole cone section. An initial vacuum of 10 inches of mercury shall be drawn. The test time shall be that time allowed for the pressure to drop from 10 inches of mercury to 9 inches of mercury.

Maximum allowable test times shall be as follows:

<u>Depth (Feet)</u>	<u>Maximum Test Time</u>
0-10	2 minutes
10.1-15	2 minutes 30 seconds
15.1-25	3 minutes

If the manhole fails the initial test, the Contractor shall locate the leaks and make proper repairs using methods approved by the Engineer. 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.

### 3.9 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.

### 3.10 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.

### 3.11 DEFLECTION TESTING FOR GRAVITY SEWER

#### 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 five (5.0) percent. 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.
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.

### 3.12 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 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; milling and overlay; removal and resetting of curbing (as required); raising and adjusting castings and valve boxes; and installation of pavement markings.

##### 1.2 RELATED WORK

- A. Earthwork specifications are included in Section 02200.

##### 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: 1/4-inch, plus no minus
2. Top Course: 1/4-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, unless approved by the Town Engineer.
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:

	<u>Driveway Aprons</u>	<u>Sidewalk</u>
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. Vertical granite curbing shall conform to the referenced specification, Section M9.04, granite type VA4.
- H. 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”.
- I. Pavement markings shall conform to the Massachusetts Highway Department Standard Specifications, Section M7.01.03 - White Thermoplastic ReflectORIZED Pavement Markings and M7.01.04 - Yellow Thermoplastic ReflectORIZED Pavement Markings.

## 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, or a winter settlement period, as determined by the Engineer, 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. Subgrade:
    - a. Prepare subgrade in accordance with Section 02200.
    - b. Complete subgrade preparation, including dynamic compaction, for full width before placing surface materials.
    - c. 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 2-inch depth layer of temporary asphalt cold patch 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.
2. The temporary pavement shall consist of a temporary asphalt cold patch course to a total thickness of 2-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.
3. Tack coat shall be applied to existing edges.

4. The pavement sub-base shall be excavated, graded, and compacted to a depth below the existing pavement (see Drawings for depths).
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. Temporary trench pavement shall be placed daily over all trenches or as directed by the Engineer.
7. 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.
8. 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.
3. 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.
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 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.
6. Tack coat shall be applied to existing edges and between each lift.
7. 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.
8. The finished surface of the top course, after compaction, shall be true to the established line and grade of the existing pavement.

D. Mill and Overlay Pavement:

1. Preparation for permanent pavement overlay shall include milling the existing and permanent trench pavement, along the project route, to a depth of 1½-inches. Areas for milling, including intersections at tie-in locations, will be determined by the Engineer prior to placement.
2. All construction methods, equipment and materials for bituminous concrete excavation by cold planer shall conform to MassDOT standard specifications (MHD Standard Specifications for Highways and Bridges Section 120.66, latest revision).
3. Limits of mill and overlay shall be to the curb on each side of the HMA permanent trench pavement or to the edge of existing pavement (See drawings for additional detail).
4. In all locations specified in the Contract Documents or determined by the Engineer, a minimum 1.5-inch depth layer of permanent overlay pavement shall be placed along the roadways. All pavement edges shall be square and straight. Irregular, jagged edges will not be allowed. The new pavement shall be rolled smooth and even with the existing pavement.
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. 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.
7. The permanent pavement shall be installed to match existing grades.

D. 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.

E. 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. Markings shall also conform to the latest standards of the municipality or agency having jurisdiction over the roadway. The markings shall be thermoplastic markings, 4-inches wide, white or yellow, single or double lines as required.
2. The Contractor shall provide temporary markings on the temporary pavements where existing markings are removed at no additional cost to the Owner.

H. Curb and Gutter Replacement:

1. Replace curb and gutter with same material to pre-construction lines and curb sections. Reset granite curb to pre-construction line and grade.

2. 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.
3. Provide expansion joints at each intersection with existing curb sections.
4. Use expansion joints one inch wide. Fill with expansion joint material and cut to shape of curb section.

I. 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 1.5 inch equal courses.
  - d. Sidewalk cross slopes can not 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. Brick sidewalks:

- a. Construct brick wheelchair ramps in accordance with MHD Section 701, Sidewalks, Wheelchair Ramps and Driveways.
- b. Construct in accordance with Contract drawing details.
- c. Sidewalk cross slopes can not 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.

5. General:

- a. Valve boxes, manhole frames, and all other castings shall be carefully set to the proposed finished grades.

J. 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 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 E – 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/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 mil 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 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. Permits
  - 2. Crossing and relocating existing utilities.
  - 3. Cleaning up.
  - 4. Incidental work.
  - 5. Protection and/or removal and reinstallation of existing signs, lampposts, fence posts, fencing and mailboxes.
  - 6. Protection and bracing of utility poles.
  - 7. Raking and re-seeding of grassed areas disturbed during construction and/or dewatering activities, including silt basin/dewatering activity areas.
  - 8. 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 PERMITS

- A. The Contractor shall obtain all necessary permits for proper execution of certain phases of the project in accordance with Section 01170 – Special Provisions.
- B. Construction General Permit: Contractor shall obtain coverage under EPA's Construction General Permit (CGP). Submit a Notice of Intent (NOI) certifying that Contractor has met the permit's eligibility conditions and will comply with the permit's effluent limits and other requirements. To submit the NOI, the operator should use the "eNOI" system (or "electronic NOI system"). To comply with the CGP, NOI must be submitted at least 14 calendar days prior to commencing earth-disturbing activities.

### 3.2 CROSSING AND RELOCATING EXISTING UTILITIES

- A. This Item includes any extra work required in 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.

### 3.3 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.

### 3.4 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.

### 3.5 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.

### 3.6 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.

### 3.7 RAKING AND RE-SEEDING

- A. Grass and landscaped areas disturbed by the Contractor shall be raked and replenished with loam if required. Place topsoil in accordance with Section 02920 – Topsoil. 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 of New England Conservation Seed Mix. 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 SUMMARY

- A. The work of this section consists of manufacturing, delivering, and placing 4" 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.

##### 1.2 RELATED SECTIONS

- A. Related Sections include the following:
  - 1. Section 02200 – Earthwork
  - 2. Section 02945 – Turf

##### 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 4 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:

<u>Common Name</u>	<u>Proportion By Weight</u>	<u>Germination Minimum</u>	<u>Purity Minimum</u>
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 be 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

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## 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 Thermoplastic Elastomers - Tension
ASTM D4397	Polyethylene Sheeting for Construction, Industrial, and Agricultural 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.

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 C150. 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 C171.

TABLE 03300-1

<u>Concrete Placement</u>	<u>Total Air Measured at Discharge from Truck (Percent)</u>
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.

C. 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.

D. Water:

1. Water shall be potable. Water for curing shall not contain any substance injurious to concrete, or which causes staining.

E. 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, thiocyanates, and admixtures containing more than 0.05% chloride ions are not permitted.
  4. Fly Ash: ASTM C618
- E. 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 3/4" 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. Welded Wire Mesh: ASTM A185; supplied in sheets.
4. 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.

## 2.5 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

## 2.6 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".

## 2.7 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 recommended 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 its 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 at 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 NRMCA QC 3. Site-mixed concrete shall be mixed in accordance with ACI 301. On-site plant shall conform to the NRMCA 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 40°F. or is expected to fall to below 40°F., 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 50°F. 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 90°F 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.

- K. 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 301 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 C171. 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.

### 3.19 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

## **ATTACHMENT 2**

## **DRAWINGS**



# WATER STREET SEWER INTERCEPTOR REPLACEMENT

## TOWN OF PLYMOUTH DEPARTMENT OF PUBLIC WORKS

FOR CONSTRUCTION  
APRIL 2022

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PLYMOUTH DEPARTMENT OF PUBLIC WORKS

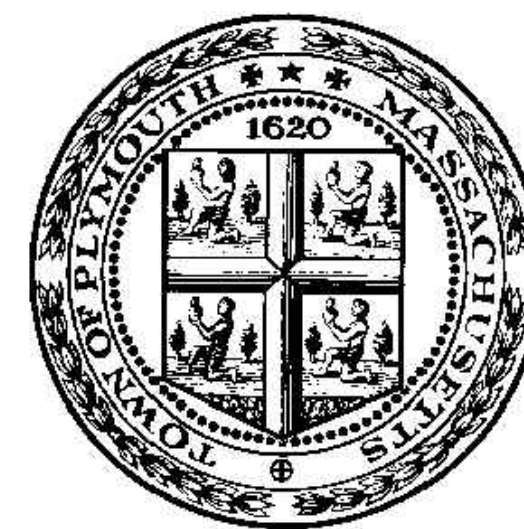
JONATHAN BEDER - DIRECTOR

PLYMOUTH SEWER DIVISION

DOUGLAS PINARD - WASTEWATER MANAGER

SELECT BOARD

RICHARD J. QUINTAL, JR., CHAIRMAN  
BETTY A. CAVACCO, VICE CHAIRMAN  
PATRICK J. FLAHERTY, SELECTMAN  
HARRY HELM, SELECTMAN  
CHARLIE BLETZER, SELECTMAN



VICINITY MAP  
1" = 500'







**LEGEND**

**EXISTING**

- BUILDINGS
- CONTOURS - MAJOR
- CONTOURS - MINOR
- CURB - BOTTOM
- CURB - TOP
- DRAINAGE UNDERGROUND
- ELECTRIC OVERHEAD WIRES
- ELECTRIC UNDERGROUND
- EDGE OF PAVEMENT
- FENCES - CHAIN LINK OR METAL
- FENCES - OTHER
- GAS UNDERGROUND
- PROPERTY LINES
- PAVEMENT MARKINGS
- SEWER UNDERGROUND
- VEGETATION
- STONE WALL
- WETLANDS - FLOOD ZONE
- WETLANDS, PONDS, RIVERS
- RIVERFRONT AREA 200-FOOT BUFFER
- WETLANDS 100-FOOT BUFFER
- WETLANDS 50-FOOT BUFFER
- WETLANDS 35-FOOT NO-WORK BUFFER
- MEAN HIGH WATER
- MEAN LOW WATER
- WATER BODY
- WATER SYSTEMS - UNDERGROUND
- CATCH BASIN
- DRAINAGE MANHOLE
- ELECTRIC MANHOLE
- GAS VALVE
- GAS SHUTOFF
- BOUND
- SEWER MANHOLE
- SIGN
- LIGHT POST
- FLAG POLE
- CONIFEROUS TREE
- DECIDUOUS TREE
- SHRUB
- UTILITY POLE
- UTILITY POLE GUY WIRE
- WETLANDS, PONDS, SALT MARSHES, RIVERS FLAG
- HYDRANT
- WATER GATE VALVE
- WATER SHUTOFF
- WATER LINE CAP/SEWER LINE CAP
- METER PIT
- TELECOMMUNICATIONS MANHOLE
- TELEPHONE BOX
- UTILITY BOX
- BORING
- UTILITY CONTINUATION
- POST/BOLLARD

**PROPOSED**

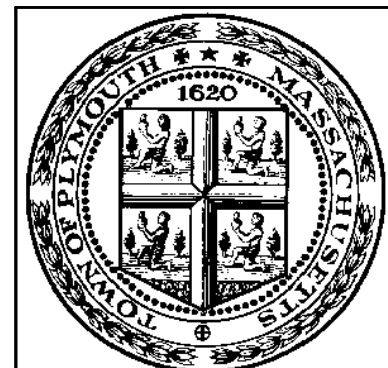
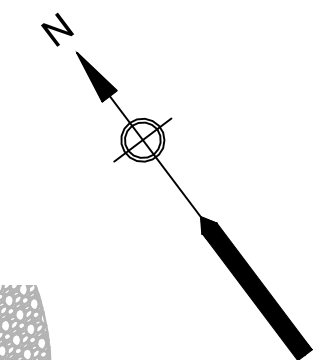
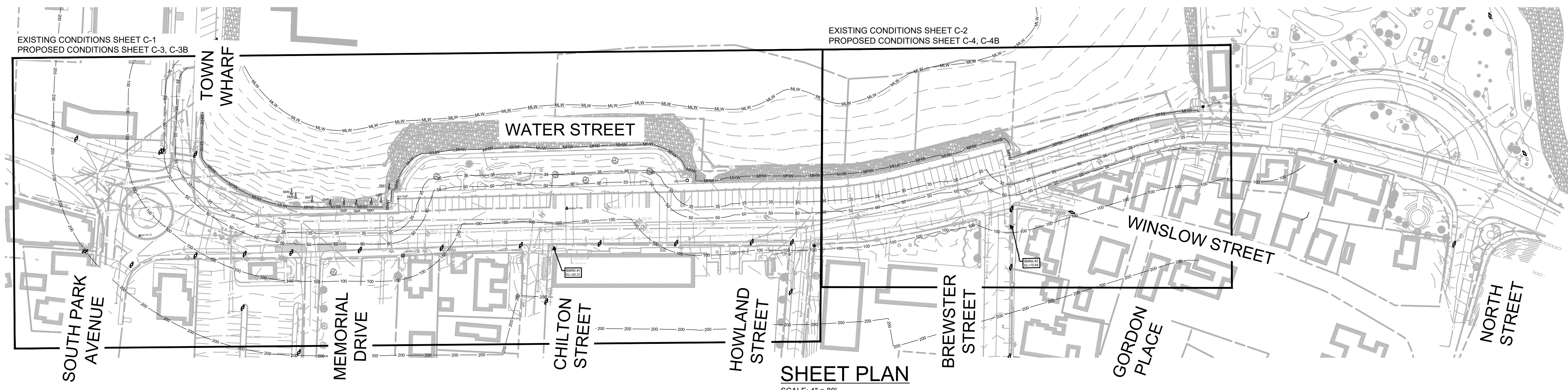
- SEWER UNDERGROUND
- SEWER MANHOLE
- FILTER SOCK
- TEST PIT
- SEWER LINE CAP
- SOLID SLEEVE COUPLING
- EXISTING BUILDING
- PROPOSED CHIMNEY SEWER SERVICES

**BENCHMARKS**

LOCATION DESCRIPTION	STREET	ELEVATION	SHEET
DH - ROTARY AT WATER STREET AND SOUTH PARK AVENUE	WATER STREET	15.12	C-1/C-3
DH - NORTH CORNER OF WATER STREET PARKING AREA ACROSS 122 WATER STREET	WATER STREET	16.61	C-1/C-3
CB/DH - IN FRONT OF 122 WATER STREET	WATER STREET	17.62	C-1/C-3
BMRK #1 - EAST CORNER OF WATER STREET AND CHILTON STREET INTERSECTION	WATER STREET	20.31	C-1/C-3
SB - MIDDLE OF WATER STREET PARKING AREA ACROSS 114 WATER STREET	WATER STREET	15.20	C-1/C-3
DH - WEST CORNER OF WATER STREET AND HOWLAND STREET INTERSECTION	WATER STREET	15.65	C-1/C-3
BOUND - EAST CORNER OF WATER STREET AND HOWLAND STREET INTERSECTION	WATER STREET	14.46	C-1/C-3
DH - SOUTH CORNER OF WATER STREET PARKING AREA ACROSS BREWSTER STREET	WATER STREET	11.10	C-2/C-4
BMRK #2 - EAST CORNER OF WATER STREET AND BREWSTER STREET INTERSECTION	BREWSTER STREET	15.84	C-2/C-4

**ABBREVIATIONS**

ABND	ABANDONED	INV	INVERT
ACI/ACP	ASBESTOS CEMENT/ASBESTOS CEMENT PIPE	LCB	LEACHING CATCH BASIN
AUL	ACTIVITY AND USE LIMITATION	MW	MONITORING WELL
BITSW	BITUMINOUS CONCRETE SIDEWALK	PL	PLASTIC
BOS	BOTTOM OF STRUCTURE	PROP	PROPOSED
BSW	BRICK SIDEWALK	PV	PLUG VALVE
CB	CATCH BASIN	PVC	POLYVINYL CHLORIDE
CS	CONCRETE CURB	RCP	REINFORCED CONCRETE PIPE
CDF	CONTROLLED DENSITY FILL	S	SEWER
CI	CAST IRON	SM	SALT MARSH
CL	CEMENT LINED	SMH	SEWER MANHOLE
CLDI	CEMENT LINED DUCTILE IRON	SS	SEWER SERVICE
CMP	CORRUGATED METAL PIPE	ST	STEEL
CPP	CORRUGATED PLASTIC PIPE	T	TELEPHONE
CS	COATED STEEL	TCB	TRAFFIC CONTROL BOX
CU	COPPER	TMH	TELEPHONE MANHOLE
CW	CROSSWALK	TOB	TOP OF BASIN
D	DRAIN	TOW	TOP OF WATER
DCB	DOUBLE CATCH BASIN	TR	TROUGH
DI	DUCTILE IRON	U/UNK	UNKNOWN
DWY	DRIVEWAY	VC	VITRIFIED CLAY
E	ELECTRIC	VGC	VERTICAL GRANITE CURB
EL	ELEVATION	W	WATER
EOP	EDGE OF PAVEMENT	WG	WATER GATE
EMH	ELECTRIC MANHOLE	WS	WATER SERVICE
FM	FORCE MAIN	WSO	WATER SHUT OFF
G	GAS		
GG	GAS GATE		



**ENVIRONMENTAL PARTNERS**  
— An Apex Company —



MARK	DATE	DESCRIPTION

Scale	AS NOTED
Date	APRIL 2022
Job No.	196-2106
Designed by	FJB
Drawn by	GAR
Checked by	DNRP
Approved by	ZFK

THIS LINE IS ONE INCH LONG WHEN PLOTTED AT FULL SCALE ON A 22" X 34" DRAWING

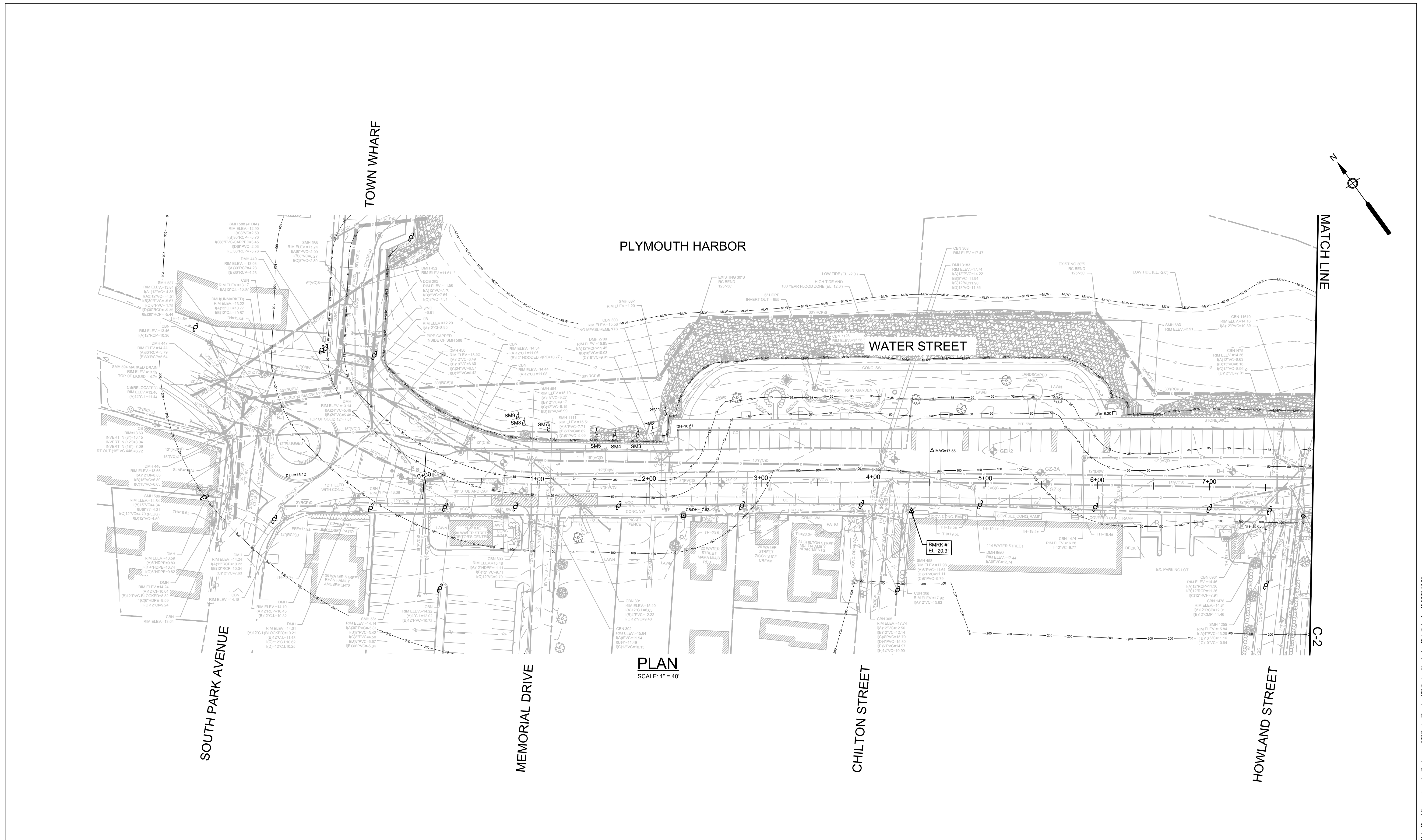
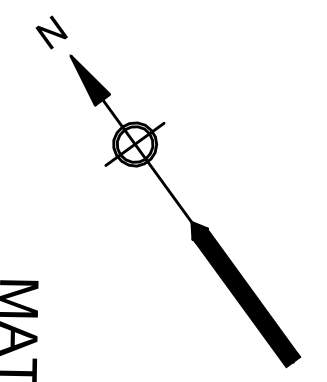
**WATER STREET SEWER INTERCEPTOR REPLACEMENT  
TOWN OF PLYMOUTH, MA**

LEGEND, ABBREVIATIONS, AND KEY MAP

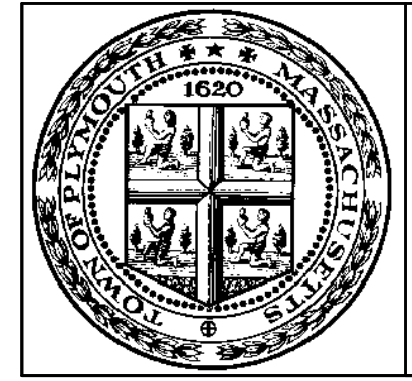
FOR CONSTRUCTION  
Sheet No.

**G-2**





**PLAN**  
SCALE: 1" = 40'



**ENVIRONMENTAL PARTNERS**  
— An Apex Company —



MARK	DATE	DESCRIPTION

Scale	AS NOTED
Date	APRIL 2022
Job No.	196-2106
Designed by	FJB
Drawn by	GAR
Checked by	DNRP
Approved by	ZFK

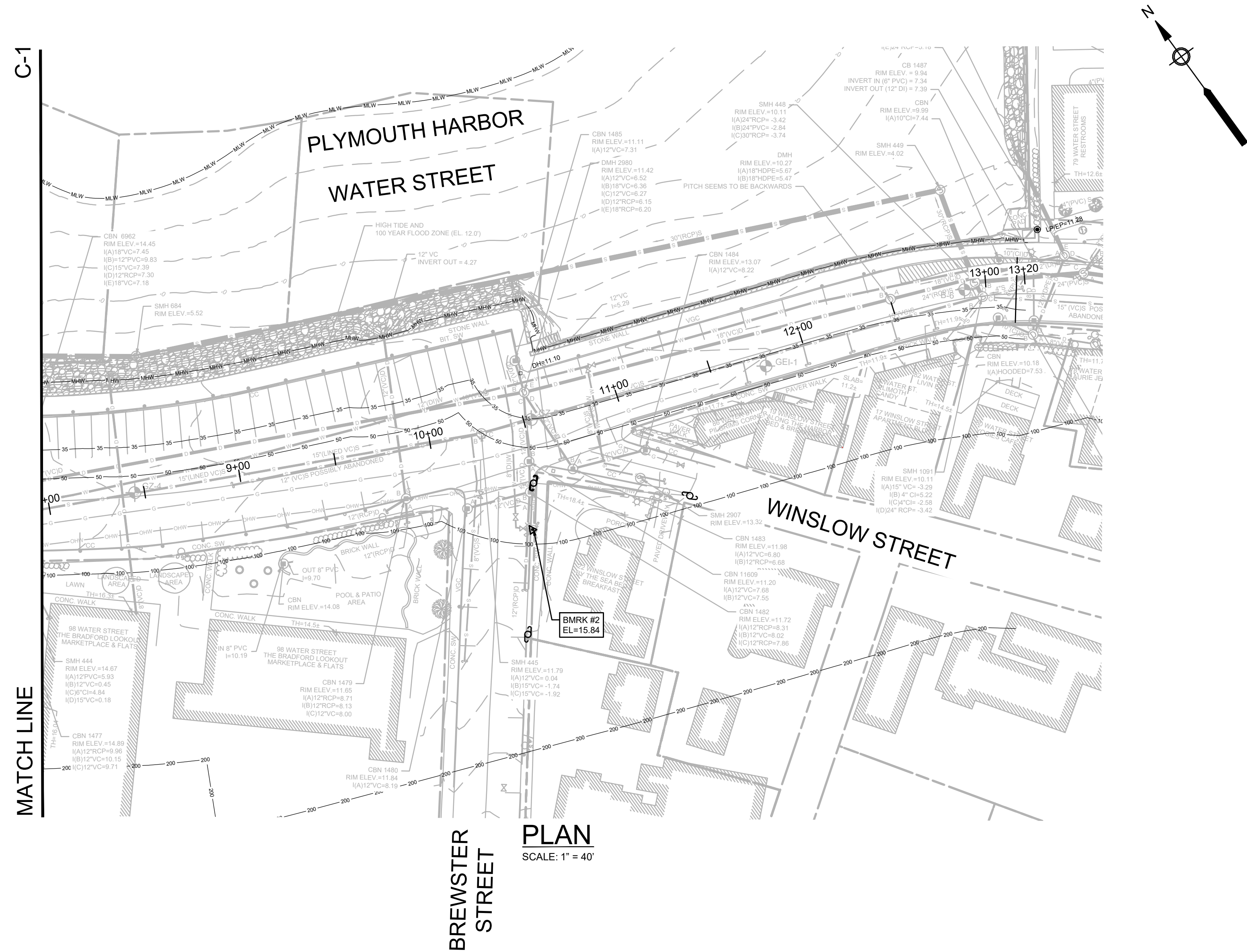
THIS LINE IS ONE INCH LONG WHEN PLOTTED AT FULL SCALE ON A 22" X 34" DRAWING

**WATER STREET SEWER INTERCEPTOR REPLACEMENT  
TOWN OF PLYMOUTH, MA**

**EXISTING CONDITIONS PLAN  
WATER STREET STA 0+00 TO 7+93**

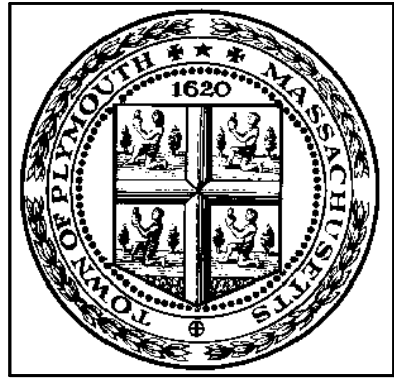
FOR CONSTRUCTION
Sheet No.
<b>C-1</b>





C-1  
MATCH LINE

BREWSTER STREET  
PLAN  
SCALE: 1" = 40'



**ENVIRONMENTAL PARTNERS**  
— An Apex Company —



MARK	DATE	DESCRIPTION

Scale	AS NOTED
Date	APRIL 2022
Job No.	196-2106
Designed by	FJB
Drawn by	GAR
Checked by	DNRP
Approved by	ZFK

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**WATER STREET SEWER INTERCEPTOR REPLACEMENT  
TOWN OF PLYMOUTH, MA**

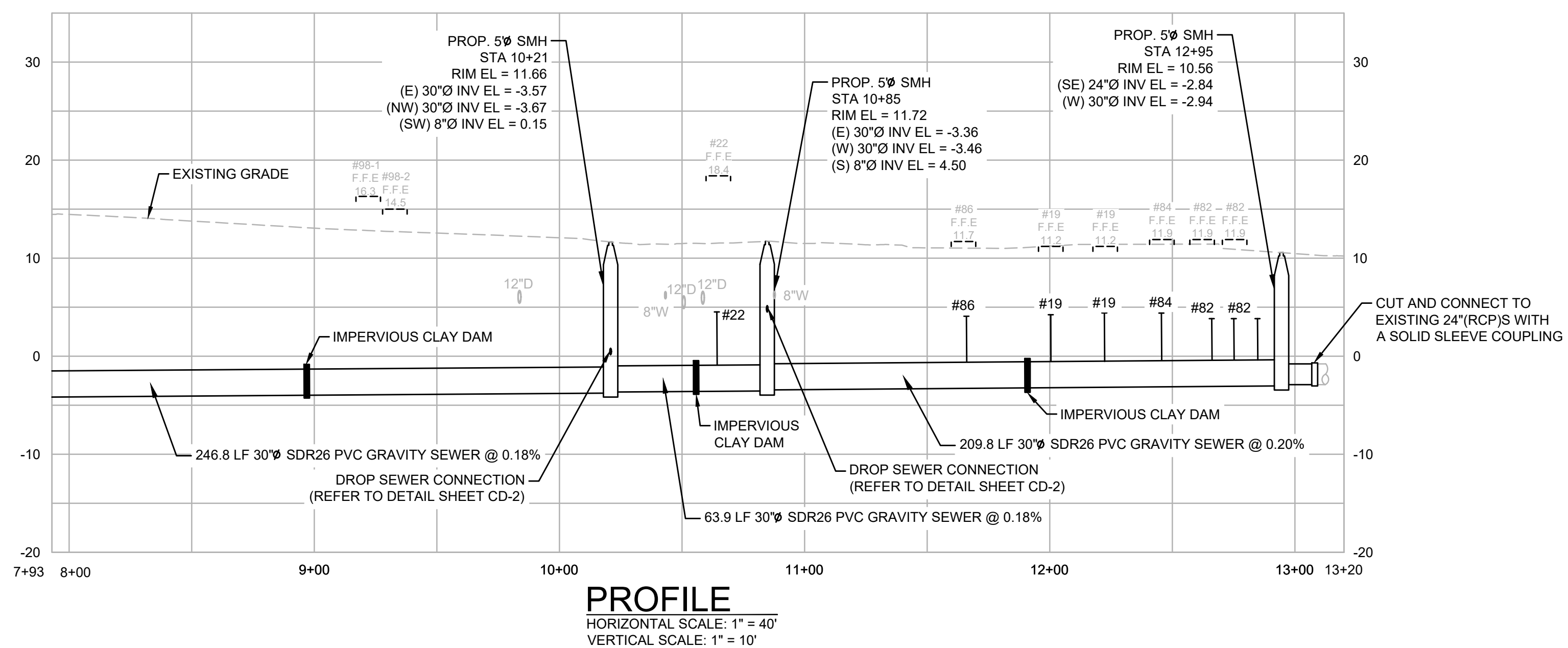
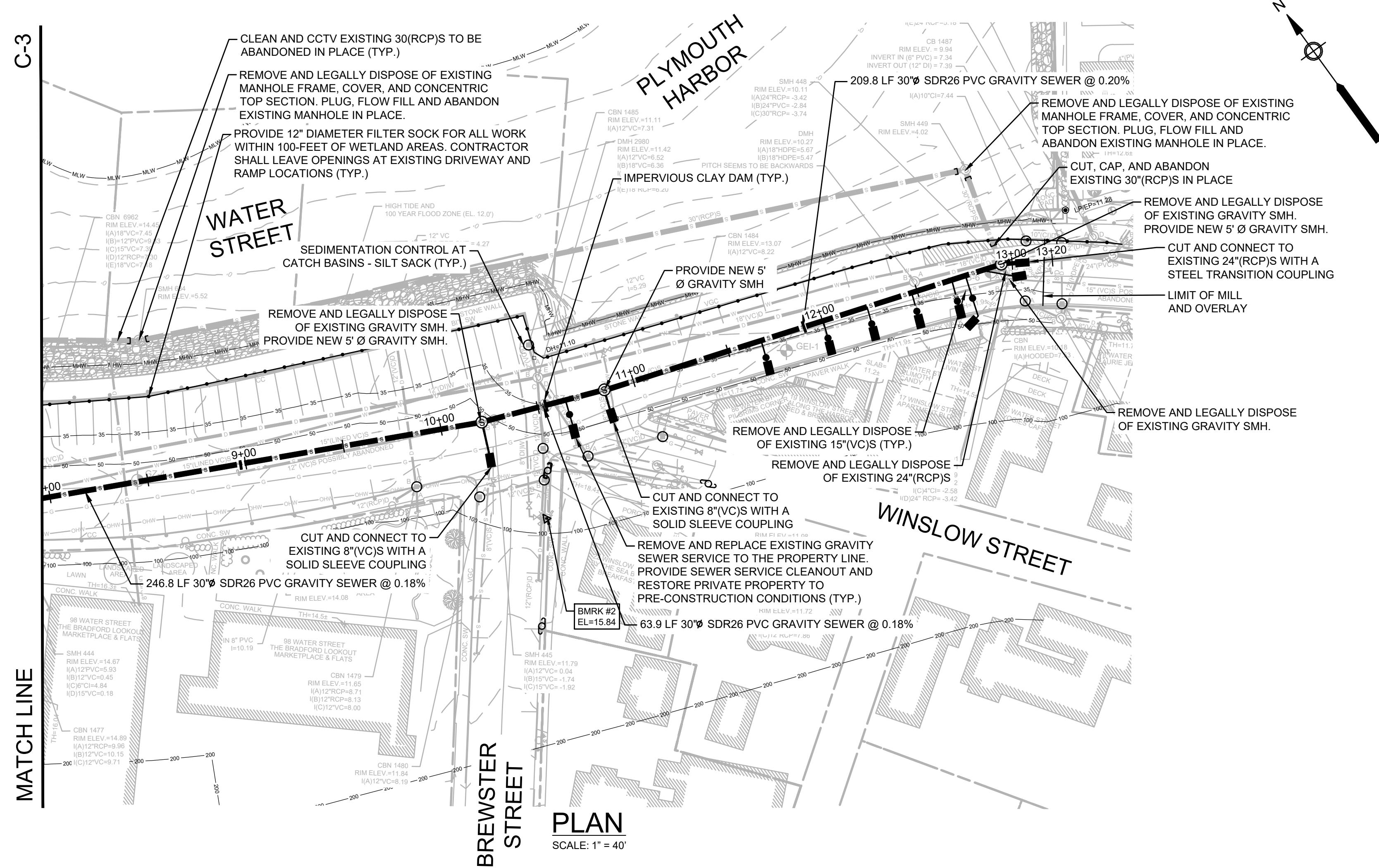
**EXISTING CONDITIONS PLAN  
WATER STREET STA 7+93 TO STA 13+20**

FOR CONSTRUCTION  
Sheet No.  
**C-2**

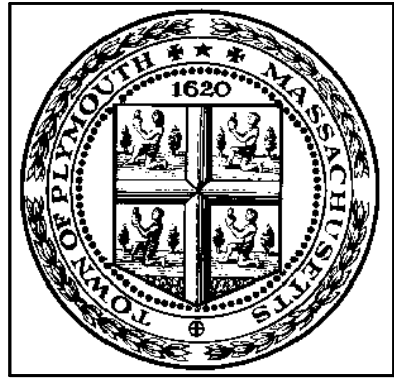








- NOTES:**
1. ALL GRAVITY SEWER MAINS AND SERVICES SHALL BE PROVIDED WITH EXTERNAL JOINT WRAP - DOUBLE-WRAPPED, 6" WIDE, 10-MIL PVC PIPE WRAP TAPE.
  2. ATTENTION: THE WORK PROPOSED ON THIS PLAN IS ALLOWED BY AN ORDER OF CONDITIONS ISSUED BY THE PLYMOUTH CONSERVATION COMMISSION WHICH INCLUDED STRICT STANDARDS AND REQUIREMENTS. NO WORK IS TO PROCEED UNTIL THE CONTRACTOR HAS REVIEWED AND AGREED TO ABIDE BY ALL CONDITIONS THEREIN BY NOTATION ON SAID PLANS.
  3. CONTRACTOR SHALL CONFIRM LOCATION OF SEWER SERVICE CONNECTIONS PRIOR TO CONSTRUCTION.
  4. CONTRACTOR TO CONFIRM DOWNSTREAM INVERTS AT SMH-581 AND UPSTREAM INVERTS AT SMH-448 PRIOR TO CONSTRUCTION. CONTRACTOR TO NOTE AND REPORT ANY DISCREPANCIES TO THE ENGINEER IMMEDIATELY.
  5. THE ESTIMATED AVERAGE DAILY FLOW FOR THE EXISTING SEWER INTERCEPTOR IS 0.85 MGD. THE ESTIMATED PEAK HOURLY FLOW FOR THE EXISTING SEWER INTERCEPTOR IS 2.65 MGD.



**ENVIRONMENTAL PARTNERS**  
— An Apex Company —



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**WATER STREET SEWER INTERCEPTOR REPLACEMENT  
TOWN OF PLYMOUTH, MA**

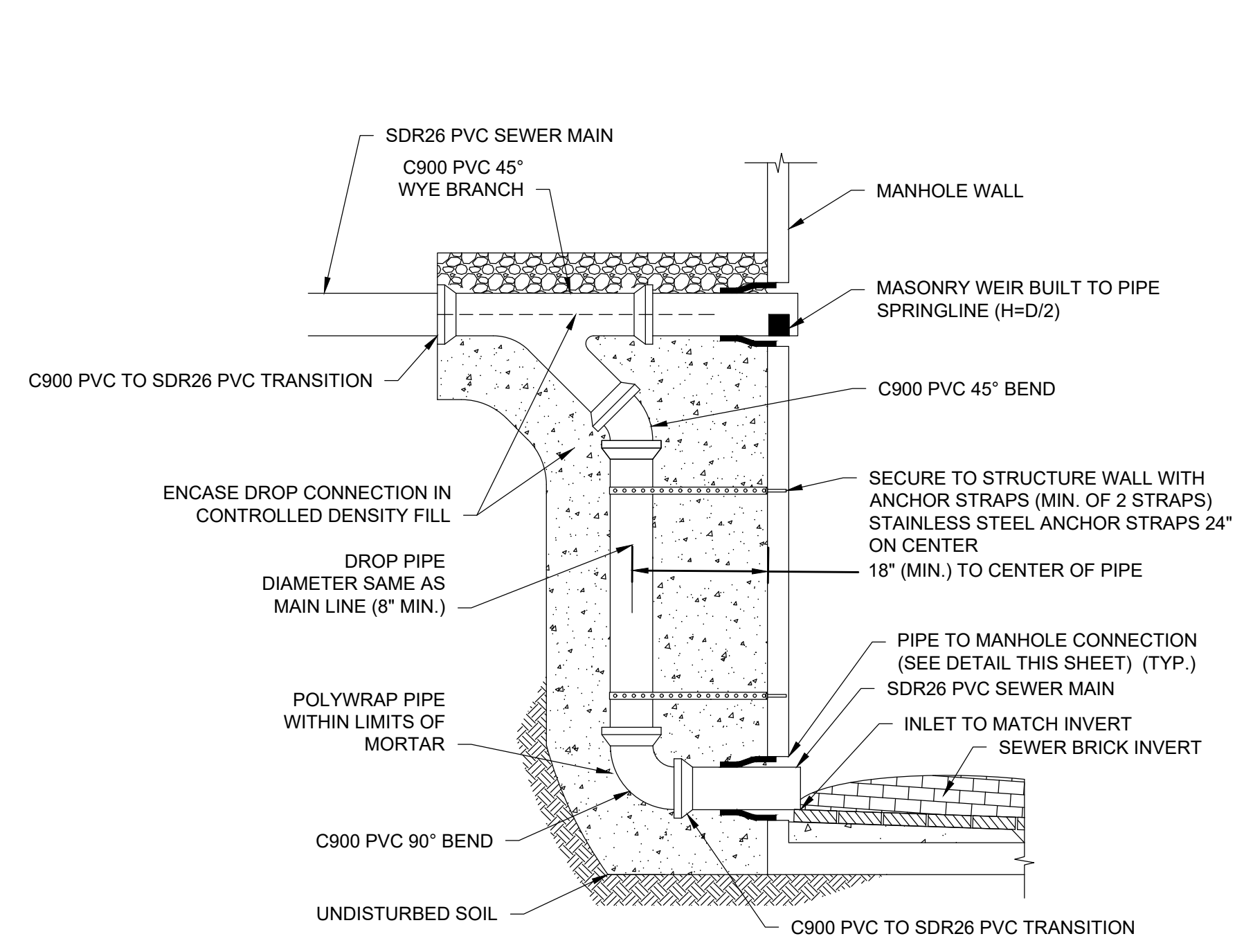
**PROPOSED CONDITIONS PLAN  
WATER STREET STA 7+93 TO STA 13+20**

FOR CONSTRUCTION  
Sheet No.  
**C-4**



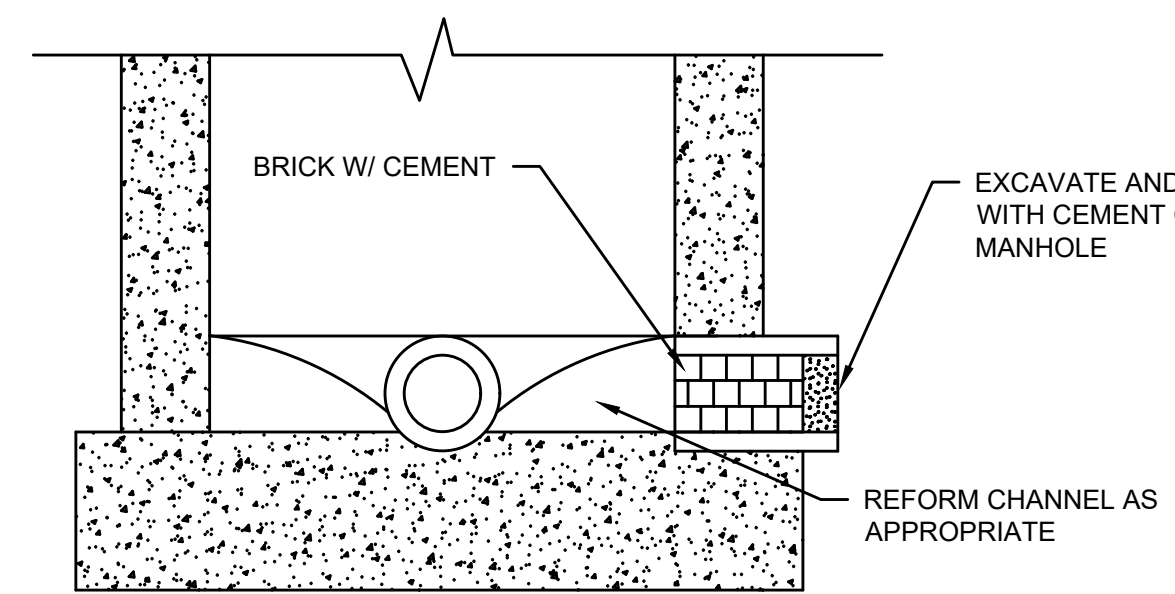






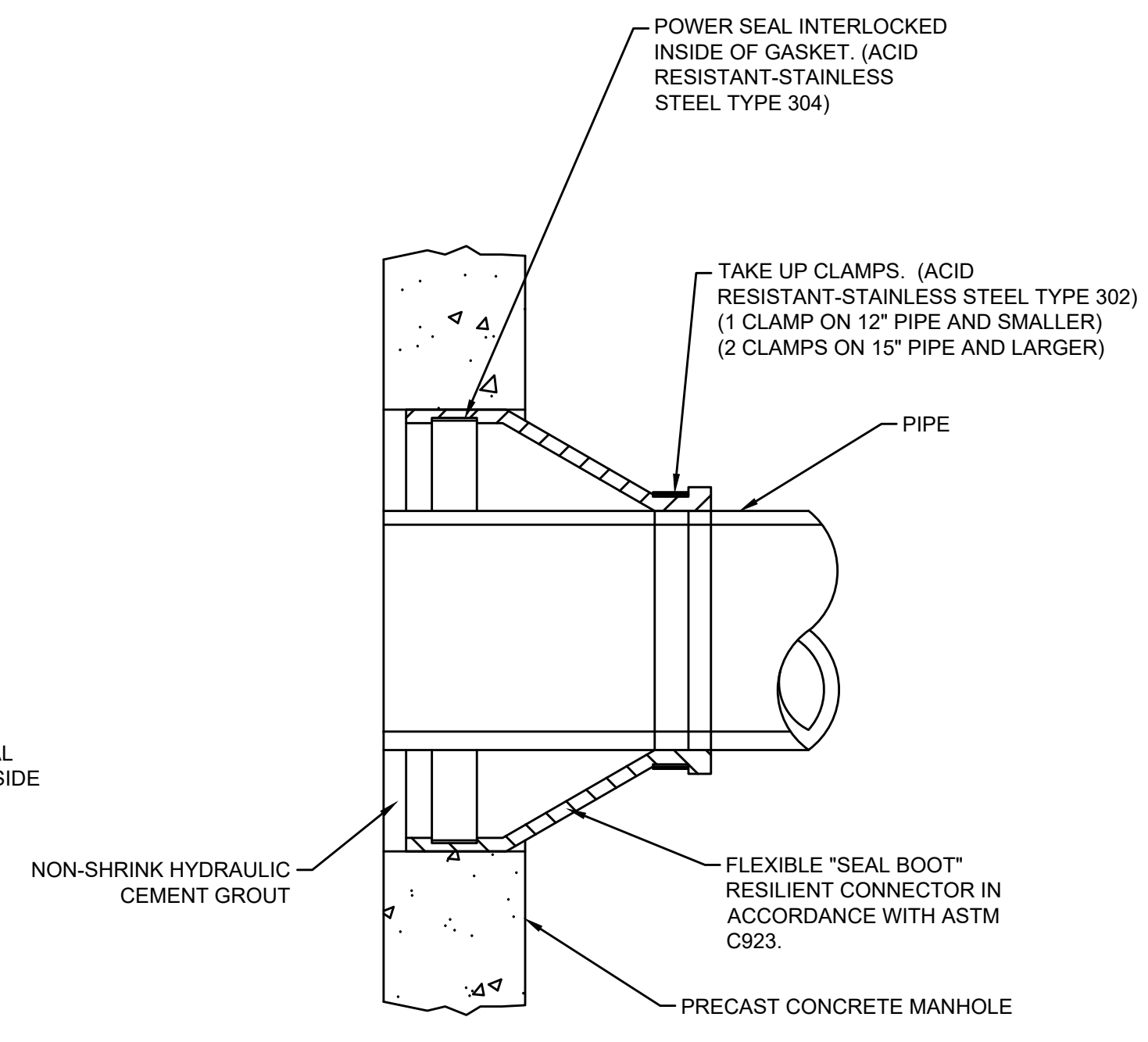
- NOTES:**
- DROP CONNECTION REQUIRED WHERE INLET PIPE IS 2 VERTICAL FEET ABOVE THE MANHOLE CHANNEL.

**DROP SEWER MANHOLE DETAIL**  
SCALE: N.T.S.



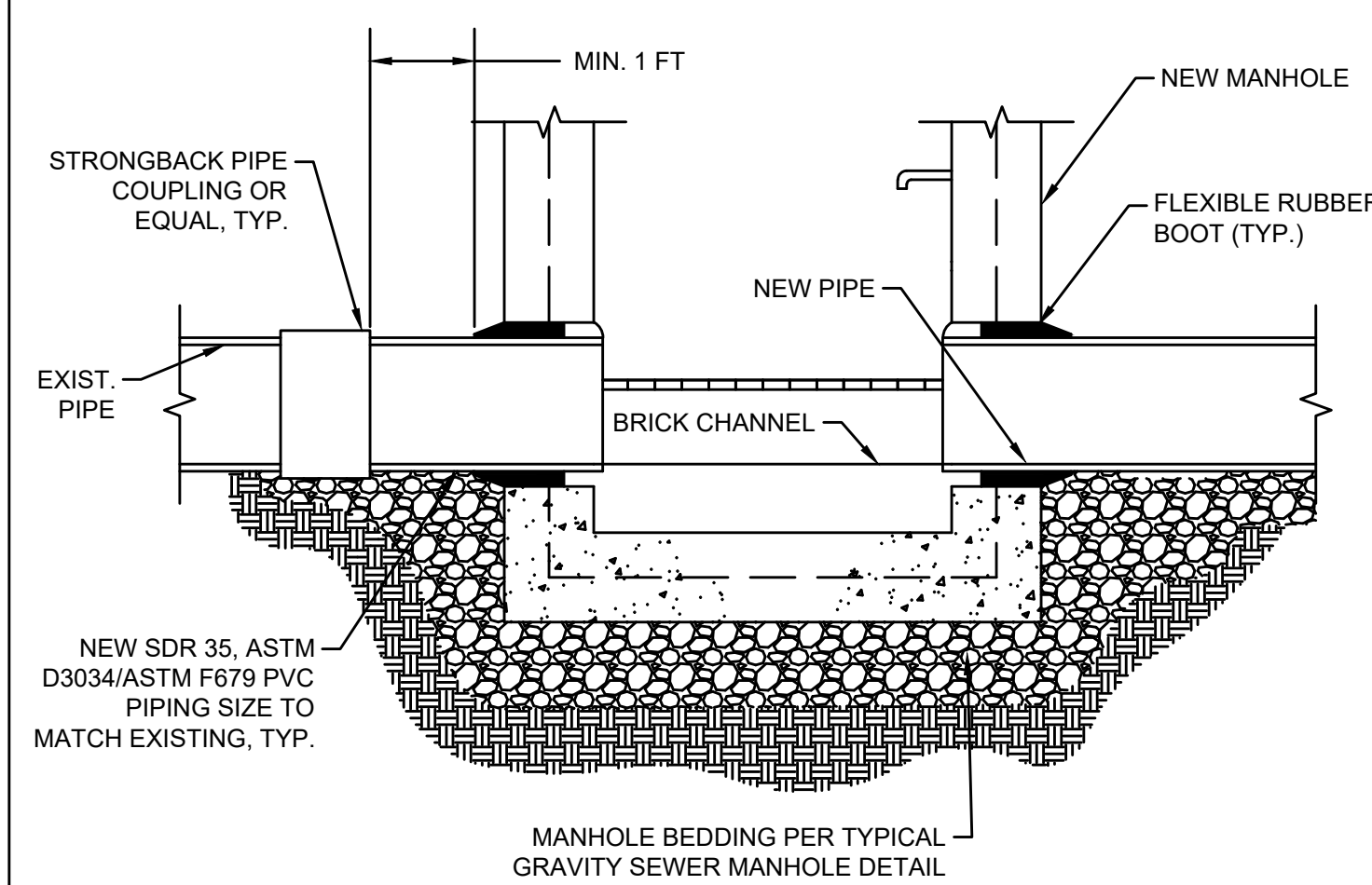
- NOTES:**
- THIS DRAWING DEPICTS CONCRETE/CLAY PIPE.
  - USE MECHANICAL PLUGS WHEN ABANDONING PLASTIC PIPES.

**PLUG FOR ABANDONING SANITARY SEWER**  
SCALE: N.T.S.



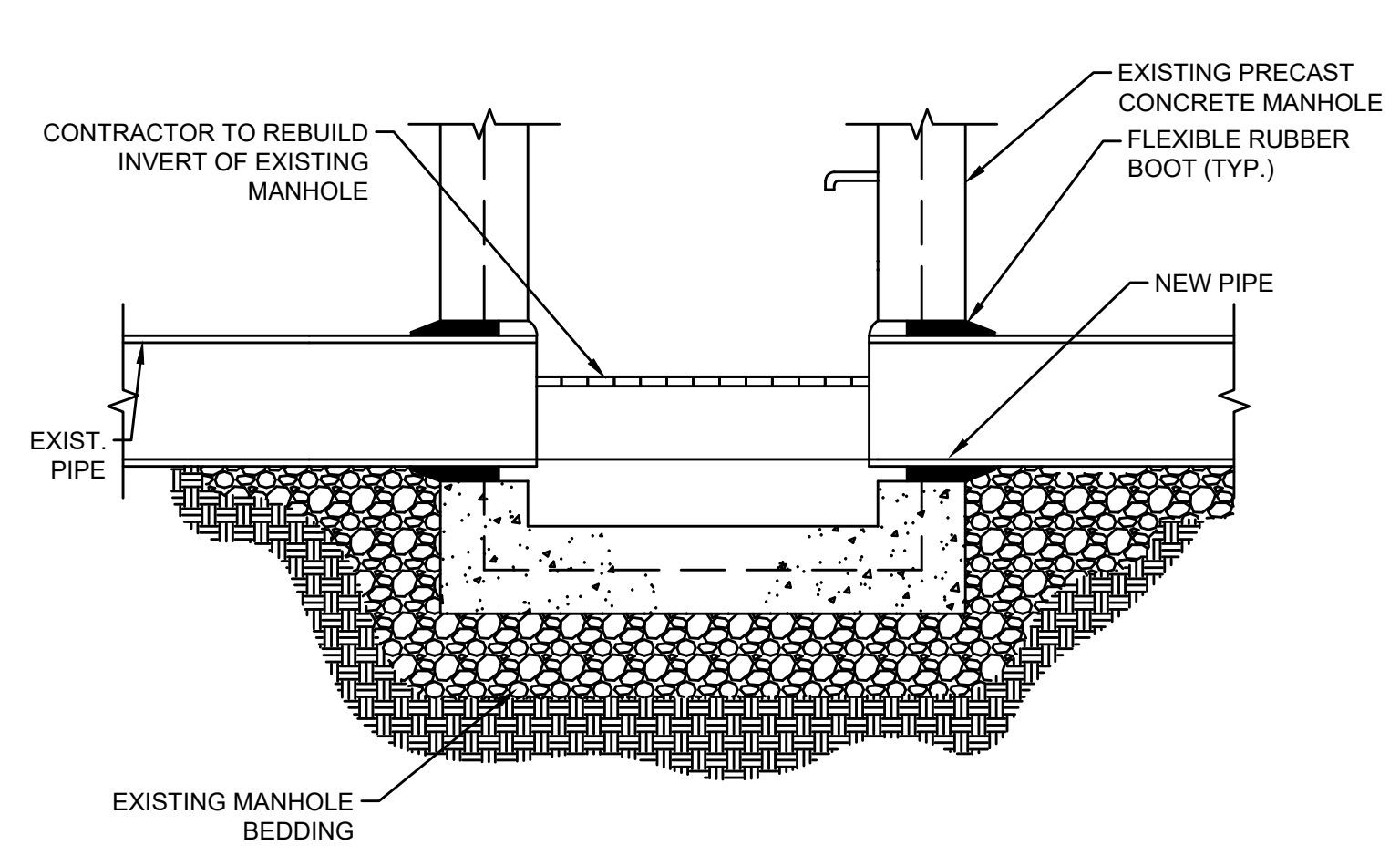
- NOTE:**
- STAINLESS STEEL CLAMP SHALL BE PROTECTED BY BITUMASTIC COATING.

**PIPE TO MANHOLE CONNECTION**  
SCALE: N.T.S.

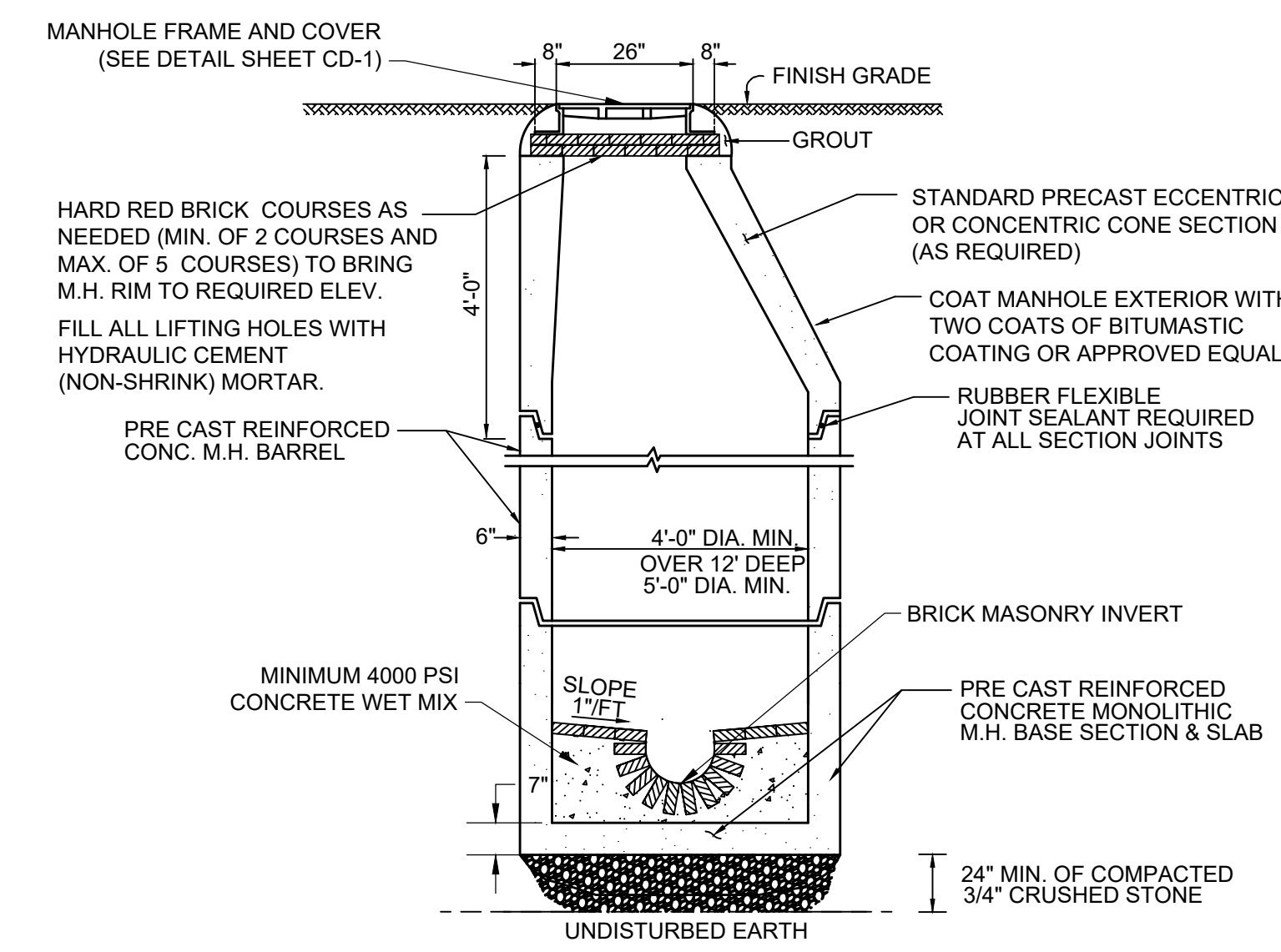


- NOTES:**
- FLEXIBLE PIPE COUPLINGS FOR CONNECTING DISSIMILAR PIPE MATERIALS SHALL BE RESISTANT TO SEWER GAS.

**CONNECTION OF EXISTING PIPE TO NEW MANHOLE**  
SCALE: N.T.S.

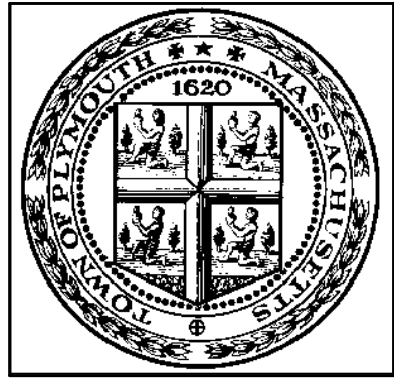


**CONNECTION OF NEW PIPE TO EXISTING MANHOLE**  
SCALE: N.T.S.



- NOTES:**
- TYPICAL SANITARY MANHOLE TO BE 4 FEET IN DIAMETER.
  - 5'-0" DIAMETER FOR ALL MANHOLE DEPTHS GREATER THAN 12 FEET OR WHEN ORDERED BY THE ENGINEER OR AS SHOWN ON DRAWINGS.
  - 6" MIN. WALL THICKNESS AND 7" MIN. BASE THICKNESS WITH 5'-0" DIAMETER MANHOLES.
  - INNER EDGE OF BRICK TABLE TO BE AT ELEVATION OF CROWN OF TOP OF PIPE.
  - DESIGN LOAD - HS20.
  - ALL INVERTS SHALL BE 4,000 PSI CONCRETE IN VOID AREAS AND RED SEWER BRICK CONSTRUCTION.
  - INVERTS SHALL NOT BE BUILT ABOVE GRADE. ALL INVERTS SHALL BE BUILT IN PLACE AFTER ALL PIPES HAVE BEEN INSTALLED.

**TYPICAL SEWER MANHOLE**  
SCALE: N.T.S.



**ENVIRONMENTAL PARTNERS**  
— An Apex Company —



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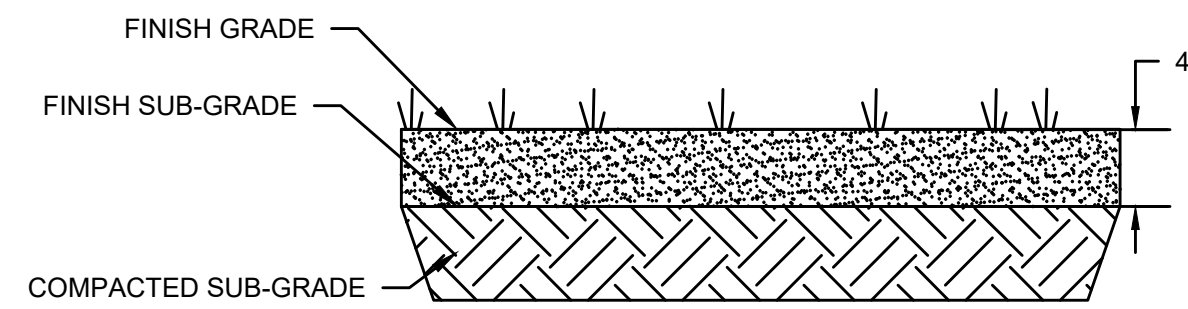
**WATER STREET SEWER INTERCEPTOR REPLACEMENT  
TOWN OF PLYMOUTH, MA**

**GRAVITY SEWER DETAILS II**

FOR CONSTRUCTION  
Sheet No.

**CD-2**



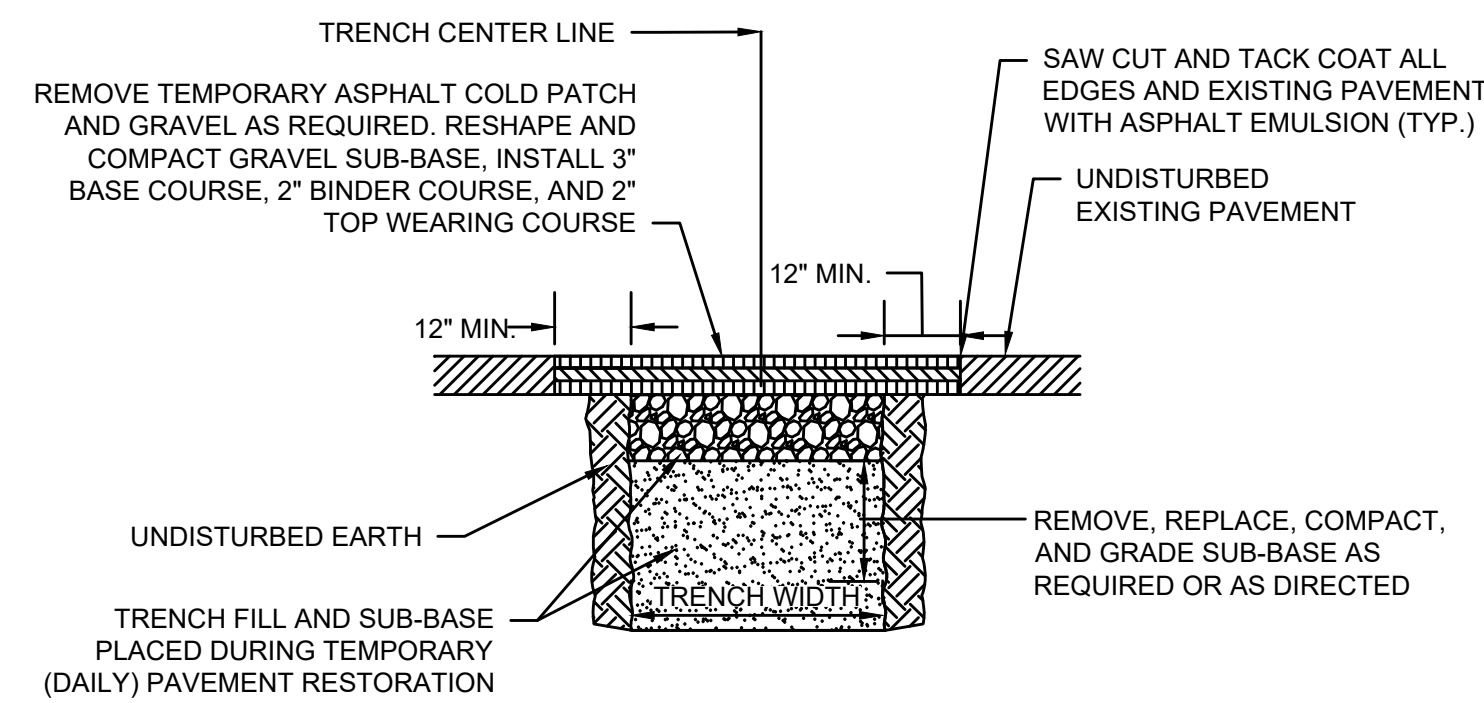


**NOTES:**

1. SEED MIX SHALL BE NEW ENGLAND CONSERVATION SEED MIX, FREE OF FERTILIZERS.
2. LOAM SHALL BE NATIVE TO LOCAL AREA AND OF LOW NITROGEN CONTENT.
3. INSTALL CURLEX CL EROSION CONTROL BLANKET AS MANUFACTURED BY AMERICAN EXCELSIOR COMPANY (OR APPROVED EQUAL) ON ALL LOAM AND SEEDED SLOPES 3:1 OR STEEPER.

**LOAM AND SEED (DISTURBED AREAS)**

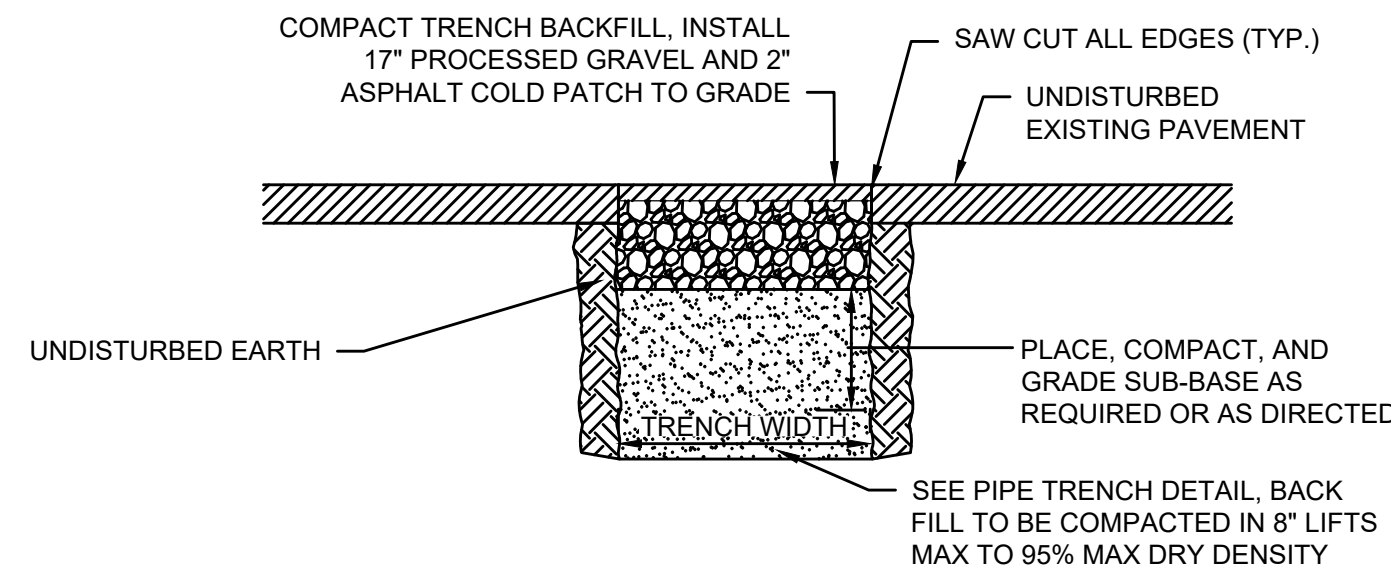
SCALE: N.T.S.



**PERMANENT TRENCH PAVEMENT RESTORATION**

**PERMANENT TRENCH RESTORATION PAVEMENT**

SCALE: N.T.S.



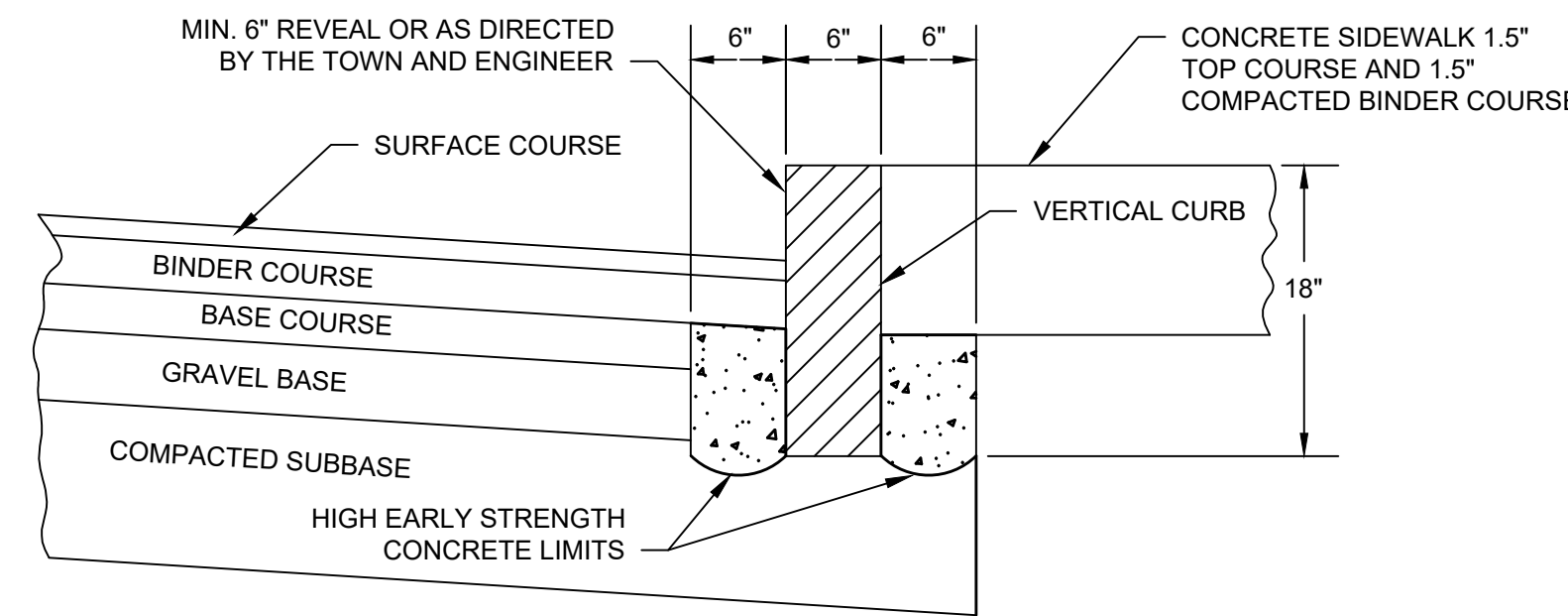
**TEMPORARY (DAILY) TRENCH RESTORATION**

**NOTES:**

1. ALL SAW CUT EDGES SHALL BE CLEAN EDGES.

**TEMPORARY TRENCH RESTORATION PAVEMENT**

SCALE: N.T.S.

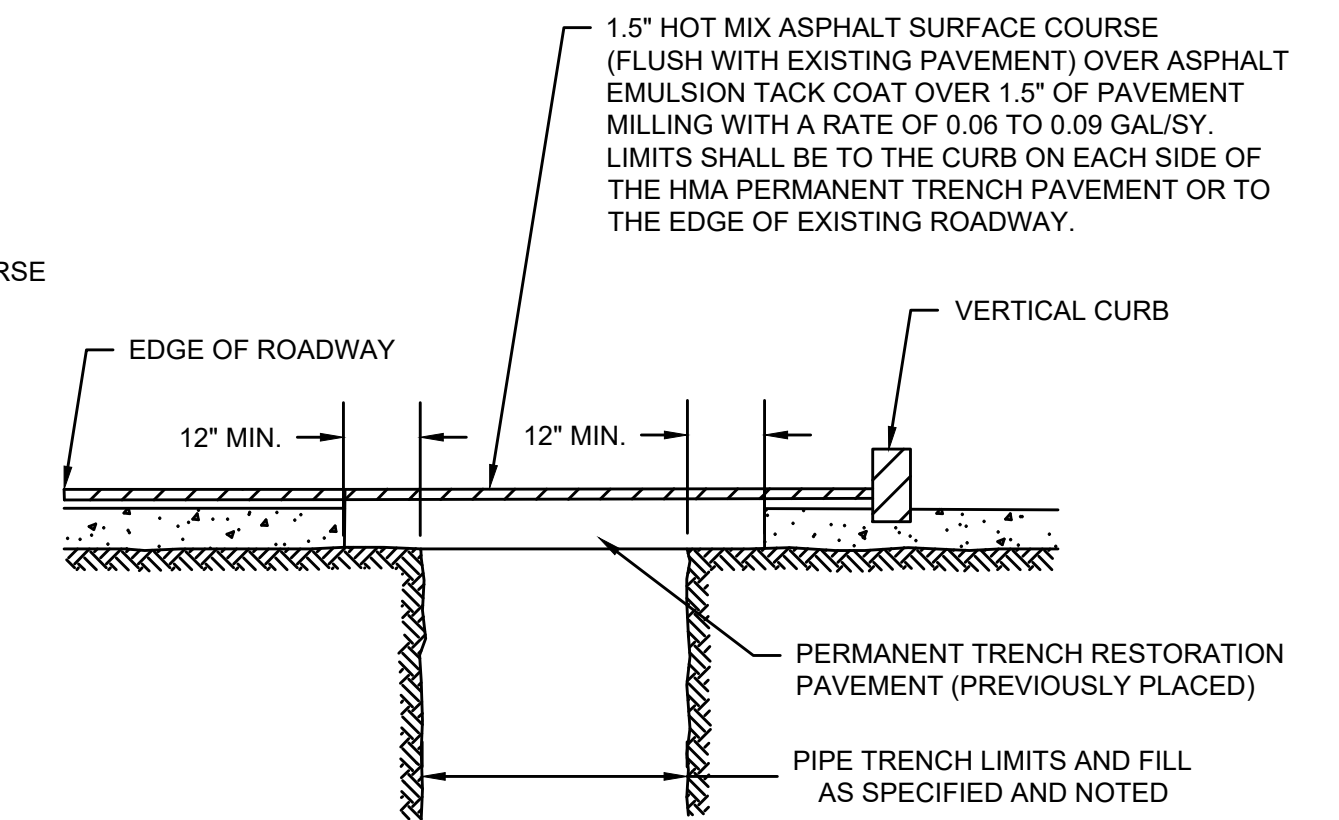


**NOTES:**

1. THE MAXIMUM ALLOWABLE SIDEWALK AND CURB RAMP CROSS SLOPES SHALL BE 2.0%.
2. MAINTAIN A MINIMUM OF 30" CLEAR AT ANY PERMANENT OBSTACLE IN ACCESS ROUTE (I.E., HYDRANTS, UTILITY POLES, TREE WELLS, SIGNS, ETC.). REPORT ALL CONFLICTS TO THE ENGINEER IMMEDIATELY.
3. WHERE ACCESSIBLE ROUTES ARE LESS THAN 5' IN WIDTH (EXCLUDING CURBING) A 5'X5' PASSING AREA SHALL BE PROVIDED AT INTERVALS NOT TO EXCEED 200 FEET.

**CONCRETE SIDEWALK AND VERTICAL GRANITE CURB**

SCALE: N.T.S.



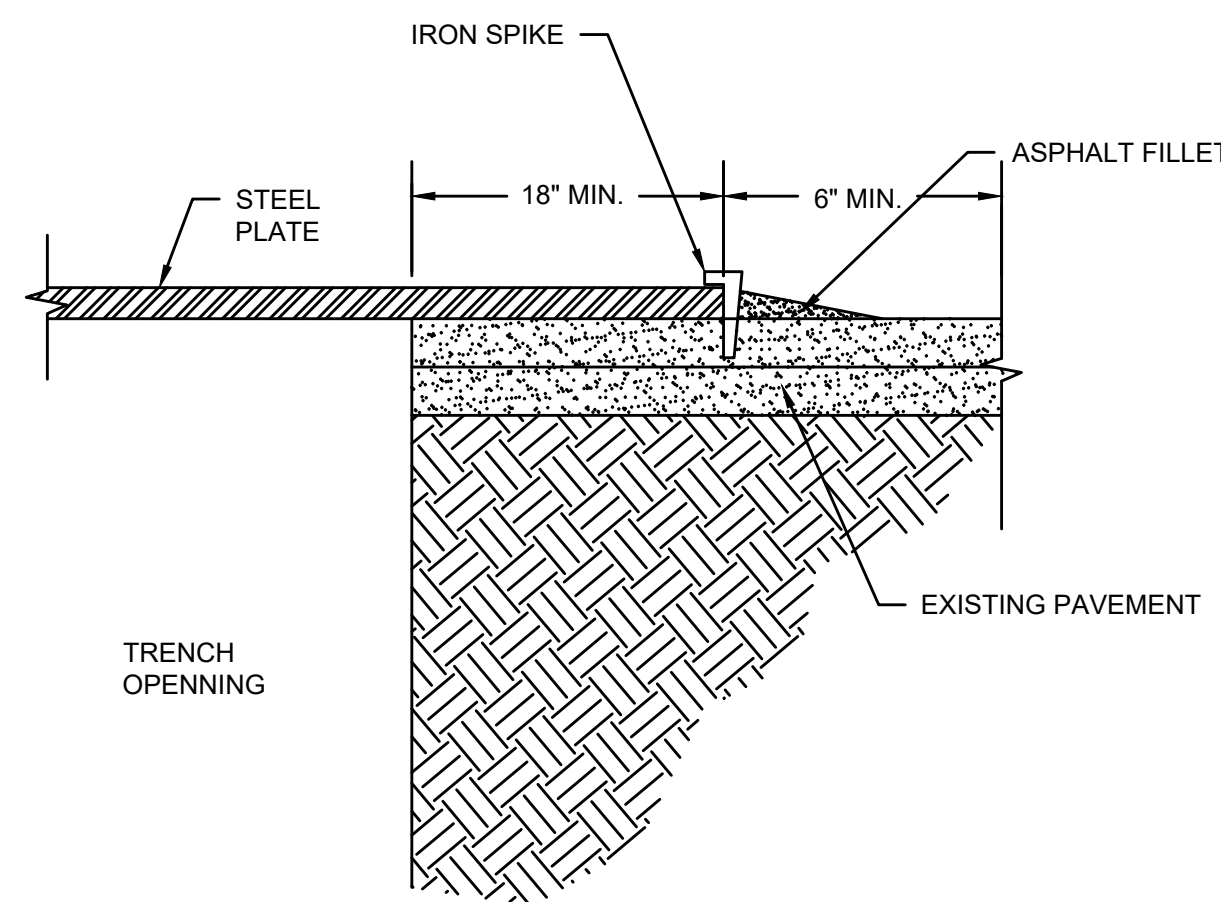
**NOTES:**

1. RESTORE AND MATCH CROSS SLOPE.
2. ALL HMA JOINTS SHALL BE SEALED WITH JOINT SEALANT.
3. LIMITS OF MILL AND OVERLAY SHALL BE WITHIN THE ENTIRE CURB-TO-CURB LIMITS OF WATER STREET.

**MILL AND OVERLAY DETAIL**

SCALE: N.T.S.

CURB REVEAL	
DESCRIPTION	REVEAL (IN)
ISOLATED AREA/SERVICE TRENCH	MATCH EXISTING/ADJACENT REVEAL

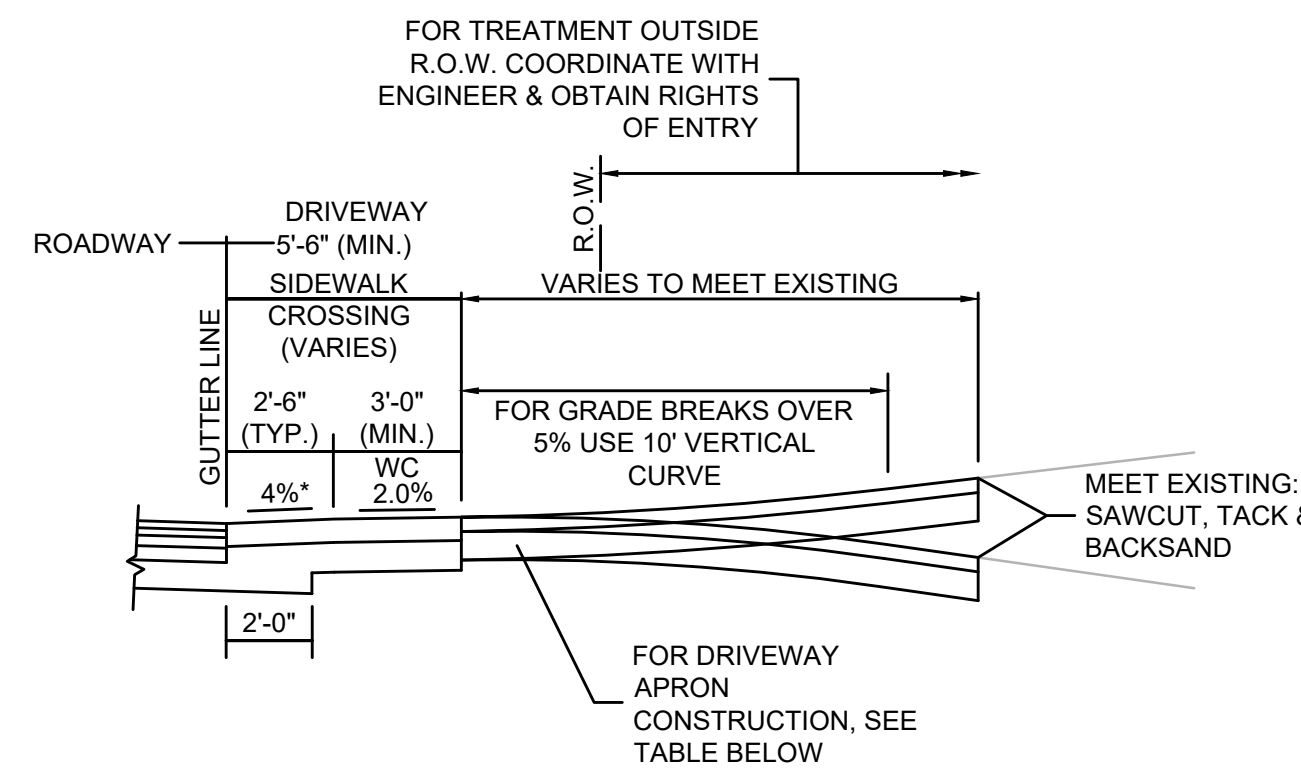


**NOTES:**

1. USE OF STEEL PLATES ALLOWED ON A CASE BY CASE BASIS, PENDING WRITTEN APPROVAL BY TOWN.
2. CONTRACTOR SHALL BE RESPONSIBLE FOR ANY DAMAGES OR CLAIMS RESULTING FROM THE USE OF STEEL PLATES.
3. MUTCD COMPLIANT RETROREFLECTIVE ORANGE CONSTRUCTION WARNING SIGNS (48"X48") WITH WORDING "STEEL PLATE AHEAD" SHALL BE INSTALLED IN ADVANCE OF STEEL PLATE INSTALLATION.
4. THE CONTRACTOR SHALL DESIGN AND UTILIZE STEEL PLATES OF ADEQUATE DIMENSIONS AND THICKNESS FOR INTENDED USE AND VEHICLE LOADING. MAXIMUM ALLOWABLE DEFLECTION SHALL BE 0.025". IRON SPIKE FASTENERS SHALL BE INSTALLED AROUND THE PERIMETER OF THE STEEL PLATE.

**STEEL PLATE INSTALLATION**

SCALE: N.T.S.



DRIVEWAY APRON CONSTRUCTION	
SURFACE:	4" HOT MIX ASPHALT (2" TOP COURSE MATERIAL OVER 2" BINDER COURSE MATERIAL)
SUBBASE:	8" GRAVEL BORROW (TYPE "B")

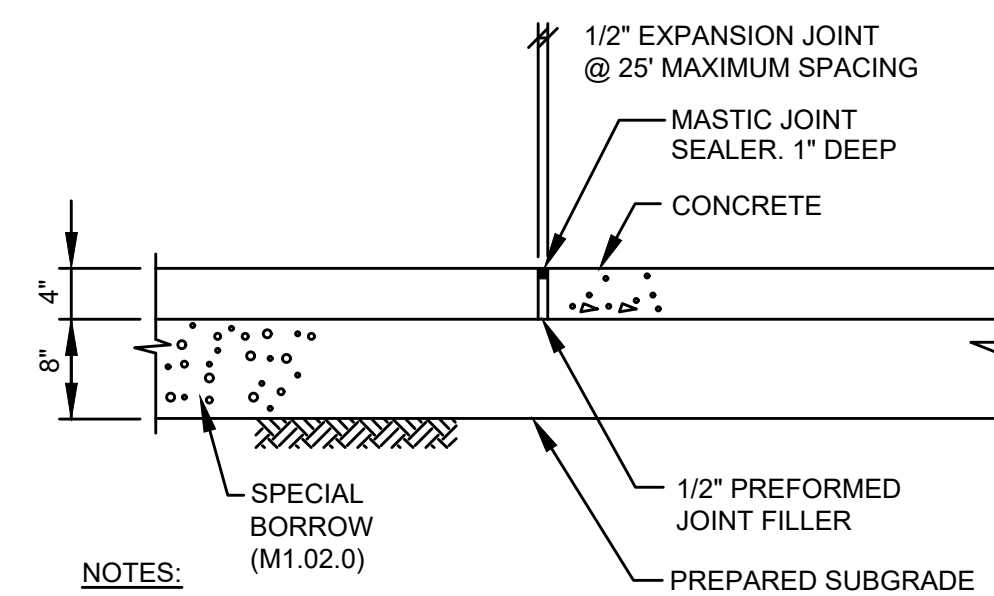
WC = WHEELCHAIR (PATHWAY)  
 R.O.W. = RIGHT OF WAY

\* - DRIVEWAY APRON SLOPE TOWARDS ROADWAY MAY VARY TO MEET FIELD CONDITIONS

DRIVEWAY APRONS SHALL BE CONSTRUCTED OF HOT MIX ASPHALT UNLESS PRIOR WRITTEN APPROVAL IS GRANTED BY DPW.

**DRIVEWAY APRON DETAIL**

SCALE: N.T.S.

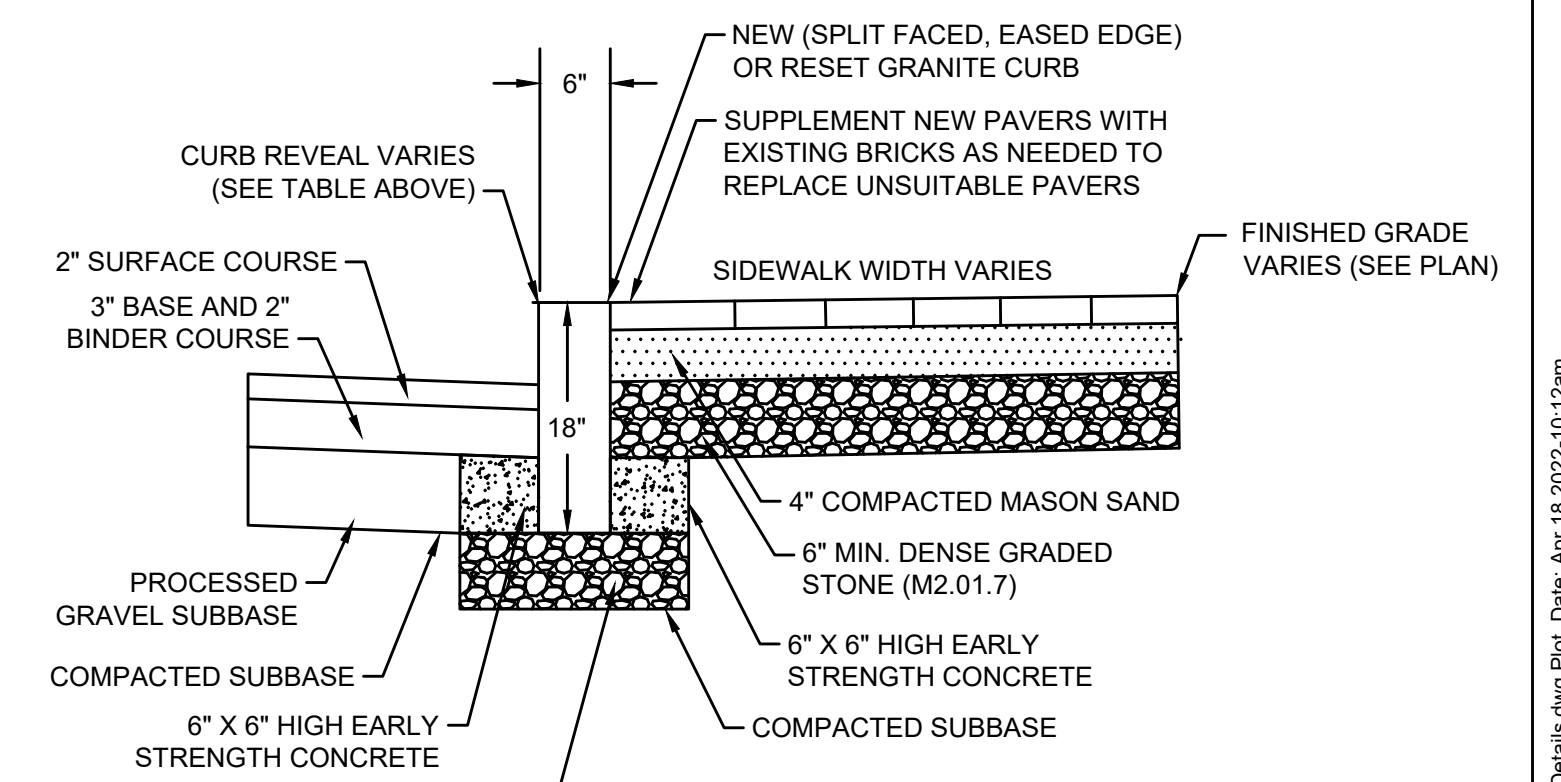


**NOTES:**

1. SCORE CONCRETE; MATCH EXISTING INTERVALS (MIN 5' INTERVALS)
2. MATCH EXISTING SLOPE (MIN 3/16"/FT)
3. SEE VERTICAL CURB DETAIL FOR METHOD OF SETTING GRANITE CURB.
4. MATCH EXISTING SIDEWALK WIDTH. THE ENTIRE WIDTH OF ANY DISTURBED SIDEWALK SHALL BE RESTORED.

**CONCRETE SIDEWALK SECTION**

SCALE: N.T.S.

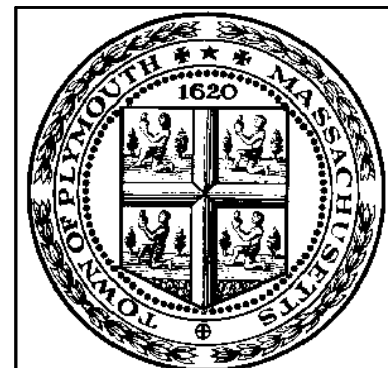


**NOTES:**

1. THE MAXIMUM ALLOWABLE SIDEWALK AND CURB RAMP CROSS SLOPES SHALL BE 2.0%.
2. MAINTAIN A MINIMUM OF 30" CLEAR AT ANY PERMANENT OBSTACLE IN ACCESS ROUTE (I.E., HYDRANTS, UTILITY POLES, TREE WELLS, SIGNS, ETC.). REPORT ALL CONFLICTS TO THE ENGINEER IMMEDIATELY.
3. WHERE ACCESSIBLE ROUTES ARE LESS THAN 5' IN WIDTH (EXCLUDING CURBING) A 5'X5' PASSING AREA SHALL BE PROVIDED AT INTERVALS NOT TO EXCEED 200 FEET.
4. BRICK WHEELCHAIR RAMPS SHALL CONFORM TO MHD SECTION 701 (SEE SPECIFICATION SECTION 02576).

**BRICK SIDEWALK AND VERTICAL GRANITE CURB**

SCALE: N.T.S.



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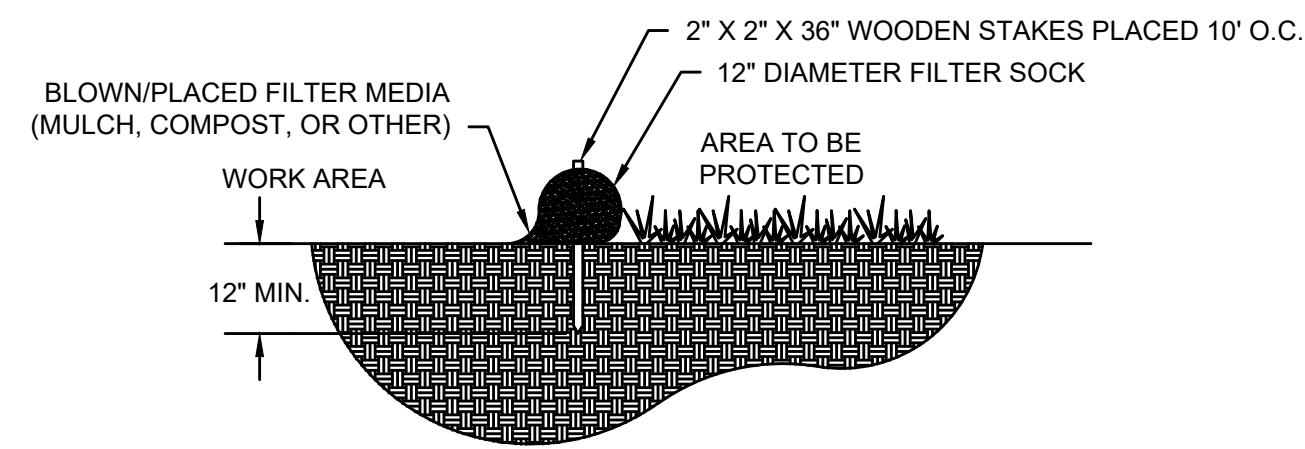
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**WATER STREET SEWER INTERCEPTOR REPLACEMENT  
 TOWN OF PLYMOUTH, MA**

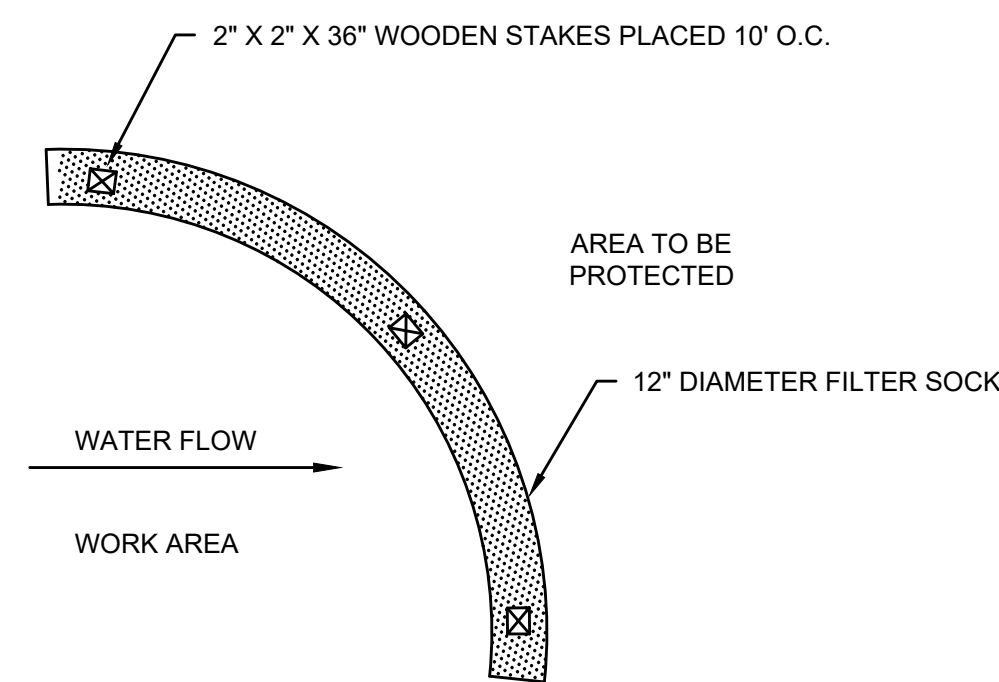
**SURFACE RESTORATION DETAILS I**

FOR CONSTRUCTION
Sheet No.
CD-3





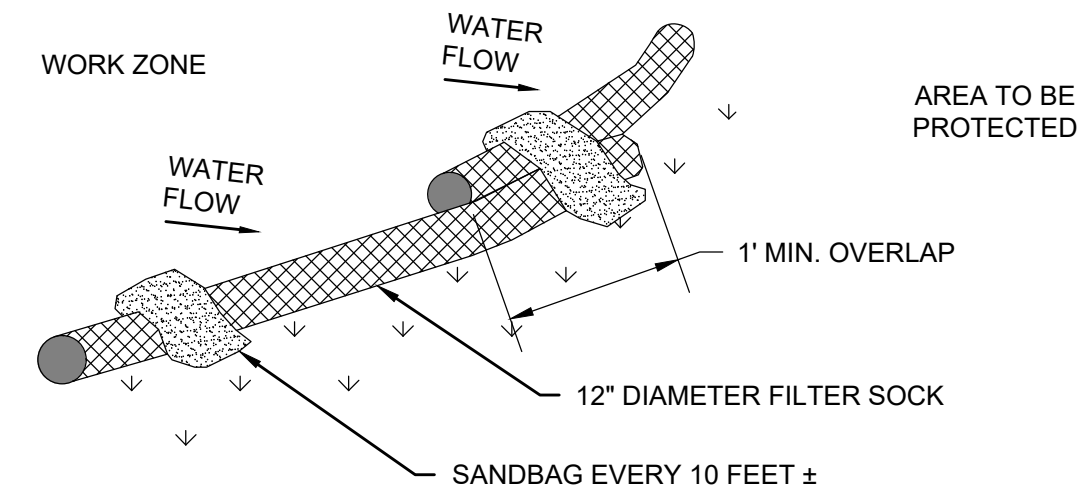
SECTION



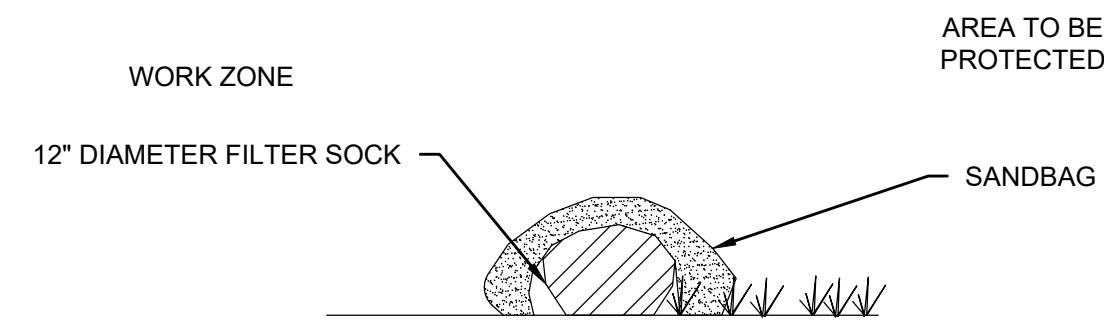
PLAN

**12" DIAMETER FILTER SOCK (AS REQUIRED)**

SCALE: N.T.S.



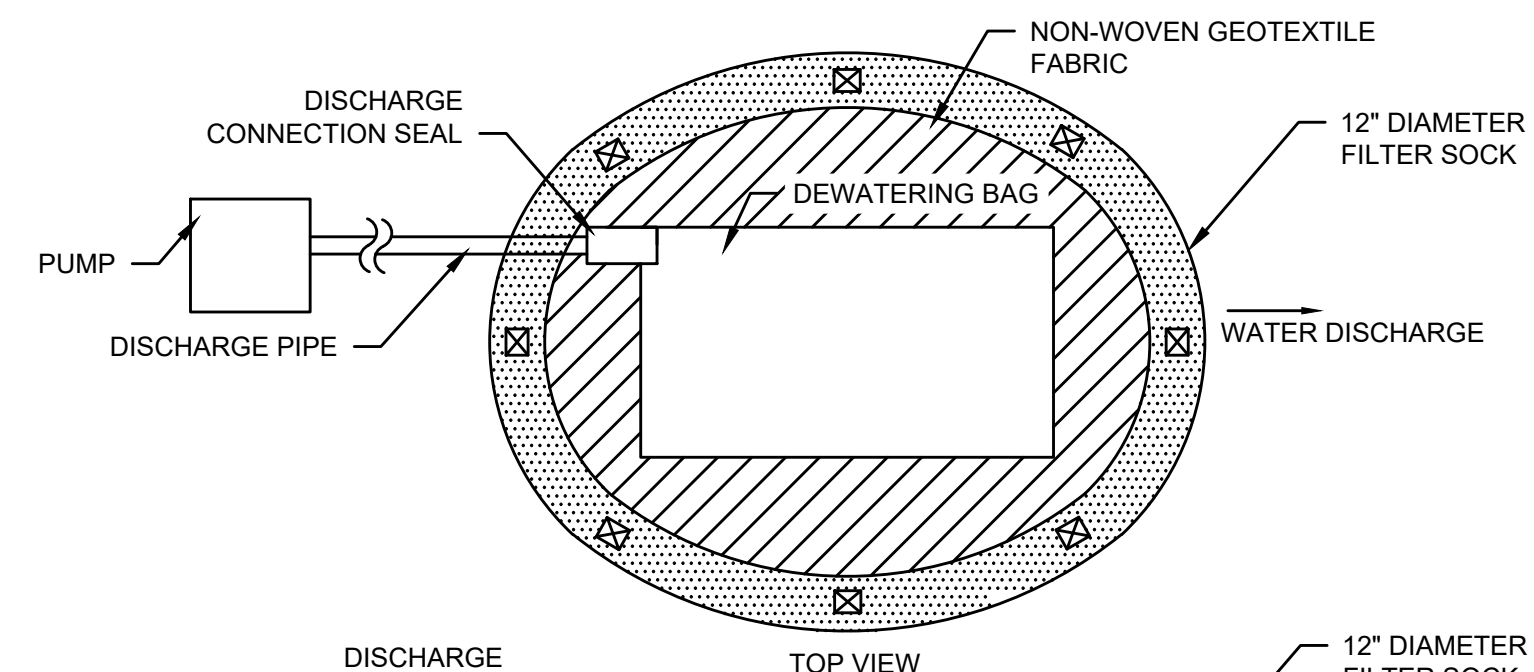
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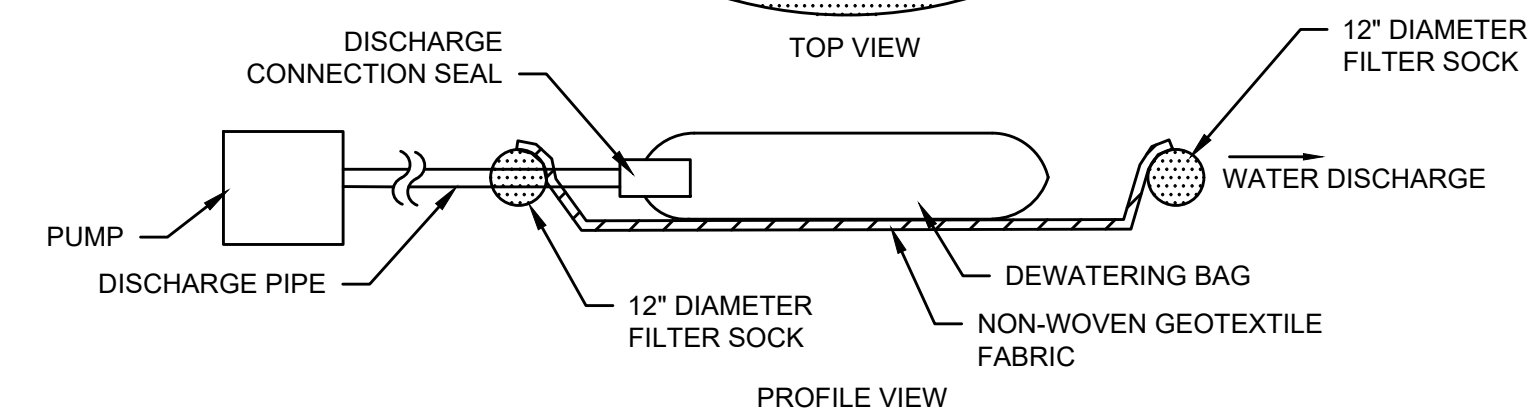
SECTION

**12" DIAMETER FILTER SOCK ON PAVEMENT**

SCALE: N.T.S.



TOP VIEW



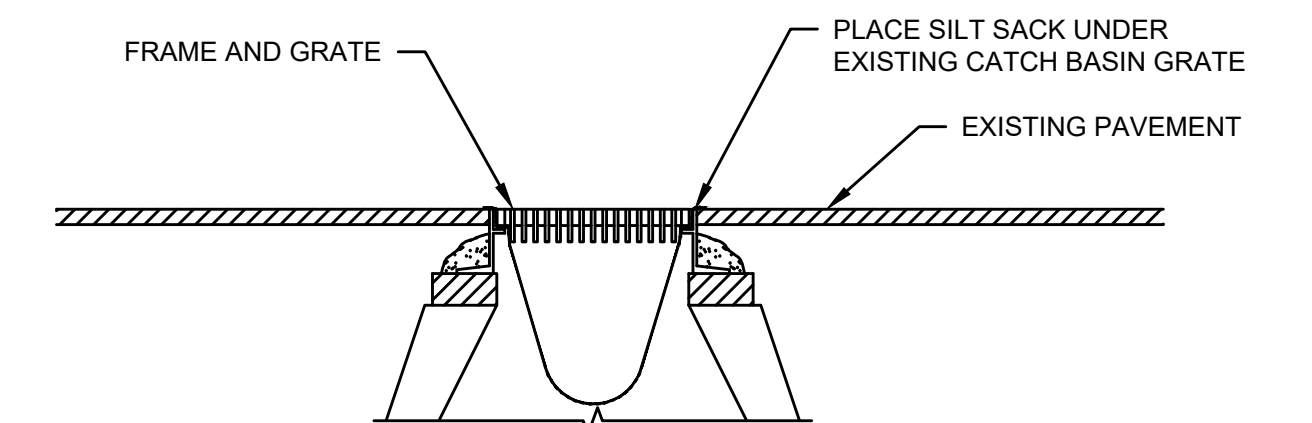
PROFILE VIEW

**NOTES:**

1. DEWATERING BAG SIZE AND QUANTITY SHALL BE AS NEEDED TO ADEQUATELY FILTER ALL PUMP EFFLUENT FROM DEWATERING ACTIVITIES. CONTRACTOR SHALL PROVIDE A REDUNDANT BAG ON SITE AT ALL TIMES.
2. EACH BAG SHALL HANDLE A 2", 3", OR 4" DISCHARGE HOSE.
3. DISCHARGE HOSES CAN BE PLACED ALONG ANY EDGE BY MAKING A SMALL INCISION INTO THE FABRIC, INSERTING THE HOSE, AND THEN CLAMPING THE FABRIC TO THE HOSE VIA WIRE, TIES, CLAMP, ROPE OR SIMILAR TO CREATE A GOOD SEAL.
4. CONTRACTOR SHALL AVOID DISCHARGING MULTIPLE PIPES INTO ONE BAG.

**DEWATERING BAGS**

SCALE: N.T.S.

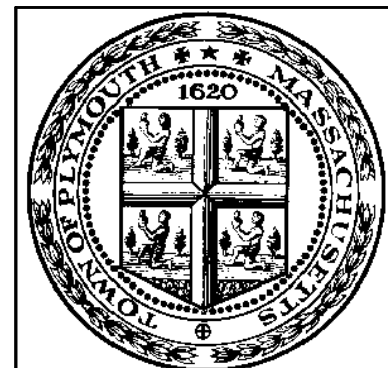


**NOTES:**

1. SILT SACKS SHALL BE INSPECTED WEEKLY AND AFTER A STORM. ACCUMULATED SILT SHALL BE REMOVED TO ALLOW CATCH BASIN TO FUNCTION PROPERLY.
2. SILT SACK HIGH FLOW MODEL AS MANUFACTURED BY ACF ENVIRONMENTAL (800-448-3636) OR APPROVED EQUAL.

**SEDIMENTATION CONTROL AT CATCH BASINS**

SCALE: N.T.S.



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**WATER STREET SEWER INTERCEPTOR REPLACEMENT  
TOWN OF PLYMOUTH, MA**

**ENVIRONMENTAL PROTECTION DETAILS I**

FOR CONSTRUCTION

Sheet No.

**CD-4**
















GENERAL TRAFFIC MANAGEMENT NOTES:

- ALL CONSTRUCTION SIGNING, DRUMS, BARRICADES, AND OTHER DEVICES SHALL CONFORM WITH PART 6 OF THE LATEST EDITION OF THE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (M.U.T.C.D.) AND ANY SUBSEQUENT MASSDOT AMENDMENTS.
- THE CONTRACTOR SHALL NOTIFY EACH ABUTTER AT LEAST 24 HOURS IN ADVANCE OF THE START OF ANY WORK THAT WILL REQUIRE THE TEMPORARY CLOSURES OF ACCESS.
- THE CONTRACTOR SHALL NOTIFY THE TOWN OF PLYMOUTH PUBLIC WORKS DEPARTMENT AT LEAST 72 HOURS IN ADVANCE OF LANE CLOSURES. ADDITIONAL NOTIFICATION SHALL BE PROVIDED BY THE CONTRACTOR UPON THE START AND COMPLETION OF THE CLOSURES.
- THE CONTRACTOR SHALL INSTALL AND MAINTAIN TRAFFIC CONTROL DEVICES AS NECESSARY AND IN ACCORDANCE WITH THE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES AND MASSDOT STANDARDS.
- TEMPORARY CONSTRUCTION SIGNAGE AND ALL OTHER TRAFFIC CONTROL DEVICES SHALL BE IN PLACE PRIOR TO THE START OF ANY WORK.
- THE CONTRACTOR SHALL MAINTAIN ACCESS AND EGRESS AT ALL TIMES TO ALL PROPERTIES AND ROADWAYS ABUTTING THE WORK ZONE UNLESS OTHERWISE APPROVED BY THE OWNER AND/OR ENGINEER.
- ALL DISTANCES MAY BE ADJUSTED TO FIT FIELD CONDITIONS, AS DIRECTED BY THE ENGINEER. MINIMUM DISTANCES HOWEVER SHOULD BE MAINTAINED WHERE INDICATED.
- MINIMUM LANE WIDTHS CONSIST OF THE CLEARANCE BETWEEN CHANNELIZING DEVICES SUCH AS DRUMS AND SHALL BE PROVIDED AT ALL TIMES.

- EXISTING PEDESTRIAN WALKWAYS SHALL REMAIN OPEN AND CLEAR OF DEBRIS. PEDESTRIANS SHALL BE PROTECTED FROM CONSTRUCTION USING THE APPROPRIATE SAFETY MEASURES AS DIRECTED BY THE ENGINEER. SUCH MEASURES WILL BE CONSIDERED INCIDENTAL TO THE PROJECT. IN LOCATIONS WHERE EXISTING PEDESTRIAN WALKWAYS HAVE BEEN IMPACTED BY CONSTRUCTION, THE ENTIRE WIDTH OF THE PEDESTRIAN WALKWAY SHALL BE RECONSTRUCTED IN KIND WITH A MINIMUM WIDTH OF 5 FEET EXCLUDING CURBING.
- MAXIMUM SPACING OF CHANNELIZING DEVICES IS EQUAL (IN FEET) TO THE SPEED LIMIT (MPH).
- CHANNELIZATION SHALL BE ACCOMPLISHED THROUGH THE USE OF REFLECTORIZED PLASTIC DRUMS. PLASTIC DRUMS WITH ANY FORM OF LIGHTING DEVICE MOUNTED ON THEM MUST PASS THE CRITERIA AS SET FORTH IN NCHRP 350 "RECOMMENDED PROCEDURES FOR THE SAFETY PERFORMANCE EVALUATION OF HIGHWAY FEATURES."
- FLASHING WARNING LIGHTS AND/OR FLAGS MAY BE USED ON ADVANCE WARNING SIGNS AS DIRECTED BY THE ENGINEER. FLAGS SHALL BE A MINIMUM OF 16" X 16".
- ALL SIGNS SHALL BE MOUNTED ON THEIR OWN STANDARD SIGN SUPPORT, UNLESS OTHERWISE NOTED.
- ALL TEMPORARY SIGNS AND SIGN SUPPORTS LOCATED ON OR NEAR THE TRAVELED WAY MUST PASS THE CRITERIA SET FORTH IN THE NCHRP 350 REPORT "RECOMMENDED PROCEDURES FOR THE SAFETY PERFORMANCE EVALUATION OF HIGHWAY FEATURES" AND/OR "MANUAL FOR ASSESSING SAFETY HARDWARE (MASH)".
- ALL TEMPORARY TRAFFIC CONTROL DEVICES AND ADVANCE WARNING SIGNS SHALL BE REMOVED IMMEDIATELY WHEN NO LONGER NEEDED.
- THE WATER STREET DETOUR PLANS SHALL ONLY BE IN USE DURING WORK HOURS. ALL DETOUR SIGNS SHALL BE COVERED BY THE CONTRACTOR OUTSIDE OF WORK HOURS.

LEGEND:

-  REFLECTORIZED PLASTIC DRUM
-  TYPE III BARRICADE
-  FLASHING ARROW PANEL
-  FLASHING ARROW PANEL
-  WORK ZONE
-  DIRECTION OF TRAFFIC
-  IMPACT ATTENUATOR
-  MEDIAN BARRIER
-  MEDIAN BARRIER WITH WARNING LIGHTS
-  WORK VEHICLE
-  TRUCK MOUNTED ATTENUATOR
-  TRAFFIC OR PEDESTRIAN SIGNAL
-  SIGN
- P POLICE DETAIL
- F FLAGGER

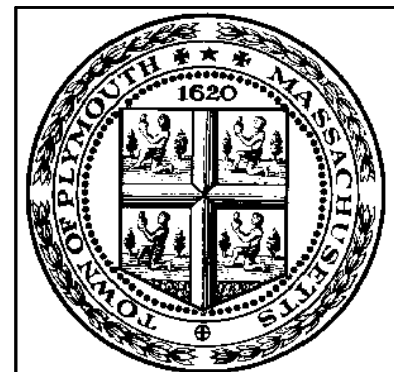
FORMULA FOR TAPER LENGTHS

L = WS  
W = WIDTH OF OFFSET IN FEET  
S = POSTED SPEED LIMIT (45 MPH)

\* TYPICAL DISTANCE BETWEEN W20-1 AND MA-R2-10a IS 350 FEET ON ALL ROADWAYS, UNLESS OTHERWISE DIRECTED OR APPROVED BY THE OWNER AND/OR ENGINEER.

TRAFFIC CONTROL NOTES:

- THE CONTRACTOR IS RESPONSIBLE FOR MAINTAINING TRAFFIC FLOW AT ALL TIMES. THE CONTRACTOR IS REQUIRED TO SUBMIT A TRAFFIC CONTROL PLAN TO THE ENGINEER AND HAVE IT APPROVED PRIOR TO COMMENCING CONSTRUCTION.
- CONTRACTOR SHALL INSTALL AND MAINTAIN PERMANENT AND TEMPORARY TRAFFIC CONTROL DEVICES AS NECESSARY AND IN A MANNER CONSISTENT WITH THE LATEST EDITION OF THE MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES.



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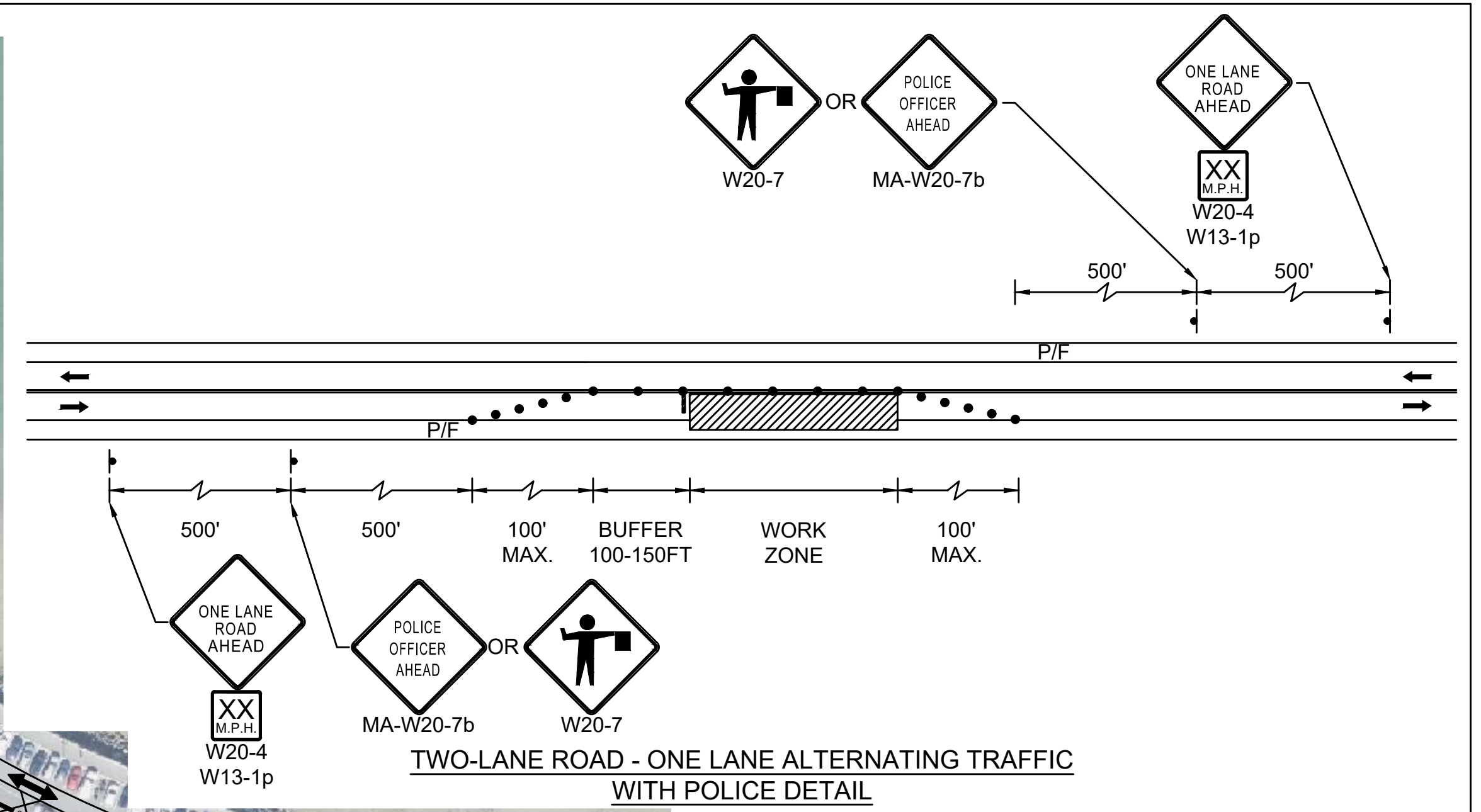
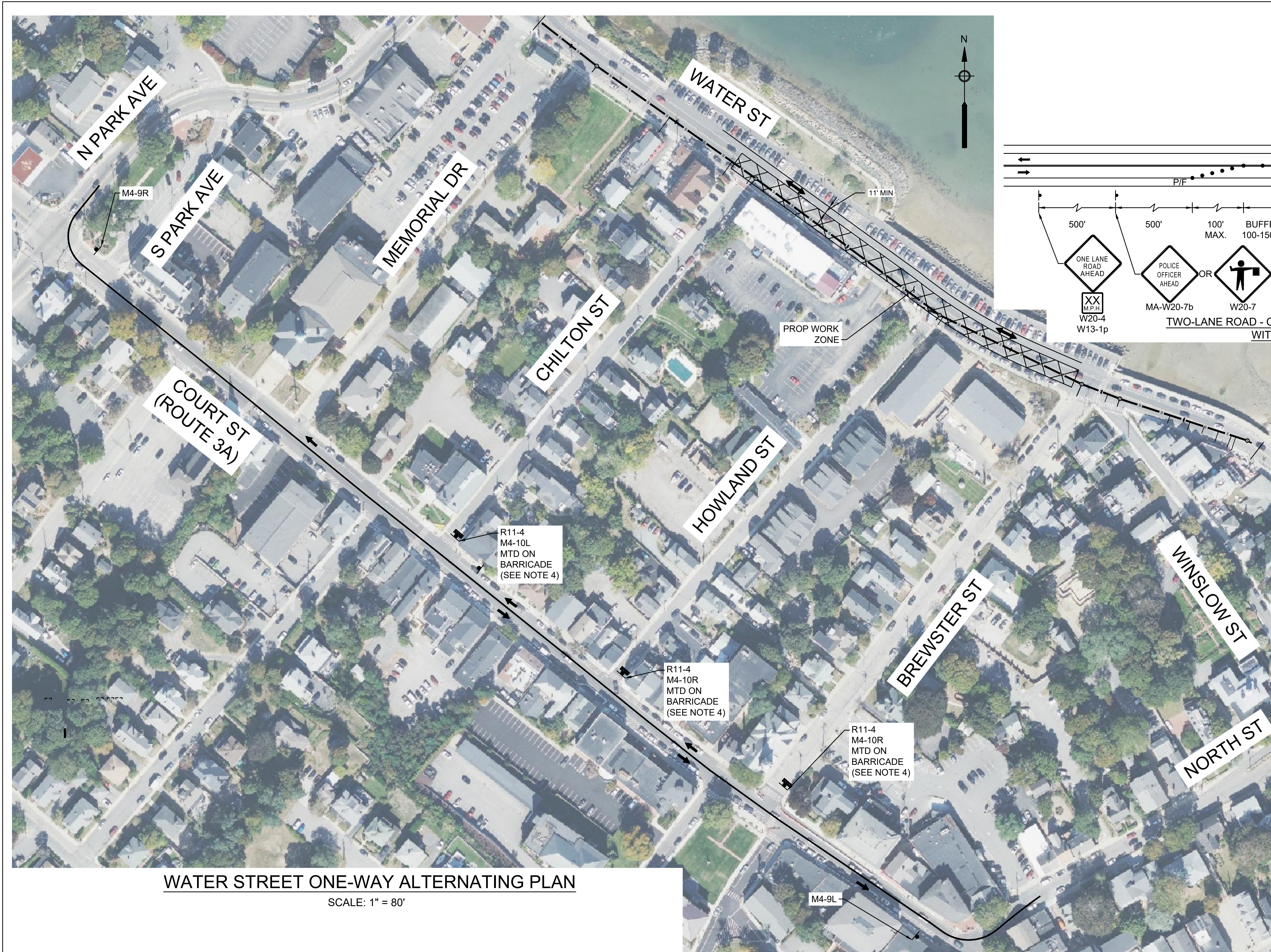
WATER STREET SEWER INTERCEPTOR REPLACEMENT  
TOWN OF PLYMOUTH, MA

TRAFFIC MANAGEMENT GENERAL NOTES AND LEGEND

FOR CONSTRUCTION  
Sheet No.

**TMP-1**



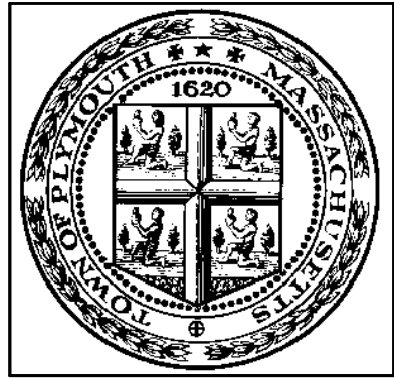


- NOTES:**
1. DETOUR SHALL BE USED AS NEEDED ALONG WATER STREET FROM CHILTON STREET TO BREWSTER STREET.
  2. ALL DETOUR SIGNS SHALL BE COVERED WHEN DETOUR IS NOT IN USE.
  3. PARKING ON WATER STREET SHALL BE MAINTAINED AT ALL TIMES. SHORT-TERM CLOSURES ARE ALLOWED AS NEEDED TO SUPPORT CONSTRUCTION. ALL PARKING CLOSURES SHALL BE COORDINATED WITH THE TOWN OF PLYMOUTH.
  4. TYPE III BARRICADES ON CHILTON ST, HOWLAND ST, AND BREWSTER ST ARE USED TO BLOCK THROUGH TRAFFIC. BARRICADES SHALL BE POSITIONED TO MAINTAIN ACCESS FOR LOCAL TRAFFIC ON THESE STREETS.

- ROAD CLOSED TO THRU TRAFFIC**
- R11-4 (60"x30")
  - DETOUR
  - M4-9L (30"x24")
  - DETOUR
  - M4-9R (30"x24")
  - DETOUR
  - M4-10L (48"x18")
  - DETOUR
  - M4-10R (48"x18")

**WATER STREET ONE-WAY ALTERNATING PLAN**

SCALE: 1" = 80'



MARK	DATE	DESCRIPTION

Scale	AS NOTED
Date	APRIL 2022
Job No.	196-2106
Designed by	RTK
Drawn by	RTK
Checked by	GEL
Approved by	ZFK

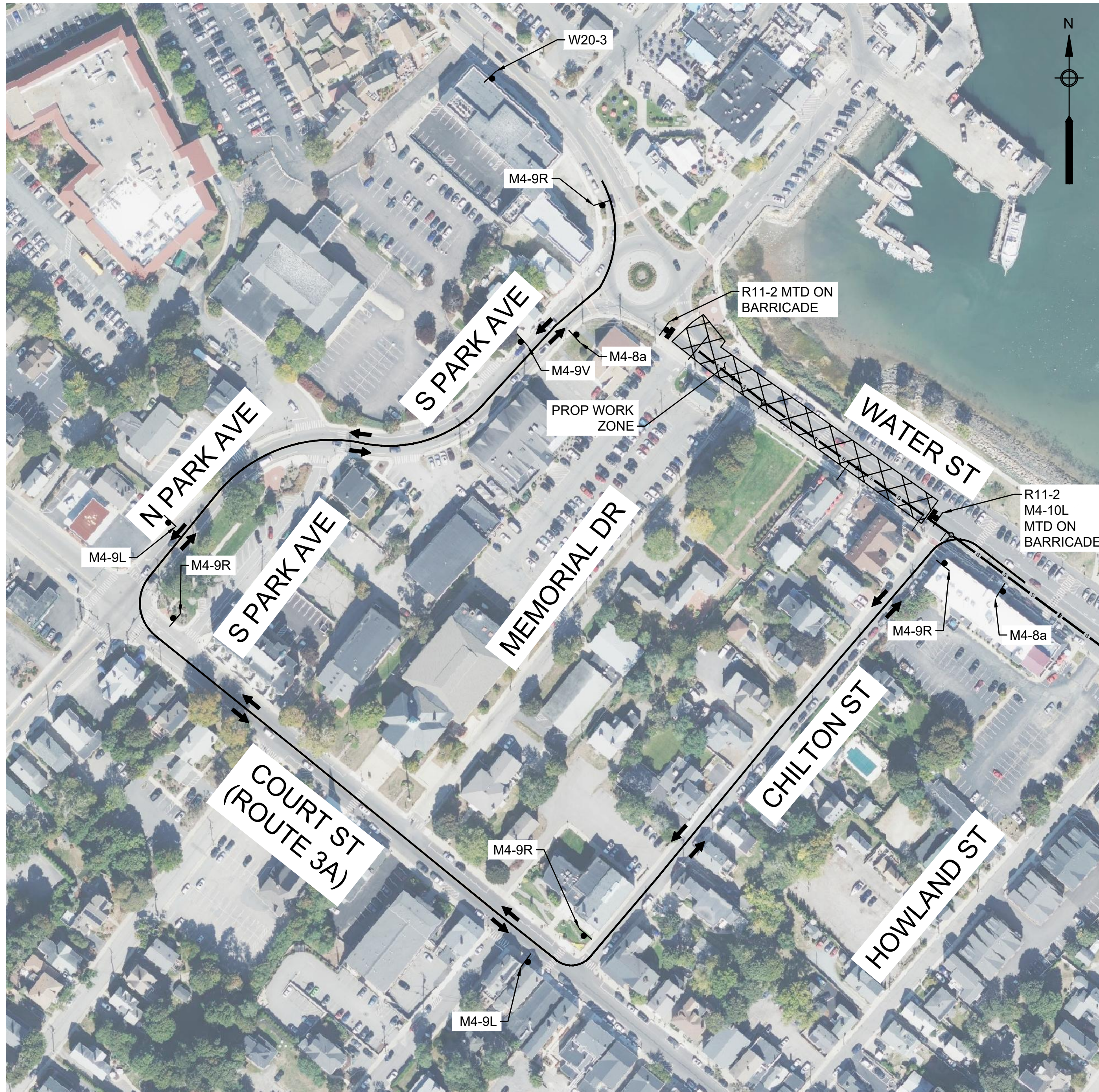
THIS LINE IS ONE INCH LONG WHEN PLOTTED AT FULL SCALE ON A 22" X 34" DRAWING

**WATER STREET SEWER INTERCEPTOR REPLACEMENT  
TOWN OF PLYMOUTH, MA**

**TRAFFIC MANAGEMENT PLAN I**

FOR CONSTRUCTION  
Sheet No. **TMP-2**





**WATER STREET WESTERN END DETOUR PLAN**

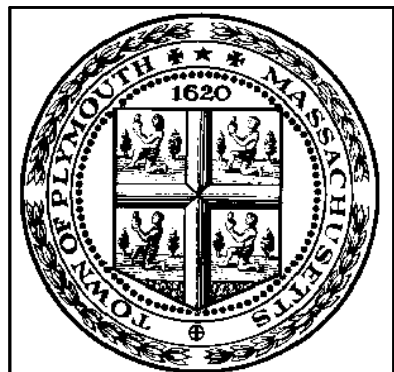
SCALE: 1" = 100'

**DETOUR SIGNING**

IDENTIFICATION NUMBER	SIZE OF SIGN		TEXT	DIMENSIONS (in)			NUMBER OF SIGNS REQUIRED	COLOR			POST SIZE AND NUMBER REQUIRED	UNIT AREA IN SQUARE FEET	AREA IN SQUARE FEET
	WIDTH	HEIGHT		LETTER HEIGHT	VERTICAL SPACING	ARROW		BACK-GROUND	LEGEND	BORDER			
R11-2	48 in	30 in	ROAD CLOSED	SEE 2009 MUTCD STANDARDS			2	WHITE	BLACK	BLACK	MOUNT ON BARRICADE	10.0	20.0
W20-3	36 in	36 in	ROAD CLOSED AHEAD				1	ORANGE	BLACK	BLACK	P-5 1	9.0	9.0
M4-8a	24 in	18 in	END DETOUR				2	ORANGE	BLACK	BLACK	P-5 2	3.0	6.0
M4-9L	30 in	24 in	DETOUR				2	ORANGE	BLACK	BLACK	P-5 2	5.0	10.0
M4-9R	30 in	24 in	DETOUR				4	ORANGE	BLACK	BLACK	P-5 4	5.0	20.0
M4-9V	30 in	24 in	DETOUR				1	ORANGE	BLACK	BLACK	P-5 1	5.0	5.0
M4-10L	48 in	18 in	DETOUR				1	ORANGE	BLACK	BLACK	MOUNT ON BARRICADE	6.0	6.0

**DETOUR NOTES:**

1. ALL DETOUR SIGNS SHALL BE COVERED WHEN DETOUR IS NOT IN USE.
2. FULL CLOSURE AND DETOUR IMPLEMENTATION SHALL BE COORDINATED WITH THE TOWN OF PLYMOUTH.



**ENVIRONMENTAL PARTNERS**  
— An Apex Company —



MARK	DATE	DESCRIPTION

Scale	AS NOTED
Date	APRIL 2022
Job No.	196-2106
Designed by	RTK
Drawn by	RTK
Checked by	GEL
Approved by	ZFK

THIS LINE IS ONE INCH LONG WHEN PLOTTED AT FULL SCALE ON A 22" X 34" DRAWING

**WATER STREET SEWER INTERCEPTOR REPLACEMENT  
TOWN OF PLYMOUTH, MA**

**TRAFFIC MANAGEMENT PLAN II**

FOR CONSTRUCTION  
Sheet No.

**TMP-3**





**WATER STREET EASTERN END DETOUR PLAN**

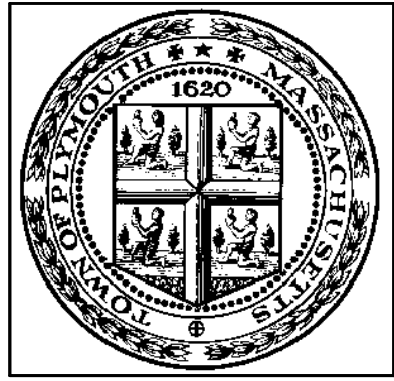
SCALE: 1" = 120'

**DETOUR SIGNING**

IDENTIFICATION NUMBER	SIZE OF SIGN		TEXT	DIMENSIONS (in)			NUMBER OF SIGNS REQUIRED	COLOR			POST SIZE AND NUMBER REQUIRED	UNIT AREA IN SQUARE FEET	AREA IN SQUARE FEET
	WIDTH	HEIGHT		LETTER HEIGHT	VERTICAL SPACING	ARROW		BACK-GROUND	LEGEND	BORDER			
R11-2	48 in	30 in	ROAD CLOSED	SEE 2009 MUTCD STANDARDS			2	WHITE	BLACK	BLACK	MOUNT ON BARRICADE	10.0	20.0
W20-2	36 in	36 in	DETOUR AHEAD				2	ORANGE	BLACK	BLACK	P-5 1	9.0	18.0
R11-4	60 in	30 in	ROAD CLOSED TO THRU TRAFFIC				2	WHITE	BLACK	BLACK	P-5 2	12.5	25.0
M4-8a	24 in	18 in	END DETOUR				2	ORANGE	BLACK	BLACK	P-5 2	3.0	6.0
M4-9L	30 in	24 in	DETOUR ←				3	ORANGE	BLACK	BLACK	P-5 3	5.0	15.0
M4-9R	30 in	24 in	DETOUR →				3	ORANGE	BLACK	BLACK	P-5 3	5.0	15.0
M4-9V	30 in	24 in	DETOUR ↑				2	ORANGE	BLACK	BLACK	P-5 2	5.0	10.0
M4-10L	48 in	18 in	← DETOUR				1	ORANGE	BLACK	BLACK	MOUNT WITH R11-4	6.0	6.0
M4-10R	48 in	18 in	DETOUR →				1	ORANGE	BLACK	BLACK	MOUNT WITH R11-4	6.0	6.0
SP-4	60 in	30 in	PLYMOUTH ROCK MAYFLOWER II OPEN				1	WHITE	BLACK	BLACK	MOUNT WITH R11-4	12.5	12.5

**DETOUR NOTES:**

1. ALL DETOUR SIGNS SHALL BE COVERED WHEN DETOUR IS NOT IN USE.
2. FULL CLOSURE AND DETOUR IMPLEMENTATION SHALL BE COORDINATED WITH THE TOWN OF PLYMOUTH.



MARK	DATE	DESCRIPTION

Scale	AS NOTED
Date	APRIL 2022
Job No.	196-2106
Designed by	RTK
Drawn by	RTK
Checked by	GEL
Approved by	ZFK

THIS LINE IS ONE INCH LONG WHEN PLOTTED AT FULL SCALE ON A 22" X 34" DRAWING

**WATER STREET SEWER INTERCEPTOR REPLACEMENT  
TOWN OF PLYMOUTH, MA**

**TRAFFIC MANAGEMENT PLAN III**

FOR CONSTRUCTION  
Sheet No.  
**TMP-4**



## **ATTACHMENT 3**

### **MASSACHUSETTS PREVAILING WAGE RATES**



CHARLES D. BAKER  
Governor

KARYN E. POLITO  
Lt. Governor

Town of Plymouth  
22147R, Water Street Sewer Interceptor Replacement  
Attachment 3 - Page 362

**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 Plymouth  
**Contract Number:** **City/Town:** PLYMOUTH  
**Description of Work:** Work includes installation of approximately 1,300 linear feet of 30" PVC gravity sewer interceptor and services via open cut trench excavation within the Town owned right-of-way on Water Street.  
**Job Location:** Water Street, Plymouth, MA 02360

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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
<b>Construction</b>						
(2 AXLE) DRIVER - EQUIPMENT <i>TEAMSTERS JOINT COUNCIL NO. 10 ZONE B</i>	12/01/2021	\$35.95	\$13.41	\$16.01	\$0.00	\$65.37
(3 AXLE) DRIVER - EQUIPMENT <i>TEAMSTERS JOINT COUNCIL NO. 10 ZONE B</i>	12/01/2021	\$36.02	\$13.41	\$16.01	\$0.00	\$65.44
(4 & 5 AXLE) DRIVER - EQUIPMENT <i>TEAMSTERS JOINT COUNCIL NO. 10 ZONE B</i>	12/01/2021	\$36.14	\$13.41	\$16.01	\$0.00	\$65.56
ADS/SUBMERSIBLE PILOT <i>PILE DRIVER LOCAL 56 (ZONE 1)</i>	08/01/2020	\$103.05	\$9.40	\$23.12	\$0.00	\$135.57
For apprentice rates see "Apprentice- PILE DRIVER"						
AIR TRACK OPERATOR <i>LABORERS - ZONE 2</i>	12/01/2021	\$36.16	\$9.10	\$16.64	\$0.00	\$61.90
	06/01/2022	\$37.06	\$9.10	\$16.64	\$0.00	\$62.80
	12/01/2022	\$37.91	\$9.10	\$16.64	\$0.00	\$63.65
	06/01/2023	\$38.81	\$9.10	\$16.64	\$0.00	\$64.55
	12/01/2023	\$39.71	\$9.10	\$16.64	\$0.00	\$65.45
For apprentice rates see "Apprentice- LABORER"						
AIR TRACK OPERATOR (HEAVY & HIGHWAY) <i>LABORERS - ZONE 2 (HEAVY &amp; HIGHWAY)</i>	12/01/2021	\$36.16	\$9.10	\$16.64	\$0.00	\$61.90
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"						
ASBESTOS REMOVER - PIPE / MECH. EQUIPT. <i>HEAT &amp; FROST INSULATORS LOCAL 6 (BOSTON)</i>	12/01/2020	\$38.10	\$12.80	\$9.45	\$0.00	\$60.35
ASPHALT RAKER <i>LABORERS - ZONE 2</i>	12/01/2021	\$35.66	\$9.10	\$16.64	\$0.00	\$61.40
	06/01/2022	\$36.56	\$9.10	\$16.64	\$0.00	\$62.30
	12/01/2022	\$37.41	\$9.10	\$16.64	\$0.00	\$63.15
	06/01/2023	\$38.31	\$9.10	\$16.64	\$0.00	\$64.05
	12/01/2023	\$39.21	\$9.10	\$16.64	\$0.00	\$64.95
For apprentice rates see "Apprentice- LABORER"						
ASPHALT RAKER (HEAVY & HIGHWAY) <i>LABORERS - ZONE 2 (HEAVY &amp; HIGHWAY)</i>	12/01/2021	\$35.66	\$9.10	\$16.64	\$0.00	\$61.40
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"						
ASPHALT/CONCRETE/CRUSHER PLANT-ON SITE <i>OPERATING ENGINEERS LOCAL 4</i>	12/01/2021	\$51.38	\$14.00	\$16.05	\$0.00	\$81.43
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
BACKHOE/FRONT-END LOADER <i>OPERATING ENGINEERS LOCAL 4</i>	12/01/2021	\$51.38	\$14.00	\$16.05	\$0.00	\$81.43
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
BARCO-TYPE JUMPING TAMPER <i>LABORERS - ZONE 2</i>	12/01/2021	\$35.66	\$9.10	\$16.64	\$0.00	\$61.40
	06/01/2022	\$36.56	\$9.10	\$16.64	\$0.00	\$62.30
	12/01/2022	\$37.41	\$9.10	\$16.64	\$0.00	\$63.15
	06/01/2023	\$38.31	\$9.10	\$16.64	\$0.00	\$64.05
	12/01/2023	\$39.21	\$9.10	\$16.64	\$0.00	\$64.95
For apprentice rates see "Apprentice- LABORER"						
BLOCK PAVER, RAMMER / CURB SETTER <i>LABORERS - ZONE 2</i>	12/01/2021	\$36.16	\$9.10	\$16.64	\$0.00	\$61.90
	06/01/2022	\$37.06	\$9.10	\$16.64	\$0.00	\$62.80
	12/01/2022	\$37.91	\$9.10	\$16.64	\$0.00	\$63.65
	06/01/2023	\$38.81	\$9.10	\$16.64	\$0.00	\$64.55
	12/01/2023	\$39.71	\$9.10	\$16.64	\$0.00	\$65.45
For apprentice rates see "Apprentice- LABORER"						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
BLOCK PAVER, RAMMER / CURB SETTER (HEAVY & HIGHWAY) <i>LABORERS - ZONE 2 (HEAVY &amp; HIGHWAY)</i> For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"	12/01/2021	\$36.16	\$9.10	\$16.64	\$0.00	\$61.90
BOILER MAKER <i>BOILERMAKERS LOCAL 29</i>	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) <i>BRICKLAYERS LOCAL 3 (QUINCY)</i>	02/01/2022	\$57.15	\$11.39	\$22.34	\$0.00	\$90.88
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**Apprentice - BRICK/PLASTER/CEMENT MASON - Local 3 Quincy**

**Effective Date - 02/01/2022**

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$28.58	\$11.39	\$22.34	\$0.00	\$62.31
2	60	\$34.29	\$11.39	\$22.34	\$0.00	\$68.02
3	70	\$40.01	\$11.39	\$22.34	\$0.00	\$73.74
4	80	\$45.72	\$11.39	\$22.34	\$0.00	\$79.45
5	90	\$51.44	\$11.39	\$22.34	\$0.00	\$85.17

Notes:

**Apprentice to Journeyworker Ratio:1:5**

BULLDOZER/GRADER/SCRAPER <i>OPERATING ENGINEERS LOCAL 4</i>	12/01/2021	\$50.83	\$14.00	\$16.05	\$0.00	\$80.88
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For apprentice rates see "Apprentice- OPERATING ENGINEERS"

CAISSON & UNDERPINNING BOTTOM MAN <i>LABORERS - FOUNDATION AND MARINE</i>	12/01/2021	\$42.33	\$9.10	\$17.72	\$0.00	\$69.15
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For apprentice rates see "Apprentice- LABORER"

CAISSON & UNDERPINNING LABORER <i>LABORERS - FOUNDATION AND MARINE</i>	12/01/2021	\$41.18	\$9.10	\$17.72	\$0.00	\$68.00
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Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
For apprentice rates see "Apprentice- LABORER"						
CAISSON & UNDERPINNING TOP MAN <i>LABORERS - FOUNDATION AND MARINE</i>	12/01/2021	\$41.18	\$9.10	\$17.72	\$0.00	\$68.00
For apprentice rates see "Apprentice- LABORER"						
CARBIDE CORE DRILL OPERATOR <i>LABORERS - ZONE 2</i>	12/01/2021	\$35.66	\$9.10	\$16.64	\$0.00	\$61.40
	06/01/2022	\$36.56	\$9.10	\$16.64	\$0.00	\$62.30
	12/01/2022	\$37.41	\$9.10	\$16.64	\$0.00	\$63.15
	06/01/2023	\$38.31	\$9.10	\$16.64	\$0.00	\$64.05
	12/01/2023	\$39.21	\$9.10	\$16.64	\$0.00	\$64.95
For apprentice rates see "Apprentice- LABORER"						
CARPENTER <i>CARPENTERS -ZONE 2 (Eastern Massachusetts)</i>	03/01/2022	\$44.53	\$8.68	\$19.97	\$0.00	\$73.18
	09/01/2022	\$45.18	\$8.68	\$19.97	\$0.00	\$73.83
	03/01/2023	\$45.78	\$8.68	\$19.97	\$0.00	\$74.43

**Apprentice - CARPENTER - Zone 2 Eastern MA**

**Effective Date - 03/01/2022**

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$22.27	\$8.68	\$1.73	\$0.00	\$32.68
2	60	\$26.72	\$8.68	\$1.73	\$0.00	\$37.13
3	70	\$31.17	\$8.68	\$14.78	\$0.00	\$54.63
4	75	\$33.40	\$8.68	\$14.78	\$0.00	\$56.86
5	80	\$35.62	\$8.68	\$16.51	\$0.00	\$60.81
6	80	\$35.62	\$8.68	\$16.51	\$0.00	\$60.81
7	90	\$40.08	\$8.68	\$18.24	\$0.00	\$67.00
8	90	\$40.08	\$8.68	\$18.24	\$0.00	\$67.00

**Effective Date - 09/01/2022**

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$22.59	\$8.68	\$1.73	\$0.00	\$33.00
2	60	\$27.11	\$8.68	\$1.73	\$0.00	\$37.52
3	70	\$31.63	\$8.68	\$14.78	\$0.00	\$55.09
4	75	\$33.89	\$8.68	\$14.78	\$0.00	\$57.35
5	80	\$36.14	\$8.68	\$16.51	\$0.00	\$61.33
6	80	\$36.14	\$8.68	\$16.51	\$0.00	\$61.33
7	90	\$40.66	\$8.68	\$18.24	\$0.00	\$67.58
8	90	\$40.66	\$8.68	\$18.24	\$0.00	\$67.58

**Notes:**

% Indentured After 10/1/17; 45/45/55/55/70/70/80/80  
Step 1&2 \$30.45/ 3&4 \$36.57/ 5&6 \$56.36/ 7&8 \$62.54

**Apprentice to Journeyworker Ratio:1:5**

CARPENTER WOOD FRAME <i>CARPENTERS-ZONE 3 (Wood Frame)</i>	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 - 04/01/2022**

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

**Effective Date - 04/01/2023**

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	\$14.50	\$7.21	\$0.00	\$0.00	\$21.71
2	60	\$14.50	\$7.21	\$0.00	\$0.00	\$21.71
3	65	\$15.70	\$7.21	\$0.00	\$0.00	\$22.91
4	70	\$16.91	\$7.21	\$0.00	\$0.00	\$24.12
5	75	\$18.12	\$7.21	\$3.80	\$0.00	\$29.13
6	80	\$19.33	\$7.21	\$3.80	\$0.00	\$30.34
7	85	\$20.54	\$7.21	\$3.80	\$0.00	\$31.55
8	90	\$21.74	\$7.21	\$3.80	\$0.00	\$32.75

**Notes:**  
% Indentured After 10/1/17; 45/45/55/55/70/70/80/80  
Step 1&2 \$17.86/ 3&4 \$20.22/ 5&6 \$27.57/ 7&8 \$29.94

**Apprentice to Journeyworker Ratio:1:5**

CEMENT MASONRY/PLASTERING BRICKLAYERS LOCAL 3 (QUINCY)	01/01/2020	\$49.07	\$12.75	\$22.41	\$0.62	\$84.85
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**Apprentice - CEMENT MASONRY/PLASTERING - Eastern Mass (Quincy)**

**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 <i>LABORERS - ZONE 2</i>	12/01/2021	\$35.66	\$9.10	\$16.64	\$0.00	\$61.40
	06/01/2022	\$36.56	\$9.10	\$16.64	\$0.00	\$62.30
	12/01/2022	\$37.41	\$9.10	\$16.64	\$0.00	\$63.15
	06/01/2023	\$38.31	\$9.10	\$16.64	\$0.00	\$64.05
	12/01/2023	\$39.21	\$9.10	\$16.64	\$0.00	\$64.95
For apprentice rates see "Apprentice- LABORER"						
CLAM SHELLS/SLURRY BUCKETS/HEADING MACHINES <i>OPERATING ENGINEERS LOCAL 4</i>	12/01/2021	\$52.38	\$14.00	\$16.05	\$0.00	\$82.43
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
COMPRESSOR OPERATOR <i>OPERATING ENGINEERS LOCAL 4</i>	12/01/2021	\$33.69	\$14.00	\$16.05	\$0.00	\$63.74
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
DELEADER (BRIDGE) <i>PAINTERS LOCAL 35 - ZONE 2</i>	01/01/2022	\$53.66	\$8.65	\$23.05	\$0.00	\$85.36
	07/01/2022	\$54.86	\$8.65	\$23.05	\$0.00	\$86.56
	01/01/2023	\$56.06	\$8.65	\$23.05	\$0.00	\$87.76
	07/01/2023	\$57.26	\$8.65	\$23.05	\$0.00	\$88.96
	01/01/2024	\$58.46	\$8.65	\$23.05	\$0.00	\$90.16
	07/01/2024	\$59.66	\$8.65	\$23.05	\$0.00	\$91.36
	01/01/2025	\$60.86	\$8.65	\$23.05	\$0.00	\$92.56

**Classification**

**Effective Date    Base Wage    Health    Pension    Supplemental Unemployment    Total Rate**

**Apprentice - PAINTER Local 35 - BRIDGES/TANKS**

**Effective Date - 01/01/2022**

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$26.83	\$8.65	\$0.00	\$0.00	\$35.48
2	55	\$29.51	\$8.65	\$6.27	\$0.00	\$44.43
3	60	\$32.20	\$8.65	\$6.84	\$0.00	\$47.69
4	65	\$34.88	\$8.65	\$7.41	\$0.00	\$50.94
5	70	\$37.56	\$8.65	\$19.63	\$0.00	\$65.84
6	75	\$40.25	\$8.65	\$20.20	\$0.00	\$69.10
7	80	\$42.93	\$8.65	\$20.77	\$0.00	\$72.35
8	90	\$48.29	\$8.65	\$21.91	\$0.00	\$78.85

**Effective Date - 07/01/2022**

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$27.43	\$8.65	\$0.00	\$0.00	\$36.08
2	55	\$30.17	\$8.65	\$6.27	\$0.00	\$45.09
3	60	\$32.92	\$8.65	\$6.84	\$0.00	\$48.41
4	65	\$35.66	\$8.65	\$7.41	\$0.00	\$51.72
5	70	\$38.40	\$8.65	\$19.63	\$0.00	\$66.68
6	75	\$41.15	\$8.65	\$20.20	\$0.00	\$70.00
7	80	\$43.89	\$8.65	\$20.77	\$0.00	\$73.31
8	90	\$49.37	\$8.65	\$21.91	\$0.00	\$79.93

**Notes:**  
 Steps are 750 hrs.

**Apprentice to Journeyworker Ratio:1:1**

DEMO: ADZEMAN LABORERS - ZONE 2	12/01/2021	\$41.33	\$9.10	\$17.57	\$0.00	\$68.00
	06/01/2022	\$42.33	\$9.10	\$17.57	\$0.00	\$69.00
	12/01/2022	\$43.33	\$9.10	\$17.57	\$0.00	\$70.00
	06/01/2023	\$44.33	\$9.10	\$17.57	\$0.00	\$71.00
	12/01/2023	\$45.58	\$9.10	\$17.57	\$0.00	\$72.25

For apprentice rates see "Apprentice- LABORER"

DEMO: BACKHOE/LOADER/HAMMER OPERATOR LABORERS - ZONE 2	12/01/2021	\$42.33	\$9.10	\$17.57	\$0.00	\$69.00
	06/01/2022	\$43.33	\$9.10	\$17.57	\$0.00	\$70.00
	12/01/2022	\$44.33	\$9.10	\$17.57	\$0.00	\$71.00
	06/01/2023	\$45.33	\$9.10	\$17.57	\$0.00	\$72.00
	12/01/2023	\$46.58	\$9.10	\$17.57	\$0.00	\$73.25

For apprentice rates see "Apprentice- LABORER"

DEMO: BURNERS LABORERS - ZONE 2	12/01/2021	\$42.08	\$9.10	\$17.57	\$0.00	\$68.75
	06/01/2022	\$43.08	\$9.10	\$17.57	\$0.00	\$69.75
	12/01/2022	\$44.08	\$9.10	\$17.57	\$0.00	\$70.75
	06/01/2023	\$45.08	\$9.10	\$17.57	\$0.00	\$71.75
	12/01/2023	\$46.33	\$9.10	\$17.57	\$0.00	\$73.00

For apprentice rates see "Apprentice- LABORER"

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
DEMO: CONCRETE CUTTER/SAWYER <i>LABORERS - ZONE 2</i>	12/01/2021	\$42.33	\$9.10	\$17.57	\$0.00	\$69.00
	06/01/2022	\$43.33	\$9.10	\$17.57	\$0.00	\$70.00
	12/01/2022	\$44.33	\$9.10	\$17.57	\$0.00	\$71.00
	06/01/2023	\$45.33	\$9.10	\$17.57	\$0.00	\$72.00
	12/01/2023	\$46.58	\$9.10	\$17.57	\$0.00	\$73.25
For apprentice rates see "Apprentice- LABORER"						
DEMO: JACKHAMMER OPERATOR <i>LABORERS - ZONE 2</i>	12/01/2021	\$42.08	\$9.10	\$17.57	\$0.00	\$68.75
	06/01/2022	\$43.08	\$9.10	\$17.57	\$0.00	\$69.75
	12/01/2022	\$44.08	\$9.10	\$17.57	\$0.00	\$70.75
	06/01/2023	\$45.08	\$9.10	\$17.57	\$0.00	\$71.75
	12/01/2023	\$46.33	\$9.10	\$17.57	\$0.00	\$73.00
For apprentice rates see "Apprentice- LABORER"						
DEMO: WRECKING LABORER <i>LABORERS - ZONE 2</i>	12/01/2021	\$41.33	\$9.10	\$17.57	\$0.00	\$68.00
	06/01/2022	\$42.33	\$9.10	\$17.57	\$0.00	\$69.00
	12/01/2022	\$43.33	\$9.10	\$17.57	\$0.00	\$70.00
	06/01/2023	\$44.33	\$9.10	\$17.57	\$0.00	\$71.00
	12/01/2023	\$45.58	\$9.10	\$17.57	\$0.00	\$72.25
For apprentice rates see "Apprentice- LABORER"						
DIRECTIONAL DRILL MACHINE OPERATOR <i>OPERATING ENGINEERS LOCAL 4</i>	12/01/2021	\$50.83	\$14.00	\$16.05	\$0.00	\$80.88
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
DIVER <i>PILE DRIVER LOCAL 56 (ZONE 1)</i>	08/01/2020	\$68.70	\$9.40	\$23.12	\$0.00	\$101.22
For apprentice rates see "Apprentice- PILE DRIVER"						
DIVER TENDER <i>PILE DRIVER LOCAL 56 (ZONE 1)</i>	08/01/2020	\$49.07	\$9.40	\$23.12	\$0.00	\$81.59
For apprentice rates see "Apprentice- PILE DRIVER"						
DIVER TENDER (EFFLUENT) <i>PILE DRIVER LOCAL 56 (ZONE 1)</i>	08/01/2020	\$73.60	\$9.40	\$23.12	\$0.00	\$106.12
For apprentice rates see "Apprentice- PILE DRIVER"						
DIVER/SLURRY (EFFLUENT) <i>PILE DRIVER LOCAL 56 (ZONE 1)</i>	08/01/2020	\$103.05	\$9.40	\$23.12	\$0.00	\$135.57
For apprentice rates see "Apprentice- PILE DRIVER"						
DRAWBRIDGE OPERATOR (Construction) <i>DRAWBRIDGE - SEIU LOCAL 888</i>	07/01/2020	\$26.77	\$6.67	\$3.93	\$0.16	\$37.53
ELECTRICIAN <i>ELECTRICIANS LOCAL 223</i>	03/01/2022	\$44.89	\$11.25	\$15.51	\$0.00	\$71.65
	09/01/2022	\$46.35	\$11.50	\$16.18	\$0.00	\$74.03
	09/01/2023	\$47.87	\$11.75	\$16.86	\$0.00	\$76.48

**Classification**

Effective Date    Base Wage    Health    Pension    Supplemental Unemployment    Total Rate  
Attachment 3 - Page 370

**Apprentice - ELECTRICIAN - Local 223**

**Effective Date - 03/01/2022**

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	40	\$17.96	\$11.25	\$0.54	\$0.00	\$29.75
2	45	\$20.20	\$11.25	\$0.61	\$0.00	\$32.06
3	50	\$22.45	\$11.25	\$0.67	\$0.00	\$34.37
4	55	\$24.69	\$11.25	\$6.93	\$0.00	\$42.87
5	60	\$26.93	\$11.25	\$7.42	\$0.00	\$45.60
6	65	\$29.18	\$11.25	\$7.88	\$0.00	\$48.31
7	70	\$31.42	\$11.25	\$8.41	\$0.00	\$51.08
8	75	\$33.67	\$11.25	\$8.91	\$0.00	\$53.83

**Effective Date - 09/01/2022**

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	40	\$18.54	\$11.50	\$0.56	\$0.00	\$30.60
2	45	\$20.86	\$11.50	\$0.63	\$0.00	\$32.99
3	50	\$23.18	\$11.50	\$0.70	\$0.00	\$35.38
4	55	\$25.49	\$11.50	\$7.35	\$0.00	\$44.34
5	60	\$27.81	\$11.50	\$7.86	\$0.00	\$47.17
6	65	\$30.13	\$11.50	\$8.37	\$0.00	\$50.00
7	70	\$32.45	\$11.50	\$8.89	\$0.00	\$52.84
8	75	\$34.76	\$11.50	\$9.40	\$0.00	\$55.66

**Notes:**

**Apprentice to Journeyworker Ratio:2:3\*\*\***

ELEVATOR CONSTRUCTOR ELEVATOR CONSTRUCTORS LOCAL 4	01/01/2022	\$65.62	\$16.03	\$20.21	\$0.00	\$101.86
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**Apprentice - ELEVATOR CONSTRUCTOR - Local 4**

**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	01/01/2022	\$45.93	\$16.03	\$20.21	\$0.00	\$82.17
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**Classification**

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
For apprentice rates see "Apprentice - ELEVATOR CONSTRUCTOR"						
FENCE & GUARD RAIL ERECTOR (HEAVY & HIGHWAY) LABORERS - ZONE 2 (HEAVY & HIGHWAY)	12/01/2021	\$35.66	\$9.10	\$16.64	\$0.00	\$61.40
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"						
FIELD ENG.INST.PERSON-BLDG,SITE,HVY/HWY OPERATING ENGINEERS LOCAL 4	11/01/2021	\$46.53	\$13.75	\$15.80	\$0.00	\$76.08
	05/01/2022	\$47.86	\$13.75	\$15.80	\$0.00	\$77.41
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
FIELD ENG.PARTY CHIEF-BLDG,SITE,HVY/HWY OPERATING ENGINEERS LOCAL 4	11/01/2021	\$48.06	\$13.75	\$15.80	\$0.00	\$77.61
	05/01/2022	\$49.22	\$13.75	\$15.80	\$0.00	\$78.77
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
FIELD ENG.ROD PERSON-BLDG,SITE,HVY/HWY OPERATING ENGINEERS LOCAL 4	11/01/2021	\$23.16	\$13.75	\$15.80	\$0.00	\$52.71
	05/01/2022	\$23.83	\$13.75	\$15.80	\$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	12/01/2021	\$41.76	\$14.00	\$16.05	\$0.00	\$71.81
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
FLAGGER & SIGNALER (HEAVY & HIGHWAY) LABORERS - ZONE 2 (HEAVY & HIGHWAY)	12/01/2021	\$24.50	\$9.10	\$16.64	\$0.00	\$50.24
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"						
FLOORCOVERER FLOORCOVERERS LOCAL 2168 ZONE 1	03/01/2022	\$49.93	\$8.68	\$20.27	\$0.00	\$78.88

**Apprentice - FLOORCOVERER - Local 2168 Zone 1**

**Effective Date - 03/01/2022**

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$24.97	\$8.68	\$1.79	\$0.00	\$35.44
2	55	\$27.46	\$8.68	\$1.79	\$0.00	\$37.93
3	60	\$29.96	\$8.68	\$14.90	\$0.00	\$53.54
4	65	\$32.45	\$8.68	\$14.90	\$0.00	\$56.03
5	70	\$34.95	\$8.68	\$16.69	\$0.00	\$60.32
6	75	\$37.45	\$8.68	\$16.69	\$0.00	\$62.82
7	80	\$39.94	\$8.68	\$18.48	\$0.00	\$67.10
8	85	\$42.44	\$8.68	\$18.48	\$0.00	\$69.60

**Notes:** Steps are 750 hrs.  
% After 10/1/17; 45/45/55/55/70/70/80/80 (1500hr Steps)  
Step 1&2 \$32.94/ 3&4 \$39.66/ 5&6 \$60.32/ 7&8 \$67.10

**Apprentice to Journeyworker Ratio:1:1**

FORK LIFT/CHERRY PICKER OPERATING ENGINEERS LOCAL 4	12/01/2021	\$51.38	\$14.00	\$16.05	\$0.00	\$81.43
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
GENERATOR/LIGHTING PLANT/HEATERS OPERATING ENGINEERS LOCAL 4	12/01/2021	\$33.69	\$14.00	\$16.05	\$0.00	\$63.74

**Classification**

**Effective Date    Base Wage    Health    Pension    Supplemental Unemployment    Total Rate**

For apprentice rates see "Apprentice- OPERATING ENGINEERS"

GLAZIER (GLASS PLANK/AIR BARRIER/INTERIOR SYSTEMS) <i>GLAZIERS LOCAL 35 (ZONE 2)</i>	01/01/2022	\$43.16	\$8.65	\$23.05	\$0.00	\$74.86
	07/01/2022	\$44.36	\$8.65	\$23.05	\$0.00	\$76.06
	01/01/2023	\$45.56	\$8.65	\$23.05	\$0.00	\$77.26
	07/01/2023	\$46.76	\$8.65	\$23.05	\$0.00	\$78.46
	01/01/2024	\$47.96	\$8.65	\$23.05	\$0.00	\$79.66
	07/01/2024	\$49.16	\$8.65	\$23.05	\$0.00	\$80.86
	01/01/2025	\$50.36	\$8.65	\$23.05	\$0.00	\$82.06

**Apprentice - GLAZIER - Local 35 Zone 2**

**Effective Date - 01/01/2022**

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$21.58	\$8.65	\$0.00	\$0.00	\$30.23
2	55	\$23.74	\$8.65	\$6.27	\$0.00	\$38.66
3	60	\$25.90	\$8.65	\$6.84	\$0.00	\$41.39
4	65	\$28.05	\$8.65	\$7.41	\$0.00	\$44.11
5	70	\$30.21	\$8.65	\$19.63	\$0.00	\$58.49
6	75	\$32.37	\$8.65	\$20.20	\$0.00	\$61.22
7	80	\$34.53	\$8.65	\$20.77	\$0.00	\$63.95
8	90	\$38.84	\$8.65	\$21.91	\$0.00	\$69.40

**Effective Date - 07/01/2022**

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$22.18	\$8.65	\$0.00	\$0.00	\$30.83
2	55	\$24.40	\$8.65	\$6.27	\$0.00	\$39.32
3	60	\$26.62	\$8.65	\$6.84	\$0.00	\$42.11
4	65	\$28.83	\$8.65	\$7.41	\$0.00	\$44.89
5	70	\$31.05	\$8.65	\$19.63	\$0.00	\$59.33
6	75	\$33.27	\$8.65	\$20.20	\$0.00	\$62.12
7	80	\$35.49	\$8.65	\$20.77	\$0.00	\$64.91
8	90	\$39.92	\$8.65	\$21.91	\$0.00	\$70.48

**Notes:**

Steps are 750 hrs.

**Apprentice to Journeyworker Ratio:1:1**

HOISTING ENGINEER/CRANES/GRADALLS <i>OPERATING ENGINEERS LOCAL 4</i>	12/01/2021	\$51.38	\$14.00	\$16.05	\$0.00	\$81.43
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**Classification**

**Effective Date    Base Wage    Health    Pension    Supplemental Unemployment    Total Rate**

**Apprentice - OPERATING ENGINEERS - Local 4**

**Effective Date - 12/01/2021**

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	55	\$28.26	\$14.00	\$0.00	\$0.00	\$42.26
2	60	\$30.83	\$14.00	\$16.05	\$0.00	\$60.88
3	65	\$33.40	\$14.00	\$16.05	\$0.00	\$63.45
4	70	\$35.97	\$14.00	\$16.05	\$0.00	\$66.02
5	75	\$38.54	\$14.00	\$16.05	\$0.00	\$68.59
6	80	\$41.10	\$14.00	\$16.05	\$0.00	\$71.15
7	85	\$43.67	\$14.00	\$16.05	\$0.00	\$73.72
8	90	\$46.24	\$14.00	\$16.05	\$0.00	\$76.29

**Notes:**

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**Apprentice to Journeyworker Ratio:1:6**

HVAC (DUCTWORK) <i>SHEETMETAL WORKERS LOCAL 17 - A</i>	02/01/2022	\$53.70	\$13.80	\$25.60	\$2.79	\$95.89
For apprentice rates see "Apprentice- SHEET METAL WORKER"						
HVAC (ELECTRICAL CONTROLS) <i>ELECTRICIANS LOCAL 223</i>	09/01/2020	\$43.66	\$10.90	\$14.66	\$0.00	\$69.22
For apprentice rates see "Apprentice- ELECTRICIAN"						
HVAC (TESTING AND BALANCING - AIR) <i>SHEETMETAL WORKERS LOCAL 17 - A</i>	02/01/2022	\$53.70	\$13.80	\$25.60	\$2.79	\$95.89
For apprentice rates see "Apprentice- SHEET METAL WORKER"						
HVAC (TESTING AND BALANCING -WATER) <i>PLUMBERS &amp; PIPEFITTERS LOCAL 51</i>	08/30/2021	\$46.49	\$10.15	\$19.95	\$0.00	\$76.59
For apprentice rates see "Apprentice- PIPEFITTER" or "PLUMBER/PIPEFITTER"						
HVAC MECHANIC <i>PLUMBERS &amp; PIPEFITTERS LOCAL 51</i>	08/30/2021	\$46.49	\$10.15	\$19.95	\$0.00	\$76.59
For apprentice rates see "Apprentice- PIPEFITTER" or "PLUMBER/PIPEFITTER"						
HYDRAULIC DRILLS <i>LABORERS - ZONE 2</i>	12/01/2021	\$36.16	\$9.10	\$16.64	\$0.00	\$61.90
	06/01/2022	\$37.06	\$9.10	\$16.64	\$0.00	\$62.80
	12/01/2022	\$37.91	\$9.10	\$16.64	\$0.00	\$63.65
	06/01/2023	\$38.81	\$9.10	\$16.64	\$0.00	\$64.55
	12/01/2023	\$39.71	\$9.10	\$16.64	\$0.00	\$65.45
For apprentice rates see "Apprentice- LABORER"						
HYDRAULIC DRILLS (HEAVY & HIGHWAY) <i>LABORERS - ZONE 2 (HEAVY &amp; HIGHWAY)</i>	12/01/2021	\$36.16	\$9.10	\$16.64	\$0.00	\$61.90
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"						
INSULATOR (PIPES & TANKS) <i>HEAT &amp; FROST INSULATORS LOCAL 6 (BOSTON)</i>	09/01/2021	\$51.40	\$13.80	\$17.14	\$0.00	\$82.34
	09/01/2022	\$53.85	\$13.80	\$17.14	\$0.00	\$84.79

Classification

Effective Date Base Wage Health Pension Supplemental Unemployment Total Rate

Apprentice - ASBESTOS INSULATOR (Pipes & Tanks) - Local 6 Boston

Effective Date - 09/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$25.70	\$13.80	\$12.42	\$0.00	\$51.92
2	60	\$30.84	\$13.80	\$13.36	\$0.00	\$58.00
3	70	\$35.98	\$13.80	\$14.31	\$0.00	\$64.09
4	80	\$41.12	\$13.80	\$15.25	\$0.00	\$70.17

Effective Date - 09/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$26.93	\$13.80	\$12.42	\$0.00	\$53.15
2	60	\$32.31	\$13.80	\$13.36	\$0.00	\$59.47
3	70	\$37.70	\$13.80	\$14.31	\$0.00	\$65.81
4	80	\$43.08	\$13.80	\$15.25	\$0.00	\$72.13

Notes:

Steps are 1 year

Apprentice to Journeyworker Ratio:1:4

IRONWORKER/WELDER IRONWORKERS LOCAL 7 (BOSTON AREA)	03/16/2022	\$50.60	\$8.20	\$26.50	\$0.00	\$85.30
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Apprentice - IRONWORKER - Local 7 Boston

Effective Date - 03/16/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	\$30.36	\$8.20	\$26.50	\$0.00	\$65.06
2	70	\$35.42	\$8.20	\$26.50	\$0.00	\$70.12
3	75	\$37.95	\$8.20	\$26.50	\$0.00	\$72.65
4	80	\$40.48	\$8.20	\$26.50	\$0.00	\$75.18
5	85	\$43.01	\$8.20	\$26.50	\$0.00	\$77.71
6	90	\$45.54	\$8.20	\$26.50	\$0.00	\$80.24

Notes:

\*\* Structural 1:6; Ornamental 1:4

Apprentice to Journeyworker Ratio:\*\*

JACKHAMMER & PAVING BREAKER OPERATOR LABORERS - ZONE 2	12/01/2021	\$35.66	\$9.10	\$16.64	\$0.00	\$61.40
	06/01/2022	\$36.56	\$9.10	\$16.64	\$0.00	\$62.30
	12/01/2022	\$37.41	\$9.10	\$16.64	\$0.00	\$63.15
	06/01/2023	\$38.31	\$9.10	\$16.64	\$0.00	\$64.05
	12/01/2023	\$39.21	\$9.10	\$16.64	\$0.00	\$64.95

For apprentice rates see "Apprentice- LABORER"

**Classification**

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
LABORER LABORERS - ZONE 2	12/01/2021	\$35.41	\$9.10	\$16.64	\$0.00	\$61.15
	06/01/2022	\$36.31	\$9.10	\$16.64	\$0.00	\$62.05
	12/01/2022	\$37.16	\$9.10	\$16.64	\$0.00	\$62.90
	06/01/2023	\$38.06	\$9.10	\$16.64	\$0.00	\$63.80
	12/01/2023	\$38.96	\$9.10	\$16.64	\$0.00	\$64.70

**Apprentice - LABORER - Zone 2**

**Effective Date - 12/01/2021**

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	\$21.25	\$9.10	\$16.64	\$0.00	\$46.99
2	70	\$24.79	\$9.10	\$16.64	\$0.00	\$50.53
3	80	\$28.33	\$9.10	\$16.64	\$0.00	\$54.07
4	90	\$31.87	\$9.10	\$16.64	\$0.00	\$57.61

**Effective Date - 06/01/2022**

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	\$21.79	\$9.10	\$16.64	\$0.00	\$47.53
2	70	\$25.42	\$9.10	\$16.64	\$0.00	\$51.16
3	80	\$29.05	\$9.10	\$16.64	\$0.00	\$54.79
4	90	\$32.68	\$9.10	\$16.64	\$0.00	\$58.42

Notes:

**Apprentice to Journeyworker Ratio:1:5**

LABORER (HEAVY & HIGHWAY) LABORERS - ZONE 2 (HEAVY & HIGHWAY)	12/01/2021	\$35.41	\$9.10	\$16.64	\$0.00	\$61.15
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**Apprentice - LABORER (Heavy & Highway) - Zone 2**

**Effective Date - 12/01/2021**

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	\$21.25	\$9.10	\$16.64	\$0.00	\$46.99
2	70	\$24.79	\$9.10	\$16.64	\$0.00	\$50.53
3	80	\$28.33	\$9.10	\$16.64	\$0.00	\$54.07
4	90	\$31.87	\$9.10	\$16.64	\$0.00	\$57.61

Notes:

**Apprentice to Journeyworker Ratio:1:5**

LABORER: CARPENTER TENDER LABORERS - ZONE 2	12/01/2021	\$35.41	\$9.10	\$16.64	\$0.00	\$61.15
	06/01/2022	\$36.31	\$9.10	\$16.64	\$0.00	\$62.05
	12/01/2022	\$37.16	\$9.10	\$16.64	\$0.00	\$62.90
	06/01/2023	\$38.06	\$9.10	\$16.64	\$0.00	\$63.80
	12/01/2023	\$38.96	\$9.10	\$16.64	\$0.00	\$64.70

For apprentice rates see "Apprentice- LABORER"

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
LABORER: CEMENT FINISHER TENDER <i>LABORERS - ZONE 2</i>	12/01/2021	\$35.41	\$9.10	\$16.64	\$0.00	\$61.15
	06/01/2022	\$36.31	\$9.10	\$16.64	\$0.00	\$62.05
	12/01/2022	\$37.16	\$9.10	\$16.64	\$0.00	\$62.90
	06/01/2023	\$38.06	\$9.10	\$16.64	\$0.00	\$63.80
	12/01/2023	\$38.96	\$9.10	\$16.64	\$0.00	\$64.70
For apprentice rates see "Apprentice- LABORER"						
LABORER: HAZARDOUS WASTE/ASBESTOS REMOVER <i>LABORERS - ZONE 2</i>	12/01/2021	\$35.50	\$9.10	\$16.70	\$0.00	\$61.30
	06/01/2022	\$36.40	\$9.10	\$16.70	\$0.00	\$62.20
	12/01/2022	\$37.25	\$9.10	\$16.70	\$0.00	\$63.05
	06/01/2023	\$38.15	\$9.10	\$16.70	\$0.00	\$63.95
	12/01/2023	\$39.05	\$9.10	\$16.70	\$0.00	\$64.85
For apprentice rates see "Apprentice- LABORER"						
LABORER: MASON TENDER <i>LABORERS - ZONE 2</i>	12/01/2021	\$35.66	\$9.10	\$16.64	\$0.00	\$61.40
	06/01/2022	\$36.56	\$9.10	\$16.64	\$0.00	\$62.30
	12/01/2022	\$37.41	\$9.10	\$16.64	\$0.00	\$63.15
	06/01/2023	\$38.31	\$9.10	\$16.64	\$0.00	\$64.05
	12/01/2023	\$39.21	\$9.10	\$16.64	\$0.00	\$64.95
For apprentice rates see "Apprentice- LABORER"						
LABORER: MASON TENDER (HEAVY & HIGHWAY) <i>LABORERS - ZONE 2 (HEAVY &amp; HIGHWAY)</i>	12/01/2021	\$35.66	\$9.10	\$16.64	\$0.00	\$61.40
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"						
LABORER: MULTI-TRADE TENDER <i>LABORERS - ZONE 2</i>	12/01/2021	\$35.41	\$9.10	\$16.64	\$0.00	\$61.15
	06/01/2022	\$36.31	\$9.10	\$16.64	\$0.00	\$62.05
	12/01/2022	\$37.16	\$9.10	\$16.64	\$0.00	\$62.90
	06/01/2023	\$38.06	\$9.10	\$16.64	\$0.00	\$63.80
	12/01/2023	\$38.96	\$9.10	\$16.64	\$0.00	\$64.70
For apprentice rates see "Apprentice- LABORER"						
LABORER: TREE REMOVER <i>LABORERS - ZONE 2</i>	12/01/2021	\$35.41	\$9.10	\$16.64	\$0.00	\$61.15
	06/01/2022	\$36.31	\$9.10	\$16.64	\$0.00	\$62.05
	12/01/2022	\$37.16	\$9.10	\$16.64	\$0.00	\$62.90
	06/01/2023	\$38.06	\$9.10	\$16.64	\$0.00	\$63.80
	12/01/2023	\$38.96	\$9.10	\$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"						
LASER BEAM OPERATOR <i>LABORERS - ZONE 2</i>	12/01/2021	\$35.66	\$9.10	\$16.64	\$0.00	\$61.40
	06/01/2022	\$36.56	\$9.10	\$16.64	\$0.00	\$62.30
	12/01/2022	\$37.41	\$9.10	\$16.64	\$0.00	\$63.15
	06/01/2023	\$38.31	\$9.10	\$16.64	\$0.00	\$64.05
	12/01/2023	\$39.21	\$9.10	\$16.64	\$0.00	\$64.95
For apprentice rates see "Apprentice- LABORER"						
LASER BEAM OPERATOR (HEAVY & HIGHWAY) <i>LABORERS - ZONE 2 (HEAVY &amp; HIGHWAY)</i>	12/01/2021	\$35.66	\$9.10	\$16.64	\$0.00	\$61.40
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"						
MARBLE & TILE FINISHERS <i>BRICKLAYERS LOCAL 3 - MARBLE &amp; TILE</i>	02/01/2022	\$43.69	\$11.39	\$20.37	\$0.00	\$75.45

**Classification**

**Effective Date    Base Wage    Health    Pension    Supplemental Unemployment    Total Rate**

**Apprentice - MARBLE & TILE FINISHER - Local 3 Marble & Tile**

**Effective Date - 02/01/2022**

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$21.85	\$11.39	\$20.37	\$0.00	\$53.61
2	60	\$26.21	\$11.39	\$20.37	\$0.00	\$57.97
3	70	\$30.58	\$11.39	\$20.37	\$0.00	\$62.34
4	80	\$34.95	\$11.39	\$20.37	\$0.00	\$66.71
5	90	\$39.32	\$11.39	\$20.37	\$0.00	\$71.08

**Notes:**

**Apprentice to Journeyworker Ratio:1:3**

MARBLE MASONS, TILELAYERS & TERRAZZO MECH BRICKLAYERS LOCAL 3 - MARBLE & TILE	02/01/2022	\$57.17	\$11.39	\$22.31	\$0.00	\$90.87
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**Apprentice - MARBLE-TILE-TERRAZZO MECHANIC - Local 3 Marble & Tile**

**Effective Date - 02/01/2022**

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$28.59	\$11.39	\$22.31	\$0.00	\$62.29
2	60	\$34.30	\$11.39	\$22.31	\$0.00	\$68.00
3	70	\$40.02	\$11.39	\$22.31	\$0.00	\$73.72
4	80	\$45.74	\$11.39	\$22.31	\$0.00	\$79.44
5	90	\$51.45	\$11.39	\$22.31	\$0.00	\$85.15

**Notes:**

**Apprentice to Journeyworker Ratio:1:5**

MECH. SWEEPER OPERATOR (ON CONST. SITES) OPERATING ENGINEERS LOCAL 4	12/01/2021	\$50.83	\$14.00	\$16.05	\$0.00	\$80.88
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For apprentice rates see "Apprentice- OPERATING ENGINEERS"

MECHANICS MAINTENANCE OPERATING ENGINEERS LOCAL 4	12/01/2021	\$50.83	\$14.00	\$16.05	\$0.00	\$80.88
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For apprentice rates see "Apprentice- OPERATING ENGINEERS"

MILLWRIGHT (Zone 2) MILLWRIGHTS LOCAL 1121 - Zone 2	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    Total Rate**

**Apprentice - MILLWRIGHT - Local 1121 Zone 2**

**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

**Effective Date - 01/02/2023**

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	55	\$23.06	\$8.58	\$5.72	\$0.00	\$37.36
2	65	\$27.25	\$8.58	\$17.93	\$0.00	\$53.76
3	75	\$31.44	\$8.58	\$18.98	\$0.00	\$59.00
4	85	\$35.63	\$8.58	\$20.01	\$0.00	\$64.22

**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:1:4**

MORTAR MIXER LABORERS - ZONE 2	12/01/2021	\$35.66	\$9.10	\$16.64	\$0.00	\$61.40
	06/01/2022	\$36.56	\$9.10	\$16.64	\$0.00	\$62.30
	12/01/2022	\$37.41	\$9.10	\$16.64	\$0.00	\$63.15
	06/01/2023	\$38.31	\$9.10	\$16.64	\$0.00	\$64.05
	12/01/2023	\$39.21	\$9.10	\$16.64	\$0.00	\$64.95
For apprentice rates see "Apprentice- LABORER"						
OILER (OTHER THAN TRUCK CRANES,GRADALLS) OPERATING ENGINEERS LOCAL 4	12/01/2021	\$23.48	\$14.00	\$16.05	\$0.00	\$53.53
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
OILER (TRUCK CRANES, GRADALLS) OPERATING ENGINEERS LOCAL 4	12/01/2021	\$28.44	\$14.00	\$16.05	\$0.00	\$58.49
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
OTHER POWER DRIVEN EQUIPMENT - CLASS II OPERATING ENGINEERS LOCAL 4	12/01/2021	\$50.83	\$14.00	\$16.05	\$0.00	\$80.88
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
Painter (BRIDGES/TANKS) PAINTERS LOCAL 35 - ZONE 2	01/01/2022	\$53.66	\$8.65	\$23.05	\$0.00	\$85.36
	07/01/2022	\$54.86	\$8.65	\$23.05	\$0.00	\$86.56
	01/01/2023	\$56.06	\$8.65	\$23.05	\$0.00	\$87.76
	07/01/2023	\$57.26	\$8.65	\$23.05	\$0.00	\$88.96
	01/01/2024	\$58.46	\$8.65	\$23.05	\$0.00	\$90.16
	07/01/2024	\$59.66	\$8.65	\$23.05	\$0.00	\$91.36
	01/01/2025	\$60.86	\$8.65	\$23.05	\$0.00	\$92.56

**Classification**

**Effective Date    Base Wage    Health    Pension    Supplemental Unemployment    Total Rate**

**Apprentice - PAINTER Local 35 - BRIDGES/TANKS**

**Effective Date - 01/01/2022**

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$26.83	\$8.65	\$0.00	\$0.00	\$35.48
2	55	\$29.51	\$8.65	\$6.27	\$0.00	\$44.43
3	60	\$32.20	\$8.65	\$6.84	\$0.00	\$47.69
4	65	\$34.88	\$8.65	\$7.41	\$0.00	\$50.94
5	70	\$37.56	\$8.65	\$19.63	\$0.00	\$65.84
6	75	\$40.25	\$8.65	\$20.20	\$0.00	\$69.10
7	80	\$42.93	\$8.65	\$20.77	\$0.00	\$72.35
8	90	\$48.29	\$8.65	\$21.91	\$0.00	\$78.85

**Effective Date - 07/01/2022**

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$27.43	\$8.65	\$0.00	\$0.00	\$36.08
2	55	\$30.17	\$8.65	\$6.27	\$0.00	\$45.09
3	60	\$32.92	\$8.65	\$6.84	\$0.00	\$48.41
4	65	\$35.66	\$8.65	\$7.41	\$0.00	\$51.72
5	70	\$38.40	\$8.65	\$19.63	\$0.00	\$66.68
6	75	\$41.15	\$8.65	\$20.20	\$0.00	\$70.00
7	80	\$43.89	\$8.65	\$20.77	\$0.00	\$73.31
8	90	\$49.37	\$8.65	\$21.91	\$0.00	\$79.93

**Notes:**

Steps are 750 hrs.

**Apprentice to Journeyworker Ratio:1:1**

PAINTER (SPRAY OR SANDBLAST, NEW) *	01/01/2022	\$44.56	\$8.65	\$23.05	\$0.00	\$76.26
* If 30% or more of surfaces to be painted are new construction, NEW paint rate shall be used. PAINTERS LOCAL 35 - ZONE 2	07/01/2022	\$45.76	\$8.65	\$23.05	\$0.00	\$77.46
	01/01/2023	\$46.96	\$8.65	\$23.05	\$0.00	\$78.66
	07/01/2023	\$48.16	\$8.65	\$23.05	\$0.00	\$79.86
	01/01/2024	\$49.36	\$8.65	\$23.05	\$0.00	\$81.06
	07/01/2024	\$50.56	\$8.65	\$23.05	\$0.00	\$82.26
	01/01/2025	\$51.76	\$8.65	\$23.05	\$0.00	\$83.46

**Apprentice - PAINTER Local 35 Zone 2 - Spray/Sandblast - New**

**Effective Date - 01/01/2022**

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$22.28	\$8.65	\$0.00	\$0.00	\$30.93
2	55	\$24.51	\$8.65	\$6.27	\$0.00	\$39.43
3	60	\$26.74	\$8.65	\$6.84	\$0.00	\$42.23
4	65	\$28.96	\$8.65	\$7.41	\$0.00	\$45.02
5	70	\$31.19	\$8.65	\$19.63	\$0.00	\$59.47
6	75	\$33.42	\$8.65	\$20.20	\$0.00	\$62.27
7	80	\$35.65	\$8.65	\$20.77	\$0.00	\$65.07
8	90	\$40.10	\$8.65	\$21.91	\$0.00	\$70.66

**Effective Date - 07/01/2022**

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$22.88	\$8.65	\$0.00	\$0.00	\$31.53
2	55	\$25.17	\$8.65	\$6.27	\$0.00	\$40.09
3	60	\$27.46	\$8.65	\$6.84	\$0.00	\$42.95
4	65	\$29.74	\$8.65	\$7.41	\$0.00	\$45.80
5	70	\$32.03	\$8.65	\$19.63	\$0.00	\$60.31
6	75	\$34.32	\$8.65	\$20.20	\$0.00	\$63.17
7	80	\$36.61	\$8.65	\$20.77	\$0.00	\$66.03
8	90	\$41.18	\$8.65	\$21.91	\$0.00	\$71.74

**Notes:**  
Steps are 750 hrs.

**Apprentice to Journeyworker Ratio:1:1**

PAINTER (SPRAY OR SANDBLAST, REPAINT)	01/01/2022	\$42.62	\$8.65	\$23.05	\$0.00	\$74.32
PAINTERS LOCAL 35 - ZONE 2	07/01/2022	\$43.82	\$8.65	\$23.05	\$0.00	\$75.52
	01/01/2023	\$45.02	\$8.65	\$23.05	\$0.00	\$76.72
	07/01/2023	\$46.22	\$8.65	\$23.05	\$0.00	\$77.92
	01/01/2024	\$47.42	\$8.65	\$23.05	\$0.00	\$79.12
	07/01/2024	\$48.62	\$8.65	\$23.05	\$0.00	\$80.32
	01/01/2025	\$49.82	\$8.65	\$23.05	\$0.00	\$81.52



**Apprentice - PAINTER Local 35 Zone 2 - Spray/Sandblast - Repaint**

**Effective Date - 01/01/2022**

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$21.31	\$8.65	\$0.00	\$0.00	\$29.96
2	55	\$23.44	\$8.65	\$6.27	\$0.00	\$38.36
3	60	\$25.57	\$8.65	\$6.84	\$0.00	\$41.06
4	65	\$27.70	\$8.65	\$7.41	\$0.00	\$43.76
5	70	\$29.83	\$8.65	\$19.63	\$0.00	\$58.11
6	75	\$31.97	\$8.65	\$20.20	\$0.00	\$60.82
7	80	\$34.10	\$8.65	\$20.77	\$0.00	\$63.52
8	90	\$38.36	\$8.65	\$21.91	\$0.00	\$68.92

**Effective Date - 07/01/2022**

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$21.91	\$8.65	\$0.00	\$0.00	\$30.56
2	55	\$24.10	\$8.65	\$6.27	\$0.00	\$39.02
3	60	\$26.29	\$8.65	\$6.84	\$0.00	\$41.78
4	65	\$28.48	\$8.65	\$7.41	\$0.00	\$44.54
5	70	\$30.67	\$8.65	\$19.63	\$0.00	\$58.95
6	75	\$32.87	\$8.65	\$20.20	\$0.00	\$61.72
7	80	\$35.06	\$8.65	\$20.77	\$0.00	\$64.48
8	90	\$39.44	\$8.65	\$21.91	\$0.00	\$70.00

**Notes:**  
Steps are 750 hrs.

**Apprentice to Journeyworker Ratio:1:1**

PAINTER / TAPER (BRUSH, NEW) *	01/01/2022	\$43.16	\$8.65	\$23.05	\$0.00	\$74.86
* If 30% or more of surfaces to be painted are new construction, NEW paint rate shall be used. PAINTERS LOCAL 35 - ZONE 2	07/01/2022	\$44.36	\$8.65	\$23.05	\$0.00	\$76.06
	01/01/2023	\$45.56	\$8.65	\$23.05	\$0.00	\$77.26
	07/01/2023	\$46.76	\$8.65	\$23.05	\$0.00	\$78.46
	01/01/2024	\$47.96	\$8.65	\$23.05	\$0.00	\$79.66
	07/01/2024	\$49.16	\$8.65	\$23.05	\$0.00	\$80.86
	01/01/2025	\$50.36	\$8.65	\$23.05	\$0.00	\$82.06

**Classification**

**Effective Date    Base Wage    Health    Pension    Supplemental Unemployment    Total Rate**

**Apprentice - PAINTER - Local 35 Zone 2 - BRUSH NEW**

**Effective Date - 01/01/2022**

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$21.58	\$8.65	\$0.00	\$0.00	\$30.23
2	55	\$23.74	\$8.65	\$6.27	\$0.00	\$38.66
3	60	\$25.90	\$8.65	\$6.84	\$0.00	\$41.39
4	65	\$28.05	\$8.65	\$7.41	\$0.00	\$44.11
5	70	\$30.21	\$8.65	\$19.63	\$0.00	\$58.49
6	75	\$32.37	\$8.65	\$20.20	\$0.00	\$61.22
7	80	\$34.53	\$8.65	\$20.77	\$0.00	\$63.95
8	90	\$38.84	\$8.65	\$21.91	\$0.00	\$69.40

**Effective Date - 07/01/2022**

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$22.18	\$8.65	\$0.00	\$0.00	\$30.83
2	55	\$24.40	\$8.65	\$6.27	\$0.00	\$39.32
3	60	\$26.62	\$8.65	\$6.84	\$0.00	\$42.11
4	65	\$28.83	\$8.65	\$7.41	\$0.00	\$44.89
5	70	\$31.05	\$8.65	\$19.63	\$0.00	\$59.33
6	75	\$33.27	\$8.65	\$20.20	\$0.00	\$62.12
7	80	\$35.49	\$8.65	\$20.77	\$0.00	\$64.91
8	90	\$39.92	\$8.65	\$21.91	\$0.00	\$70.48

**Notes:**

Steps are 750 hrs.

**Apprentice to Journeyworker Ratio:1:1**

PAINTER / TAPER (BRUSH, REPAINT)	01/01/2022	\$41.22	\$8.65	\$23.05	\$0.00	\$72.92
PAINTERS LOCAL 35 - ZONE 2	07/01/2022	\$42.42	\$8.65	\$23.05	\$0.00	\$74.12
	01/01/2023	\$43.62	\$8.65	\$23.05	\$0.00	\$75.32
	07/01/2023	\$44.82	\$8.65	\$23.05	\$0.00	\$76.52
	01/01/2024	\$46.02	\$8.65	\$23.05	\$0.00	\$77.72
	07/01/2024	\$47.22	\$8.65	\$23.05	\$0.00	\$78.92
	01/01/2025	\$48.42	\$8.65	\$23.05	\$0.00	\$80.12

**Apprentice - PAINTER Local 35 Zone 2 - BRUSH REPAINT**

Effective Date - 01/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$20.61	\$8.65	\$0.00	\$0.00	\$29.26
2	55	\$22.67	\$8.65	\$6.27	\$0.00	\$37.59
3	60	\$24.73	\$8.65	\$6.84	\$0.00	\$40.22
4	65	\$26.79	\$8.65	\$7.41	\$0.00	\$42.85
5	70	\$28.85	\$8.65	\$19.63	\$0.00	\$57.13
6	75	\$30.92	\$8.65	\$20.20	\$0.00	\$59.77
7	80	\$32.98	\$8.65	\$20.77	\$0.00	\$62.40
8	90	\$37.10	\$8.65	\$21.91	\$0.00	\$67.66

Effective Date - 07/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$21.21	\$8.65	\$0.00	\$0.00	\$29.86
2	55	\$23.33	\$8.65	\$6.27	\$0.00	\$38.25
3	60	\$25.45	\$8.65	\$6.84	\$0.00	\$40.94
4	65	\$27.57	\$8.65	\$7.41	\$0.00	\$43.63
5	70	\$29.69	\$8.65	\$19.63	\$0.00	\$57.97
6	75	\$31.82	\$8.65	\$20.20	\$0.00	\$60.67
7	80	\$33.94	\$8.65	\$20.77	\$0.00	\$63.36
8	90	\$38.18	\$8.65	\$21.91	\$0.00	\$68.74

**Notes:**  
Steps are 750 hrs.

**Apprentice to Journeyworker Ratio:1:1**

PAINTER TRAFFIC MARKINGS (HEAVY/HIGHWAY) LABORERS - ZONE 2 (HEAVY & HIGHWAY)	12/01/2021	\$35.41	\$9.10	\$16.64	\$0.00	\$61.15
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For apprentice rates see "Apprentice- LABORER (Heavy and Highway)

PANEL & PICKUP TRUCKS DRIVER TEAMSTERS JOINT COUNCIL NO. 10 ZONE B	12/01/2021	\$35.78	\$13.41	\$16.01	\$0.00	\$65.20
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PIER AND DOCK CONSTRUCTOR (UNDERPINNING AND DECK) PILE DRIVER LOCAL 56 (ZONE 1)	08/01/2020	\$49.07	\$9.40	\$23.12	\$0.00	\$81.59
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For apprentice rates see "Apprentice- PILE DRIVER"

PILE DRIVER PILE DRIVER LOCAL 56 (ZONE 1)	08/01/2020	\$49.07	\$9.40	\$23.12	\$0.00	\$81.59
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**Classification**

**Effective Date    Base Wage    Health    Pension    Supplemental Unemployment    Total Rate**

**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**

PIPELAYER LABORERS - ZONE 2	12/01/2021	\$35.66	\$9.10	\$16.64	\$0.00	\$61.40
	06/01/2022	\$36.56	\$9.10	\$16.64	\$0.00	\$62.30
	12/01/2022	\$37.41	\$9.10	\$16.64	\$0.00	\$63.15
	06/01/2023	\$38.31	\$9.10	\$16.64	\$0.00	\$64.05
	12/01/2023	\$39.21	\$9.10	\$16.64	\$0.00	\$64.95

For apprentice rates see "Apprentice- LABORER"

PIPELAYER (HEAVY & HIGHWAY) LABORERS - ZONE 2 (HEAVY & HIGHWAY)	12/01/2021	\$35.66	\$9.10	\$16.64	\$0.00	\$61.40
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For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"

PLUMBER & PIPEFITTER PLUMBERS & PIPEFITTERS LOCAL 51	08/30/2021	\$46.49	\$10.15	\$19.95	\$0.00	\$76.59
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**Apprentice - PLUMBER/PIPEFITTER - Local 51**

**Effective Date - 08/30/2021**

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	40	\$18.60	\$10.15	\$2.50	\$0.00	\$31.25
2	50	\$23.25	\$10.15	\$2.50	\$0.00	\$35.90
3	60	\$27.89	\$10.15	\$8.80	\$0.00	\$46.84
4	70	\$32.54	\$10.15	\$14.08	\$0.00	\$56.77
5	80	\$37.19	\$10.15	\$17.60	\$0.00	\$64.94

**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	08/30/2021	\$46.49	\$10.15	\$19.95	\$0.00	\$76.59
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For apprentice rates see "Apprentice- PIPEFITTER" or "PLUMBER/PIPEFITTER"

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
PNEUMATIC DRILL/TOOL OPERATOR <i>LABORERS - ZONE 2</i>	12/01/2021	\$35.66	\$9.10	\$16.64	\$0.00	\$61.40
	06/01/2022	\$36.56	\$9.10	\$16.64	\$0.00	\$62.30
	12/01/2022	\$37.41	\$9.10	\$16.64	\$0.00	\$63.15
	06/01/2023	\$38.31	\$9.10	\$16.64	\$0.00	\$64.05
	12/01/2023	\$39.21	\$9.10	\$16.64	\$0.00	\$64.95
For apprentice rates see "Apprentice- LABORER"						
PNEUMATIC DRILL/TOOL OPERATOR (HEAVY & HIGHWAY) <i>LABORERS - ZONE 2 (HEAVY &amp; HIGHWAY)</i>	12/01/2021	\$35.66	\$9.10	\$16.64	\$0.00	\$61.40
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"						
POWDERMAN & BLASTER <i>LABORERS - ZONE 2</i>	12/01/2021	\$36.41	\$9.10	\$16.64	\$0.00	\$62.15
	06/01/2022	\$37.31	\$9.10	\$16.64	\$0.00	\$63.05
	12/01/2022	\$38.16	\$9.10	\$16.64	\$0.00	\$63.90
	06/01/2023	\$39.06	\$9.10	\$16.64	\$0.00	\$64.80
	12/01/2023	\$39.96	\$9.10	\$16.64	\$0.00	\$65.70
For apprentice rates see "Apprentice- LABORER"						
POWDERMAN & BLASTER (HEAVY & HIGHWAY) <i>LABORERS - ZONE 2 (HEAVY &amp; HIGHWAY)</i>	12/01/2021	\$36.41	\$9.10	\$16.64	\$0.00	\$62.15
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"						
POWER SHOVEL/DERRICK/TRENCHING MACHINE <i>OPERATING ENGINEERS LOCAL 4</i>	12/01/2021	\$51.38	\$14.00	\$16.05	\$0.00	\$81.43
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
PUMP OPERATOR (CONCRETE) <i>OPERATING ENGINEERS LOCAL 4</i>	12/01/2021	\$51.38	\$14.00	\$16.05	\$0.00	\$81.43
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
PUMP OPERATOR (DEWATERING, OTHER) <i>OPERATING ENGINEERS LOCAL 4</i>	12/01/2021	\$33.69	\$14.00	\$16.05	\$0.00	\$63.74
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
READY-MIX CONCRETE DRIVER <i>TEAMSTERS 653 - Southeastern Concrete (Weymouth)</i>	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 <i>OPERATING ENGINEERS LOCAL 4</i>	12/01/2021	\$50.83	\$14.00	\$16.05	\$0.00	\$80.88
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
RIDE-ON MOTORIZED BUGGY OPERATOR <i>LABORERS - ZONE 2</i>	12/01/2021	\$35.66	\$9.10	\$16.64	\$0.00	\$61.40
	06/01/2022	\$36.56	\$9.10	\$16.64	\$0.00	\$62.30
	12/01/2022	\$37.41	\$9.10	\$16.64	\$0.00	\$63.15
	06/01/2023	\$38.31	\$9.10	\$16.64	\$0.00	\$64.05
	12/01/2023	\$39.21	\$9.10	\$16.64	\$0.00	\$64.95
For apprentice rates see "Apprentice- LABORER"						
ROLLER/SPREADER/MULCHING MACHINE <i>OPERATING ENGINEERS LOCAL 4</i>	12/01/2021	\$50.83	\$14.00	\$16.05	\$0.00	\$80.88
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
ROOFER (Inc.Roofers Waterproofing &Roofers Damproofg) <i>ROOFERS LOCAL 33</i>	02/01/2022	\$47.03	\$12.28	\$19.45	\$0.00	\$78.76

**Classification**

**Effective Date    Base Wage    Health    Pension    Supplemental Unemployment    Total Rate**

**Apprentice - ROOFER - Local 33**

**Effective Date - 02/01/2022**

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$23.52	\$12.28	\$5.21	\$0.00	\$41.01
2	60	\$28.22	\$12.28	\$19.45	\$0.00	\$59.95
3	65	\$30.57	\$12.28	\$19.45	\$0.00	\$62.30
4	75	\$35.27	\$12.28	\$19.45	\$0.00	\$67.00
5	85	\$39.98	\$12.28	\$19.45	\$0.00	\$71.71

**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	02/01/2022	\$47.28	\$12.28	\$19.45	\$0.00	\$79.01
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For apprentice rates see "Apprentice- ROOFER"

SHEETMETAL WORKER SHEETMETAL WORKERS LOCAL 17 - A	02/01/2022	\$53.70	\$13.80	\$25.60	\$2.79	\$95.89
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**Apprentice - SHEET METAL WORKER - Local 17-A**

**Effective Date - 02/01/2022**

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	42	\$22.55	\$13.80	\$6.01	\$0.00	\$42.36
2	42	\$22.55	\$13.80	\$6.01	\$0.00	\$42.36
3	47	\$25.24	\$13.80	\$11.26	\$1.51	\$51.81
4	47	\$25.24	\$13.80	\$11.26	\$1.51	\$51.81
5	52	\$27.92	\$13.80	\$12.23	\$1.62	\$55.57
6	52	\$27.92	\$13.80	\$12.48	\$1.63	\$55.83
7	60	\$32.22	\$13.80	\$13.87	\$1.80	\$61.69
8	65	\$34.91	\$13.80	\$14.84	\$1.91	\$65.46
9	75	\$40.28	\$13.80	\$16.77	\$2.13	\$72.98
10	85	\$45.65	\$13.80	\$18.20	\$2.33	\$79.98

**Notes:**  
Steps are 6 mos.

**Apprentice to Journeyworker Ratio:1:4**

SPECIALIZED EARTH MOVING EQUIP < 35 TONS TEAMSTERS JOINT COUNCIL NO. 10 ZONE B	12/01/2021	\$36.24	\$13.41	\$16.01	\$0.00	\$65.66
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SPECIALIZED EARTH MOVING EQUIP > 35 TONS TEAMSTERS JOINT COUNCIL NO. 10 ZONE B	12/01/2021	\$36.53	\$13.41	\$16.01	\$0.00	\$65.95
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**Classification**

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
SPRINKLER FITTER	03/01/2022	\$64.36	\$10.44	\$22.10	\$0.00	\$96.90
<i>SPRINKLER FITTERS LOCAL 550 - (Section A) Zone 1</i>	10/01/2022	\$66.06	\$10.44	\$22.10	\$0.00	\$98.60
	03/01/2023	\$67.76	\$10.44	\$22.10	\$0.00	\$100.30
	10/01/2023	\$69.51	\$10.44	\$22.10	\$0.00	\$102.05
	03/01/2024	\$71.31	\$10.44	\$22.10	\$0.00	\$103.85
	10/01/2024	\$73.11	\$10.44	\$22.10	\$0.00	\$105.65
	03/01/2025	\$74.91	\$10.44	\$22.10	\$0.00	\$107.45

**Apprentice - SPRINKLER FITTER - Local 550 (Section A) Zone 1**

Effective Date - 03/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	35	\$22.53	\$10.44	\$12.35	\$0.00	\$45.32
2	40	\$25.74	\$10.44	\$13.10	\$0.00	\$49.28
3	45	\$28.96	\$10.44	\$13.85	\$0.00	\$53.25
4	50	\$32.18	\$10.44	\$14.60	\$0.00	\$57.22
5	55	\$35.40	\$10.44	\$15.35	\$0.00	\$61.19
6	60	\$38.62	\$10.44	\$16.10	\$0.00	\$65.16
7	65	\$41.83	\$10.44	\$16.85	\$0.00	\$69.12
8	70	\$45.05	\$10.44	\$17.60	\$0.00	\$73.09
9	75	\$48.27	\$10.44	\$18.35	\$0.00	\$77.06
10	80	\$51.49	\$10.44	\$19.10	\$0.00	\$81.03

Effective Date - 10/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	35	\$23.12	\$10.44	\$12.35	\$0.00	\$45.91
2	40	\$26.42	\$10.44	\$13.10	\$0.00	\$49.96
3	45	\$29.73	\$10.44	\$13.85	\$0.00	\$54.02
4	50	\$33.03	\$10.44	\$14.60	\$0.00	\$58.07
5	55	\$36.33	\$10.44	\$15.35	\$0.00	\$62.12
6	60	\$39.64	\$10.44	\$16.10	\$0.00	\$66.18
7	65	\$42.94	\$10.44	\$16.85	\$0.00	\$70.23
8	70	\$46.24	\$10.44	\$17.60	\$0.00	\$74.28
9	75	\$49.55	\$10.44	\$18.35	\$0.00	\$78.34
10	80	\$52.85	\$10.44	\$19.10	\$0.00	\$82.39

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 <i>OPERATING ENGINEERS LOCAL 4</i>	12/01/2021	\$50.83	\$14.00	\$16.05	\$0.00	\$80.88
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For apprentice rates see "Apprentice- OPERATING ENGINEERS"

TAMPERS, SELF-PROPELLED OR TRACTOR DRAWN <i>OPERATING ENGINEERS LOCAL 4</i>	12/01/2021	\$50.83	\$14.00	\$16.05	\$0.00	\$80.88
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For apprentice rates see "Apprentice- OPERATING ENGINEERS"

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
TELECOMMUNICATION TECHNICIAN <i>ELECTRICIANS LOCAL 223</i>	09/01/2021	\$37.63	\$11.25	\$13.17	\$0.00	\$62.05
	09/01/2022	\$38.16	\$11.25	\$13.31	\$0.00	\$62.72
	09/01/2023	\$39.40	\$11.50	\$13.91	\$0.00	\$64.81
	09/01/2024	\$40.69	\$11.75	\$14.53	\$0.00	\$66.97

**Apprentice - TELECOMMUNICATION TECHNICIAN - Local 223**

**Effective Date - 09/01/2021**

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 <i>BRICKLAYERS LOCAL 3 - MARBLE &amp; TILE</i>	02/01/2022	\$56.09	\$11.39	\$22.34	\$0.00	\$89.82
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**Apprentice - TERRAZZO FINISHER - Local 3 Marble & Tile**

**Effective Date - 02/01/2022**

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$28.05	\$11.39	\$22.34	\$0.00	\$61.78
2	60	\$33.65	\$11.39	\$22.34	\$0.00	\$67.38
3	70	\$39.26	\$11.39	\$22.34	\$0.00	\$72.99
4	80	\$44.87	\$11.39	\$22.34	\$0.00	\$78.60
5	90	\$50.48	\$11.39	\$22.34	\$0.00	\$84.21

**Notes:**

**Apprentice to Journeyworker Ratio:1:3**

TEST BORING DRILLER <i>LABORERS - FOUNDATION AND MARINE</i>	12/01/2021	\$42.58	\$9.10	\$17.72	\$0.00	\$69.40
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For apprentice rates see "Apprentice- LABORER"

TEST BORING DRILLER HELPER <i>LABORERS - FOUNDATION AND MARINE</i>	12/01/2021	\$41.30	\$9.10	\$17.72	\$0.00	\$68.12
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For apprentice rates see "Apprentice- LABORER"

TEST BORING LABORER <i>LABORERS - FOUNDATION AND MARINE</i>	12/01/2021	\$41.18	\$9.10	\$17.72	\$0.00	\$68.00
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For apprentice rates see "Apprentice- LABORER"

TRACTORS/PORTABLE STEAM GENERATORS <i>OPERATING ENGINEERS LOCAL 4</i>	12/01/2021	\$50.83	\$14.00	\$16.05	\$0.00	\$80.88
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For apprentice rates see "Apprentice- OPERATING ENGINEERS"

TRAILERS FOR EARTH MOVING EQUIPMENT <i>TEAMSTERS JOINT COUNCIL NO. 10 ZONE B</i>	12/01/2021	\$36.82	\$13.41	\$16.01	\$0.00	\$66.24
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TUNNEL WORK - COMPRESSED AIR <i>LABORERS (COMPRESSED AIR)</i>	12/01/2021	\$53.41	\$9.10	\$18.17	\$0.00	\$80.68
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For apprentice rates see "Apprentice- LABORER"



Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
TUNNEL WORK - COMPRESSED AIR (HAZ. WASTE) <i>LABORERS (COMPRESSED AIR)</i>	12/01/2021	\$55.41	\$9.10	\$18.17	\$0.00	\$82.68
For apprentice rates see "Apprentice- LABORER"						
TUNNEL WORK - FREE AIR <i>LABORERS (FREE AIR TUNNEL)</i>	12/01/2021	\$45.48	\$9.10	\$18.17	\$0.00	\$72.75
For apprentice rates see "Apprentice- LABORER"						
TUNNEL WORK - FREE AIR (HAZ. WASTE) <i>LABORERS (FREE AIR TUNNEL)</i>	12/01/2021	\$47.48	\$9.10	\$18.17	\$0.00	\$74.75
For apprentice rates see "Apprentice- LABORER"						
VAC-HAUL <i>TEAMSTERS JOINT COUNCIL NO. 10 ZONE B</i>	12/01/2021	\$36.24	\$13.41	\$16.01	\$0.00	\$65.66
WAGON DRILL OPERATOR <i>LABORERS - ZONE 2</i>	12/01/2021	\$35.66	\$9.10	\$16.64	\$0.00	\$61.40
	06/01/2022	\$36.56	\$9.10	\$16.64	\$0.00	\$62.30
	12/01/2022	\$37.41	\$9.10	\$16.64	\$0.00	\$63.15
	06/01/2023	\$38.31	\$9.10	\$16.64	\$0.00	\$64.05
	12/01/2023	\$39.21	\$9.10	\$16.64	\$0.00	\$64.95
For apprentice rates see "Apprentice- LABORER"						
WAGON DRILL OPERATOR (HEAVY & HIGHWAY) <i>LABORERS - ZONE 2 (HEAVY &amp; HIGHWAY)</i>	12/01/2021	\$35.66	\$9.10	\$16.64	\$0.00	\$61.40
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"						
WASTE WATER PUMP OPERATOR <i>OPERATING ENGINEERS LOCAL 4</i>	12/01/2021	\$51.38	\$14.00	\$16.05	\$0.00	\$81.43
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
WATER METER INSTALLER <i>PLUMBERS &amp; PIPEFITTERS LOCAL 51</i>	08/30/2021	\$46.49	\$10.15	\$19.95	\$0.00	\$76.59
For apprentice rates see "Apprentice- PLUMBER/PIPEFITTER" or "PLUMBER/GASFITTER"						

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.

**APPENDIX A**

***SELECTION OF MASSACHUSETTS GENERAL LAWS***

## **CHAPTER 30. GENERAL PROVISIONS RELATIVE TO STATE DEPARTMENTS, COMMISSIONS, OFFICERS AND EMPLOYEES**

### **Chapter 30: Section 39F. Construction contracts; assignment and subrogation; subcontractor defined; enforcement of claim for direct payment; deposit, reduction of disputed amounts**

Section 39F. (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.

### **Chapter 30: Section 39K. Public building construction contracts; payments**

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.

**Chapter 30: Section 39N. Construction contracts; equitable adjustment in contract price for differing subsurface or latent physical conditions**

Section 39N. 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.

**Chapter 30: Section 39O. Contracts for construction and materials; suspension, delay or interruption due to order of awarding authority; adjustment in contract price; written claim**

Section 39O. 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.

**APPENDIX B**

***ORDER OF CONDITIONS – TOWN OF PLYMOUTH***

COPY



**Massachusetts Department of Environmental Protection**  
**Bureau of Resource Protection - Wetlands**  
**WPA Form 5 – Order of Conditions**  
Massachusetts Wetlands Protection Act M.G.L. c. 131, §40

Provided by MassDEP:  
SE57-3212  
MassDEP File #  
PCC-21-81  
Plymouth File #  
Plymouth  
City/Town

**A. General Information**

Please note:  
this form has  
been modified  
with added  
space to  
accommodate  
the Registry  
of Deeds  
Requirements

**Important:**  
When filling  
out forms on  
the  
computer,  
use only the  
tab key to  
move your  
cursor - do  
not use the  
return key.



1. From: Plymouth  
Conservation Commission

2. This issuance is for  
(check one): a.  Order of Conditions b.  Amended Order of Conditions

3. To: Applicant:  
Douglas Pinard, Wastewater Superintendent  
a. First Name b. Last Name  
Town of Plymouth - Department of Public Works  
c. Organization  
131 Camelot Drive  
d. Mailing Address  
Plymouth MA 02360  
e. City/Town f. State g. Zip Code

4. Property Owner (if different from applicant):  
Same  
a. First Name b. Last Name  
c. Organization  
d. Mailing Address  
e. City/Town f. State g. Zip Code

5. Project Location:  
Water Street Plymouth  
a. Street Address b. City/Town  
Within Town's Right of Way / Easement Within Town's Right of Way / Easement  
c. Assessors Map/Plat Number d. Parcel/Lot Number  
Latitude and Longitude, if known: d m s d m s  
d. Latitude e. Longitude



**Massachusetts Department of Environmental Protection**  
 Bureau of Resource Protection - Wetlands  
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 Massachusetts Wetlands Protection Act M.G.L. c. 131, §40

Provided by MassDEP:  
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 City/Town

**B. Findings (cont.)**

Denied because:

- b.  the proposed work cannot be conditioned to meet the performance standards set forth in the wetland regulations. Therefore, work on this project may not go forward unless and until a new Notice of Intent is submitted which provides measures which are adequate to protect the interests of the Act, and a final Order of Conditions is issued. **A description of the performance standards which the proposed work cannot meet is attached to this Order.**
- c.  the information submitted by the applicant is not sufficient to describe the site, the work, or the effect of the work on the interests identified in the Wetlands Protection Act. Therefore, work on this project may not go forward unless and until a revised Notice of Intent is submitted which provides sufficient information and includes measures which are adequate to protect the Act's interests, and a final Order of Conditions is issued. **A description of the specific information which is lacking and why it is necessary is attached to this Order as per 310 CMR 10.05(6)(c).**
3.  Buffer Zone Impacts: Shortest distance between limit of project disturbance and the wetland resource area specified in 310 CMR 10.02(1)(a) \_\_\_\_\_ a. linear feet

**Inland Resource Area Impacts:** Check all that apply below. (For Approvals Only)

Resource Area	Proposed Alteration	Permitted Alteration	Proposed Replacement	Permitted Replacement
4. <input type="checkbox"/> Bank	_____ a. linear feet	_____ b. linear feet	_____ c. linear feet	_____ d. linear feet
5. <input type="checkbox"/> Bordering Vegetated Wetland	_____ a. square feet	_____ b. square feet	_____ c. square feet	_____ d. square feet
6. <input type="checkbox"/> Land Under Waterbodies and Waterways	_____ a. square feet _____ e. c/y dredged	_____ b. square feet _____ f. c/y dredged	_____ c. square feet	_____ d. square feet
7. <input type="checkbox"/> Bordering Land Subject to Flooding	_____ a. square feet	_____ b. square feet	_____ c. square feet	_____ d. square feet
Cubic Feet Flood Storage	_____ e. cubic feet	_____ f. cubic feet	_____ g. cubic feet	_____ h. cubic feet
8. <input type="checkbox"/> Isolated Land Subject to Flooding	_____ a. square feet	_____ b. square feet		
Cubic Feet Flood Storage	_____ c. cubic feet	_____ d. cubic feet	_____ e. cubic feet	_____ f. cubic feet
9. <input type="checkbox"/> Riverfront Area	_____ a. total sq. feet	_____ b. total sq. feet		
Sq ft within 100 ft	_____ c. square feet	_____ d. square feet	_____ e. square feet	_____ f. square feet
Sq ft between 100-200 ft	_____ g. square feet	_____ h. square feet	_____ i. square feet	_____ j. square feet





Massachusetts Department of Environmental Protection  
Bureau of Resource Protection - Wetlands  
**WPA Form 5 – Order of Conditions**  
Massachusetts Wetlands Protection Act M.G.L. c. 131, §40

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Plymouth  
City/Town

**B. Findings (cont.)**

\* #23. If the project is for the purpose of restoring or enhancing a wetland resource area in addition to the square footage that has been entered in Section B.5.c (BVW) or B.17.c (Salt Marsh) above, please enter the additional amount here.

23.  Restoration/Enhancement \*:
- a. square feet of BVW \_\_\_\_\_ b. square feet of salt marsh \_\_\_\_\_
24.  Stream Crossing(s):
- a. number of new stream crossings \_\_\_\_\_ b. number of replacement stream crossings \_\_\_\_\_

**C. General Conditions Under Massachusetts Wetlands Protection Act**

The following conditions are only applicable to Approved projects.

1. Failure to comply with all conditions stated herein, and with all related statutes and other regulatory measures, shall be deemed cause to revoke or modify this Order.
2. The Order does not grant any property rights or any exclusive privileges; it does not authorize any injury to private property or invasion of private rights.
3. This Order does not relieve the permittee or any other person of the necessity of complying with all other applicable federal, state, or local statutes, ordinances, bylaws, or regulations.
4. The work authorized hereunder shall be completed within three years from the date of this Order unless either of the following apply:
  - a. The work is a maintenance dredging project as provided for in the Act; or
  - b. The time for completion has been extended to a specified date more than three years, but less than five years, from the date of issuance. If this Order is intended to be valid for more than three years, the extension date and the special circumstances warranting the extended time period are set forth as a special condition in this Order.
  - c. If the work is for a Test Project, this Order of Conditions shall be valid for no more than one year.
5. This Order may be extended by the issuing authority for one or more periods of up to three years each upon application to the issuing authority at least 30 days prior to the expiration date of the Order. An Order of Conditions for a Test Project may be extended for one additional year only upon written application by the applicant, subject to the provisions of 310 CMR 10.05(11)(f).
6. If this Order constitutes an Amended Order of Conditions, this Amended Order of Conditions does not extend the issuance date of the original Final Order of Conditions and the Order will expire on 12/15/2024 unless extended in writing by the Department.
7. Any fill used in connection with this project shall be clean fill. Any fill shall contain no trash, refuse, rubbish, or debris, including but not limited to lumber, bricks, plaster, wire, lath, paper, cardboard, pipe, tires, ashes, refrigerators, motor vehicles, or parts of any of the foregoing.



Massachusetts Department of Environmental Protection  
Bureau of Resource Protection - Wetlands  
**WPA Form 5 – Order of Conditions**  
Massachusetts Wetlands Protection Act M.G.L. c. 131, §40

Provided by MassDEP:  
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MassDEP File #  
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**Plymouth**  
City/Town

**C. General Conditions Under Massachusetts Wetlands Protection Act (cont.)**

17. Prior to the start of work, and if the project involves work adjacent to a Bordering Vegetated Wetland, the boundary of the wetland in the vicinity of the proposed work area shall be marked by wooden stakes or flagging. Once in place, the wetland boundary markers shall be maintained until a Certificate of Compliance has been issued by the Conservation Commission.
18. All sedimentation barriers shall be maintained in good repair until all disturbed areas have been fully stabilized with vegetation or other means. At no time shall sediments be deposited in a wetland or water body. During construction, the applicant or his/her designee shall inspect the erosion controls on a daily basis and shall remove accumulated sediments as needed. The applicant shall immediately control any erosion problems that occur at the site and shall also immediately notify the Conservation Commission, which reserves the right to require additional erosion and/or damage prevention controls it may deem necessary. Sedimentation barriers shall serve as the limit of work unless another limit of work line has been approved by this Order.
19. The work associated with this Order (the "Project")
  - (1)  is subject to the Massachusetts Stormwater Standards
  - (2)  is NOT subject to the Massachusetts Stormwater Standards

**If the work is subject to the Stormwater Standards, then the project is subject to the following conditions:**

- a) All work, including site preparation, land disturbance, construction and redevelopment, shall be implemented in accordance with the construction period pollution prevention and erosion and sedimentation control plan and, if applicable, the Stormwater Pollution Prevention Plan required by the National Pollution Discharge Elimination System Construction General Permit as required by Stormwater Condition 8. Construction period erosion, sedimentation and pollution control measures and best management practices (BMPs) shall remain in place until the site is fully stabilized.
- b) No stormwater runoff may be discharged to the post-construction stormwater BMPs unless and until a Registered Professional Engineer provides a Certification that:
  - i.* all construction period BMPs have been removed or will be removed by a date certain specified in the Certification. For any construction period BMPs intended to be converted to post construction operation for stormwater attenuation, recharge, and/or treatment, the conversion is allowed by the MassDEP Stormwater Handbook BMP specifications and that the BMP has been properly cleaned or prepared for post construction operation, including removal of all construction period sediment trapped in inlet and outlet control structures;
  - ii.* as-built final construction BMP plans are included, signed and stamped by a Registered Professional Engineer, certifying the site is fully stabilized;
  - iii.* any illicit discharges to the stormwater management system have been removed, as per the requirements of Stormwater Standard 10;





Massachusetts Department of Environmental Protection  
Bureau of Resource Protection - Wetlands  
**WPA Form 5 – Order of Conditions**  
Massachusetts Wetlands Protection Act M.G.L. c. 131, §40

Provided by MassDEP:  
SE57-3212  
MassDEP File #  
PCC-21-81  
Plymouth File #  
Plymouth  
City/Town

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**C. General Conditions Under Massachusetts Wetlands Protection Act (cont.)**

- g) The responsible party shall:
  - 1. Maintain an operation and maintenance log for the last three (3) consecutive calendar years of inspections, repairs, maintenance and/or replacement of the stormwater management system or any part thereof, and disposal (for disposal the log shall indicate the type of material and the disposal location);
  - 2. Make the maintenance log available to MassDEP and the Conservation Commission ("Commission") upon request; and
  - 3. Allow members and agents of the MassDEP and the Commission to enter and inspect the site to evaluate and ensure that the responsible party is in compliance with the requirements for each BMP established in the O&M Plan approved by the issuing authority.
- h) All sediment or other contaminants removed from stormwater BMPs shall be disposed of in accordance with all applicable federal, state, and local laws and regulations.
- i) Illicit discharges to the stormwater management system as defined in 310 CMR 10.04 are prohibited.
- j) The stormwater management system approved in the Order of Conditions shall not be changed without the prior written approval of the issuing authority.
- k) Areas designated as qualifying pervious areas for the purpose of the Low Impact Site Design Credit (as defined in the MassDEP Stormwater Handbook, Volume 3, Chapter 1, Low Impact Development Site Design Credits) shall not be altered without the prior written approval of the issuing authority.
- l) Access for maintenance, repair, and/or replacement of BMPs shall not be withheld. Any fencing constructed around stormwater BMPs shall include access gates and shall be at least six inches above grade to allow for wildlife passage.

Special Conditions (if you need more space for additional conditions, please attach a text document):

**See pages 9a 9b for General Conditions issued under the Bylaw.**

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**For Special Conditions issued under the Bylaw see page 13 and pages that follow, if applicable.**

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- 20. For Test Projects subject to 310 CMR 10.05(11), the applicant shall also implement the monitoring plan and the restoration plan submitted with the Notice of Intent. If the conservation commission or Department determines that the Test Project threatens the public health, safety or the environment, the applicant shall implement the removal plan submitted with the Notice of Intent or modify the project as directed by the conservation commission or the Department.



**Massachusetts Department of Environmental Protection**

Bureau of Resource Protection – Wetland

**WPA Form 5 – Order of Conditions**

Massachusetts Wetlands Protection Act M.G.L. c. 131, § 40 and  
Town of Plymouth Wetlands Bylaw

DEP File Number:

**SE57-3212**

Provided by DEP

PCC File Number:

**PCC-21-81**

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**B1. Additional Conditions** (issued by the Town of Plymouth)

12. No additional work shall be allowed in or within 100 feet of the wetland/resource area boundary, including but not limited to the cutting or removing, of vegetation or soil, unless it is specifically allowed by this Order and as is shown on the final approved plan, or unless it is first approved by the Conservation Commission. The purpose of this condition is to encourage the growth and stability of natural vegetation (trees, shrubs, thickets, etc.) and land features, in order to provide an undisturbed natural buffer to the wetland and/or resource area.
13. Copies of all plans and/or other information received by the Commission for this project shall be submitted by the applicant to the Southeast Regional Office of the Department of Environmental Protection (DEP), 20 Riverside Drive, Route 105, Lakeville, MA 02347.
14. Prior to the commencement of any site activity, a Professional Engineer (PE), licensed by the Commonwealth of Massachusetts, shall inspect the installation of the erosion control barriers (ECB) for compliance with the final approved plan referenced (or mandated) by this Order of Conditions. The inspection results shall be submitted to the Conservation Commission in writing, signed and wet stamped by the PE who performed the inspection. No work can commence without this approval.
15. If this project involves work on a septic system, then this is also subject to approvals by the Plymouth Board of Health. Any plan changes shall require the approval of the Conservation Commission.
16. If work associated with this Order is subject to the Massachusetts Stormwater Policy Standards, then General Condition No. 19 (page 7) also becomes a part of this Order under the Town of Plymouth Wetland Bylaw.



**Massachusetts Department of Environmental Protection**  
**Bureau of Resource Protection - Wetlands**  
**WPA Form 5 – Order of Conditions**  
Massachusetts Wetlands Protection Act M.G.L. c. 131, §40

Provided by MassDEP:  
SE57-3212  
MassDEP File #  
PCC-21-81  
Plymouth File #  
Plymouth  
City/Town

**E. Signatures**

This Order is valid for three years, unless otherwise specified as a special condition pursuant to General Conditions #4, from the date of issuance.

December 15, 2021

1. Date of Issuance

Please indicate the number of members who will sign this form.

This Order must be signed by a majority of the Conservation Commission.

2. Number of Signers

The Order must be mailed by certified mail (return receipt requested) or hand delivered to the applicant. A copy also must be mailed or hand delivered at the same time to the appropriate Department of Environmental Protection Regional Office, if not filing electronically, and the property owner, if different from applicant.

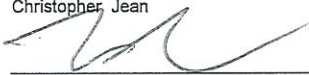
Signatures:

  
Ann Burnham, Vice-Chairperson

  
Bruce Howard, Chairperson

Karen Edwards  
  
David McCarthy

Frank Drollett

Christopher Jean  
  
Lucas Nichols

by hand delivery on

by certified mail, return receipt requested, on

Date

December 15, 2021

Date

**F. Appeals**

The applicant, the owner, any person aggrieved by this Order, any owner of land abutting the land subject to this Order, or any ten residents of the city or town in which such land is located, are hereby notified of their right to request the appropriate MassDEP Regional Office to issue a Superseding Order of Conditions. The request must be made by certified mail or hand delivery to the Department, with the appropriate filing fee and a completed Request for Departmental Action Fee Transmittal Form, as provided in 310 CMR 10.03(7) within ten business days from the date of issuance of this Order. A copy of the request shall at the same time be sent by certified mail or hand delivery to the Conservation Commission and to the applicant, if he/she is not the appellant.

Any appellants seeking to appeal the Department's Superseding Order associated with this appeal will be required to demonstrate prior participation in the review of this project. Previous participation in the permit proceeding means the submission of written information to the Conservation Commission prior to the close of the public hearing, requesting a Superseding Order, or providing written information to the Department prior to issuance of a Superseding Order.

The request shall state clearly and concisely the objections to the Order which is being appealed and how the Order does not contribute to the protection of the interests identified in the Massachusetts Wetlands Protection Act (M.G.L. c. 131, § 40), and is inconsistent with the wetlands regulations (310 CMR 10.00). To the extent that the Order is based on a municipal ordinance or bylaw, and not on the Massachusetts Wetlands Protection Act or regulations, the Department has no appellate jurisdiction.

**Plymouth Wetlands Bylaw Appeal Process**

The General Laws of Massachusetts (G.L.M.) permit an aggrieved person to appeal an Order of Condition (Order) to Superior Court.

An appeal must be made to the Plymouth County Superior Court within sixty (60) days from the date of issuance of the Order.

Additional information and guidance can be found in G.L.M. Chapter 249, Section 4.





**Massachusetts Department of Environmental Protection**  
Bureau of Resource Protection - Wetlands  
**WPA Form 5 – Order of Conditions**  
Massachusetts Wetlands Protection Act M.G.L. c. 131, §40

Provided by MassDEP:  
SE57-3212  
MassDEP File #  
PCC-21-81  
Plymouth File #  
Plymouth  
City/Town

**G. Recording Information**

Prior to commencement of work, this Order of Conditions must be recorded in the Registry of Deeds or the Land Court for the district in which the land is located, within the chain of title of the affected property. In the case of recorded land, the Final Order shall also be noted in the Registry's Grantor Index under the name of the owner of the land subject to the Order. In the case of registered land, this Order shall also be noted on the Land Court Certificate of Title of the owner of the land subject to the Order of Conditions. The recording information on this page shall be submitted to the Conservation Commission listed below.

Plymouth  
Conservation Commission

Detach on dotted line, have stamped by the Registry of Deeds and submit to the Conservation Commission.

To:

Plymouth  
Conservation Commission

Please be advised that the Order of Conditions for the Project at:

Water Street  
Project Location

SE57-3212  
MassDEP File Number

Has been recorded at the Registry of Deeds of:

Plymouth  
County

Book

Page

for: Property Owner

and has been noted in the chain of title of the affected property in:

N/A Town's Right of Way / Easement  
Book

Page

In accordance with the Order of Conditions issued on:

December 15, 2021  
Date

If recorded land, the instrument number identifying this transaction is:

Instrument Number

If registered land, the document number identifying this transaction is:

Document Number

Signature of Applicant

**Massachusetts Department of Environmental Protection**  
Bureau of Resource Protection – Wetland  
**WPA Form 5 – Order of Conditions**  
Massachusetts Wetlands Protection Act M.G.L. c. 131, § 40 and  
Town of Plymouth Wetlands Bylaw

DEP File Number  
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Provided by DEP  
PCC File Number  
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26. If siltation, erosion, or other adverse impacts to any resource areas occur, the Commission reserves the right to impose additional conditions as necessary to protect the interests of the Wetlands Protection Act and the Plymouth Wetlands Protection By-Law.
27. To assure the continued effective removal of sediments, the Contractor will inspect the barriers weekly and after each rainfall event to determine its condition. At the time of these inspections, accumulated sediments will be removed from the barriers and damaged barriers will be repaired or replaced as necessary. In no event shall silt be allowed to accumulate to a height greater than half of the height of the ECB. Any removed sediment will be disposed at a suitable location.
28. At no time shall silt or sediment be allowed beyond the limit of work (ECB). The Conservation Commission must be notified within 24 hours if any silt or sediment goes beyond this limit of work.
29. No ECB may be removed without the approval of the Commission or its staff

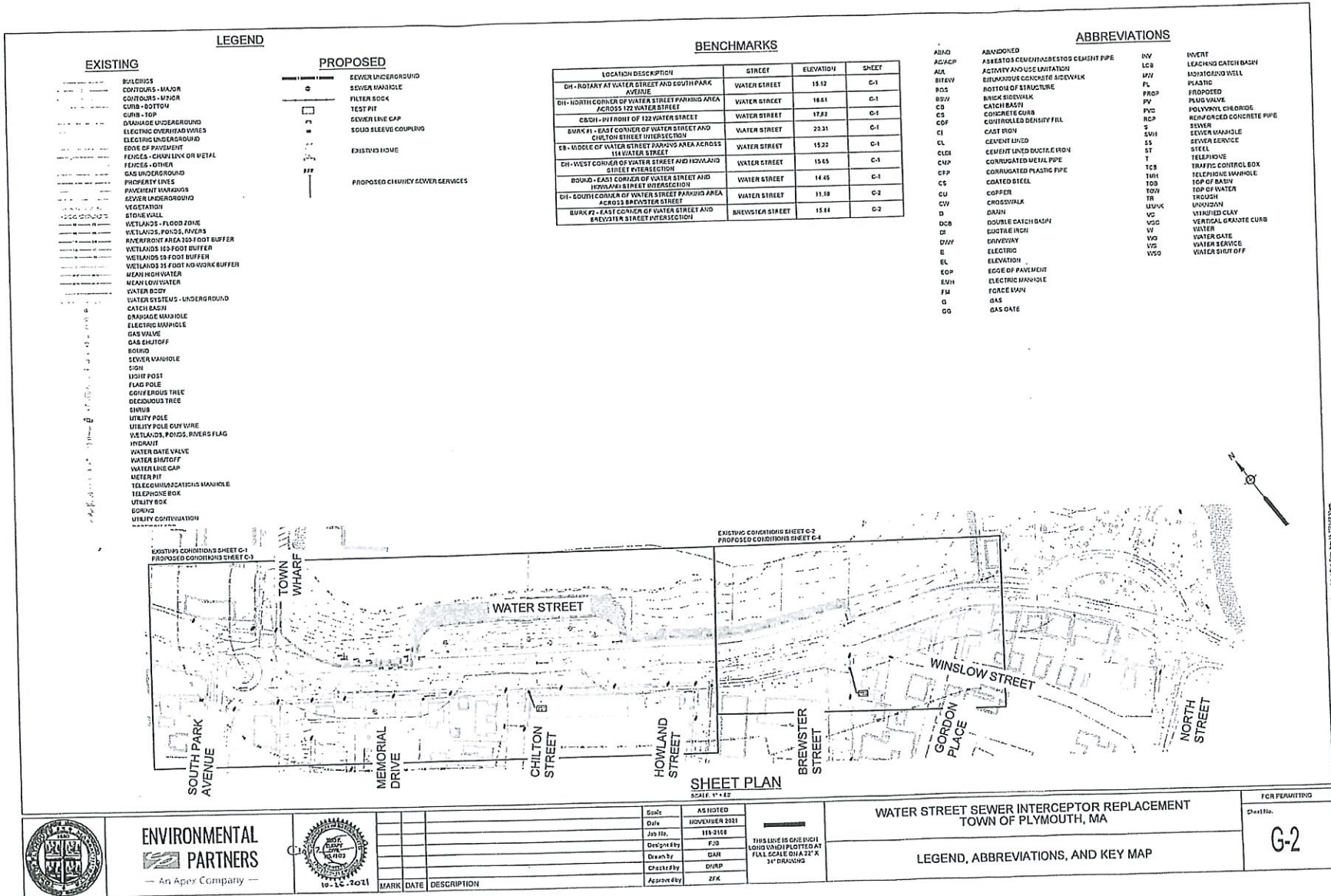
### **Heavy Equipment**

30. All machinery deployed within Conservation jurisdiction shall use biodegradable hydraulic fluid. Documentation shall be submitted to the Conservation Commission prior to initiation of site activity.
31. No vehicles/heavy equipment/machinery shall be stored within wetland resource areas or the 100-foot buffer zone resource areas.
32. No refueling of equipment or trucks shall occur within 100 feet (horizontal distance) of wetland resource areas.
33. There shall be no more than a total of 50 gallons of fuel (other than what is in vehicles) or maintenance chemicals relating to this construction stored on the site in an area subject to the Conservation Commission's jurisdiction at any one time. No routine servicing of vehicles used for this project shall be permitted on the site. The Conservation Commission and the Board of Health shall be notified prior to initiating any emergency repair on the site drainage system or wetland resource area.
34. Any leaks or spills of hydraulic fluid, gasoline, or other oils or hazardous material must be cleaned up immediately and disposed of at an appropriate off-site location in accordance with all federal, state, and local requirements and regulations. The Contractor must notify the Conservation Commission and the Board of Health within 24 hours of any spillage or leakage of oil or hazardous material, including appropriate amount of Speedy Dry on site.

### **Site Maintenance**

35. Any fill used in connection with this project shall be clean fill, containing no trash, refuse, rubbish or debris, including but not limited to lumber, bricks, plaster, wire, lath, paper, cardboard, pipe, tires, ashes, refrigerators, motor vehicles or parts of any of the foregoing.
36. Any stockpiled or similar material must be enclosed within an erosion control barrier to prevent erosion or siltation migrating into resource areas or the undisturbed buffer zone.
37. The Contractor shall be responsible for removing and disposing of debris and excavated material to an off-site disposal area in accordance with all federal, state, and local requirements and regulations. Any





**EXISTING**

- BUILDINGS
- CONTOURS - MAJOR
- CONTOURS - MINOR
- CURB - BOTTOM
- CURB - TOP
- DRAINAGE UNDERGROUND
- ELECTRIC OVERHEAD WIRES
- ELECTRIC UNDERGROUND
- EDGE OF PAVEMENT
- FENCES - CHAIN LINK OR METAL
- FENCES - OTHER
- GAS UNDERGROUND
- PROPERTY LINES
- PAVEMENT MARKINGS
- SEWER UNDERGROUND
- VEGETATION
- STUCCO WALLS
- WETLANDS - FLOOD ZONE
- WETLANDS, PONDS, RIVERS
- RIVERFRONT AREA 100-FOOT BUFFER
- WETLANDS 102-FOOT BUFFER
- WETLANDS 50-FOOT BUFFER
- WETLANDS 15-FOOT NONWATER BUFFER
- MEAN HIGH WATER
- MEAN LOW WATER
- WATER BODIES
- WATER SYSTEMS - UNDERGROUND
- CATCH BASIN
- DRAINAGE MANHOLE
- ELECTRIC MANHOLE
- GAS VALVE
- GAS SHUTOFF
- HOARD
- SEWER MANHOLE
- SIGN
- LIGHT POST
- FLAG POLE
- DIFFERENT TREE
- DECIDUOUS TREE
- SHRUB
- UTILITY POLE
- UTILITY POLE CUY WIRE
- WETLANDS, PONDS, RIVERS FLAG
- HYDRANT
- WATER DATE VALVE
- WATER SHUTOFF
- WATER LINE CAP
- METER PIT
- TELECOMMUNICATIONS MANHOLE
- TELEPHONE BOX
- UTILITY BOX
- GROUND
- UTILITY CONTINUATION

**LEGEND**

**PROPOSED**

- SEWER UNDERGROUND
- SEWER MANHOLE
- FILTER SOCK
- TEST PIT
- SEWER LINE CAP
- SOLID SLEEVE COUPLING
- EXISTING HOME
- PROPOSED CITY/UNY SEWER SERVICES

**BENCHMARKS**

LOCATION DESCRIPTION	STREET	ELEVATION	SHEET
DH - ROTARY AT WATER STREET AND SOUTH PARK AVENUE	WATER STREET	15.12	C-1
DH - NORTH CORNER OF WATER STREET PARKING AREA ACROSS 122 WATER STREET	WATER STREET	16.61	C-1
CSH - HEIGHT OF 122 WATER STREET	WATER STREET	17.82	C-1
BURK #1 - EAST CORNER OF WATER STREET AND CHILTON STREET INTERSECTION	WATER STREET	23.31	C-1
EB - MIDDLE OF WATER STREET PARKING AREA ACROSS 114 WATER STREET	WATER STREET	15.22	C-1
DH - WEST CORNER OF WATER STREET AND HOWLAND STREET INTERSECTION	WATER STREET	15.65	C-1
ROUND - EAST CORNER OF WATER STREET AND HOWLAND STREET INTERSECTION	WATER STREET	14.45	C-1
DH - SOUTH CORNER OF WATER STREET PARKING AREA ACROSS BREWSTER STREET	WATER STREET	15.10	C-2
BURK #2 - EAST CORNER OF WATER STREET AND BREWSTER STREET INTERSECTION	BREWSTER STREET	15.44	C-2

**ABBREVIATIONS**

- ABND ABANDONED
- AC/ACP ASBESTOS CEMENT UNDRERSTOS CEMENT PIPE
- ALA ACTIVITY AND USE LIMITATION
- BIEVW BITUMINOUS CONCRETE SIDEWALK
- BOS BOTTOM OF STRUCTURE
- BSW BRICK SIDEWALK
- CB CATCH BASIN
- CS CONCRETE CURB
- COF CONTROLLED DENSITY FILL
- CI CAST IRON
- CL CEMENT LINED
- CLDI CEMENT LINED DUCTILE IRON
- CNP CORRUGATED METAL PIPE
- CPP CORRUGATED PLASTIC PIPE
- CS COATED STEEL
- CU COPPER
- CW CROSSWALK
- D DRAIN
- DCB DOUBLE CATCH BASIN
- DI DIRT HIGH
- DIV DRIVEWAY
- E ELECTRIC
- EL ELEVATION
- EDP EDGE OF PAVEMENT
- EVH ELECTRIC MANHOLE
- FM FORCE MAIN
- G GAS
- GG GAS GATE
- INV INVERT
- LCB LEACHING CATCH BASIN
- MD1012020 WELL
- PL PLASTIC
- PROP PROPOSED
- PV PLUS VALVE
- PVC POLYVINYL CHLORIDE
- PWC REINFORCED CONCRETE PIPE
- S SEWER
- SM SEWER MANHOLE
- SS SEWER SERVICE
- ST STEEL
- T TELEPHONE
- TCB TRAFFIC CONTROL BOX
- TMH TELEPHONE MANHOLE
- TOB TOP OF BASIN
- TOF TOP OF WATER
- TR TROUGH
- UNY UNDRY
- VC VERTICAL CLAY
- VCG VERTICAL GRANITE CURB
- VH VALVE
- VG WATER GATE
- VGS WATER SERVICE
- VGO WATER SHUT OFF

**SHEET PLAN**  
SCALE: 1"=40'

WATER STREET SEWER INTERCEPTOR REPLACEMENT  
TOWN OF PLYMOUTH, MA  
LEGEND, ABBREVIATIONS, AND KEY MAP

FOR PERMITTING  
Sheet No. **G-2**



**ENVIRONMENTAL PARTNERS**  
— An Apex Company —



MARK	DATE	DESCRIPTION

Scale: **AS NOTED**  
Date: **NOVEMBER 2021**  
Job No.: **118-3108**  
Designated: **P-20**  
Drawn by: **GAN**  
Checked by: **DWRP**  
Approved by: **ZFK**

THIS SHEET IS ONE INCH LONG WHICH PLOTTED AT FULL SCALE ON A 24" X 36" DRAWING

Drawing No. 118-3108-0111 - Water Street Sewer Interceptor Replacement Appendix B - Legend, Abbreviations, and Key Map. Date: 11/18/2021

## **APPENDIX C**

### ***BORING LOGS AND SOIL TEST RESULTS***



Geotechnical  
Environmental  
Water Resources  
Ecological

March 10, 2015  
Project 1501480

VIA EMAIL: [zfk@envpartners.com](mailto:zfk@envpartners.com)

Mr. Ziad F. Kary, P.E.  
Environmental Partners Group  
1900 Crown Colony Drive, Suite 402  
Quincy, MA 02169

Dear Mr. Kary:

**Re: Subsurface Explorations and Geotechnical Construction Considerations  
Water Street Sewer Replacement  
Plymouth, Massachusetts**

This letter report presents the results of our subsurface explorations and our geotechnical construction considerations for the Water Street Sewer Replacement project located in Plymouth, Massachusetts. Our scope of work included the following tasks:

1. Reviewed information provided to us regarding the project and previous work performed by others at the site.
2. Performed a subsurface exploration program consisting of three borings and the installation of three vibrating wire piezometers.
3. Performed laboratory testing on selected soils samples collected from the borings.
4. Developed recommendations for the geotechnical aspects of construction.
5. Prepared this letter report.

You authorized our work for this project by signing our Proposal 619745, dated January 29, 2015.

Elevations in this letter report are in feet and are referenced to the North American Vertical Datum of 1988 (NAVD 88).

**Site and Project Description**

The site is located on Water Street in Plymouth, Massachusetts (Fig. 1) and extends a distance of about 1,400 feet from Town Wharf to about 200 feet west of Chilton Street. Water Street runs in an east-west direction. Plymouth Harbor is to the north of Water Street. The town center is to the south. The surface topography along Water Street through project area is relatively flat. Ground surface elevations range from about El. 10 to El. 18. The surface topography rises gradually upward toward the south.

The project will consist of abandoning an existing sewer and replacing it with a new 30-inch-diameter sewer along Water Street. The new sewer will extend a distance of about 1,400 feet along Water Street beginning near Town Wharf to about 200 feet west of Chilton Street. The alignment of the new sewer is located within the right-of-way of Water Street and to the south of the existing sewer (Fig. 2). The invert of the new sewer will range from about 15 to 22 feet below existing grade (El. -4.7 to El. -3.2). The new sewer will be installed using cut-and-cover methods. The new sewer pipe and manholes will be supported on the natural soils and bedding material.

A section of the new sewer has already been installed from about Sta. 0+00 to Sta. 1+50. Based on our review of project correspondence provided to us, the contractor experienced significant difficulties during the installation due to excavation instability caused by higher than anticipated groundwater pressures and seepage.

## **Previous Subsurface Explorations by Others**

### ***Weston and Sampson (2013)***

In 2013, Weston and Sampson performed six borings (B-1 through B-6) along the sewer alignment to support the design of the replacement sewer. Based on our review of the boring logs, all the borings were advanced to a depth of 27 feet using hollow-stem auger drilling methods. No wells were installed. The Weston and Sampson boring logs are contained in Appendix A. Boring locations are shown on Fig. 2.

### ***GZA GeoEnvironmental (2014)***

In 2014, GZA performed a subsurface exploration program and geotechnical analyses to support a differing site conditions claim and to evaluate the geohydrological conditions at the site. The exploration program consisted of drilling six borings (GZ-01 through GZ-05, and GZ-03A), installing three groundwater observations wells (GZ-01, GZ-03, and GZ-05), and performing grain size analyses on selected soil samples collected from the borings. The borings were advanced to depths ranging from 41 to 61 feet using cased drive-and-wash and open hole drilling methods. The observation wells were installed to depths ranging from 20 to 40 feet. GZA identified artesian conditions in all three wells. The Town of Plymouth removed the wells in December 2014. The GZA boring logs, well logs, and laboratory test results are contained in Appendix A. Boring locations are shown on Fig. 2.

## **Subsurface Explorations by GEI**

### ***Borings***

Geologic-Earth Exploration drilled three borings (GEI-1 through GEI-3) at the site during the period from February 19 through February 25, 2015. Boring locations are shown in Fig. 2. GEI boring logs are contained in Appendix B.

GEI-1 was advanced to a depth of 41 feet, and GEI-2 and GEI-3 were each advanced to a depth of 36 feet. Standard Penetration Tests (SPTs) were performed in each boring beginning near the ground surface and at about 5-foot intervals thereafter. Split-spoon samples were collected and visually classified in the field. All borings were advanced using rotary-wash drilling methods.



### ***Vibrating Wire Piezometers***

We installed Geokon Model 4500S-350kPa vibrating wire piezometers (VWPs) in each borehole upon completion of drilling. GEI-1(PZ), GEI-2(PZ), and GEI-3(PZ) were installed at depths of 33.2 feet, 28.6 feet, and 27.6 feet, respectively. The boreholes and VWPs were completed by fully grouting the boreholes from the bottom up using a cement-bentonite grout and installing flush-mounted road boxes at the ground surface. VWP installation logs are contained in Appendix B.

### ***Laboratory Testing***

We performed five sieve analyses on soil samples collected from the borings. Test results are contained in Appendix C.

### **Subsurface Conditions**

#### ***Soil***

The generalized subsurface conditions encountered in the borings are described below beginning from the ground surface and proceeding downward. The subsurface conditions described below are consistent with the subsurface descriptions described in previous explorations. The subsurface conditions are known at the sampling locations and may vary significantly at other locations. These variations may not become evident until construction.

Asphalt: A 4-inch-thick layer of asphalt was encountered at the ground surface at each boring location.

Fill: A 3- to 7-foot-thick layer of fill was encountered beneath the asphalt in all the borings. The fill consisted mostly of fine to coarse sand with varying amounts of gravel and non-plastic fines.

Stratified Clay, Silt, and Fine Sand: A 20- to 35-foot-thick layer of stratified clay, silt, and fine sand was encountered beneath the fill in all the borings. This layer consisted mostly of low to medium plasticity clays and non-plastic silts, with occasional interbedded layers of fine sand with varying amounts of silt that varied in thickness from a few inches to a few feet.

Stratified Sand, Silt, and Gravel: A layer stratified sand, silt, and gravel was encountered beneath the clay, silt, and fine sand. This layer consisted of mostly fine sand with varying amounts of silt and gravel. This layer is differentiated from the layer above by the noticeable absence of clay.

### ***Piezometric Groundwater Pressures***

Measured piezometric groundwater pressures are summarized in the table below. The VWP monitoring reports are provided in Appendix B. The piezometric head and elevation represent the height and elevation that a column of water would rise to above the piezometer tip and the groundwater pressure at the piezometer tip.

Piezometer	Ground Surface Elevation* (feet)	Date of Reading	Piezometric Head (feet)	Piezometric Elevation (feet)
GEI-1(PZ)	11.0	March 5, 2015	38.7	16.5
		March 9, 2015	37.7	15.5
GEI-2(PZ)	17.0	March 5, 2015	28.6	17.0
		March 9, 2015	28.1	16.5
GEI-3(PZ)	15.0	March 5, 2015	31.5	18.9
		March 9, 2015	30.1	17.5
* Ground surface elevations estimated from site plans.				

Readings performed on March 5, 2015 were taken at approximately high tide. Readings performed on March 9, 2015 were taken at approximately low tide. Our readings indicate that the piezometric heads are influenced by the tide.

Based on the piezometric elevations above, artesian groundwater conditions exist at GEI-1 and GEI-3 during both high and low tide events where the piezometric elevations range from 2.5 to 5.5 feet above the ground surface. Near artesian conditions exist at GEI-2 during both low and high tide events where the piezometric elevation rises to or very near the ground surface. Thus, the stratified sand, silt, and gravel layer is essentially a lower aquifer that is confined by the upper less pervious stratified clay, silt, and sand layer.

## Construction Considerations

### *Dewatering and Depressurization*

Dewatering will be required to manage groundwater and surface runoff that enters the excavation. Hydrostatic depressurization of the stratified sand, silt, and gravel (lower aquifer) will be required to maintain base stability of the excavation and prevent base heave during final excavations to subgrade.

Shallow wells, well points, or sumps with pumps within the trench excavation may be used to manage surface runoff and groundwater from the fill layer and isolated sand layers within stratified clay, silt, and fine sand layer that enter the excavation. Sumps should extend at least 2 feet below the bottom of the excavation and consist of a perforated pipe surrounded by peastone. A non-woven filter fabric should be placed between the soil and the peastone.

The lower aquifer should be depressurized to a piezometric head that is at least two feet below the bottom of the trench to ensure a stable trench bottom. This will require lowering the piezometric head up to 25 feet at some locations. Single stage vacuum well points may be used at some locations. However, the typical limiting lift of a vacuum well point is about 15 to 20 feet. At locations where greater lift is required, the vacuum pump may need to be lowered into the excavation, or deep wells or educator pumps may need to be employed.

The contractor's dewatering and depressurization systems should be designed in conjunction with the excavation support system by a professional engineer registered in the Commonwealth of

Massachusetts, and should be submitted for review prior to construction. The design should include detailed instructions for installing and removing or abandoning the system with consideration for the artesian conditions.

Dewatering the lower aquifer may induce consolidation of the clay and cause settlement of adjacent areas and structures. The contractor should be required to implement a monitoring program that includes:

1. A pre-construction survey of adjacent structures and surface features, including video recordings.
2. The establishment of monitoring points on adjacent structures, surface features, and utilities.
3. A schedule for monitoring these points for lateral and vertical movements prior to the start of dewatering activities and throughout construction.
4. Measures that will be taken to mitigate, including the suspension of dewatering activities, if movements approach or exceed critical values.

### ***Excavations and Excavation Support***

The depth of the trench excavation for the new sewer is estimated to range from about 17 to 22 feet. Traffic along Water Street will likely be maintained during construction, and there are numerous side streets, buried utilities, driveways, sidewalks, and walkways that will be located in close proximity to the excavation. Therefore, an excavation support system will be required.

Stacked trench boxes with steel plates are feasible for trench construction where movements of surface features adjacent to the trench can be tolerated and where depths of the pipe are relatively shallow. Excavations up to depths of about 14 feet can be supported routinely by one trench box in combination with steel plates. Movements of the trench sidewalls to fill the gap between the sidewall and the trench box should be expected and typically result in greater surface settlements and lateral movements than with other methods of excavation support. The risk of trench sidewall collapse before the trench boxes are moved into place becomes greater with increased trench depth. The extent and magnitude of surface settlements adjacent to the trench will also increase with increased trench depth. Lowering the groundwater by dewatering the fill layer with wells or well points before excavation to levels below the base of the trench is essential for the use of trench boxes because the trench sidewalls must stand unsupported until the trench box is placed. Given the depth of excavation and groundwater conditions at the site, trench boxes may not be feasible for this project.

An excavation support system consisting of soldier piles and lagging or internally braced sheetpiles may be used for this project. However, we anticipate that internally braced interlocking sheetpiles will be the most effective excavation support system for this project. The sheetpiles will take less time to install and will provide a better groundwater cutoff in the fill and stratified clay, silt, and fine sand layers than a soldier pile and lagging system, and may reduce the extent of dewatering needed in the upper aquifer.

All excavations and excavation support systems should meet OSHA requirements. The contractor's excavation support system should be designed by a professional engineer registered in the Commonwealth of Massachusetts, and should be submitted for review prior to construction.

The bottom of excavation for the new sewer will be located in the stratified clay, silt, and fine sand layer. We recommend that the final excavation to subgrade be performed with an excavator equipped with a smooth-blade bucket to reduce disturbance to the subgrade.

The final excavation to subgrade should not be performed until the piezometric head in the confined aquifer is lowered to at least two feet below the bottom of the excavation.

### **Backfilling**

The materials excavated from the trench will consist of granular fill and the stratified clay, silt, and fine sand. The existing fill may be reused as backfill provided it can be properly compacted.

The stratified clay, silt, and fine sand material, which is anticipated to be predominantly a saturated fine-grained soil, may be difficult to compact if the material is not properly moisture conditioned. Moisture conditioning fine-grained soils for proper compaction can be time consuming and affected by weather conditions. We recommend that the stratified clay, silt, and fine sand not be placed as backfill within four feet of the final road surface.

Trench backfill obtained from off-site sources and placed beneath streets should meet the requirements for Massachusetts Department of Transportation (MassDOT) Specification M1.03.1, Processed Gravel for Subbase.

Samples of the proposed backfill should be submitted to a geotechnical laboratory and tested for gradation (ASTM D422), moisture content (ASTM D2216), and moisture-density relationship (ASTM D1557) to determine the material's suitability for reuse, and establish the range of suitable water contents and densities to achieve proper compaction. Backfill within four feet of the final road surface should be placed in 8-inch-thick lifts and compacted to at least 95% of maximum dry density as determined by ASTM D1557. Backfill placed beneath a depth of four feet from the final road surface should be compacted to at least 92% of maximum dry density as determined by ASTM D1557.

Controlled density fill (CDF) may also be used as backfill to reduce the amount of time the trench remains open or where backfill compaction is difficult. CDF is a flowable, self-consolidating, rigid setting material that can substitute for compacted soil backfill. The CDF should meet the requirements of the Massachusetts Department of Transportation Supplemental Specifications Subsection M4.080 Controlled Density Fill Type 2E (flowable, excavatable).

Please contact me at 781-721-4031 or Lee Wooten at 781-721-4034 if you have any questions.

Sincerely,

GEI CONSULTANTS, INC.

Douglas J. Aghjayan, P.E.  
Project Manager

R. Lee Wooten, P.E.  
Principal

DJA/RLW:mrb

Attachments:

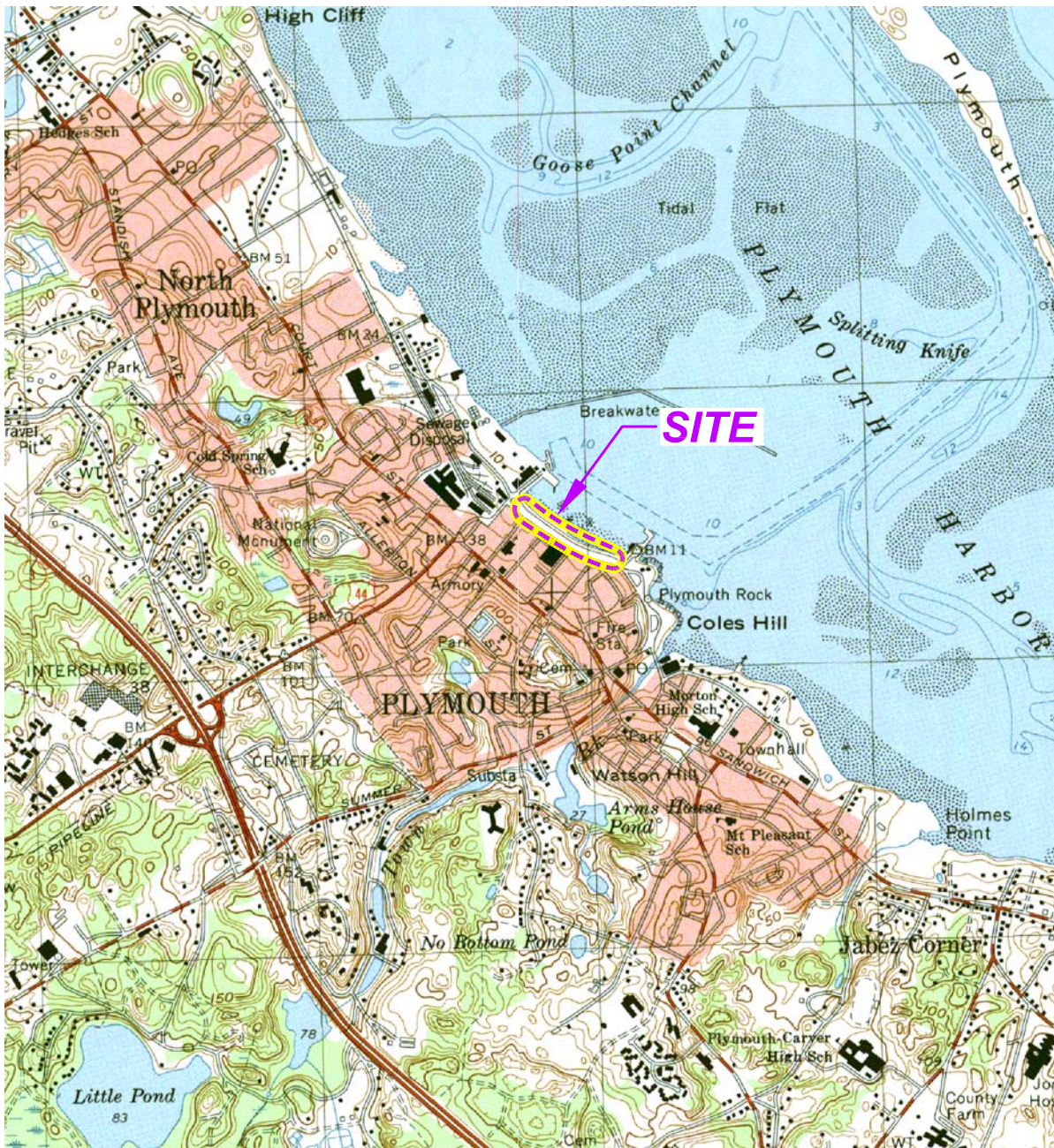
Figure 1	Site Location Map
Figure 2	Boring Location Plan
Appendix A	Previous Explorations by Others
Appendix B	Explorations by GEI
Appendix C	Laboratory Testing

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# Figures

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This Image provided by MassGIS is from U.S.G.S.  
 Topographic 7.5 X 15 Minute Series  
 Plymouth, MA Quadrangle, 1985.  
 Datum is National Geodetic Vertical Datum (NGVD).  
 Contour Interval is 3 Meters.



Water Street Sewer Replacement  
 Plymouth, Massachusetts

Environmental Partners Group  
 Quincy, Massachusetts



Project 1501480

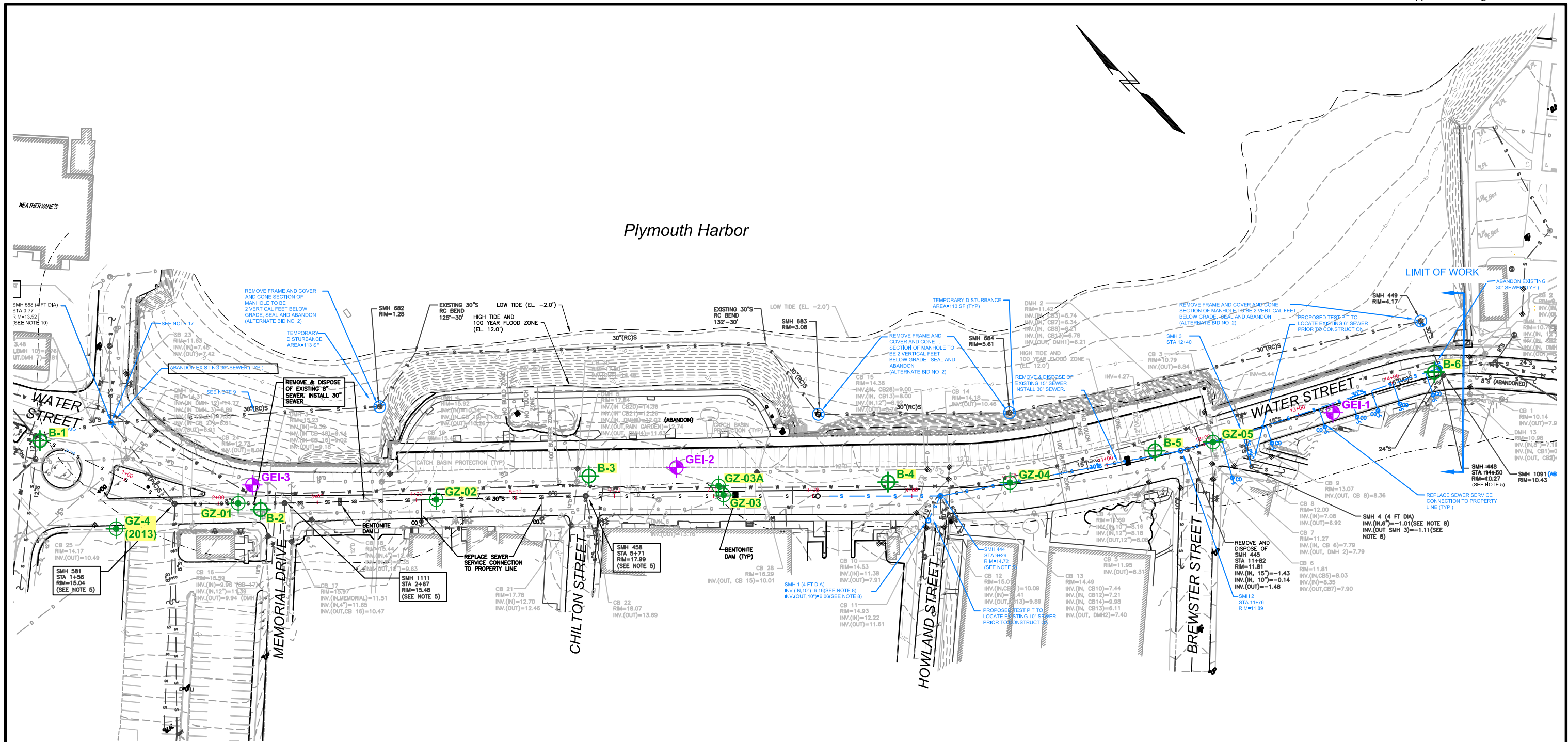
SITE LOCATION MAP

March 2015

Fig. 1



Plymouth Harbor

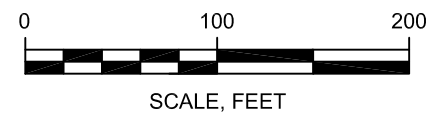


**LEGEND:**

-  BORING BY GEI (2015)
-  BORING BY GZA (2014)
-  BORING BY WESTON & SAMPSON (2013)

**NOTES:**

1. BASE PLAN FROM FIGURE TITLED "TOWN OF PLYMOUTH WATER STREET SEWER INTERCEPTOR REPLACEMENT, ALTERNATE A," PREPARED BY ENVIRONMENTAL PARTNERS GROUP AND DATED JANUARY 2015.
2. ELEVATION DATUM IS NAVD88.



Water Street Sewer Replacement Plymouth, Massachusetts		BORING LOCATION PLAN
Environmental Partners Group Quincy, Massachusetts		Project 1501480    March 2015    Fig. 2



# **Appendix A**

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## **Previous Explorations by Others**

<b>Weston &amp; Sampson</b>				<b>PROJECT</b> Water St. Sewer Interceptor Plymouth, MA		<b>REPORT OF BORING No.</b> <u>8-1</u> <b>SHEET</b> <u>1</u> <b>OF</b> <u>6</u> <b>Project No.</b> <u>2130314.A</u> <b>CHKD BY</b> <u>Christopher J. Palmer</u>			
<b>BORING Co.</b> <u>New England Boring Contractors</u>				<b>BORING LOCATION</b> <u>See attached plan</u>		<b>FOREMAN</b> <u>Trent</u>			
<b>WSE ENGINEER:</b> <u>Per Onsager</u>				<b>GROUND SURFACE ELEV.</b> <u>DATUM</u>		<b>DATE START</b> <u>7/22/13</u> <b>DATE END</b> <u>7/22/13</u>			
<b>SAMPLER:</b> <u>2 IN. OD SPLIT SPOON SAMPLER (SPT) DRIVEN 24 INCHES</u> <u>USING A 140 LB. WINCH OPERATED SAFETY HAMMER</u>				<b>GROUNDWATER READINGS</b>					
<b>CASING:</b> <u>HOLLOW-STEM AUGER 4" CASING USING A 140 LB. HAMMER</u> <u>FALLING 30 IN</u>				<b>DATE</b>	<b>TIME</b>	<b>WATER AT</b>	<b>CASING AT</b>		
<b>CASING SIZE:</b> <u>4 IN. INSIDE/8 IN. OUTER DIAMETER</u> <b>OTHER:</b> <u>N/A</u>				<u>7/22/2013</u>	<u>10:23</u>	<u>11.8 ft.</u>	<u>10 ft.</u>		
							<b>STABILIZATION TIME</b>		
							<u>N/A</u>		
DEPTH (feet)	CASING (lb/ft)	SAMPLE				PID (ppm)	SAMPLE DESCRIPTION	NOTES	STRATUM DESCRIPTION
		No.	REC/PEN (in)	DEPTH (ft)	BLOWS/6"				
5		S-1	13/24	1-3	18-10-5-3	N/A	Medium dense, brown, coarse to fine SAND FILL, some sub-angular gravel; moist.		7 IN. AC PAVEMENT
		S-2	10/24	5-7	2-4-3-2		- becomes loose, with seams of gray, silty clay.		
		S-3	4/24	10-12	2-2-2-2		- same as above, with little gravel, trace silt; wet.		
		S-4	2/24	15-17	10-12-13-21		Medium dense, brown-gray, coarse to fine SAND, some debris (possible dimensional lumber), trace silt and gravel; wet.	1	
		S-5	5/24	20-22	34-37-17-17		- becomes very dense, with concrete fragments.	1	
		S-6	24/24	25-27	3-3-5-12		Medium stiff, gray, clayey SILT, trace fine sand and debris (wood); wet.	1 2	
30								SILT End of boring @ 27.0 ft.	
<b>GRANULAR SOILS</b>		<b>COHESIVE SOILS</b>		<b>NOTES:</b> 1.) Possible buried structure. 2.) Bottom 4 inches: becomes SILT, some fine sand.					
<b>BLOWS/FT</b>	<b>DENSITY</b>	<b>BLOWS/FT</b>	<b>DENSITY</b>						
0-4	V. LOOSE	0-2	V. SOFT						
4-10	LOOSE	2-4	SOFT						
10-30	M. DENSE	4-8	M. STIFF						
30-50	DENSE	8-15	STIFF						
> 50	V. DENSE	15-30	V. STIFF						
		> 30	HARD						
<b>NOTES:</b> 1) THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES. TRANSITIONS MAY BE GRADUAL. 2) WATER LEVEL READINGS HAVE BEEN MADE IN THE DRILL HOLES AT TIMES AND UNDER CONDITIONS STATED ON THIS BORING LOG. FLUCTUATIONS IN THE LEVEL OF GROUNDWATER MAY OCCUR DUE TO OTHER FACTORS THAN THOSE PRESENT AT THE TIME MEASUREMENTS ARE MADE.									
								<b>BORING No.</b> <u>8-1</u>	



<b>Weston &amp; Sampson</b>		<b>PROJECT</b> Water St. Sewer Interceptor Plymouth, MA	<b>REPORT OF BORING No.</b> <u>      B-3      </u> <b>SHEET</b> <u>      3      </u> OF <u>      6      </u> <b>Project No.</b> <u>      2130314.A      </u> <b>CHKD BY</b> <u>      Christopher J. Palmer      </u>								
<b>BORING Co.</b> <u>      New England Boring Contractors      </u>		<b>BORING LOCATION</b> <u>      See attached plan      </u>									
<b>FOREMAN</b> <u>      Trent      </u>		<b>GROUND SURFACE ELEV.</b> <u>      DATUM      </u>									
<b>WSE ENGINEER:</b> <u>      Per Onsager      </u>		<b>DATE START</b> <u>      7/23/13      </u> <b>DATE END</b> <u>      7/23/13      </u>									
<b>SAMPLER:</b> <u>      2 IN. OD SPLIT SPOON SAMPLER (SPT) DRIVEN 24 INCHES                  USING A 140 LB. WINCH OPERATED SAFETY HAMMER      </u>		<b>GROUNDWATER READINGS</b>									
<b>CASING:</b> <u>      HOLLOW-STEM AUGER 4" CASING USING A 140 LB. HAMMER                  FALLING 30 IN      </u>		<b>DATE</b> <u>      7/23/2013      </u>	<b>TIME</b> <u>      9:30      </u>								
<b>CASING SIZE:</b> <u>      4 IN. INSIDE/8 IN. OUTER DIAMETER      </u> OTHER: <u>      N/A      </u>		<b>WATER AT</b> <u>      9 ft.      </u>	<b>CASING AT</b> <u>      N/A      </u>								
		<b>STABILIZATION TIME</b> <u>      N/A      </u>									
DEPTH (feet)	CASING (lb/ft)	SAMPLE				PID (ppm)	SAMPLE DESCRIPTION	NOTES	STRATUM DESCRIPTION		
		No.	REC/PEN (in)	DEPTH (ft)	BLOWS/6"						
5		S-1	15/25	1-3	26-38-26-25	N/A	Very dense, brown, coarse to fine SAND FILL, little gravel; moist.	1	7 IN. AC PAVEMENT		
									SAND FILL		
		S-2	24/24	5-7	2-3-9-3				Stiff, light brown, SILT, trace clay and fine sand; moist.		
		S-3	20/24	10-12	2-3-3-7				- becomes medium stiff, gray, with little clay; wet.		SILT
15		S-4	19/24	15-17	2-2-4-6		- same as above, without clay.				
20		S-5	2/24	20-22	6-9-11-17		- becomes very stiff, gray-brown with iron-staining, with little fine sand.				
25		S-6	15/24	25-27	W.O.H/12"- 2-3		Very loose, brown, medium to fine SAND, trace silt; wet.		SAND		
								End of boring @ 27.0 ft.			
30											
<b>GRANULAR SOILS</b>		<b>COHESIVE SOILS</b>		<b>NOTES:</b> 1.) Water level measured after casing was removed from hole.							
BLOWS/FT	DENSITY	BLOWS/FT	DENSITY								
0-4	V. LOOSE	0-2	V. SOFT								
4-10	LOOSE	2-4	SOFT								
10-30	M. DENSE	4-8	M. STIFF								
30-50	DENSE	8-15	STIFF								
> 50	V. DENSE	15-30	V. STIFF								
				> 30	HARD						
<b>NOTES:</b> 1) THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES. TRANSITIONS MAY BE GRADUAL. 2) WATER LEVEL READINGS HAVE BEEN MADE IN THE DRILL HOLES AT TIMES AND UNDER CONDITIONS STATED ON THIS BORING LOG. FLUCTUATIONS IN THE LEVEL OF GROUNDWATER MAY OCCUR DUE TO OTHER FACTORS THAN THOSE PRESENT AT THE TIME MEASUREMENTS ARE MADE.											
								BORING No. <u>      B-3      </u>			

<b>Weston &amp; Sampson</b>		<b>PROJECT</b> Water St. Sewer Interceptor Plymouth, MA		<b>REPORT OF BORING No.</b> <u>B-4</u> SHEET <u>4</u> OF <u>6</u> Project No. <u>2130314.A</u> CHKD BY <u>Christopher J. Palmer</u>					
BORING Co. <u>New England Boring Contractors</u> FOREMAN <u>Trent</u> WSE ENGINEER: <u>Per Onsager</u>		BORING LOCATION <u>See attached plan</u> GROUND SURFACE ELEV. _____ DATUM _____ DATE START <u>7/23/13</u> DATE END <u>7/23/13</u>							
SAMPLER: <u>2 IN. OD SPLIT SPOON SAMPLER (SPT) DRIVEN 24 INCHES</u> <u>USING A 140 LB. WINCH OPERATED SAFETY HAMMER.</u>		<b>GROUNDWATER READINGS</b>							
CASING: <u>HOLLOW-STEM AUGER 4" CASING USING A 140 LB. HAMMER</u> <u>FALLING 30 IN.</u>		DATE <u>7/23/2013</u>	TIME <u>12:08</u>	WATER AT <u>20 ft.</u>	CASING AT <u>20 ft.</u>				
CASING SIZE: <u>4 IN. INSIDE/6 IN. OUTER DIAMETER.</u> OTHER: <u>N/A</u>					STABILIZATION TIME <u>N/A</u>				
DEPTH (feet)	CASING (lb/ft)	SAMPLE				PID (ppm)	SAMPLE DESCRIPTION	NOTES	STRATUM DESCRIPTION
		No.	REC/PEN (In)	DEPTH (ft)	BLOWS/ft*				
5		S-1	18/24	1-3	26-25-8-9	N/A	Dense, brown with black-staining, coarse to fine SAND FILL, some gravel, trace organics; moist. Slight petroleum odor.		7 IN. ASPHALT
		S-2	18/24	5-7	6-8-9-10		Medium dense, brown, medium to fine SAND, little silt; moist.		SAND FILL
10		S-3	22/24	10-12	4-5-7-9		Top 9 inches: same as above. Bottom 13 inches: stiff, gray, SILT, trace fine sand; moist.		SAND
		S-4	23/24	15-17	5-5-7-10		- same as above.		SILT
20		S-5	24/24	20-22	3-2-2-4		Soft to medium stiff, gray, clayey SILT, trace fine sand; wet.		SAND
		S-6	18/24	25-27	10-12-18-32		Dense, brown, fine SAND, trace silt; wet.		End of boring @ 27.0 ft.
30									
<b>GRANULAR SOILS</b>		<b>COHESIVE SOILS</b>		NOTES:  1) THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES. TRANSITIONS MAY BE GRADUAL. 2) WATER LEVEL READINGS HAVE BEEN MADE IN THE DRILL HOLES AT TIMES AND UNDER CONDITIONS STATED ON THIS BORING LOG. FLUCTUATIONS IN THE LEVEL OF GROUNDWATER MAY OCCUR DUE TO OTHER FACTORS THAN THOSE PRESENT AT THE TIME MEASUREMENTS ARE MADE.					
BLOWS/FT	DENSITY	BLOWS/FT	DENSITY						
0-4	V. LOOSE	0-2	V. SOFT						
4-10	LOOSE	2-4	SOFT						
10-30	M. DENSE	4-8	M. STIFF						
30-50	DENSE	8-15	STIFF						
> 50	V. DENSE	15-30	V. STIFF						
		> 30	HARD						

BORING No. B-4

<b>Weston &amp; Sampson</b>				<b>PROJECT</b> Water St. Sewer Interceptor Plymouth, MA		<b>REPORT OF BORING No.</b> <u>      B-5      </u> SHEET <u>      5      </u> OF <u>      6      </u> Project No. <u>      2130314.A      </u> CHKD BY <u>      Christopher J. Palmer      </u>			
BORING Co. <u>      New England Boring Contractors      </u>		BORING LOCATION <u>      See attached plan      </u>		FOREMAN <u>      Trent      </u>		GROUND SURFACE ELEV. <u>      DATUM      </u>			
WSE ENGINEER: <u>      Per Onsager      </u>		DATE START <u>      7/23/13      </u>		DATE END <u>      7/23/13      </u>					
SAMPLER: <u>      2 IN. OD SPLIT SPOON SAMPLER (SPT) DRIVEN 24 INCHES      </u> <u>      USING A 140 LB. WINCH OPERATED SAFETY HAMMER      </u>				<b>GROUNDWATER READINGS</b>					
CASING: <u>      HOLLOW-STEM AUGER 4" CASING USING A 140 LB. HAMMER      </u> <u>      FALLING 30 IN      </u>				DATE <u>      7/23/2013      </u>		TIME <u>      No wet samples observed      </u>			
CASING SIZE: <u>      4 IN. INSIDE/7 IN. OUTER DIAMETER      </u> OTHER: <u>      N/A      </u>									
DEPTH (feet)	CASING (lb/ft)	SAMPLE				PID (ppm)	SAMPLE DESCRIPTION	NOTES	STRATUM DESCRIPTION
		No.	REC/PEN (In)	DEPTH (ft)	BLOWS/6"				
5		S-1	24/24	1-3	49-45-15-11	N/A	Very dense, brown, coarse to fine SAND FILL, some gravel; moist. Bottom 6 inches: becomes dark brown, with minor petroleum odor.  Medium dense, dark brown, coarse to fine SAND FILL, some gravel; moist.  Bottom 12 inches: becomes medium dense, medium to fine SAND FILL. Stiff, gray, SILT, trace fine sand; moist.  - same as above, with little clay.  - becomes medium stiff, with trace gravel.  - becomes very soft, with trace clay and without gravel.		6 IN. AC PAVEMENT
		S-2	20/24	5-7	4-6-8-14				SAND FILL
		S-3	20/24	10-12	3-4-8-8				
		S-4	24/24	15-17	2-3-5-8				
		S-5	24/24	20-22	2-2-3-4				
		S-6	21/24	25-27	W.O.H. 12"-3-4				
								SILT	
								SAND	
								End of boring @ 27.0 ft.	
<b>GRANULAR SOILS</b>		<b>COHESIVE SOILS</b>		<b>NOTES:</b>					
BLOWS/FT	DENSITY	BLOWS/FT	DENSITY	1.) Bottom 7 Inches: Loose, brown, fine SAND, trace silt; moist.					
0-4	V. LOOSE	0-2	V. SOFT						
4-10	LOOSE	2-4	SOFT						
10-30	M. DENSE	4-8	M. STIFF						
30-50	DENSE	8-15	STIFF						
> 50	V. DENSE	15-30	V. STIFF						
		> 30	HARD						
NOTES: 1) THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES. TRANSITIONS MAY BE GRADUAL. 2) WATER LEVEL READINGS HAVE BEEN MADE IN THE DRILL HOLES AT TIMES AND UNDER CONDITIONS STATED ON THIS BORING LOG. FLUCTUATIONS IN THE LEVEL OF GROUNDWATER MAY OCCUR DUE TO OTHER FACTORS THAN THOSE PRESENT AT THE TIME MEASUREMENTS ARE MADE.									
								BORING No	B-5

<b>Weston &amp; Sampson</b>		<b>PROJECT</b> Water St. Sewer Interceptor Plymouth, MA	<b>REPORT OF BORING No.</b> <u>B-6</u> SHEET <u>6</u> OF <u>6</u> Project No. <u>2130314.A</u> CHKD BY <u>Christopher J. Palmer</u>						
BORING Co. <u>New England Boring Contractors</u>		BORING LOCATION <u>See attached plan</u>							
FOREMAN <u>Trent</u>		GROUND SURFACE ELEV. <u>        </u> DATUM <u>        </u>							
WSE ENGINEER: <u>Per Onsager</u>		DATE START <u>7/24/13</u> DATE END <u>7/24/13</u>							
SAMPLER: <u>2 IN. OD SPLIT SPOON SAMPLER (SPT) DRIVEN 24 INCHES</u> <u>USING A 140 LB. WINCH OPERATED SAFETY HAMMER.</u>		<b>GROUNDWATER READINGS</b>							
CASING: <u>HOLLOW-STEM AUGER 4" CASING USING A 140 LB. HAMMER</u> <u>FALLING 30 IN.</u>		DATE <u>7/24/2013</u> TIME <u>9:10</u> WATER AT <u>10 ft.</u> CASING AT <u>10 ft.</u> STABILIZATION TIME <u>N/A</u>							
CASING SIZE: <u>4 IN. INSIDE/8 IN. OUTER DIAMETER</u> OTHER: <u>N/A</u>									
DEPTH (feet)	CASING (ft/ft)	SAMPLE				PID (ppm)	SAMPLE DESCRIPTION	NOTES	STRATUM DESCRIPTION
		No.	REC/PEN (in)	DEPTH (ft)	BLOWS/ft*				
5		S-1	17/24	1-3	14-12-8-9	N/A	Medium dense, brown, coarse to fine SAND FILL, little gravel; moist.		5 IN. AC PAVEMENT
									SAND FILL
10		S-2	15/24	5-7	7-5-2-4		- same as above, with 12 in. layer of medium stiff, light brown, silt, trace sand, debris (brick fragments).		SILT FILL
									SAND FILL
15		S-3	13/24	10-12	11-17-28-18		- becomes dense, gravelly; wet.  Bottom 5 inches: GRAVEL FILL, little to coarse fine sand, trace silt; wet.		GRAVEL FILL
20		S-4	24/24	15-17	2-8-6-9		Stiff, brown-gray, SILT, little sand, with 6 in. thick layer of gray, fine sand, trace silt; wet.		
25		S-5	22/24	20-22	4-5-8-8		- same as above.		SILT
30		S-6	24/24	25-27	2-2-4-4		- becomes medium stiff, with trace clay and fine sand.		
								End of boring @ 27.0 ft.	
<b>GRANULAR SOILS</b>		<b>COHESIVE SOILS</b>		NOTES:  1) THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES. TRANSITIONS MAY BE GRADUAL. 2) WATER LEVEL READINGS HAVE BEEN MADE IN THE DRILL HOLES AT TIMES AND UNDER CONDITIONS STATED ON THIS BORING LOG. FLUCTUATIONS IN THE LEVEL OF GROUNDWATER MAY OCCUR DUE TO OTHER FACTORS THAN THOSE PRESENT AT THE TIME MEASUREMENTS ARE MADE.					
BLOWS/FT	DENSITY	BLOWS/FT	DENSITY						
0-4	V. LOOSE	0-2	V. SOFT						
4-10	LOOSE	2-4	SOFT						
10-30	M. DENSE	4-8	M. STIFF						
30-50	DENSE	8-15	STIFF						
> 50	V. DENSE	15-30	V. STIFF						
		> 30	HARD						
				BORING No. <u>B-6</u>					

**LOG KEY**



**GZA**  
**Geo Environmental, Inc.**  
*Engineers and Scientists*

**BURMISTER SOIL CLASSIFICATION**

COMPONENT	NAME	PROPORTIONAL TERM	PERCENT BY WEIGHT	IDENTIFICATION OF FINES		
				Material	PI	Atterberg Thread Dia.
MAJOR	GRAVEL, SAND, FINES*		>50	SILT	0	Cannot Roll
Minor	Gravel, Sand, Fines*	and some little trace	35 - 50 20-35 10-20 0-10	Clayey SILT	1-5	1/4"
				SILT & CLAY	5-10	1/8"
				CLAY & SILT	10-20	1/16"
				Silty CLAY	20-40	1/32"
				CLAY	>40	1/64"

\*See identification of fines table.

GRADATION DESIGNATION	PROPORTION OF COMPONENT	PLASTIC SOILS		GRAVEL & SAND	
		Consistency	Blows/Ft. SPT N-Value	Density	Blows/Ft. SPT N-Value
Fine to coarse	All fractions > 10%	Very Soft	< 2	Very Loose	< 4
Medium to coarse	<10% fine	Soft	2 - 4	Loose	4 - 10
Fine to medium	<10% coarse	Medium Stiff	4 - 8	Medium Dense	10 - 30
Coarse	<10% fine and medium	Stiff	8 - 15	Dense	30 - 50
Medium	<10% coarse and fine	Very Stiff	15 - 30	Very Dense	> 50
Fine	<10% coarse and medium	Hard	>30		

**UNIFIED SOIL CLASSIFICATION SYSTEM (USCS) (ASTM D 2487)**

MAJOR DIVISIONS	Group Symbols
Coarse Grained Soils More than 50% of material larger than No. 200 sieve.	Gravel More than 50% larger than No. 4 sieve.
	Clean Gravels (Little or no fines) GW GP
	Gravels with Fines (Appreciable amount of fines) GM GC
	Sand More than 50% smaller than No. 4 sieve.
	Clean Sands (Little or no fines) SW SP
	Sands with Fines (Appreciable amount of fines) SM SC
	Silts and Clays Liquid Limit <50 ML CL
Fine Grained Soils More than 50% of material smaller than No. 200 sieve.	Silts and Clays Liquid Limit >50 OL MH CH OH
	Highly Organic Soils Pt


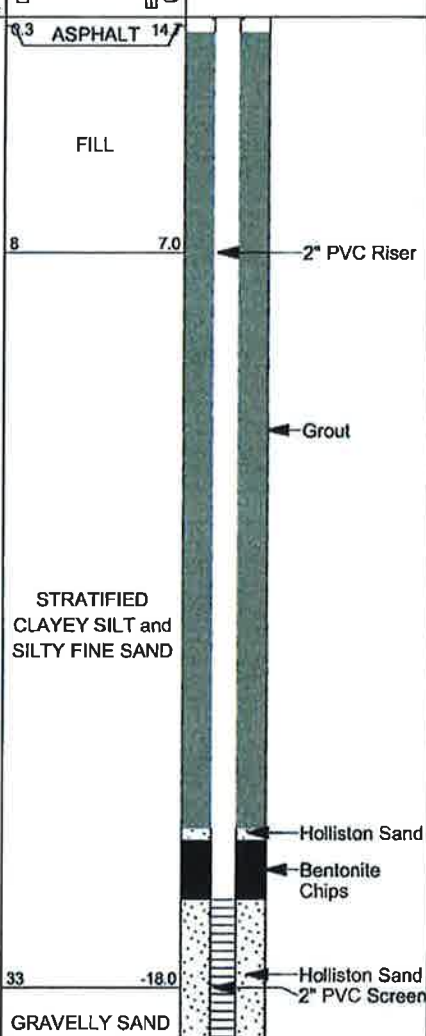
**ORGANIC SOIL CLASSIFICATION**

Fibrous PEAT (Pt) - Lightweight, spongy, mostly visible organic matter, water squeezes readily from sample. Typically near top of deposit.  
 Fine Grained PEAT (Pt) - Lightweight, spongy, little visible organic matter, water squeezes readily from sample. Typically below fibrous peat.  
 Organic Silt (OL) - Typically gray to dark gray, often has strong H2S odor. Typically contains shells or shell fragments. Lightweight. Usually found near coastal regions. May contain wide range of sand fractions.  
 Organic Clay (OH) - Typically gray to dark gray, high plasticity. Usually found near coastal regions. May contain wide range of sand fractions. Need organic content test for final identification.

**ABBREVIATIONS**

MR = Mud Rotary	Tv = Field Vane Shear Test (Torvane) Shear Strength
HSA = Hollow Stem Auger	PP = Pocket Penetrometer Shear Strength
SSA = Solid Stem Auger	PI = Plasticity Index
SS = Split Spoon Sampler	Wn = Moisture Content
U = Undisturbed Sample (Shelby Tube)	CO = Consolidation
MC = Modified California Sampler	UC = Unconfined Compression Test
V = Vibracore	UU = Unconsolidated Undrained (Triaxial) Test
M = Macrocore	SI = Sieve Analysis
	DS = Direct Shear
USCS = Unified Soil Classification System (ASTM D2487)	PID = Photoionization Detector
NYCBC = New York City Building Code	ppm = Parts Per Million
WOR = Weight of Rods	REC = Recovery
WOH = Weight of Hammer	RQD = Rock Quality Designation
SPT = Standard Penetration Test (ASTM D1586)	▼ = Measured Water Level
N-Value = Cumulative number of uncorrected blows for the middle two six-inch intervals (blows/foot).	



TEST BORING LOG																																			
			Grove Construction Water Street Plymouth, Massachusetts				EXPLORATION NO.: GZ-01 SHEET: 1 of 2 PROJECT NO: 34004.01 REVIEWED BY: A. Urbano																												
Logged By: J. Clegg Drilling Co.: New Hampshire Boring Foreman: N. Studdard			Type of Rig: HW Rig Model: Drilling Method: Casing		Boring Location: See Plan Ground Surface Elev. (ft.): 15 Final Boring Depth (ft.): 51 Date Start - Finish: 5/27/2014 - 5/27/2014			H. Datum:  V. Datum: NAVD 88																											
Hammer Type: Safety Hammer Hammer Weight (lb.): 300 Hammer Fall (in.): 24 Auger or Casing O.D./I.D Dia (in.): 4"			Sampler Type: SS Sampler O.D. (in.): 2.0 Sampler Length (in.): 24 Rock Core Size:		<table border="1"> <thead> <tr> <th colspan="5">Groundwater Depth (ft.)</th> </tr> <tr> <th>Date</th> <th>Time</th> <th>Water Depth</th> <th>Casing</th> <th>Stab. Time</th> </tr> </thead> <tbody> <tr> <td>5/27/2014</td> <td>16:30</td> <td>11" Above GS</td> <td>Well</td> <td>2 Hrs.</td> </tr> <tr> <td>5/28/2014</td> <td>07:30am</td> <td>20" Above GS</td> <td>Well</td> <td>17 Hrs.</td> </tr> <tr> <td>5/28/2014</td> <td>12:32pm</td> <td>36" Above GS</td> <td>Well</td> <td>22 Hrs.</td> </tr> </tbody> </table>						Groundwater Depth (ft.)					Date	Time	Water Depth	Casing	Stab. Time	5/27/2014	16:30	11" Above GS	Well	2 Hrs.	5/28/2014	07:30am	20" Above GS	Well	17 Hrs.	5/28/2014	12:32pm	36" Above GS	Well	22 Hrs.
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Depth (ft)	Casing Blows/ Core Rate	Sample					SPT Value	Sample Description Modified Burmister	Remark	Stratum		Equipment Installed																							
		No.	Depth (ft.)	Pen. (in)	Rec. (in)	Blows (per 6 in.)				Depth	Description																								
5		S-1	0.3-2.3	24	24	13 17 11 8	28	S-1 : 0.3": ASPHALT Medium dense, Gray/black, fine to coarse SAND, little (-) Silt, trace Gravel, trace Asphalt	1 2	8.3	ASPHALT 14.7																								
		S-2	4-6	24	14	20 13 11 15	24	S-2 : Medium dense, brown, fine to coarse SAND, trace Gravel, trace Silt																											
	S-3	9-11	24	22	7 7 9 12	16	S-3 : Very stiff, gray, Silty CLAY, trace fine Sand	3	8	7.0																									
	S-4	14-16	24	14	5 6 8 9	14	S-4 : Stiff, gray, Clayey SILT, trace fine Sand																												
	20		S-5	19-21	24	12	16 15 16 15	31	S-5 : Hard, gray SILT & CLAY, trace Silt with gray fine SAND, trace Silt and Clay varves (±1/16" thick) spaced ±1"-2".																										
			S-6	24-26	24	11	5 7 10 10	17	S-6 : Top 7": Very stiff, gray CLAY & SILT, trace fine Sand Bottom 4": Gray, fine SAND, some Silt, trace Gravel																										
			S-7	29-31	24	14	10 12	22	S-7 : Top 2": Very stiff, gray, SILT & CLAY, little fine SAND Bottom 12": Light brown, fine SAND, little (+) Silt, trace Gravel																										
							10 11																												
30		S-8	34-36	24	6	32 14	S-8 : Dense, light brown, fine to																												
35																																			



**REMARKS**

- 1 - Borehole elevation approximated from a plan titled "Water Street STA 0-77 to STA 7+00" dated 12/30/2013, prepared by Weston & Sampson.
- 2 - Performed at approximate station location 2+20. Note GS refers to ground surface.
- 3 - Possible stratum change at ±8' based on color change in wash and loss of gravel in wash water.
- 4 - Observed increase in drilling resistance/rapping of drill rods while advancing the drill bit from ±37' to 39' indicating possible gravel/cobbles.
- 5 - Observed ±10" of blow in after removing the split spoon for sample S-9. Cleaned out hole to ±42' and obtained sample S-10.


See Log Key for explanation of sample description and identification procedures. Stratification lines represent approximate boundaries between soil and bedrock types. Actual transitions may be gradual. Water level readings have been made at the times and under the conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the times the measurements were made.

**Exploration No.:**  
**GZ-01**


GZA TEMPLATE TEST BORING W/ EQUIP.: 5/30/2014; 12:25:01 PM

TEST BORING LOG																															
			<b>Grove Construction</b> Water Street Plymouth, Massachusetts				<b>EXPLORATION NO.: GZ-01</b> <b>SHEET: 2 of 2</b> <b>PROJECT NO: 34004.01</b> <b>REVIEWED BY: A. Urbano</b>																								
<b>Logged By:</b> J. Clegg <b>Drilling Co.:</b> New Hampshire Boring <b>Foreman:</b> N. Studdard			<b>Type of Rig:</b> HW <b>Rig Model:</b> <b>Drilling Method:</b> Casing		<b>Boring Location:</b> See Plan <b>Ground Surface Elev. (ft.):</b> 15 <b>Final Boring Depth (ft.):</b> 51 <b>Date Start - Finish:</b> 5/27/2014 - 5/27/2014			<b>H. Datum:</b>  <b>V. Datum:</b> NAVD 88																							
<b>Hammer Type:</b> Safety Hammer <b>Hammer Weight (lb.):</b> 300 <b>Hammer Fall (in.):</b> 24 <b>Auger or Casing O.D./I.D Dia (in.):</b> 4"			<b>Sampler Type:</b> SS <b>Sampler O.D. (in.):</b> 2.0 <b>Sampler Length (in.):</b> 24 <b>Rock Core Size:</b>			<b>Groundwater Depth (ft.)</b>																									
						<table border="1" style="width:100%; border-collapse: collapse;"> <thead> <tr> <th>Date</th> <th>Time</th> <th>Water Depth</th> <th>Casing</th> <th>Stab. Time</th> </tr> </thead> <tbody> <tr> <td>5/27/2014</td> <td>16:30</td> <td>11" Above GS</td> <td>Well</td> <td>2 Hrs.</td> </tr> <tr> <td>5/28/2014</td> <td>07:30am</td> <td>20" Above GS</td> <td>Well</td> <td>17 Hrs.</td> </tr> <tr> <td>5/28/2014</td> <td>12:32pm</td> <td>36" Above GS</td> <td>Well</td> <td>22 Hrs.</td> </tr> </tbody> </table>		Date	Time	Water Depth	Casing	Stab. Time	5/27/2014	16:30	11" Above GS	Well	2 Hrs.	5/28/2014	07:30am	20" Above GS	Well	17 Hrs.	5/28/2014	12:32pm	36" Above GS	Well	22 Hrs.				
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Depth (ft)	Casing Blows/ Core Rate	Sample					SPT Value	Sample Description Modified Burmister	Remark	Field Test Data	Stratum		Equipment Installed																		
		No.	Depth (ft.)	Pen. (in)	Rec. (in)	Blows (per 6 in.)					Description	Depth																			
128						19 12	33	coarse SAND and Gravel, trace Silt	4			 2" PVC Screen																			
88																															
94																															
73																															
40		S-9	39-41	24	7	7 10	33	S-9 : Dense, light brown, fine SAND, little Silt	5		39		-24.0																		
76						23 36			6																						
78																															
84		S-10	42-44	24	16	21 18	35	S-10 : Dense, light brown, fine SAND, little (+) Silt, with ±1/16" thick dark brown/red fine Sand,																							
91						17 27																									
45		S-11	44-46	24	22	13 15	33	some Silt, varves spaced ±3-4"																							
75						18 19																									
56																															
57																															
70																															
50		S-12	49-51	24	22	16 28	65	S-12 : Top 10": Very dense, light brown./gray, fine SAND, little Gravel, little Silt	7																						
						37 53			8		51	-36.0																			
								Bottom 12": Light brown, fine SAND, little Silt with Iron oxide staining, (±1/16" thick varves of light brown/red, fine SAND, little (+) Silt, spaced ±2"-3" in bottom 12" of sample)																							
								End of exploration at 51 feet.																							
55																															
60																															
65																															
70																															
<b>REMARKS</b> 6 - Maintained a positive head of water in the casing while drilling and sampling from 42'-51'. 7 - Installed a 2" PVC monitoring well. Well is screened from 40' to 30' and solid from 30' to 0'. Driller pulled casing back to 40' and allowed the borehole to collapse. The driller backfilled from 40' to 30' with Holliston Sand, from 30' to 28' with bentonite chips, from 28' to 27.5' with Holliston Sand and then grouted around the solid section of the casing from 27.5' to 0.5'. A V-plug was installed at the top of the well (to prevent artesian flow) and a road box was installed at the existing street grade. 8 - On May 28, 2014 at 1:50pm the static water level was 33" above grade. Observed a flowing artesian condition with a flow rate of 3 gallons per minute with casing 12" above grade.																															
See Log Key for explanation of sample description and identification procedures. Stratification lines represent approximate boundaries between soil and bedrock types. Actual transitions may be gradual. Water level readings have been made at the times and under the conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the times the measurements were made.										<b>Exploration No.:</b> <b>GZ-01</b>																					

GZA TEMPLATE TEST BORING W/ EQUIP.; 6/30/2014; 12:26:01 PM


TEST BORING LOG													
			Grove Construction Water Street Plymouth, Massachusetts				EXPLORATION NO.: GZ-02 SHEET: 1 of 2 PROJECT NO: 34004.01 REVIEWED BY: A. Urbano						
Logged By: J. Clegg Drilling Co.: New Hampshire Boring Foreman: N. Studdard			Type of Rig: HW Rig Model: Drilling Method: Casing		Boring Location: See Plan Ground Surface Elev. (ft.): 16 Final Boring Depth (ft.): 60.5 Date Start - Finish: 5/28/2014 - 5/29/2014			H. Datum:  V. Datum: NAVD 88					
Hammer Type: Safety Hammer Hammer Weight (lb.): 300 Hammer Fall (in.): 24 Auger or Casing O.D./I.D Dia (in.): 4"			Sampler Type: SS Sampler O.D. (in.): 2.0 Sampler Length (in.): 24 Rock Core Size:		Groundwater Depth (ft.)								
					Date	Time	Water Depth	Casing	Stab. Time				
					5/28/2014	12:35pm	37"	34'	30 Mins.				
					5/28/2014	15:30	6.3'	45'	1 Hr.				
Depth (ft)	Casing Blows/Core Rate	Sample				Blows (per 6 in.)	SPT Value	Sample Description Modified Burmister	Remark	Field Test Data	Stratum Description		Equipment Installed
		No.	Depth (ft.)	Pen. (in)	Rec. (in)						Depth (ft.)	Depth (ft.)	
		S-1	0.3-2.3	24	14	37 25 18 19	43	S-1 : 0.3": ASPHALT Dense, brown, fine to coarse SAND, little Gravel, little (-) Silt, trace Asphalt	1 2		FILL	No Equipment Installed	
5		S-2	4-6	24	13	10 7 7 12	14	S-2 : Medium dense, light brown, fine SAND, some Silt and Clay					
10		S-3	9-11	24	17	13 9 11 13	20	S-3 : Top 12": Medium dense, light brown, fine SAND, some Silt and Clay Bottom 15": Gray, Silty CLAY, trace fine Sand					
15		S-4	14-16	24	17	17 10 13 19	23	S-4 : Top 7": Medium dense, gray, fine SAND, some Clayey Silt, trace Gravel Bottom 10": Gray CLAY & SILT, trace fine Sand					
20		S-5	19-21	24	18	22 14 19 18	33	S-5 : Hard, gray, CLAY & SILT, trace fine Sand with ±1/16" thick varves of gray, fine SAND, trace Silt, spaced ±1" to 3".			STRATIFIED SILTY FINE SAND and CLAYEY SILT		
25		S-6	24-26	24	16	7 9 10 14	19	S-6 : Very stiff, gray, Silty CLAY, trace fine Sand					
30		S-7	29-31	24	21	13 9 7 11	16	S-7 : Medium dense, light brown, fine SAND, little (+) Silt					
35		S-8	34-36	24	22	15 18		S-8 : Dense, gray/brown, fine					
<b>REMARKS</b> 1 - Borehole elevation approximated from a plan titled "Water Street STA 0-77 to STA 7+00" dated 12/30/2013, prepared by Weston & Sampson. 2 - Performed at approximate station location 4+20.													
See Log Key for explanation of sample description and identification procedures. Stratification lines represent approximate boundaries between soil and bedrock types. Actual transitions may be gradual. Water level readings have been made at the times and under the conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the times the measurements were made.										Exploration No.: GZ-02			

GZA TEMPLATE TEST BORING W/ EQUIP.: 6/30/2014; 12:28:03 PM

TEST BORING LOG														
			Grove Construction Water Street Plymouth, Massachusetts				EXPLORATION NO.: GZ-02 SHEET: 2 of 2 PROJECT NO: 34004.01 REVIEWED BY: A. Urbano							
Logged By: J. Clegg Drilling Co.: New Hampshire Boring Foreman: N. Studdard			Type of Rig: HW Rig Model: Drilling Method: Casing		Boring Location: See Plan Ground Surface Elev. (ft.): 16 Final Boring Depth (ft.): 60.5 Date Start - Finish: 5/28/2014 - 5/29/2014			H. Datum:  V. Datum: NAVD 88						
Hammer Type: Safety Hammer Hammer Weight (lb.): 300 Hammer Fall (in.): 24 Auger or Casing O.D./I.D Dia (in.): 4"			Sampler Type: SS Sampler O.D. (in.): 2.0 Sampler Length (in.): 24 Rock Core Size:		Groundwater Depth (ft.)									
					Date	Time	Water Depth	Casing	Stab. Time					
					5/28/2014	12:35pm	37"	34'	30 Mins.					
					5/28/2014	15:30	6.3'	45'	1 Hr.					
Depth (ft)	Casing Blows/ Core Rate	Sample					Blows (per 6 in.)	SPT Value	Sample Description Modified Burmister	Remark	Field Test Data	Stratum Description		Equipment Installed
		No.	Depth (ft.)	Pen. (in)	Rec. (in)							Depth (ft.)	Elev. (ft.)	
197						30 39	48	SAND, some Clayey Silt						
198														
187														
192														
40		S-9	39-41	24	24	15 18		S-9 : Dense, gray/brown, fine SAND, some Clayey Silt						
206						24 23	42							
215														
220														
257														
251														
45		S-10	44-46	24	24	18 17		S-10 : Dense, light brown, fine SAND, little (+) Silt						
259						14 29	31							
50														
55														
60		S-11	58.5-60.5	24	12	84 77		S-11 : Very dense, light brown, fine (+) to medium SAND, some Angular Gravel, some Silt - Glacial Till	3					
						78 58	R		4	58	-42.0			
									5	60.5	-44.5			
65														
70														
End of exploration at 60.5 feet.														
3 - Advanced roller bit ahead of casing from 44 to 58.5 feet. Possible stratum change at 58' based on slower penetration of the roller bit, rapping of the drill rods and gravel observed in the wash water. 4 - Upon completion, borehole was tremmie grouted to the existing grade. 5 - Water level readings assumed to be unstabilized.														
See Log Key for explanation of sample description and identification procedures. Stratification lines represent approximate boundaries between soil and bedrock types. Actual transitions may be gradual. Water level readings have been made at the times and under the conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the times the measurements were made.											Exploration No.: GZ-02			

GZA TEMPLATE TEST BORING W/ EQUIP.; 6/30/2014; 12:26:03 PM



TEST BORING LOG															
 <b>GZA GeoEnvironmental, Inc.</b> <i>Engineers and Scientists</i>			<b>Grove Construction</b> Water Street Plymouth, Massachusetts				EXPLORATION NO.: GZ-03 SHEET: 1 of 2 PROJECT NO: 34004.01 REVIEWED BY: A. Urbano								
Logged By: J. Clegg Drilling Co.: New Hampshire Boring Foreman: N. Studdard			Type of Rig: HW Rig Model: Drilling Method: Casing		Boring Location: See Plan Ground Surface Elev. (ft.): 17 Final Boring Depth (ft.): 41 Date Start - Finish: 5/29/2014 - 5/29/2014			H. Datum:  V. Datum: NAVD 88							
Hammer Type: Safety Hammer Hammer Weight (lb.): 300 Hammer Fall (in.): 24 Auger or Casing O.D./I.D Dia (in.): 4"			Sampler Type: SS Sampler O.D. (in.): 2.0 Sampler Length (in.): 24 Rock Core Size:			Groundwater Depth (ft.)									
						Date		Time		Water Depth		Casing		Stab. Time	
						5/30/2014		08:30am		7" Above GS		Well		16 Hrs.	
						5/30/2014		13:20pm		12" Above GS		Well		21 Hrs.	
						6/2/2014		12:25pm		8" Above GS		Well		4 Days	
Depth (ft)	Casing Blows/ Core Rate	Sample						Sample Description Modified Burmister	Remark	Field Test Data	Stratum		Equipment Installed		
		No.	Depth (ft.)	Pen. (in)	Rec. (in)	Blows (per 6 in.)	SPT Value				Depth (ft)	Description			
5		S-1	0.5-2.5	24	15	17 25 28 19	53	S-1 : Very dense, brown, fine to coarse SAND, some Gravel, trace silt, trace Asphalt	1		0.5	ASPHALT	16.5	Riser	
									2						
10	18	S-2	4-6	24	22	8 9 14 14	23	S-2 : Medium dense, gray/light brown, fine SAND and Clayey Silt (possible rust colored soil mottles throughout the sample)	3		3.5	FILL	13.5		
15	19	S-3	9-11	24	3	7 8 9 10	17	S-3 : Medium dense, light brown, fine SAND and Clayey Silt, trace Gravel							
20	21	S-4	14-16	24	24	5 7 8 12	15	S-4 : Stiff, gray, Clayey SILT, trace fine Sand							
25	20	S-5	19-21	24	10	5 2 2 2	4	S-5 : Top 7": Soft, gray, CLAYEY SILT, trace fine Sand Bottom 3": Light brown, fine SAND and SILT							
30	21	S-6	24-26	24	11	12 5 11 15	16	S-6 : Medium dense, light brown, medium to fine (+) SAND, some Silt, little (-) Gravel (piece of gravel in tip)	4		23	SILTY GRAVELLY SAND	-6.0	Bentonite Chips	
35	27	S-7	29-31	24	18	16 15 15 14	30	S-7 : Top 4": Dense, light brown, fine SAND, some Clayey Silt, little Gravel Top/Middle 3": Light brown, fine SAND, trace (+) Silt Bottom/Middle 4": Light brown, fine to medium SAND, some	5		27	STRATIFIED CLAYEY SILT and FINE SAND	-10.0	Screen	
	60	S-8	34-36	24	24	14 14					34	Holliston Sand	-17.0		

GZA TEMPLATE TEST BORING W/ EQUIP.: 6/30/2014; 12:28:04 PM

**REMARKS**

- 1 - Borehole elevation approximated from a plan titled "Water Street STA 7+00 to STA 14+50 dated 12/30/2013, prepared by Weston & Sampson.
- 2 - Performed at approximate station location 7+10. Note: GS refers to ground surface.
- 3 - Apparent stratum change at 3.5' based on color change of wash advancing the roller bit.
- 4 - Encountered a possible cobble at 27.8' based on roller bit resistance and rock fragments in the wash water. Roller bit augered through obstruction at ±28.3'.
- 5 - Maintained on a positive head of water in the casing while extracting drill rods from 29' to the bottom of the borehole.


See Log Key for explanation of sample description and identification procedures. Stratification lines represent approximate boundaries between soil and bedrock types. Actual transitions may be gradual. Water level readings have been made at the times and under the conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the times the measurements were made.

**Exploration No.:**  
**GZ-03**

TEST BORING LOG													
<b>GZA</b> <b>GeoEnvironmental, Inc.</b> <i>Engineers and Scientists</i>			<b>Grove Construction</b> <b>Water Street</b> <b>Plymouth, Massachusetts</b>				<b>EXPLORATION NO.: GZ-03</b> <b>SHEET: 2 of 2</b> <b>PROJECT NO: 34004.01</b> <b>REVIEWED BY: A. Urbano</b>						
			<b>Logged By:</b> J. Clegg <b>Drilling Co.:</b> New Hampshire Boring <b>Foreman:</b> N. Studdard			<b>Type of Rig:</b> HW <b>Rig Model:</b> <b>Drilling Method:</b> Casing		<b>Boring Location:</b> See Plan <b>Ground Surface Elev. (ft.):</b> 17 <b>Final Boring Depth (ft.):</b> 41 <b>Date Start - Finish:</b> 5/29/2014 - 5/29/2014			<b>H. Datum:</b>  <b>V. Datum:</b> NAVD 88		
<b>Hammer Type:</b> Safety Hammer <b>Hammer Weight (lb.):</b> 300 <b>Hammer Fall (in.):</b> 24 <b>Auger or Casing O.D./I.D Dia (in.):</b> 4"			<b>Sampler Type:</b> SS <b>Sampler O.D. (in.):</b> 2.0 <b>Sampler Length (in.):</b> 24 <b>Rock Core Size:</b>			<b>Groundwater Depth (ft.)</b>							
						<b>Date</b>		<b>Time</b>		<b>Water Depth</b>	<b>Casing</b>	<b>Stab. Time</b>	
						5/30/2014		08:30am		7" Above GS	Well	16 Hrs.	
						5/30/2014		13:20pm		12" Above GS	Well	21 Hrs.	
						6/2/2014		12:25pm		8" Above GS	Well	4 Days	
Depth (ft)	Casing Blows/ Core Rate	Sample					SPT Value	Sample Description Modified Bernier	Remark	Field Test Data	Stratum		Equipment Installed
		No.	Depth (ft.)	Pen. (in)	Rec. (in)	Blows (per 6 in.)					Depth (ft)	Description	
83						18 29	32	Clayey Silt					
99								Bottom 7": Light brown, fine SAND, trace Silt					
92								S-8 : Top 18": Dense, light brown/gray, SILT, little fine Sand					
100								Middle 2": Light brown/gray, SILT and fine SAND					
40	120	S-9	39-41	24	22	17 15 21 31	36	Bottom 4": Light brown/gray, SILT, little fine Sand	6		41	STRATIFIED SILT and SILTY FINE SAND -24.0	
45								S-9 : Dense, light brown, fine SAND, some Silt					
50								End of exploration at 41 feet.					
55													
60													
65													
70													
<b>REMARKS</b> 6 - Installed a 2" PVC Monitoring well. Well is screened from 32.5' to 22.5' and solid from 22.5' to 0'. Driller pulled casing back to 32.5' and backfilled the hole with Holliston Sand from 41' to 32.5', then installed the PVC well. The driller then backfilled from 32.5' to 22.5' with Holliston Sand and from 22.5' to 1' with bentonite chips. A V-plug was installed at the top of the well (to prevent artesian flow) and a road box was installed at the existing street grade.													
See Log Key for explanation of sample description and identification procedures. Stratification lines represent approximate boundaries between soil and bedrock types. Actual transitions may be gradual. Water level readings have been made at the times and under the conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the times the measurements were made.											<b>Exploration No.:</b> <b>GZ-03</b>		


GZA TEMPLATE TEST BORING W/ EQUIP.: 6/30/2014, 12:28:05 PM




TEST BORING LOG													
			Grove Construction Water Street Plymouth, Massachusetts				EXPLORATION NO.: GZ-03A SHEET: 2 of 2 PROJECT NO: 34004.01 REVIEWED BY: A. Urbano						
Logged By: J. Clegg Drilling Co.: New Hampshire Boring Foreman: N. Studdard			Type of Rig: HW Rig Model: Drilling Method: Casing		Boring Location: See Plan Ground Surface Elev. (ft.): 17 Final Boring Depth (ft.): 54 Date Start - Finish: 6/3/2014 - 6/3/2014			H. Datum:  V. Datum: NAVD 88					
Hammer Type: Safety Hammer Hammer Weight (lb.): 300 Hammer Fall (in.): 24 Auger or Casing O.D./I.D Dia (in.): 4"			Sampler Type: SS Sampler O.D. (in.): 2.0 Sampler Length (in.): 24 Rock Core Size:		Groundwater Depth (ft.)								
					Date	Time	Water Depth	Casing	Stab. Time				
					6/3/2014	12:35pm	2' 2"	34'	40 Mins.				
Depth (ft)	Casing Blows/ Core Rate	Sample					SPT Value	Sample Description Modified Burmister	Remark	Field Test Data	Stratum		Equipment Installed
		No.	Depth (ft.)	Pen. (in)	Rec. (in)	Blows (per 6 in.)					Depth (ft)	Description	
40		S-1	39-41	24	23	19 15 22 26	37	S-1 : Top 7": Dense, light brown, fine SAND, trace Silt, trace Gravel Bottom 16": Light brown/gray, CLAYEY SILT, some fine Sand	4		SANDY SILT 38 -21.0		
45		S-2	44-46	24	11	20 25 27 34	52	S-2 : Very stiff, gray, Silty CLAY, trace fine Sand			SAND 40 -23.0		
50		S-3	49-51	24	19	31 49 51 69	R	S-3 : Top 11": Very dense, gray, fine SAND, some Clayey Silt Bottom 8": Light brown, fine Sand, little (+) Silt	5		STRATIFIED SILTY FINE SAND and CLAYEY SILT 52 -35.0		
55								End of exploration at 54 feet.	6 7 8		SAND 54 -37.0		
60													
65													
70													
<b>REMARKS</b> 5 - Drill bit clogged while advancing from 51' to 52'. Pulled rod, cleaned the bit and resumed drilling. 6 - Borehole blew in to ±34' after pulling the drill bit and dropping the split spoon. Attempted to redrill the hole to 54', the hole collapsed again to ±34' after pulling the drill bit. 7 - Upon completion, borehole grouted to the existing grade. 8 - Water level reading assumed to be unstabilized.													
See Log Key for explanation of sample description and identification procedures. Stratification lines represent approximate boundaries between soil and bedrock types. Actual transitions may be gradual. Water level readings have been made at the times and under the conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the times the measurements were made.											Exploration No.: GZ-03A		

GZA TEMPLATE TEST BORING W/ EQUIP.: 6/30/2014; 12:28:05 PM




TEST BORING LOG														
			<b>Grove Construction</b> Water Street Plymouth, Massachusetts				<b>EXPLORATION NO.: GZ-04</b> <b>SHEET: 1 of 2</b> <b>PROJECT NO: 34004.01</b> <b>REVIEWED BY: A. Urbano</b>							
<b>Logged By:</b> J. Clegg <b>Drilling Co.:</b> New Hampshire Boring <b>Foreman:</b> N. Studdard			<b>Type of Rig:</b> HW <b>Rig Model:</b> <b>Drilling Method:</b> Casing		<b>Boring Location:</b> See Plan <b>Ground Surface Elev. (ft.):</b> 14 <b>Final Boring Depth (ft.):</b> 61 <b>Date Start - Finish:</b> 5/30/2014 - 5/30/2014				<b>H. Datum:</b>  <b>V. Datum:</b> NAVD 88					
<b>Hammer Type:</b> Safety Hammer <b>Hammer Weight (lb.):</b> 300 <b>Hammer Fall (in.):</b> 24 <b>Auger or Casing O.D./I.D Dia (in.):</b> 4"			<b>Sampler Type:</b> SS <b>Sampler O.D. (in.):</b> 2.0 <b>Sampler Length (in.):</b> 24 <b>Rock Core Size:</b>			<b>Groundwater Depth (ft.)</b>								
						<b>Date</b>		<b>Time</b>		<b>Water Depth</b>		<b>Casing</b>	<b>Stab. Time</b>	
						5/30/2014		14:50pm		5.4'		19'	20 Mins.	
Depth (ft)	Casing Blows/ Core Rate	Sample						Sample Description Modified Burmister	Remark	Field Test Data	Stratum		Equipment Installed	
		No.	Depth (ft.)	Pen. (in)	Rec. (in)	Blows (per 6 in.)	SPT Value				Depth (ft)	Description		Elev. (ft.)
36		S-1	0.3-2.3	24	17	14	18	S-1 : Dense, brown/black, fine to coarse SAND, some Gravel, trace Silt, trace Asphalt	1		9.3	ASPHALT	13.7	No Equipment Installed
						15	15				33			
31		S-2	4-6	24	1"	7	4	S-2 : Loose, brown, GRAVEL, little fine to coarse Sand, trace Silt (piece of gravel in tip of spoon)	2		FILL			
						3	3							7
34		S-3	9-11	24	0	8	5	S-3 : Stiff, gray, Clayey SILT, trace fine Sand	3		7.5	6.5		
						3	5				8			
5		S-4	14-16	24	24	12	14	S-4 : Very stiff, gray, SILT & CLAY, trace fine to medium Sand	4		STRATIFIED CLAYEY SILT and SILTY FINE SAND			
						14	14							28
10		S-5	19-21	24	24	3	3	S-5 : Stiff, gray, SILT & CLAY, trace fine Sand	4					
						6	5							9
15		S-6	24-26	24	18	15	9	S-6 : Medium dense, gray, fine SAND, some Silt	4		27	-13.0		
						12	10				21			
20		S-7	29-31	24	3"	12	17	S-7 : Dense, light brown, fine SAND, little (-) Silt (pieces of gravel in tip of spoon)	4		SILTY GRAVELY SAND			
						19	19							36
25		S-8	34-36	24	6	16	9	S-8 : Medium dense, gray,	4					
30		<b>REMARKS</b> 1 - Borehole elevation approximated from a plan titled "Water Street STA 7+00 to STA 14+50 dated 12/30/2013, prepared by Weston & Sampson. 2 - Performed at approximate station location 10+00. 3 - No recovery in 2" split spoon at sample S-3, drove 3" sampler to obtain sample from 9'-11'. 4 - Advanced the borehole using "Open Hole" techniques with in a positive head of drilling slurry from 19' to 61'.												
													35	
<b>Exploration No.:</b> <b>GZ-04</b>														

GZA TEMPLATE TEST BORING W/ EQUIP.: 5/30/2014; 12:28:06 PM

TEST BORING LOG														
			Grove Construction Water Street Plymouth, Massachusetts				EXPLORATION NO.: GZ-04 SHEET: 2 of 2 PROJECT NO: 34004.01 REVIEWED BY: A. Urbano							
Logged By: J. Clegg Drilling Co.: New Hampshire Boring Foreman: N. Studdard			Type of Rig: HW Rig Model: Drilling Method: Casing		Boring Location: See Plan Ground Surface Elev. (ft.): 14 Final Boring Depth (ft.): 61 Date Start - Finish: 5/30/2014 - 5/30/2014			H. Datum:  V. Datum: NAVD 88						
Hammer Type: Safety Hammer Hammer Weight (lb.): 300 Hammer Fall (in.): 24 Auger or Casing O.D./I.D Dia (in.): 4"			Sampler Type: SS Sampler O.D. (in.): 2.0 Sampler Length (in.): 24 Rock Core Size:		Groundwater Depth (ft.)									
					Date		Time		Water Depth		Casing	Stab. Time		
					5/30/2014		14:50pm		5.4'		19'	20 Mins.		
Depth (ft)	Casing Blows/ Core Rate	Sample					Blows (per 6 in.)	SPT Value	Sample Description Modified Burmister	Remark	Field Test Data	Stratum		Equipment Installed
		No.	Depth (ft.)	Pen. (in)	Rec. (in)							Depth (ft)	Description	
						7 11	16	coarse to fine (+) SAND, some Gravel, little Silt				SILTY GRAVELY SAND		
40		S-9	39-41	24	10"	16 15 22 25	37	S-9 : Very stiff, gray, SILT & CLAY, trace fine Sand				37.5	-23.5	
45	O P E N	S-10	44-46	24	19	24 19 21 31	40	S-10 : Hard, gray, SILT & CLAY, little fine Sand						
50	H O L E	S-11	49-51	24	17	18 16 18 23	34	S-11 : Hard, gray/brown, Silty CLAY, trace fine Sand						
55		S-12	54-56	24	16	25 53 50 55	R	S-12 : Very dense, gray, fine SAND, some Silt	5					
60		S-13	59-61	24	2	21 26 31 36	57	S-13 : Hard, gray, silty CLAY, trace fine Sand	6			61	-47.0	
								End of exploration at 61 feet.	7					
65														
70														
<b>REMARKS</b> 5 - Stratum change at 52' based on increased drill bit resistance. 6 - Upon completion, borehole tremmie grouted to the existing ground surface. 7 - Water level readings assumed to be unstabilized.														
See Log Key for explanation of sample description and identification procedures. Stratification lines represent approximate boundaries between soil and bedrock types. Actual transitions may be gradual. Water level readings have been made at the times and under the conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the times the measurements were made.											Exploration No.: GZ-04			

GZA TEMPLATE TEST BORING W/ EQUIP.: 6/30/2014; 12:28:06 PM

TEST BORING LOG																															
			Grove Construction Water Street Plymouth, Massachusetts				EXPLORATION NO.: GZ-05 SHEET: 1 of 2 PROJECT NO: 34004.01 REVIEWED BY: A. Urbano																								
Logged By: J. Clegg Drilling Co.: New Hampshire Boring Foreman: N. Studdard			Type of Rig: HW Rig Model: Drilling Method: Casing		Boring Location: See Plan Ground Surface Elev. (ft.): 11 Final Boring Depth (ft.): 46 Date Start - Finish: 6/2/2014 - 8/2/2014			H. Datum:  V. Datum: NAVD 88																							
Hammer Type: Safety Hammer Hammer Weight (lb.): 300 Hammer Fall (in.): 24 Auger or Casing O.D./I.D Dia (in.): 4"			Sampler Type: SS Sampler O.D. (in.): 2.0 Sampler Length (in.): 24 Rock Core Size:				<table border="1"> <thead> <tr> <th colspan="5">Groundwater Depth (ft.)</th> </tr> <tr> <th>Date</th> <th>Time</th> <th>Water Depth</th> <th>Casing</th> <th>Stab. Time</th> </tr> </thead> <tbody> <tr> <td>6/3/2014</td> <td>08:40am</td> <td>45" Above GS</td> <td>Well</td> <td>18 Hrs.</td> </tr> <tr> <td>6/3/2014</td> <td>14:00</td> <td>47" Above GS</td> <td>Well</td> <td>23 Hrs.</td> </tr> </tbody> </table>					Groundwater Depth (ft.)					Date	Time	Water Depth	Casing	Stab. Time	6/3/2014	08:40am	45" Above GS	Well	18 Hrs.	6/3/2014	14:00	47" Above GS	Well	23 Hrs.
Groundwater Depth (ft.)																															
Date	Time	Water Depth	Casing	Stab. Time																											
6/3/2014	08:40am	45" Above GS	Well	18 Hrs.																											
6/3/2014	14:00	47" Above GS	Well	23 Hrs.																											
Depth (ft)	Casing Blows/ Core Rate	Sample						Sample Description Modified Burmister	Remark	Field Test Data	Stratum Description Elev. (ft.)	Equipment Installed																			
		No.	Depth (ft.)	Pen. (in)	Rec. (in)	Blows (per 6 in.)	SPT Value																								
18		S-1	0.3-2.3	24	17	16 30 18 7	48	S-1 : Dense, brown/black, fine to coarse SAND, some Gravel, little Asphalt, trace Silt	1	10.3 ASPHALT 10.7	Riser																				
31									2	FILL 8.0																					
23		S-2	4-6	24	20	11 11 11 12	22	S-2 : Medium dense, light brown, fine SAND and Silt (possible rust colored soil mottles throughout sample)			Bentonite Chips																				
72		S-3	9-11	24	16	31 30 29 21	59	S-3 : Top 10": Very dense, light brown, fine to medium SAND, some Silt, trace Gravel Bottom 6": Light brown, clayey SILT with a vertical seam of fine to medium SAND, some Silt			Holliston Sand																				
94		S-4	14-16	24	18	12 13 16 19	29	S-4 : Top 6": Very stiff, gray, SILT & CLAY, trace Sand Middle 10": Brown, fine to medium SAND, little (-) Silt Bottom 2": Light brown, fine to medium SAND, some Silt		14.5 -3.5 15.5 SAND -4.5	Screen																				
95		S-5	19-21	24	24	6 6 10 12	16	S-5 : Very stiff, gray, Silty CLAY, trace fine Sand																							
100		S-6	24-26	24	24	6 6 7 8	13	S-6 : Stiff, gray, CLAY & SILT, trace fine Sand			STRATIFIED CLAYEY SILT and SILTY FINE SAND																				
89		S-7	29-31	24	22	6 14 13 16	27	S-7 : Very stiff, gray, CLAY & SILT, some fine Sand, trace Gravel	3																						
34		S-8	34-36	24	20	8 9		S-8 : Top 7": Very stiff, gray,																							


**REMARKS**

- 1 - Borehole elevation approximated from a plan titled "Water Street STA 7+00 to STA 14+50 dated 12/30/2013, prepared by Weston & Sampson.
- 2 - Performed at approximate station location 12+70. Note: GS refers to ground surface.
- 3 - Advanced the borehole using "open hole" technique with a positive head of water from 34 to 46 feet.

See Log Key for explanation of sample description and identification procedures. Stratification lines represent approximate boundaries between soil and bedrock types. Actual transitions may be gradual. Water level readings have been made at the times and under the conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the times the measurements were made.


**Exploration No.: GZ-05**

GZA TEMPLATE TEST BORING W/ EQUIP.: 6/30/2014; 12:28:07 PM

TEST BORING LOG																
			Grove Construction Water Street Plymouth, Massachusetts				EXPLORATION NO.: GZ-05 SHEET: 2 of 2 PROJECT NO: 34004.01 REVIEWED BY: A. Urbano									
Logged By: J. Clegg Drilling Co.: New Hampshire Boring Foreman: N. Studdard			Type of Rig: HW Rig Model: Drilling Method: Casing		Boring Location: See Plan Ground Surface Elev. (ft.): 11 Final Boring Depth (ft.): 46 Date Start - Finish: 6/2/2014 - 6/2/2014				H. Datum:  V. Datum: NAVD 88							
Hammer Type: Safety Hammer Hammer Weight (lb.): 300 Hammer Fall (in.): 24 Auger or Casing O.D./I.D Dia (in.): 4"			Sampler Type: SS Sampler O.D. (In.): 2.0 Sampler Length (in.): 24 Rock Core Size:				Groundwater Depth (ft.)									
							Date		Time		Water Depth		Casing		Stab. Time	
							6/3/2014		08:40am		45" Above GS		Well		18 Hrs.	
							6/3/2014		14:00		47" Above GS		Well		23 Hrs.	
Depth (ft)	Casing Blows/ Core Rate	Sample					Blows (per 6 in.)	SPT Value	Sample Description Modified Burmister	Remark	Field Test Data	Stratum Description		Equipment Installed		
		No.	Depth (ft.)	Pen. (in)	Rec. (in)							Depth (ft)	Blow (ft)			
40	O P E N	S-9	39-41	24	12	5 6 6 7	12	clayey SILT, some fine Sand Bottom 13": Light brown, fine SAND, some Silt	4		38	STRATIFIED CLAYEY SILT and SILTY FINE SAND				
45	H O L L E	S-10	44-46	24	18	28 18 13 23	31	S-9 : Top 4": Light brown, fine SAND, trace (+) Silt Bottom 8": Gray, CLAY & SILT, some Gravel, some fine to coarse Sand  S-10 : Top 7": Dense, gray, fine to coarse SAND, some Gravel, little Silt	5	46	-35.0	STRATIFIED CLAYEY SILT and SILTY FINE SAND and SAND				
50								Middle 3": Gray, fine to medium SAND, trace Silt, trace Gravel Bottom 8": Gray, clayey SILT, little fine to medium SAND	6							
55								End of exploration at 46 feet.								
60																
65																
70																
<b>REMARKS</b> 4 - Encountered a gravelly zone from ±41.5' to 43' based on drill bit resistance and rapping of the drill rods. 5 - With the casing at 34 feet and the borehole open to 44 feet, lowered drill rods into the borehole and displaced ±1.5' of water to approximate 21" below grade. Observed the groundwater rise to ±7" below grade in ±6 minutes. 6 - Installed a 2" PVC Monitoring well. Well is screened from 20' to 10' and solid form 10' to 0'. Driller pulled casing back to 20' and allowed the borehole to collapse from 44' to 20', then installed the PVC well. The driller then backfilled from 20' to 10' with Holliston Sand, from 10' to 1' with bentonite chips and installed a road box flush with the existing grade. A V-plug was installed at the top of the well (to prevent artesian flow).																
See Log Key for explanation of sample description and identification procedures. Stratification lines represent approximate boundaries between soil and bedrock types. Actual transitions may be gradual. Water level readings have been made at the times and under the conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the times the measurements were made.											Exploration No.: <b>GZ-05</b>					

GZA TEMPLATE TEST BORING W/ EQUIP.: 6/30/2014; 12:28:07 PM



TEST BORING LOG												
			Plymouth Parking Garage Water Street and Memorial Drive Plymouth, Massachusetts				EXPLORATION NO.: GZ-4 SHEET: 1 of 2 PROJECT NO: 171716 REVIEWED BY: MJO					
Logged By: D. Wolongevicz Drilling Co.: New Hampshire Boring Foreman: N. Stuttard			Type of Rig: Truck Rig Model: D-50 Drilling Method: Drive and Wash		Boring Location: See Plan Ground Surface Elev. (ft.): 17.5 Final Boring Depth (ft.): 61 Date Start - Finish: 7/22/2013 - 7/22/2013			H. Datum: V. Datum: NGVD 29				
Hammer Type: Safety Hammer Hammer Weight (lb.): 140 Hammer Fall (in.): 30 Auger or Casing O.D./I.D Dia (in.): 4.5"/4"			Sampler Type: Split Spoon Sampler O.D. (in.): 2.0 Sampler Length (in.): 24 Rock Core Size: HW		Groundwater Depth (ft.)							
					Date	Time	Water Depth	Stab. Time				
					7/22/13	1415	3.5	20 min.				
Depth (ft)	Casing Blows/ Core Rate	Sample					Sample Description and Identification (Modified Burmister Procedure)	Remark	Field Test Data	Depth (ft.)	Stratum Description	Elev. (ft.)
		No.	Depth (ft.)	Pen. (in)	Rec. (in)	Blows (per 6 in.)						
5		S-1	1-3	24	9	10 6 4 5	S-1 : Medium dense, brown, fine to medium SAND, some Silt, little Gravel	1	0.2			
		S-2	3-5	24	16	6* 7* 7* 14*	S-2 : Top 4": Dark gray, fine to coarse SAND, some Silt, little Gravel	3	0.2		FILL	
		S-3	5-7	24	8	15 9 6 6	Bottom 12": Brown, fine to coarse SAND, little (+) Gravel, little Silt	4	0.2			
		S-4	7-9	24	19	8* 13* 20* 13*	S-3 : Medium dense, brown, fine to coarse SAND, little (+) Gravel, little Silt S-4 : Top 15": Brown, fine to coarse SAND, trace Gravel, trace Silt	5	0.2	7		10.5
10						Bottom 4": Brown, fine to medium SAND, some Silt	6	ND			SAND	
										12		5.5
15		S-5	14-16	24	20	9 10 14 16	S-5 : Very stiff, gray, Silty CLAY, varved with three (1/16 Inch minus thick) lens of fine Sand and Silt (spaced approximately 2 inches apart)	7	ND			
20		S-6	19-21	24	12	6 7 11 11	S-6 : Very stiff, gray, Silty CLAY	8	ND			
25		S-7	24-26	24	15	11 8 5 6	S-7 : Top 7": Brown, fine to medium SAND, little Silt Bottom 8": Olive, Silty CLAY with varves of fine Sand, some Silt (1/16 inch minus thick) spaced 1/4 to 1 inch apart	9	ND	23		-5.5
										24		-6.5
30		S-8	29-31	24	22	4 5 4 4	S-8 : Stiff, brown, CLAY & SILT and fine SAND with a single 1/4 Inch thick lens of Silty Clay	10	ND			
										33		-15.5


GZA TEMPLATE TEST BORING 300, 12/4/2013, 10:57:17 AM

**REMARKS**

- 1 - Ground surface elevation estimated from a drawing entitled "TOPOGRAPHIC PLAN - MUNICIPAL PARKING LOT - MEMORIAL DRIVE PLYMOUTH, MA" prepared by Nilsch Engineering on 10/24/2011.
- 2 - Where applicable, field testing results represent total organic vapor levels, referenced to a benzene standard, measured in the headspace of sealed soil sample jars using a Thermo Environmental 5808 organic vapor meter equipped with a Photoionization detector (PID) and 10.6 eV lamp. Results in parts per million by volume (ppmv), ND indicates nothing detected (<0.1 ppm).
- 3 - In the "Blows per 6" column, the numbers which have an asterisk symbol indicates that after the preceding split spoon sample was driven an AW-rod attachment was placed on a split spoon and subsequently driven without cleaning out the borehole with the drill bit. These blow counts are not representative of SPT-N Values.
- 4 - Where applicable, field testing results represent total organic vapor levels, referenced to a benzene standard, measured in the headspace of sealed soil sample jars using a Thermo Environmental 5808 organic vapor meter equipped with a Photoionization detector (PID) and 10.6 eV lamp. Results in parts per million by volume (ppmv), ND indicates nothing detected (<0.1 ppm).
- 5 - Observed that the split spoon sample S-1 appeared to be dry and that the split spoon sample S-2 appeared to be saturated, as well as all subsequent split spoon samples.
- 6 - Observed that the drilling contractor maintained a positive head on the borehole while extracting the drill bit below a depth of 9-feet.
- 7 - Observed an increase in drilling resistance at a depth of 23-feet.

See Log Key for explanation of sample description and identification procedures. Stratification lines represent approximate boundaries between soil and bedrock types. Actual transitions may be gradual. Water level readings have been made at the times and under the conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the times the measurements were made.

**Exploration No.: GZ-4**

TEST BORING LOG													
 <b>GZA</b> <b>GeoEnvironmental, Inc.</b> <i>Engineers and Scientists</i>			<b>Plymouth Parking Garage</b> <b>Water Street and Memorial Drive</b> <b>Plymouth, Massachusetts</b>				<b>EXPLORATION NO.: GZ-4</b> <b>SHEET: 2 of 2</b> <b>PROJECT NO: 171716</b> <b>REVIEWED BY: MJO</b>						
<b>Logged By:</b> D. Wolongevicz <b>Drilling Co.:</b> New Hampshire Boring <b>Foreman:</b> N. Stultard			<b>Type of Rig:</b> Truck <b>Rlg Model:</b> D-50 <b>Drilling Method:</b> Drive and Wash		<b>Boring Location:</b> See Plan <b>Ground Surface Elev. (ft.):</b> 17.5 <b>Final Boring Depth (ft.):</b> 61 <b>Date Start - Finish:</b> 7/22/2013 - 7/22/2013			<b>H. Datum:</b> <b>V. Datum:</b> NGVD 29					
<b>Hammer Type:</b> Safety Hammer <b>Hammer Weight (lb.):</b> 140 <b>Hammer Fall (in.):</b> 30 <b>Auger or Casing O.D./I.D Dia (in.):</b> 4.6"14"			<b>Sampler Type:</b> Split Spoon <b>Sampler O.D. (In.):</b> 2.0 <b>Sampler Length (in.):</b> 24 <b>Rock Core Size:</b> HW			<b>Groundwater Depth (ft.)</b>							
						<b>Date</b>		<b>Time</b>		<b>Water Depth</b>		<b>Stab. Time</b>	
						7/22/13		1415		3.5		20 min.	
Depth (ft)	Casing Blows/ Core Rate	Sample					Sample Description and Identification (Modified Burmister Procedure)	Remark	Field Test Data	Stratum Description	Elev. (ft.)		
		No.	Depth (ft.)	Pen. (in)	Rec. (in)	Blows (per 6 in.)							
35		S-9	34-36	24	12	5 5 5 5	S-9 : Medium dense, brown, fine to medium SAND and SILT	ND					
									37.5	-20.0			
40		S-10	39-41	24	11	15 22 24 22	S-10 : Dense, brown-orange, fine to coarse SAND, little Gravel, trace Silt	ND					
45		S-11	44-46	24	9	19 33 28 29	S-11 : Very dense, fine to medium SAND, trace Silt	ND					
50		S-12	49-51	24	18	32 26 22 25	S-12 : Dense, brown with orange, fine to medium SAND, trace Silt	ND					
55		S-13	54-56	24	8	28 32 34 27	S-13 : Very dense, brown, fine to coarse SAND, little Gravel, little Silt	ND					
60		S-14	59-61	24	8	29 39 42 38	S-14 : Very dense, brown, fine to coarse SAND, little Gravel, trace Silt	ND					
							End of exploration at 61 feet.	8	61	-43.5			
65													
<b>REMARKS</b> 8 - Upon completion of the test boring, the contractor backfilled with drill cuttings and patched the surface with asphalt													
See Log Key for explanation of sample description and identification procedures. Stratification lines represent approximate boundaries between soil and bedrock types. Actual transitions may be gradual. Water level readings have been made at the times and under the conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the times the measurements were made.										<b>Exploration No.:</b> <b>GZ-4</b>			

GZA TEMPLATE TEST BORING 300, 12/4/2013, 10:57:18 AM

**LABORATORY TESTING DATA SHEET**

Project Name Water Street  
 Project No. 03.0034004.01  
 Project Manager Anthony Urbano

Location Plymouth, MA  
 Assigned By Anthony Urbano  
 Report Date 6/19/2014

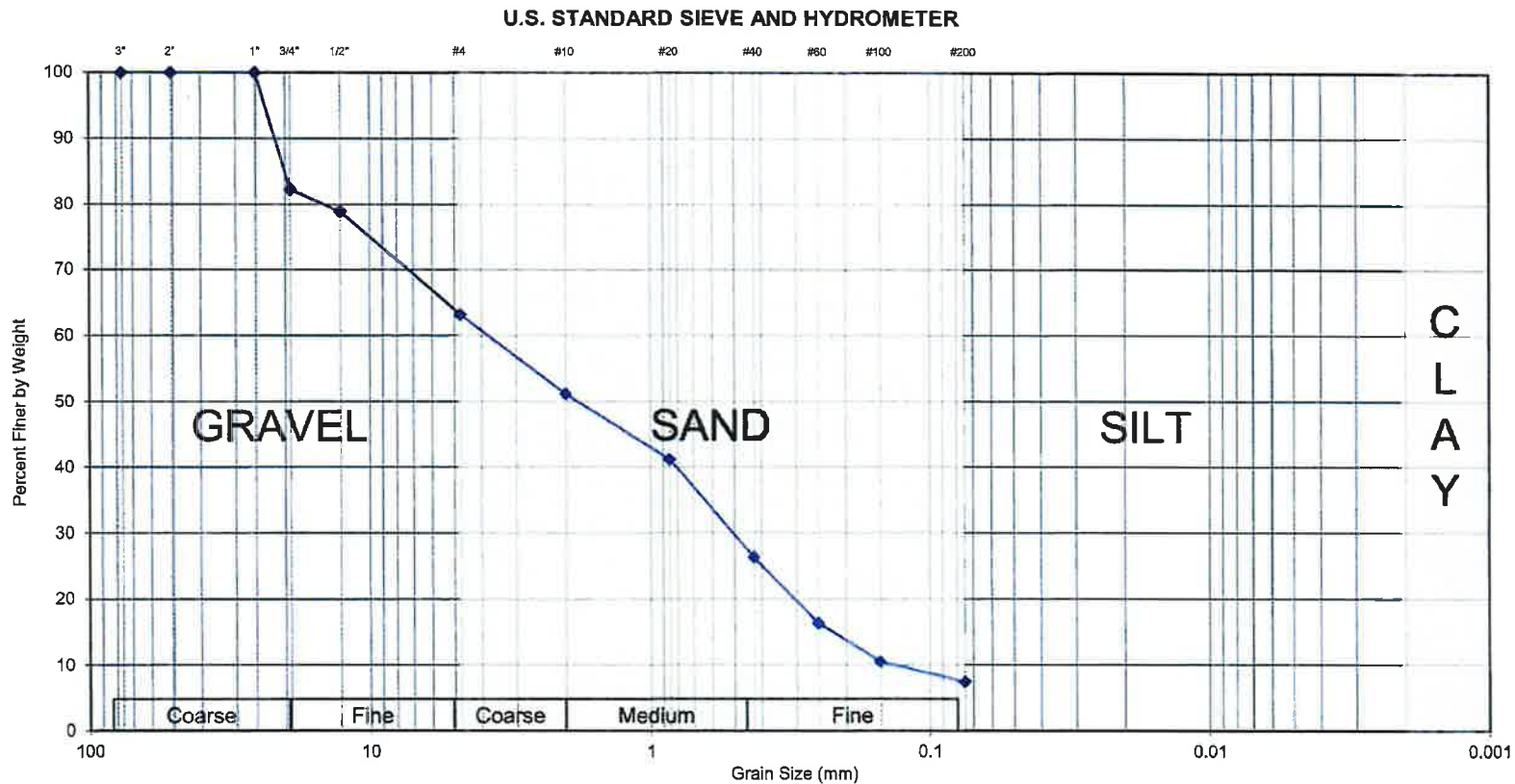
Reviewed By *Matthew P. [Signature]*  
 Date Reviewed 6/19/2014

Boring/ Test Pit No.	Sample No.	Depth ft.	Lab No.	Identification Tests								Strength Tests					Laboratory Log and Soil Description	
				Water Content %	LL %	PL %	Sieve -200 %	Hyd -2 $\mu$ %	ORG %	G <sub>s</sub>	Dry unit wt. pcf	Torvane or Type Test	$\sigma_c$ psf	Failure Criteria	$\sigma_1 - \sigma_3$ psf	Strain %		
GZ-1	S-8	34-36	1				7.4											Brown f-c SAND and f-c GRAVEL, trace Silt
GZ-1	S-11	44-46	2				35.1											Brown fine SAND and SILT
GZ-3	S-6	24-26	3				27.5											Brown f-m SAND, some Silt, little f-c Gravel
GZ-3A	S-1	39-41	4				12.2											Brown f-m SAND, little Silt, trace Gravel
GZ-4	S-8	34-36	5				17.6											Gray f-c SAND, some f-c Gravel, little Silt
GZ-5	S-4	14-16	6				13.5											Gray f-c SAND, little Silt, little fine Gravel
GZ-5	S-10	44-46	7				8.1											Brown f-m SAND, trace Silt, trace Gravel



195 Frances Avenue  
 Cranston, RI 02910 401-467-6454

ASTM D422



Gravel 36.8%      Sand 55.8%      Fines 7.4%

Lab #	Exploration	Sample	Depth	Description	WC	LL	PL	PI
1	GZ-1	S-8	34-36'	Brown f-c SAND and f-c GRAVEL, trace Silt				

Sieve Size	% Passing
3/4"	82.3
1/2"	78.9
#4	63.2
#10	51.2
#20	41.2
#40	26.3
#60	16.2
#100	10.5
#200	7.4

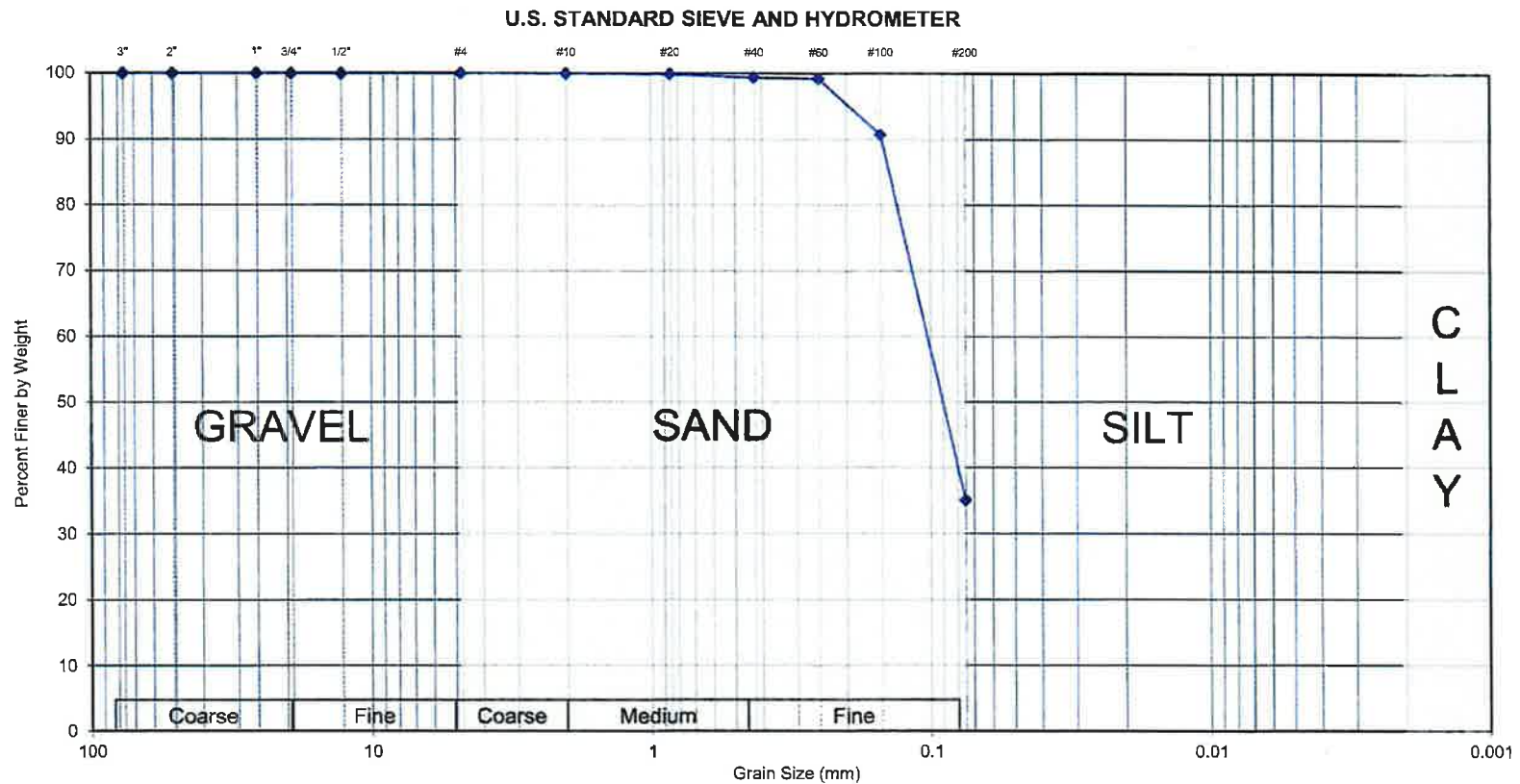
**THIELSCH**  
**ENGINEERING**

195 Frances Ave., Cranston, RI 02910  
 401-467-6454

CTS-74-14-0003  
 Water Street  
 Plymouth, MA  
 GZA File # 03.0034004.01  
 Tested by: PC      Date: 6/19/14  
 Reviewed by: MBP      Date: 6/19/14



ASTM D422



Gravel 0.0%      Sand 64.9%      Fines 35.1%

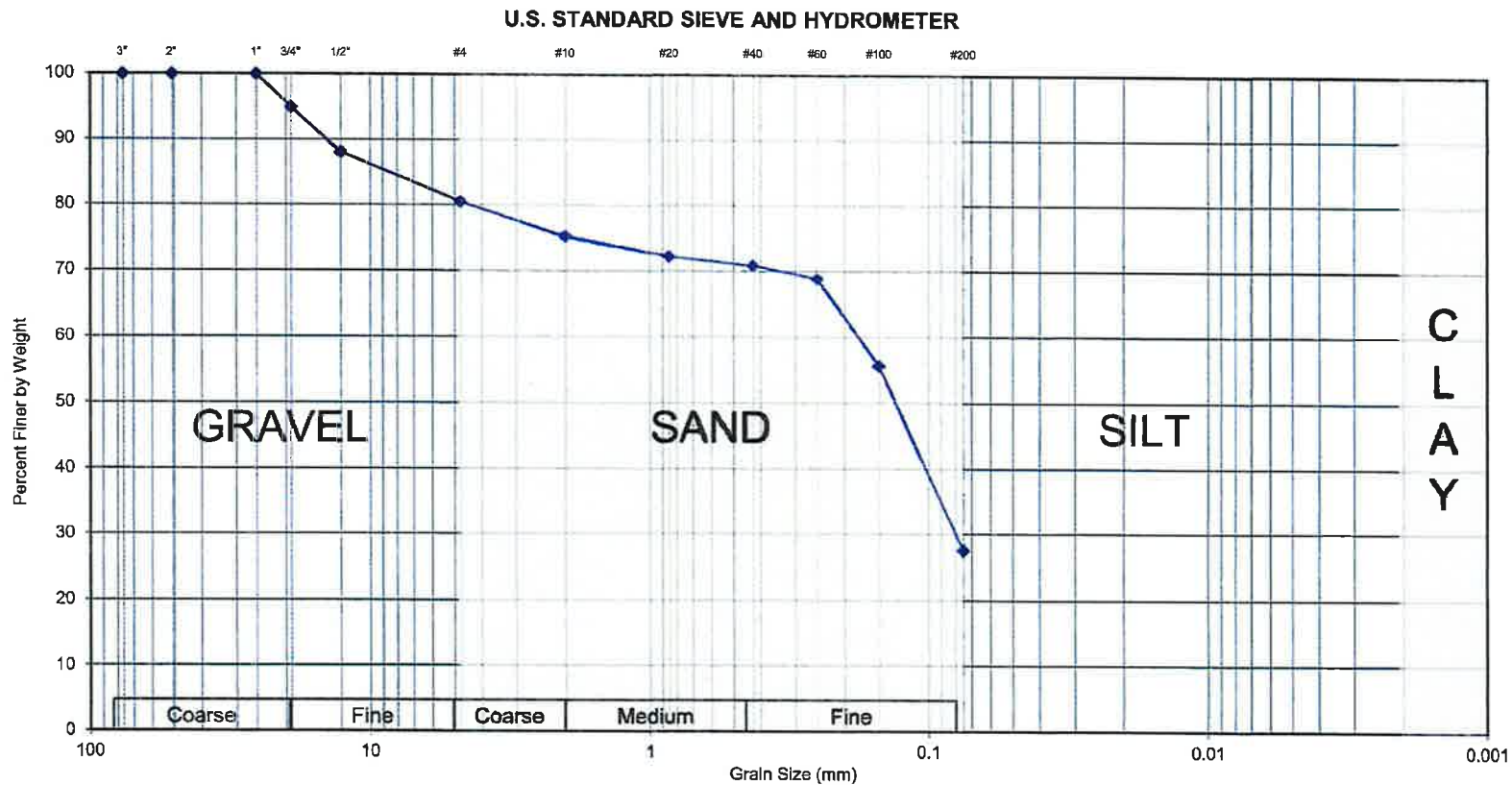
Lab #	Exploration	Sample	Depth	Description	WC	LL	PL	PI
2	GZ-1	S-11	44.4-46'	Brown fine SAND and SILT				

Sieve Size	% Passing
3/4"	100.0
1/2"	100.0
#4	100.0
#10	100.0
#20	99.9
#40	99.4
#60	99.2
#100	90.7
#200	35.1

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 195 Frances Ave., Cranston, RI 02910  
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CTS-74-14-0003  
 Water Street  
 Plymouth, MA  
 GZA File # 03.0034004.01  
 Tested by: PC      Date: 6/19/14  
 Reviewed by: MBP      Date: 6/19/14

ASTM D422



Gravel 19.5%                      Sand 52.9%                      Fines 27.5%

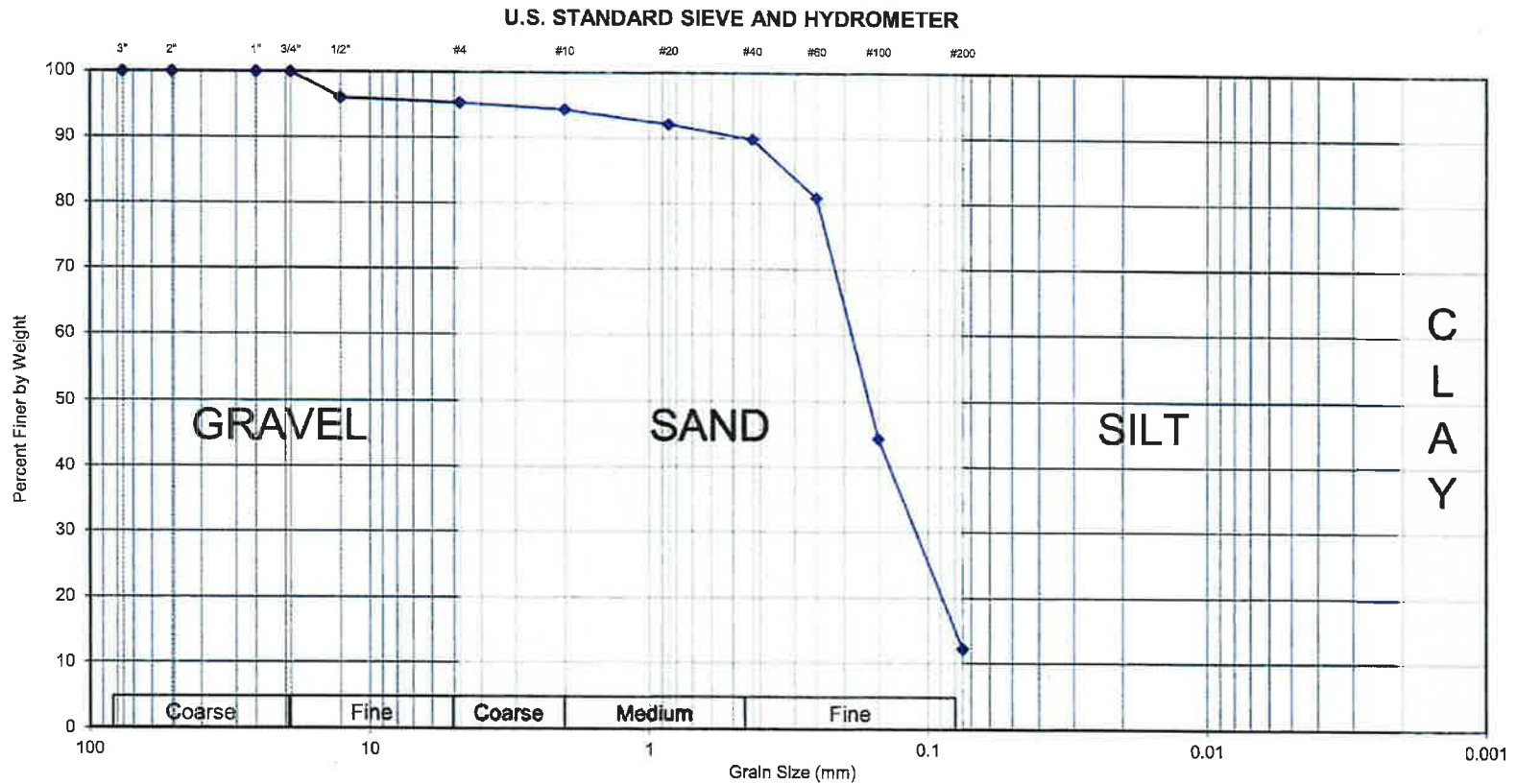
Lab #	Exploration	Sample	Depth	Description	WC	LL	PL	PI
3	GZ-3	S-6	24-26'	Brown f-m SAND, some Silt, little f-c Gravel				

Sieve Size	% Passing
3/4"	95.0
1/2"	88.0
#4	80.5
#10	75.2
#20	72.2
#40	70.8
#60	68.8
#100	55.6
#200	27.5

**THIELSCH**  
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 195 Frances Ave., Cranston, RI 02910  
 401-467-6454

CTS-74-14-0003  
 Water Street  
 Plymouth, MA  
 GZA File # 03.0034004.01  
 Tested by: PC      Date: 6/19/14  
 Reviewed by: MBP      Date: 6/19/14

ASTM D422



Gravel 4.7%                      Sand 83.1%                      Fines 12.2%

Lab #	Exploration	Sample	Depth	Description	WC	LL	PL	PI
4	GZ-3A	S-1	39-39.6'	Brown f-m SAND, little Silt, trace Gravel				

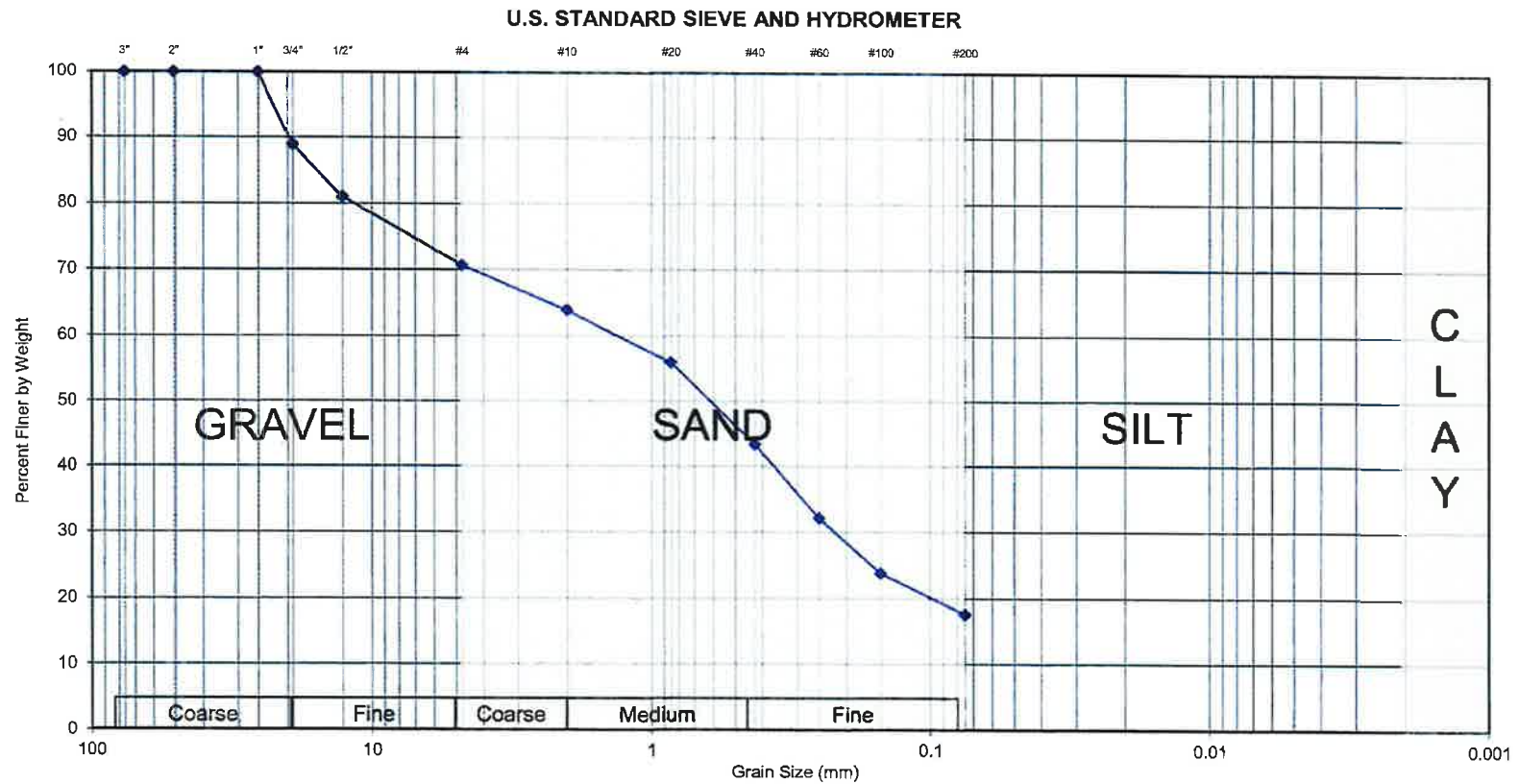
Sieve Size	% Passing
3/4"	100.0
1/2"	96.0
#4	95.3
#10	94.3
#20	92.1
#40	89.8
#60	80.9
#100	44.3
#200	12.2

**THIELSCH**  
**ENGINEERING**

195 Frances Ave., Cranston, RI 02910  
 401-467-6454

CTS-74-14-0003  
 Water Street  
 Plymouth, MA  
 GZA File # 03.0034004.01  
 Tested by: PC      Date: 6/19/14  
 Reviewed by: MBP      Date: 6/19/14

ASTM D422



Gravel  
29.4%

Sand  
53.0%

Fines  
17.6%

Lab #	Exploration	Sample	Depth	Description	WC	LL	PL	PI
5	GZ-4	S-8	34-36'	Gray f-c SAND, some f-c Gravel, little Silt				

Sieve Size	% Passing
3/4"	88.9
1/2"	81.0
#4	70.6
#10	63.9
#20	56.0
#40	43.4
#60	32.1
#100	23.8
#200	17.6

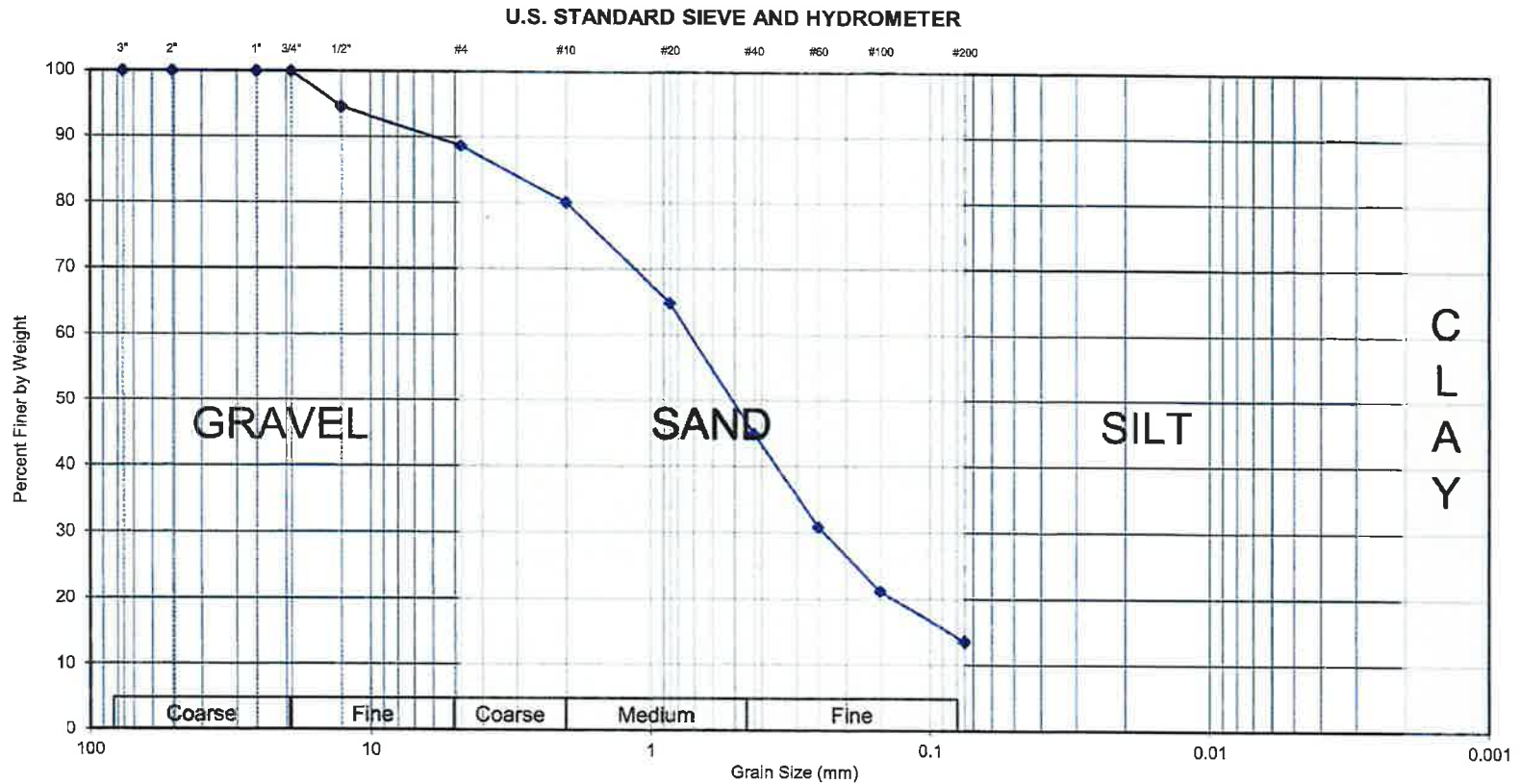
**THIELSCH**  
**ENGINEERING**

195 Frances Ave., Cranston, RI 02910  
 401-467-6454

CTS-74-14-0003  
 Water Street  
 Plymouth, MA  
 GZA File # 03.0034004.01  
 Tested by: PC Date: 6/19/14  
 Reviewed by: MBP Date: 6/19/14



ASTM D422



Gravel 11.4%      Sand 75.1%      Fines 13.5%

Lab #	Exploration	Sample	Depth	Description	WC	LL	PL	PI
6	GZ-5	S-4	14-16'	Gray f-c SAND, little Silt, little fine Gravel				

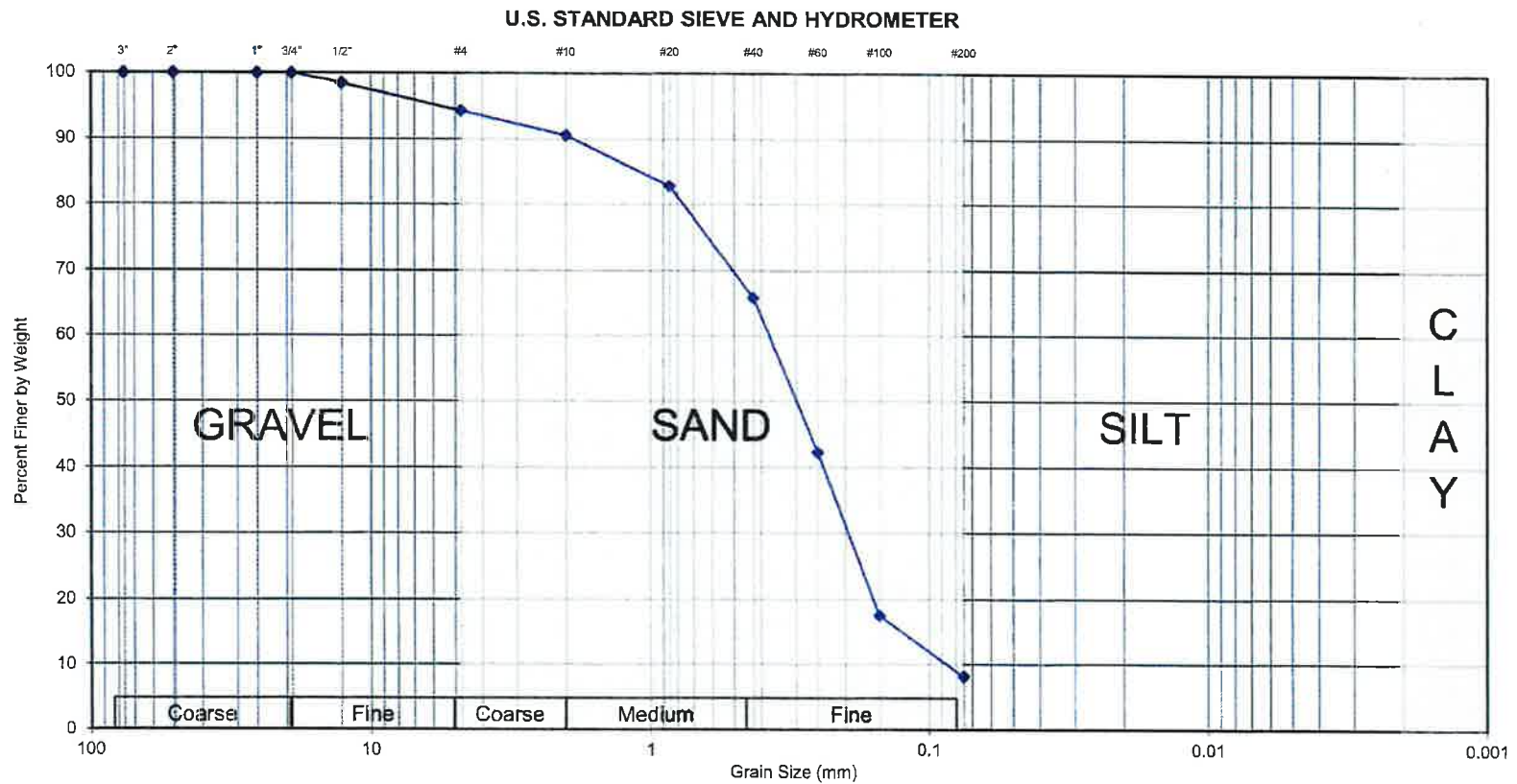
Sieve Size	% Passing
3/4"	100.0
1/2"	94.5
#4	88.6
#10	80.1
#20	64.9
#40	44.9
#60	30.9
#100	21.1
#200	13.5



195 Frances Ave., Cranston, RI 02910  
 401-467-6454

CTS-74-14-0003  
 Water Street  
 Plymouth, MA  
 GZA File # 03.0034004.01  
 Tested by: PC      Date: 6/19/14  
 Reviewed by: MBP      Date: 6/19/14

ASTM D422



Gravel 5.7%                      Sand 86.2%                      Fines 8.1%

Lab #	Exploration	Sample	Depth	Description	WC	LL	PL	PI
7	GZ-5	S-10	44-46'	Brown f-m SAND, trace Silt, trace Gravel				

Sieve Size	% Passing
3/4"	100.0
1/2"	98.5
#4	94.3
#10	90.6
#20	82.8
#40	65.9
#60	42.3
#100	17.5
#200	8.1

**THIELSCH**  
**ENGINEERING**

195 Frances Ave., Cranston, RI 02910  
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CTS-74-14-0003  
 Water Street  
 Plymouth, MA  
 GZA File # 03.0034004.01  
 Tested by: PC      Date: 6/19/14  
 Reviewed by: MBP      Date: 6/19/14

## **Appendix B**

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### **Explorations by GEI**

**BORING**

**GEI-1**

PAGE 1 of 2

**BORING INFORMATION**

LOCATION: See Boring Location Plan  
 GROUND SURFACE EL. (ft): ~11 DATE START/END: 2/25/2015 - 2/25/2015  
 VERTICAL DATUM: NAVD 88 DRILLING COMPANY: Geologic, Inc.  
 TOTAL DEPTH (ft): 41.0 DRILLER NAME: R. Eastwood  
 LOGGED BY: D. McVeety RIG TYPE: Mobile B-57 Truck Rig

**DRILLING INFORMATION**

HAMMER TYPE: Donut Hammer - spooling winch CASING I.D./O.D.: 4 inch / 4.5 inch CORE BARREL TYPE: NA  
 AUGER I.D./O.D.: NA / NA DRILL ROD O.D.: 2.6 inch CORE BARREL I.D./O.D.: NA / NA  
 DRILLING METHOD: Drive and Wash/Open Hole  
 WATER LEVEL DEPTHS (ft): Not measured

**ABBREVIATIONS:** Pen. = Penetration Length S = Split Spoon Sample Qp = Pocket Penetrometer Strength NA, NM = Not Applicable, Not Measured  
 Rec. = Recovery Length C = Core Sample Sv = Pocket Torvane Shear Strength Blows per 6 in.: 140-lb hammer falling  
 RQD = Rock Quality Designation U = Undisturbed Sample LL = Liquid Limit 30 inches to drive a 2-inch-O.D.  
 = Length of Sound Cores > 4 in / Pen., % SC = Sonic Core PI = Plasticity Index split spoon sampler.  
 WOR = Weight of Rods DP = Direct Push Sample PID = Photoionization Detector  
 WOH = Weight of Hammer HSA = Hollow-Stem Auger I.D./O.D. = Inside Diameter/Outside Diameter

Elev. (ft)	Depth (ft)	Sample Information				Drilling Remarks/ Field Test Data	Layer Name	Soil and Rock Description
		Sample No.	Depth (ft)	Pen./ Rec. (in)	Blows per 6 in. or RQD			
		S1	0.5 to 0.8	3/3	100/3"	~4 in. asphalt at the surface	ASPHALT	S1: SILTY SAND (SM). 70% fine to coarse sand, 10% fine gravel up 1/4", 20% non-plastic fines; brown. FILL
	5	S2	4 to 6	24/13	4-3-5-4		FILL	S2 (0-3"): SILTY SAND (SM). 70% mostly fine to medium sand, 20% non-plastic fines, 10% fine gravel up to 1/4"; black and dark gray. FILL
							SILT	S2 (3-13"): SILT (ML). Low plasticity fines, <5% fine sand; gray.
	10	S3	9 to 11	24/18	23-14-11-15	Gray clay in wash	SAND	S3 (0-10"): NARROWLY GRADED SAND (SP). 95% mostly fine sand, <5% non-plastic fines; light brown.
							SILTY CLAY	S3 (10-18"): SILT WITH SAND (ML). 80% low plasticity fines, 20% mostly fine sand; light brown.
	15	S4	14 to 14.4	5/0	100/5"	Driller suggests coarse sand, gravel, cobbles, and boulders 12'-17.5'	SAND AND GRAVEL	S4: NO RECOVERY
	20	S5	19 to 21	24/24	9-8-12-14		CLAY	S5: LEAN CLAY (CL). Low to medium plasticity fines, ~5% fine sand; gray.

**NOTES:**  
High blowcounts at ground surface due to frozen ground.

**PROJECT NAME:** Water Street Sewer Replacement

**CITY/STATE:** Plymouth, MA

**GEI PROJECT NUMBER:** 1501480



GEI WOBURN STD 1-LOCATION-LAYER NAME BORING LOGS.GPJ GEI DATA TEMPLATE 2013.GDT 3/5/15



**BORING  
 GEI-1  
 PAGE 2 of 2**

**LOCATION:** See Boring Location Plan  
**GROUND SURFACE EL. (ft):** ~11  
**DATE START/END:** 2/25/2015 - 2/25/2015  
**VERTICAL DATUM:** NAVD 88  
**DRILLING COMPANY:** Geologic, Inc.

Elev. (ft)	Depth (ft)	Sample Information				Drilling Remarks/ Field Test Data	Layer Name	Soil and Rock Description
		Sample No.	Depth (ft)	Pen./ Rec. (in)	Blows per 6 in. or RQD			
25	24 to 26	S6	24/7	11-12-22-20	Driller suggests layer of fine sand starts at 31.5'  Vibrating wire piezometer installed at 33.2 ft	CLAY	S6: LEAN CLAY (CL). Similar to S5.	
30	29 to 31	S7	24/18	5-5-15-17			S7 (0-1"): NARROWLY GRADED SAND WITH SILT AND GRAVEL (SP-SM). 60% mostly coarse sand, 30% fine gravel up to 1/2", 10% non-plastic fines; brown. S7 (1-14"): LEAN CLAY (CL). Similar to S5.	
35	34 to 36	S8	24/14	14-15-17-34			SILT AND SAND	S7 (14-18"): SILT (ML). Non-plastic fines, <5% fine sand; gray.  S8 (0-10"): SILTY SAND (SM). ~75% fine sand, 25% non-plastic fines; light brown. 10": ~1" piece of gravel. S8 (10-14"): SANDY SILT (ML). 70% non-plastic fines, 30% fine sand; light brown.
40	39 to 41	S9	24/18	69-25-46-39		S9 (0-2"): CLAYEY GRAVEL WITH SAND (GC). 40% fine to coarse gravel up to 1 1/4", 30% fine to coarse sand, 30% low-plasticity fines; gray with black gravel. S9 (2-18"): SILT (ML). Low plasticity fines, <5% fine sand; gray.		
45						Bottom of boring at depth 41 ft. Cutting drummed; piezometer grouted in hole.		
50								
55								

GEI WOBURN STD 1-LOCATION-LAYER NAME BORING LOGS.GPJ GEI DATA TEMPLATE 2013.GDT 3/5/15

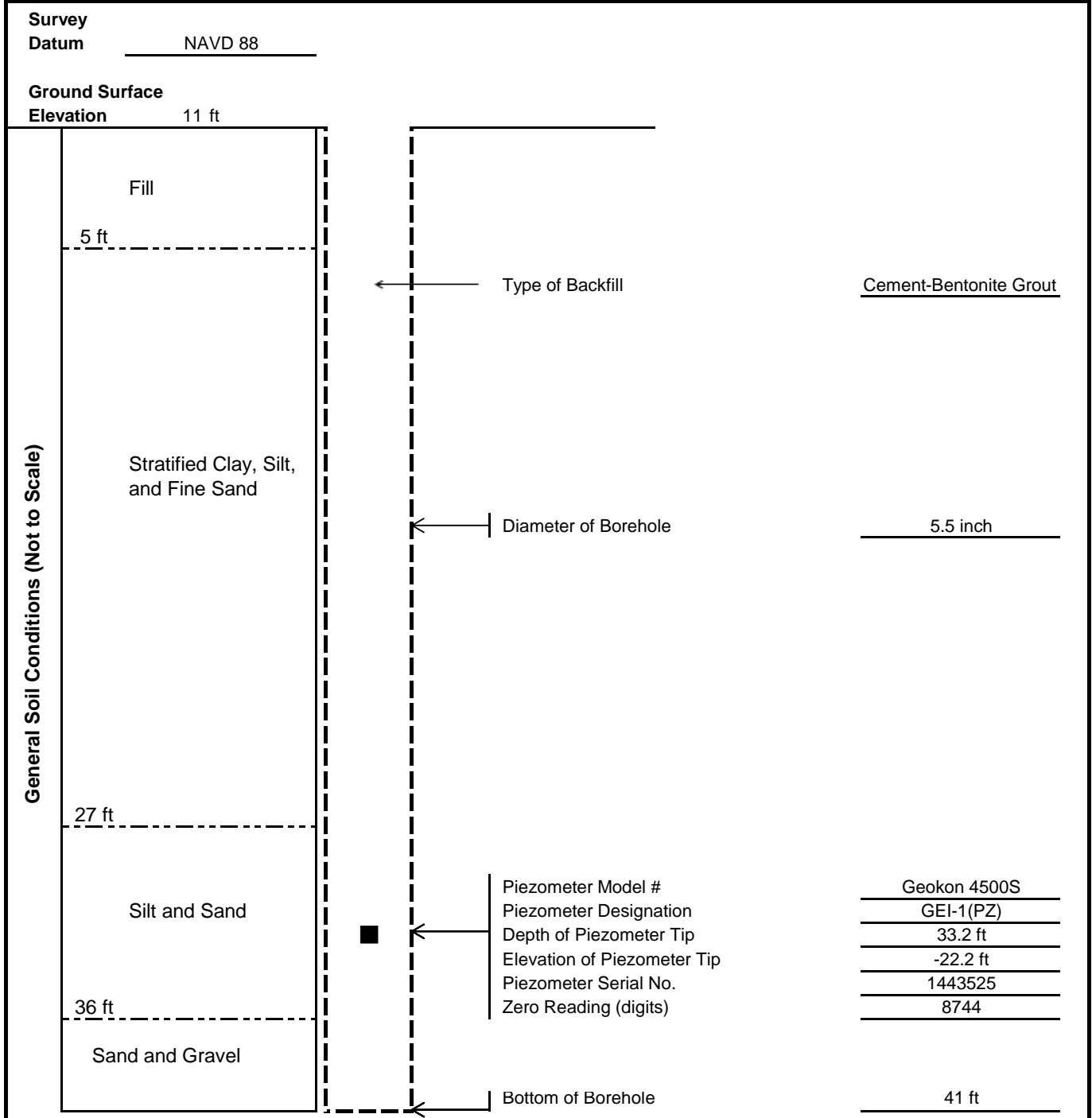
**NOTES:**  
 High blowcounts at ground surface due to frozen ground.

**PROJECT NAME:** Water Street Sewer Replacement  
**CITY/STATE:** Plymouth, MA  
**GEI PROJECT NUMBER:** 1501480



<b>Vibrating Wire Piezometer Installation Report</b>	<b>GEI-1(PZ)</b>
--	------------------

<b>PROJECT</b> Water Street Sewer Replacement	<b>PROJECT NO.</b> 1401480
<b>LOCATION</b> Plymouth, MA	<b>BORING NO.</b> GEI-1
<b>CLIENT</b> Environmental Partners Group	<b>LOCATION</b> See Boring Location Plan
<b>CONTRACTOR</b> Geologic-Earth Exploration	
<b>DRILLER</b> R. Eastwood	
<b>GEI REP.</b> D. McVeety	<b>INSTAL. DATE</b> 2/25/2015



**NOTES:** Zero reading taken with Geokon Model GK-401 readout box.  
 Flush-mount road box with 5-pt bolt installed at ground surface.







## Vibrating Wire Pressure Transducer Calibration Report

Model Number: 4500S-350 kPa

Date of Calibration: January 20, 2015

This calibration has been verified/validated as of 02/05/2015

Serial Number: 1443525

Temperature: 22.10 °C

Calibration Instruction: VW Pressure Transducers

Barometric Pressure: 988 mbar

Cable Length: 50 feet

Technician: *[Signature]*

Applied Pressure (kPa)	Gage Reading 1st Cycle	Gage Reading 2nd Cycle	Average Gage Reading	Calculated Pressure (Linear)	Error Linear (%FS)	Calculated Pressure (Polynomial)	Error Polynomial (%FS)
0.0	8749	8750	8750	0.175	0.05	0.047	0.01
70.0	8152	8152	8152	69.84	-0.04	69.92	-0.02
140.0	7553	7553	7553	139.7	-0.08	139.9	-0.03
210.0	6951	6951	6951	209.9	-0.02	210.1	0.03
279.9	6350	6351	6351	279.9	-0.01	280.0	0.01
349.9	5749	5749	5749	350.0	0.02	349.9	-0.01

(kPa) Linear Gage Factor (G): -0.1166 (kPa/ digit)

Polynomial Gage factors: A: -1.448E-07 B: -0.1145 C: \_\_\_\_\_

Thermal Factor (K): -0.06453 (kPa/ °C)

Calculate C by setting P=0 and R<sub>1</sub> = initial field zero reading into the polynomial equation

(psi) Linear Gage Factor (G): -0.01691 (psi/ digit)

Polynomial Gage Factors: A: -2.1E-08 B: -0.01661 C: \_\_\_\_\_

Thermal Factor (K): -0.009359 (psi/ °C)

Calculate C by setting P=0 and R<sub>1</sub> = initial field zero reading into the polynomial equation

Calculated Pressures: Linear,  $P = G(R_1 - R_0) + K(T_1 - T_0) - (S_1 - S_0)^*$

Polynomial,  $P = AR_1^2 + BR_1 + C + K(T_1 - T_0) - (S_1 - S_0)^*$

\*Barometric pressures expressed in kPa or psi. Barometric compensation is not required with vented transducers.

Factory Zero Reading: 8736 Temperature: 22.9 °C Barometer: 991.1 mbar

The above instrument was found to be in tolerance in all operating ranges.  
 The above named instrument has been calibrated by comparison with standards traceable to the NIST, in compliance with ANSI Z540-1.

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**BORING**

**GEI-2**

PAGE 1 of 2

**BORING INFORMATION**

LOCATION: See Boring Location Plan  
GROUND SURFACE EL. (ft): ~17 DATE START/END: 2/19/2015 - 2/19/2015  
VERTICAL DATUM: NAVD 88 DRILLING COMPANY: Geologic, Inc.  
TOTAL DEPTH (ft): 36.0 DRILLER NAME: R. Eastwood  
LOGGED BY: D. McVeety RIG TYPE: Mobile B-57 Truck Rig

**DRILLING INFORMATION**

HAMMER TYPE: Donut Hammer - spooling winch CASING I.D./O.D.: 4 inch / 4.5 inch CORE BARREL TYPE: NA  
AUGER I.D./O.D.: NA / NA DRILL ROD O.D.: 2.6 inch CORE BARREL I.D./O.D.: NA / NA  
DRILLING METHOD: Drive and Wash/Open Hole  
WATER LEVEL DEPTHS (ft): Not measured

**ABBREVIATIONS:** Pen. = Penetration Length S = Split Spoon Sample Qp = Pocket Penetrometer Strength NA, NM = Not Applicable, Not Measured  
Rec. = Recovery Length C = Core Sample Sv = Pocket Torvane Shear Strength Blows per 6 in.: 140-lb hammer falling  
RQD = Rock Quality Designation U = Undisturbed Sample LL = Liquid Limit 30 inches to drive a 2-inch-O.D.  
= Length of Sound Cores > 4 in / Pen., % SC = Sonic Core PI = Plasticity Index split spoon sampler.  
WOR = Weight of Rods DP = Direct Push Sample PID = Photoionization Detector  
WOH = Weight of Hammer HSA = Hollow-Stem Auger I.D./O.D. = Inside Diameter/Outside Diameter

Elev. (ft)	Depth (ft)	Sample Information				Drilling Remarks/ Field Test Data	Layer Name	Soil and Rock Description
		Sample No.	Depth (ft)	Pen./ Rec. (in)	Blows per 6 in. or RQD			
		S1	0.5 to 2.5	24/16	33-39-22-22	~4 in. asphalt at the surface	ASPHALT	S1 (0-5"): WIDELY GRADED SAND WITH SILT AND GRAVEL (SW-SM). 70% fine to coarse sand, 20% gravel up to 3/4", 10% fines; dark gray-black. FILL S1 (5-16"): SILTY SAND WITH GRAVEL (SM). 65% fine to coarse sand, 20% fine gravel up to 1/2", 15% non-plastic fines; light brown. FILL
	5	S2	4 to 6	24/8	10-5-5-2		FILL	S2: SILTY SAND WITH GRAVEL (SM). 70% fine to coarse sand, 15% fine to coarse gravel up to 1", 15% non-plastic fines; light brown. FILL
	10	S3	9 to 11	24/2	7-8-16-20		SILTY CLAY	S3: GRAVELLY LEAN CLAY (CL). 50% low plasticity fines, 50% fine gravel up to 1/2"; light brown.
	15	S4	14 to 16	24/15	5-5-5-7			S4: LEAN CLAY (CL). 95% low plasticity fines, <5% fine sand; gray.
	20	S5	19 to 21	24/20	12-15-18-18			S5: LEAN CLAY (CL). 100% low plasticity fines, trace gravel; gray. 2": 1" piece of rounded gravel. 15": <1/16" thick seam of fine sand.

**NOTES:**  
High blowcounts at ground surface due to frozen ground.

**PROJECT NAME:** Water Street Sewer Replacement

**CITY/STATE:** Plymouth, MA

**GEI PROJECT NUMBER:** 1501480



GEI WOBURN STD 1-LOCATION-LAYER NAME BORING LOGS.GPJ GEI DATA TEMPLATE 2013.GDT 3/5/15

**BORING  
 GEI-2  
 PAGE 2 of 2**

**LOCATION:** See Boring Location Plan  
**GROUND SURFACE EL. (ft):** ~17  
**VERTICAL DATUM:** NAVD 88  
**DATE START/END:** 2/19/2015 - 2/19/2015  
**DRILLING COMPANY:** Geologic, Inc.

Elev. (ft)	Depth (ft)	Sample Information				Drilling Remarks/ Field Test Data	Layer Name	Soil and Rock Description
		Sample No.	Depth (ft)	Pen./ Rec. (in)	Blows per 6 in. or RQD			
25		S6	24 to 26	24/18	21-14-14-13	FINE SAND	S6 (0-5"): SILT (ML). ~90% non-plastic fines, 10% fine sand; light brown. S6 (5-18"): SILTY SAND (SM). 60% fine sand, 40% non-plastic fines; light brown.	
							S7 (0-5"): NARROWLY GRADED SAND (SP). 95% mostly fine and medium sand, <5% non-plastic fines; light brown.	
30		S7	29 to 31	24/16	27-19-43-85	GRAVELLY SILT	S7 (5-15"): SILT (ML). Non-plastic fines, 5% fine sand; light brown. S7 (15-16"): CLAYEY GRAVEL (GC). 70% fine to coarse angular gravel up to 1", 30% low plasticity fines; light brown.	
							S8: LEAN CLAY WITH SAND AND GRAVEL (CL). 70% low plasticity fines; ~15% fine sand, ~15% gravel up to 3/4"; olive brown.	
35		S8	34 to 36	24/7	23-25-44-54		Bottom of boring at depth 36 ft. Cutting drummed; piezometer grouted in hole.	
40								
45								
50								
55								

Vibrating wire piezometer installed at 28.6 ft

**NOTES:**  
 High blowcounts at ground surface due to frozen ground.

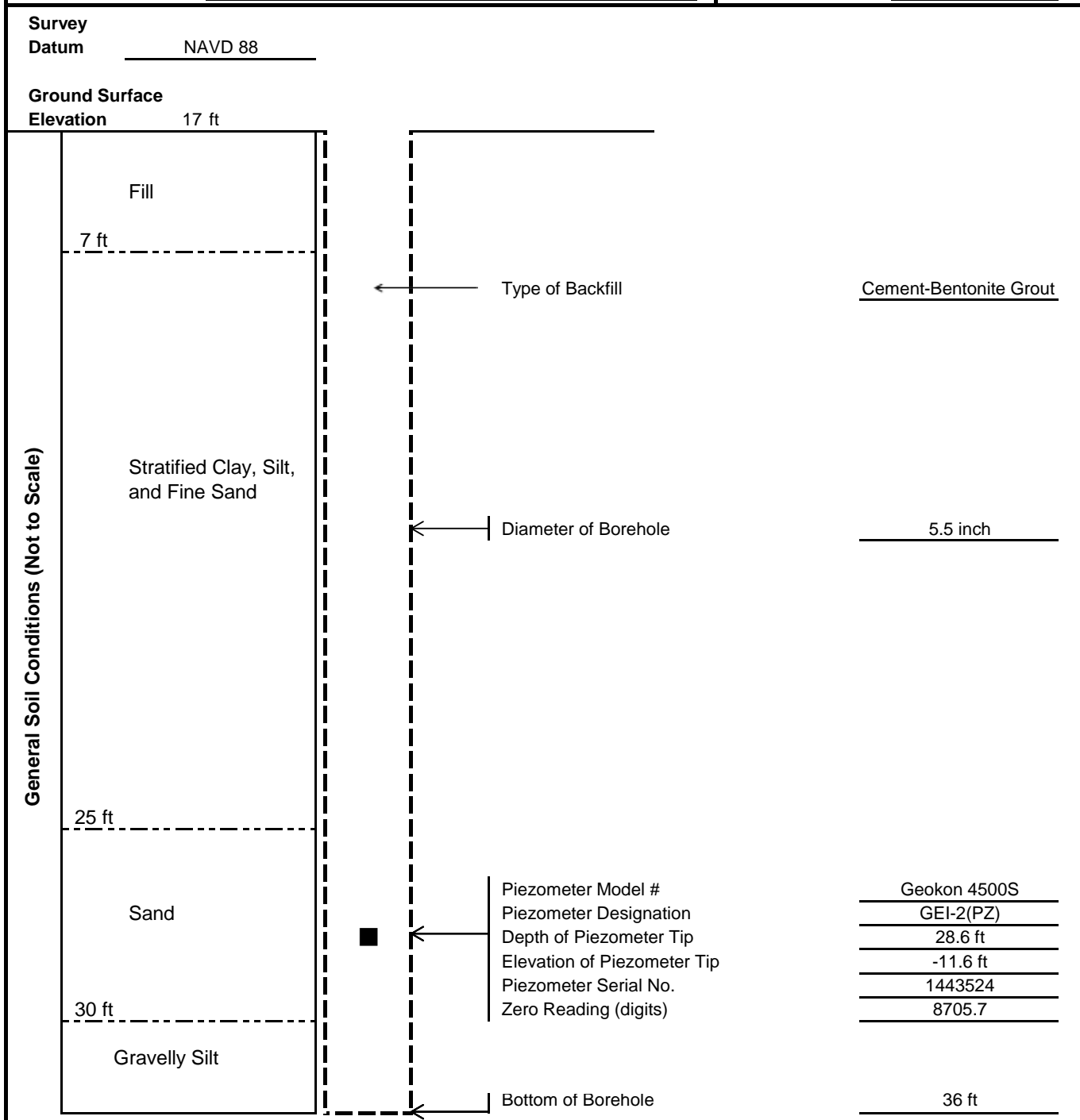
**PROJECT NAME:** Water Street Sewer Replacement  
**CITY/STATE:** Plymouth, MA  
**GEI PROJECT NUMBER:** 1501480



GEI WOBURN STD 1-LOCATION-LAYER NAME BORING LOGS.GPJ GEI DATA TEMPLATE 2013.GDT 3/5/15

<b>Vibrating Wire Piezometer Installation Report</b>	<b>GEI-2(PZ)</b>
--	------------------

<b>PROJECT</b> Water Street Sewer Replacement	<b>PROJECT NO.</b> 140148-0
<b>LOCATION</b> Plymouth, MA	<b>BORING NO.</b> GEI-2
<b>CLIENT</b> Environmental Partners Group	<b>LOCATION</b> See Boring Location Plan
<b>CONTRACTOR</b> Geologic-Earth Exploration	
<b>DRILLER</b> R. Eastwood	
<b>GEI REP.</b> D. McVeety	<b>INSTAL. DATE</b> 2/19/2015



**NOTES:** Zero reading taken with Geokon Model GK-403 readout box.  
 Flush-mount road box with 5-pt bolt installed at ground surface.



**VIBRATING WIRE PIEZOMETER MONITORING REPORT**

Project No.:	1501480	Piezometer ID:	GEI-2(PZ)
Project:	Water Street Sewer Replacement	Installed By:	D. McVeety
Location:	Water Street Plymouth, MA	Installation Date:	2/19/2015

General Information				Initial Readings and Factory Calibration Data			
Make/Model No.:	Geokon 4500S-350kPa			Initial VWP Reading, R <sub>0</sub>	8705.7 digits		
Serial No.:	1443524			Temperature, T <sub>0</sub>	1 deg.C		
Coord. Location, N:	Unknown	Coordinate System:	NA	Barometric Pressure, S <sub>0</sub>	1005.08 mbar		
Coord. Location, E:	Unknown			Barometric Pressure, S <sub>0</sub>	14.6 psi		
Ground Surf. Elev. (ft):	17	Elevation Datum:	NAVD88	Linear Gage Factor, G:	-0.01733 psi/digit		
Tip Elevation (ft):	-11.6			Thermal Factor, K:	-0.00694 psi/deg.C		

Date	Time	VWP Reading (digits)	Temp. (deg. C)	Barometric Pressure (mbar)	Barometric Pressure (psi)	Piezometric Pressure (psi)	Piezometric Head (feet)	Piezometric Elevation (feet)	Remarks
2/25/2015	14:50	7988	15.5	1005.8	14.59	12.33	28.47	16.87	High tide at 4:40 pm.
3/5/2015	12:00	7975	14	1019.0	14.78	12.37	28.57	16.97	High tide at 11:08 am.
3/9/2015	9:35	7986	14	1019.0	14.78	12.18	28.13	16.53	Low tide at 8:41 am.

Notes:  
 $P = G(R - R_0) + K(T - T_0) - (S - S_0)$   
 1 mbar = 0.01450377 psi





48 Spencer St. Lebanon, NH 03766 USA

## Vibrating Wire Pressure Transducer Calibration Report

Model Number: 4500S-350 kPaDate of Calibration: January 20, 2015

This calibration has been verified/validated as of 02/05/2015

Serial Number: 1443524Temperature: 21.90 °CCalibration Instruction: VW Pressure TransducersBarometric Pressure: 988.1 mbarCable Length: 50 feetTechnician: 

Applied Pressure (kPa)	Gage Reading 1st Cycle	Gage Reading 2nd Cycle	Average Gage Reading	Calculated Pressure (Linear)	Error Linear (%FS)	Calculated Pressure (Polynomial)	Error Polynomial (%FS)
0.0	8723	8723	8723	0.358	0.10	0.092	0.03
70.0	8143	8143	8143	69.66	-0.09	69.75	-0.07
140.0	7555	7556	7556	139.9	-0.03	140.1	0.04
210.0	6971	6971	6971	209.7	-0.08	210.0	0.00
279.9	6384	6384	6384	279.8	-0.03	279.9	-0.01
349.9	5795	5795	5795	350.2	0.08	349.9	0.00

(kPa) Linear Gage Factor (G): -0.1195 (kPa/ digit)Polynomial Gage factors: A: -2.619E-07 B: -0.1157 C: \_\_\_\_\_Thermal Factor (K): -0.04785 (kPa/ °C)Calculate C by setting P=0 and R<sub>1</sub> = initial field zero reading into the polynomial equation(psi) Linear Gage Factor (G): -0.01733 (psi/ digit)Polynomial Gage Factors: A: -3.799E-08 B: -0.01678 C: \_\_\_\_\_Thermal Factor (K): -0.006940 (psi/ °C)Calculate C by setting P=0 and R<sub>1</sub> = initial field zero reading into the polynomial equationCalculated Pressures: Linear,  $P = G(R_1 - R_0) + K(T_1 - T_0) - (S_1 - S_0)^*$ Polynomial,  $P = AR_1^2 + BR_1 + C + K(T_1 - T_0) - (S_1 - S_0)^*$ 

\*Barometric pressures expressed in kPa or psi. Barometric compensation is not required with vented transducers.

Factory Zero Reading: 8701 Temperature: 22.8 °C Barometer: 991.1 mbarThe above instrument was found to be in tolerance in all operating ranges.  
The above named instrument has been calibrated by comparison with standards traceable to the NIST, in compliance with ANSI Z540-1.

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**BORING**

**GEI-3**

PAGE 1 of 2

**BORING INFORMATION**

LOCATION: See Boring Location Plan  
GROUND SURFACE EL. (ft): ~15 DATE START/END: 2/23/2015 - 2/23/2015  
VERTICAL DATUM: NAVD 88 DRILLING COMPANY: Geologic, Inc.  
TOTAL DEPTH (ft): 36.0 DRILLER NAME: R. Eastwood  
LOGGED BY: D. McVeety RIG TYPE: Mobile B-57 Truck Rig

**DRILLING INFORMATION**

HAMMER TYPE: Donut Hammer - spooling winch CASING I.D./O.D.: 4 inch / 4.5 inch CORE BARREL TYPE: NA  
AUGER I.D./O.D.: NA / NA DRILL ROD O.D.: 2.6 inch CORE BARREL I.D./O.D.: NA / NA  
DRILLING METHOD: Drive and Wash/Open Hole  
WATER LEVEL DEPTHS (ft): Not measured

**ABBREVIATIONS:** Pen. = Penetration Length S = Split Spoon Sample Qp = Pocket Penetrometer Strength NA, NM = Not Applicable, Not Measured  
Rec. = Recovery Length C = Core Sample Sv = Pocket Torvane Shear Strength Blows per 6 in.: 140-lb hammer falling  
RQD = Rock Quality Designation U = Undisturbed Sample LL = Liquid Limit 30 inches to drive a 2-inch-O.D.  
= Length of Sound Cores > 4 in / Pen., % SC = Sonic Core PI = Plasticity Index split spoon sampler.  
WOR = Weight of Rods DP = Direct Push Sample PID = Photoionization Detector  
WOH = Weight of Hammer HSA = Hollow-Stem Auger I.D./O.D. = Inside Diameter/Outside Diameter

Elev. (ft)	Depth (ft)	Sample Information				Drilling Remarks/ Field Test Data	Layer Name	Soil and Rock Description
		Sample No.	Depth (ft)	Pen./ Rec. (in)	Blows per 6 in. or RQD			
		S1	0.5 to 0.8	4/12	100/4"	~4 in. asphalt at the surface	ASPHALT	S1: WIDELY GRADED SAND WITH SILT (SW-SM). 80% fine to coarse sand, 10% fine gravel up 1/4", 10% non-plastic fines; brown; some pulverised asphalt. FILL
	5	S2	4 to 6	24/12	10-16-25-24		FILL	S2 (0-6"): SILTY SAND (SM). 70% fine to coarse sand, 30% low plasticity fines; light brown. Fines in ~1/2" clumps.
	10	S3	9 to 11	24/23	11-8-12-11		FINE SAND	S2 (6-12"): NARROWLY GRADED SAND (SP). Fine to medium sand, 5% fines; light brown.
	15	S4	14 to 16	24/12	7-8-10-15		CLAY	S3: LEAN CLAY (CL). Low to medium plasticity fines; gray; stiff. Top 6": Vertical seam <1/16" thick of orangish-brown silt.
	20	S5	19 to 21	24/20	15-11-15-15			S4: LEAN CLAY (CL). 80% low plasticity fines, 20% fine to coarse sand; gray.
								S5, 0-2": LEAN CLAY (CL). Similar to S4. S5 (2-5"): NARROWLY GRADED SAND WITH SILT (SP-SM). 90% mostly fine to medium sand, 10% non-plastic fines; gray. S5 (5-20"): LEAN CLAY (CL). Similar to S3, but very stiff.

**NOTES:**  
High blowcounts at ground surface due to frozen ground.

**PROJECT NAME:** Water Street Sewer Replacement

**CITY/STATE:** Plymouth, MA

**GEI PROJECT NUMBER:** 1501480



GEI WOBURN STD 1-LOCATION-LAYER NAME BORING LOGS.GPJ GEI DATA TEMPLATE 2013.GDT 3/5/15

**BORING  
 GEI-3  
 PAGE 2 of 2**

**LOCATION:** See Boring Location Plan  
**GROUND SURFACE EL. (ft):** ~15  
**DATE START/END:** 2/23/2015 - 2/23/2015  
**VERTICAL DATUM:** NAVD 88  
**DRILLING COMPANY:** Geologic, Inc.

Elev. (ft)	Depth (ft)	Sample Information				Drilling Remarks/ Field Test Data	Layer Name	Soil and Rock Description
		Sample No.	Depth (ft)	Pen./ Rec. (in)	Blows per 6 in. or RQD			
	25	S6	24 to 26	24/19	3-6-11-16	Vibrating wire piezometer installed at 27.6 ft Because of S7 poor recovery, SS redriven 34'-36' (PUSH)	CLAY	S6: CLAYEY SILT (ML). Low plasticity fines; gray, some light brown silt.
	30	S7	29 to 31	24/3	34-25-20-28		SILT AND SAND	S7: SILT WITH SAND (ML). 80% low plasticity fines, 20% fine sand; light brown.
	35	S8	34 to 36	24/22	19-100/12"-21		SAND AND GRAVEL	S8 (0-10"): NARROWLY GRADED SAND WITH SILT (SP-SM). Fine to medium sand, ~5% non-plastic fines; light brown. S8 (10-12"): WIDELY GRADED GRAVEL (GW). 80% fine to coarse gravel up to 1", 20% mostly coarse sand; light brown. S8 (12-22"): SILTY SAND WITH GRAVEL (SM). ~50% fine to coarse sand, ~35% gravel up 3/4", ~15% non-plastic fines; orangish, reddish brown. Bottom of boring at depth 36 ft. Cutting drummed; piezometer grouted in hole.
	40							
	45							
	50							
	55							

GEI WOBURN STD 1-LOCATION-LAYER NAME BORING LOGS.GPJ GEI DATA TEMPLATE 2013.GDT 3/5/15

**NOTES:**  
 High blowcounts at ground surface due to frozen ground.

**PROJECT NAME:** Water Street Sewer Replacement

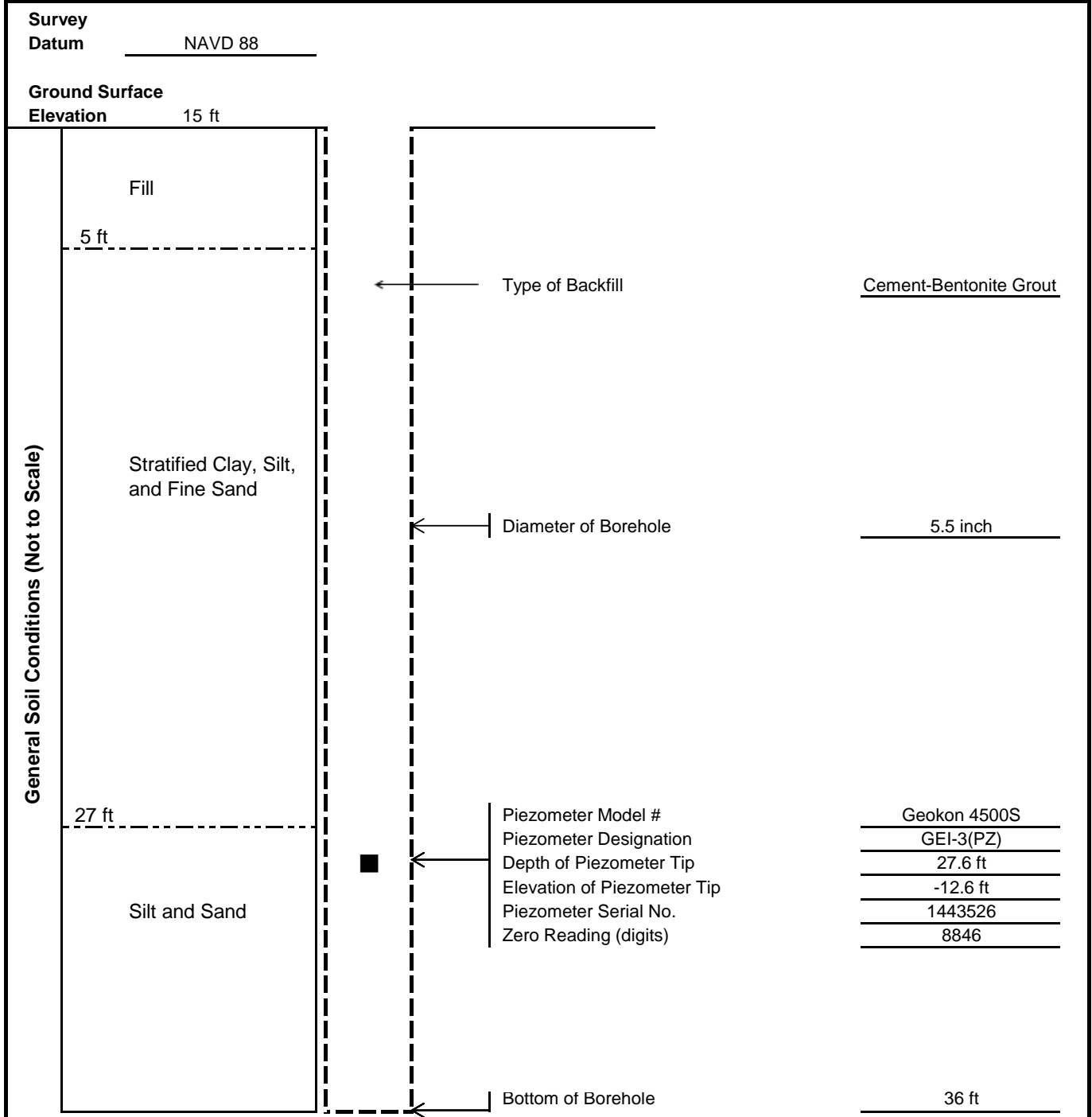
**CITY/STATE:** Plymouth, MA

**GEI PROJECT NUMBER:** 1501480



<b>Vibrating Wire Piezometer Installation Report</b>	<b>GEI-3(PZ)</b>
--	------------------

<b>PROJECT</b> <u>Water Street Sewer Replacement</u>	<b>PROJECT NO.</b> <u>140148-0</u>
<b>LOCATION</b> <u>Plymouth, MA</u>	<b>BORING NO.</b> <u>GEI-3</u>
<b>CLIENT</b> <u>Environmental Partners Group</u>	<b>LOCATION</b> <u>See Boring Location Plan</u>
<b>CONTRACTOR</b> <u>Geologic-Earth Exploration</u>	<b>INSTAL. DATE</b> <u>2/23/2015</u>
<b>DRILLER</b> <u>R. Eastwood</u>	
<b>GEI REP.</b> <u>D. McVeety</u>	



**NOTES:** Zero reading taken with Geokon Model GK-403 readout box.  
 Flush-mount road box with 5-pt bolt installed at ground surface.



**VIBRATING WIRE PIEZOMETER MONITORING REPORT**

Project No.:	1501480	Piezometer ID:	GEI-3(PZ)
Project:	Water Street Sewer Replacement	Installed By:	D. McVeety
Location:	Water Street Plymouth, MA	Installation Date:	2/23/2015

General Information				Factory Calibration Data			
Make/Model No.:	Geokon 4500S-350kPa			Initial VWP Reading, R <sub>0</sub>	8846 digits		
Serial No.:	1443526			Temperature, T <sub>0</sub>	4 deg.C		
Coord. Location, N:	Unknown	Coordinate System:	NA	Barometric Pressure, S <sub>0</sub>	1016.3 mbar		
Coord. Location, E:	Unknown			Barometric Pressure, S <sub>0</sub>	14.7 psi		
Ground Surf. Elev. (ft):	15	Elevation Datum:	NAVD88	Linear Gage Factor, G:	-0.01648 psi/digit		
Tip Elevation (ft):	-12.6			Thermal Factor, K:	-0.002761 psi/deg.C		

Date	Time	VWP Reading (digits)	Temp. (deg. C)	Barometric Pressure (mbar)	Barometric Pressure (psi)	Piezometric Pressure (psi)	Piezometric Head (feet)	Piezometric Elevation (feet)	Remarks
2/25/2015	16:00	8023	14	1007.5	14.61	13.66	31.55	18.95	High tide at 4:40 pm.
3/5/2015	12:45	8015	13	1019.0	14.78	13.63	31.48	18.88	High tide at 11:08 am.
3/9/2015	9:21	8051	14	1019.0	14.78	13.03	30.10	17.50	Low tide at 8:41 am.

Notes:  
 $Piezometric\ Pressure = G(R - R_0) + K(T - T_0) - (S - S_0)$   
 1 mbar = 0.01450377 psi



## Vibrating Wire Pressure Transducer Calibration Report

Model Number: 4500S-350 kPa

Date of Calibration: January 20, 2015

This calibration has been verified/validated as of 02/05/2015

Serial Number: 1443526

Temperature: 22.10 °C

Calibration Instruction: VW Pressure Transducers

Barometric Pressure: 988 mbar

Cable Length: 50 feet

Technician: *[Signature]*

Applied Pressure (kPa)	Gage Reading 1st Cycle	Gage Reading 2nd Cycle	Average Gage Reading	Calculated Pressure (Linear)	Error Linear (%FS)	Calculated Pressure (Polynomial)	Error Polynomial (%FS)
0.0	8864	8865	8865	0.170	0.05	0.011	0.00
70.0	8250	8250	8250	70.01	0.01	70.00	0.01
140.0	7636	7636	7636	139.8	-0.05	139.9	-0.03
210.0	7019	7019	7019	209.9	-0.01	210.0	0.01
279.9	6402	6402	6402	280.0	0.03	280.0	0.02
349.9	5786	5786	5786	350.1	0.03	349.9	-0.01

(kPa) Linear Gage Factor (G): -0.1137 (kPa/ digit)

Polynomial Gage factors:                    A: -9.92E-08                    B: -0.1122                    C: \_\_\_\_\_

Thermal Factor (K): -0.01904 (kPa/ °C)

Calculate C by setting P=0 and R<sub>1</sub> = initial field zero reading into the polynomial equation

(psi) Linear Gage Factor (G): -0.01648 (psi/ digit)

Polynomial Gage Factors:                    A: -1.439E-08                    B: -0.01627                    C: \_\_\_\_\_

Thermal Factor (K): -0.002761 (psi/ °C)

Calculate C by setting P=0 and R<sub>1</sub> = initial field zero reading into the polynomial equation

Calculated Pressures:                    Linear,  $P = G(R_1 - R_0) + K(T_1 - T_0) - (S_1 - S_0)^*$

Polynomial,  $P = AR_1^2 + BR_1 + C + K(T_1 - T_0) - (S_1 - S_0)^*$

\*Barometric pressures expressed in kPa or psi. Barometric compensation is not required with vented transducers.

Factory Zero Reading: 8852                    Temperature: 23.1 °C                    Barometer: 991.1 mbar

The above instrument was found to be in tolerance in all operating ranges.  
 The above named instrument has been calibrated by comparison with standards traceable to the NIST, in compliance with ANSI Z540-1.

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## **Appendix C**

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### **Laboratory Testing**

## Particle Size Distribution Report







## Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines			
		Coarse	Fine	Coarse	Medium	Fine				
○	0.0	0.0	0.5	0.0	0.5	61.3	37.7			
×	LL	PL	D85	D60	D50	D30	D15	D10	Cc	Cu
○	nv	np	0.1792	0.1080	0.0914					

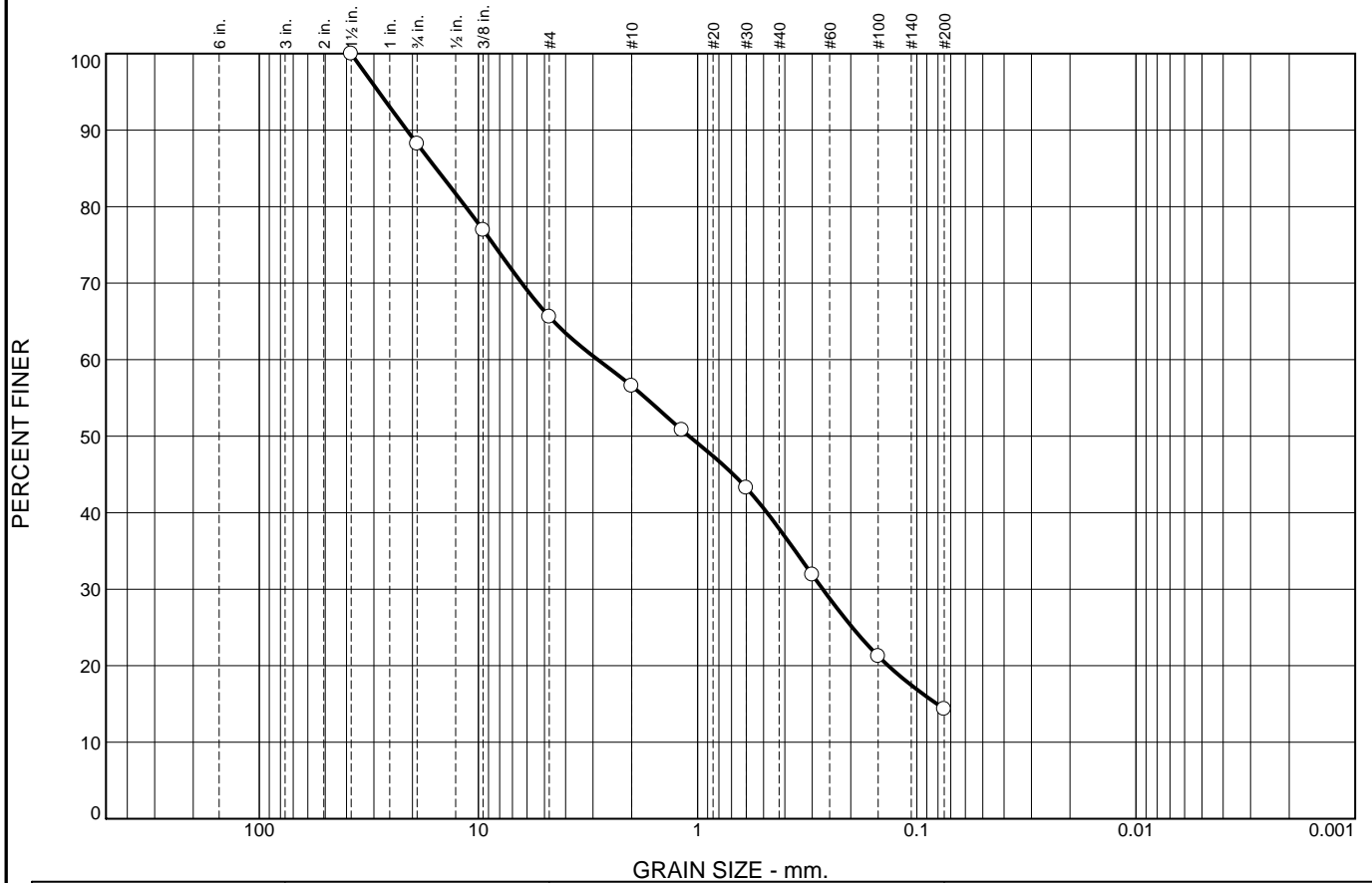
Material Description	USCS	AASHTO
○ Silty SAND	SM	A-4(0)

<b>Project No.</b> 1501480 <b>Client:</b> Environmental Partners Group <b>Project:</b> Water Street Sewer Replacement, Plymouth, MA  ○ <b>Source:</b> GEI-2 <b>Depth:</b> 24 - 26 feet <b>Sample No.:</b> S6 (5 - 18 inches)	<b>Remarks:</b>   
GEI Consultants, Inc. 400 Unicorn Park Drive Woburn, MA 01801 	<b>Figure</b>

Tested By: DJA



## Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines
		Coarse	Fine	Coarse	Medium	Fine	
<input type="radio"/>	0.0	11.8	22.6	9.0	18.7	23.6	14.3

<input checked="" type="checkbox"/>	LL	PL	D85	D60	D50	D30	D15	D10	Cc	Cu
<input type="radio"/>	nv	np	15.6149	2.8546	1.0936	0.2685	0.0808			

Material Description							USCS	AASHTO
<input type="radio"/> Silty SAND with gravel							SM	A-1-b

<p><b>Project No.</b> 1501480      <b>Client:</b> Environmental Partners Group</p> <p><b>Project:</b> Water Street Sewer Replacement, Plymouth, MA</p> <p><input type="radio"/> <b>Source:</b> GEI-3      <b>Depth:</b> 34 - 36 feet      <b>Sample No.:</b> S8 (12 - 22 inches)</p>	<p><b>Remarks:</b></p>
<p>GEI Consultants, Inc.                  400 Unicorn Park Drive                  Woburn, MA 01801</p>	

Tested By: DJA

Figure

**APPENDIX D**

***USACE SELF VERIFICATION FORM***



**US Army Corps  
of Engineers**®  
New England District

**V: Self-Verification Notification Form**  
(for all tidal and non-tidal projects subject to Corps jurisdiction)

Complete **all** fields (write “none” if applicable) below or use the fillable form at [www.nae.usace.army.mil/missions/regulatory/state-general-permits/massachusetts-general-permit](http://www.nae.usace.army.mil/missions/regulatory/state-general-permits/massachusetts-general-permit). Before work within Corps jurisdiction commences, and unless otherwise specified, email this form, a location map, and project plans drawn to scale and not larger than 11” x 17”, to [cenae-r@usace.army.mil](mailto:cenae-r@usace.army.mil), (978) 318-8303 (fax), or “Regulatory Division, U.S. Army Corps of Engineers, New England District, 696 Virginia Road, Concord, MA 01742-2751”. The Corps will acknowledge receipt of this form in writing. Please call (978) 318-8338 with questions.

Permittee: Town of Plymouth Department of Public Works - Wastewater Division  
Address, City, State & Zip: 131 Camelot Drive, Plymouth, MA 02360  
Phone(s) and Email: (508) 830-4159 ext. 213, Douglas Pinard, dpinard@townhall.plymouth.ma.us

Contractor (write none if same as permittee): None  
Address, City, State & Zip: None  
Phone(s) and Email: None

Prior Corps File or Permit Numbers(s): None  
Project Location (provide detailed description if necessary): Within Town-owned right-of-way limits on Water Street in Downtown Plymouth

Address, City, State & Zip: Water Street, Plymouth, MA, 02360  
Latitude/Longitude Coordinates (if address doesn't exist): \_\_\_\_\_  
Waterway Name: None

Work will be done under the following activity(s) in Section III, Eligible Activities (check all that apply):

1 _____	5 _____	9 <u>x</u>	13 _____	17 _____	21 _____
2 _____	6 _____	10 _____	14 _____	18 _____	22 _____
3 _____	7 _____	11 _____	15 _____	19 _____	23 _____
4 _____	8 _____	12 _____	16 _____	20 _____	

Project Purpose: Abandonment of existing 30-inch diameter RCP gravity sewer interceptor within the intertidal zone of Plymouth's Harbor and the installation 30-inch diameter PVC gravity sewer interceptor within right-of-way limits on Water Street in Downtown Plymouth; concerns regarding the existing gravity sewer interceptor include vulnerability of system to a pipe break or leak, integrity of pipe and manhole structures, and saltwater infiltration into gravity system

Work Description: Work includes installation of approximately 1300 linear feet of new sewer main via open cut trench excavation within Water Street; project requires use of combination of trench dewatering techniques to facilitate installation of new interceptor including open sump pumping, deep well systems, and vacuum wellpoint systems; design includes provisions for water mitigation including wrapping all PVC piping with external joint wrap and installing watertight manhole frames and covers; existing interceptor will be capped at each end and abandoned in place

(continued on next page)

Aggregate total wetland impact area: temporary 4,290 SF permanent \_\_\_\_\_ SF  
Aggregate total waterway impact area: temporary \_\_\_\_\_ SF permanent \_\_\_\_\_ SF  
Aggregate total area of structures (e.g., floats, pile-supported structures) temporary \_\_\_\_\_ SF permanent \_\_\_\_\_ SF

Does your project include any indirect or secondary impacts? (See General Condition 3.)

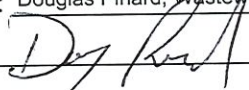
Yes \_\_\_\_\_ No

If yes, describe here: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Proposed Work Dates: Start: January 2022 Finish: June 2022

**Your name/signature below, as permittee, confirms that: a) your project meets the self-verification criteria; and b) you accept and agree to comply with the applicable terms and conditions in the General Permits for Massachusetts.**

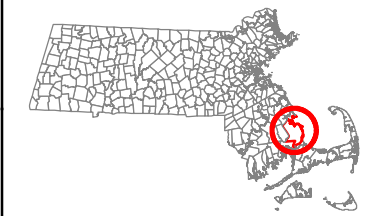
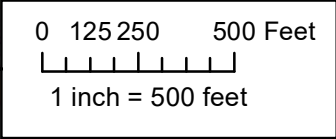
Permittee Printed Name: Douglas Pinard, Wastewater Manager

Permittee Signature:  Date: 11/18/21

# ATTACHMENT A

## Project Location Map





**Water Street  
Sewer Interceptor Replacement  
USGS Locus Map  
Plymouth, Massachusetts**



## **APPENDIX E**

### ***ASBESTOS CEMENT FORMS 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**

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## **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.<sup>1</sup>

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

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<sup>1</sup> 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”<sup>2</sup> 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

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<sup>2</sup> “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.



May 22, 2015 Update

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](http://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](mailto: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](mailto:caroline.mcfadden@state.ma.us)

**Central Region**

Gregg Levins

Telephone: 508-767-2768 or e-mail: [gregory.levins@state.ma.us](mailto:gregory.levins@state.ma.us)

**Northeast Region**

John Macauley

Telephone: 978-694-3262 or e-mail: [john.macauley@state.ma.us](mailto:john.macauley@state.ma.us)

**Southeast Region**

Cynthia Baran

Telephone: 508-946-2887 or e-mail: [cynthia.baran@state.ma.us](mailto: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](mailto:marc.simpson@state.ma.us)

May 22, 2015 Update

**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, 2<sup>nd</sup> Floor

Boston, MA 02114

Telephone: 617-626-6960 Fax: 617-626-6965 Web Site: [www.mass.gov/dols](http://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 <sup>3</sup> (yd <sup>3</sup> )
	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
	10. Transporter 1 (Acknowledgment of receipt of materials)			
Transporter	Printed/typed name & title		Signature	Month Day Year
	Address and telephone no.			
	11. Transporter 2 (Acknowledgment of receipt of materials)			
	Printed/typed name & title		Signature	Month Day Year
Address and telephone no.				
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.)	
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:

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16. Describe the containerization/disposal methods to comply with 310 CMR 7.15 and 453 CMR 6.14(2)(g):

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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 *work 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 *work 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 *work 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 ACM

(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 ACM.

(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 ACM, 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 ACM, 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 ACM, 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 ACM, 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 ACM, 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 ACM, 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  
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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 (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; diagramming 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 taken 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 information.

(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<sup>3</sup>/min/ft<sup>2</sup> 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 material.

(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 Rescission. 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).

**APPENDIX F**

***WETLAND DELINEATION REPORT***

**PINEBROOK**



**CONSULTING**

October 24, 2021

ENVIRONMENTAL PARTNERS GROUP  
1900 Crown Colony Drive, Suite 402  
Quincy, Massachusetts 02169  
Attention: Andrew Grota, Project Engineer

RE: Wetland Evaluation/Delineation for Water Street Sewer Interceptor Project  
Plymouth, Massachusetts

Dear Andrew:

On September 21, 2021; at your request; I identified/delineated the wetland resource areas; as defined under the Massachusetts Wetlands Protection Act (M.G.L. Chapter 131, Section 40) and the associated regulations, 310 CMR 10.00 (Regulations) and the Town of Plymouth Wetlands Protection By-law (By-law); in the vicinity of the above-referenced Project. Specifically, the stretch of Water Street from the intersection of Winslow Street and Water Street, past Brewster, Howland, Chilton Street and Memorial Drive and terminating at the rotary circle on Water Street. The purpose of the delineation was to identify the wetland resource areas within the jurisdictional 100-foot buffer zone of the work to be conducted for the Water Street Sewer Interceptor Project proposed by the Town of Plymouth. The following provides a description of my findings.

Four resource areas; defined under 10.25, 10.27, 10.30 and 10.32 of the Regulations and under the By-law; as land under the ocean/nearshore area, coastal beach/tidal flat, coastal bank and salt marsh, respectively were identified and/or delineated in the field. The following is a description of my findings:

Plymouth Harbor (Harbor); located east of Water Street and the proposed Project activities; represents resource area land under the ocean/nearshore area. A tidal flat; which is evident at low tide; and a fringe of salt marsh; both associated with the Harbor; are confined by the upgradient coastal bank. In this instance the coastal bank; which was not delineated (flagged) in the field; is represented by the top of existing seawall located adjacent to the Street/side walk. The coastal bank; or the most encompassing of the resource areas; is within the 100 foot buffer zone of the proposed activities and extends along the entire Project route. An approximate 40-foot fringe of salt marsh; located at the northerly end of the Project route in the vicinity of the intersection of Water Street and Memorial Drive on the opposite side of the Street; was identified/flagged with pink flags labeled SM-1 thru SM-9. The flags extend from the park to the point where there was no access due to the flooded conditions. The salt marsh boundary extends however, to the wall located at the roadway that accesses the docks and existing commercial businesses

Page 2. Water Street Interceptor Project, Plymouth, MA

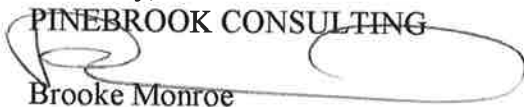
(i.e. Woods Seafood, Tavern on the Wharf etc.) from the rotary off Water Street (see attached sketch of the wetland resource areas). The upper boundary of the salt marsh was identified by the presence of, primarily, phragmites (*Phragmites australis*) and bittersweet (*Celastrus orbiculata*), transitioning to spotted jewelweed (*Impatiens capensis*) and the indigenous salt marsh vegetation *Spartina alterniflora* and *Spartina patens* in the herbaceous layer. Water Street would also be defined as land subject to coastal storm flowage (i.e. land subject to any inundation caused by coastal storms). It is my understanding that the identified resource areas and wetland flags are to be shown a Plan to be submitted with a Notice of Intent for the proposed work.

According to the most recent Massachusetts Natural Heritage Atlas (NHESP 14<sup>th</sup> Edition) dated August 1, 2017, the project location is not mapped as estimated and priority habitat for rare wildlife/species and there are no certified/mapped vernal pools within the Project area. Plymouth Harbor; however, is mapped as priority and estimated habitat.

If you have any questions regarding these findings and/or you need additional information, please feel free to call me at any time. I am glad I could assist you with this project and let me know if I can be of any help in the future.

Sincerely,

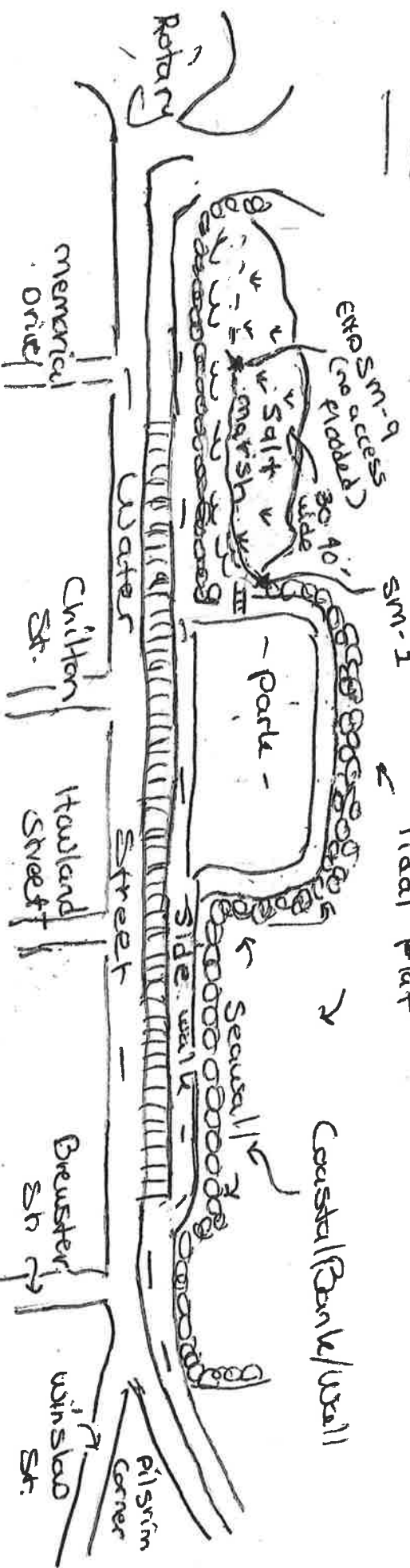
PINEBROOK CONSULTING



Brooke Monroe

Environmental Scientist

Wetland Resource Areas  
Water Street Interceptor  
Plymouth, MA  
9/21/2021



- Inner Harbor is land subject to coastal storm damage -  
- Plymouth Harbor -

bc

**APPENDIX G**

***MASSACHUSETTS COVID-19 GUIDELINES***



## Commonwealth of Massachusetts COVID-19 GUIDELINES AND PROCEDURES FOR ALL CONSTRUCTION SITES AND WORKERS AT ALL PUBLIC WORK

These Guidelines and Procedures MUST be implemented at all times on all construction sites. All construction sites MUST conduct a Safety Stand Down day to disseminate these Guidelines to all employees and workers.

### **Employee Health Protection – ZERO Tolerance**

*The following applies to both State employees and contracted staff working on behalf of the State.*

- ZERO TOLERANCE FOR SICK WORKERS REPORTING TO WORK. IF YOU ARE SICK, STAY HOME! IF YOU FEEL SICK, GO HOME! IF YOU SEE SOMEONE SICK, SEND THEM HOME!
- If you are exhibiting any of the symptoms below, you are to report this to your supervisor (via phone, text or email) right away, and head home from the job site or stay home if already there.

If you notice a co-worker showing signs or complaining about such symptoms, he or she should be directed to their supervisor (via phone, text or email) and asked to leave the project site immediately.

COVID-19 Typical Symptoms:

- Fever
- Cough
- Shortness of Breath
- Sore Throat
- Prior to starting a shift, each employee will self-certify to their supervisor that they:
  - Have no signs of a fever or a measured temperature above 100.3 degrees or greater, a cough or trouble breathing within the past 24 hours.
  - Have not had “close contact” with an individual diagnosed with COVID-19. “Close contact” means living in the same household as a person who has tested positive for COVID-19, caring for a person who has tested positive for COVID-19, being within 6 feet of a person who has tested positive for COVID-19 for about 15 minutes, or coming in direct contact with secretions (e.g., sharing utensils, being coughed on) from a person who has tested positive for COVID-19, while that person was symptomatic.
  - Have not been asked to self-isolate or quarantine by their doctor or a local public health official.
- Workers that are working in a confined space or inside a closed building envelope will have to be temperature screened by a Medical Professional or Trained Individual provided that such screening is out of public view to respect privacy and results are kept private.
- Employees exhibiting symptoms or unable to self-certify should be directed to leave the work site and seek medical attention and applicable testing by their health care provider. They are not to return to the work site until cleared by a medical professional.



## **General On-the-Job Guidance to Prevent Exposure & Limit the Transmission of the Virus**

- No handshaking
- Wash hands often with soap for at least 20 seconds or use an alcohol-based hand sanitizer with at least 60% ethanol or 70% isopropanol
- Contractor and State Agency Field Offices are locked down to all but authorized personnel
- Each jobsite should develop cleaning and decontamination procedures that are posted and shared. These Procedures must cover all areas including trailers, gates, equipment, vehicles, etc. and shall be posted at all entry points to the sites, and throughout the project site.
- A “No Congregation” policy is in effect, individuals must implement social distancing by maintaining a minimum distance of 6-feet from other individuals
- Avoid face to face meetings – critical situations requiring in-person discussion must follow social distancing
- Conduct all meetings via conference calls, if possible. Do not convene meetings of more than 10 people. Recommend use of cell phones, texting, web meeting sites and conference calls for project discussion
- All individual work crew meetings/tailgate talks should be held outside and follow social distancing
- Please keep all crews a minimum of 6’ apart at all times to eliminate the potential of cross contamination
- At each job briefing/tool box talk, employees are asked if they are experiencing any symptoms, and are sent home if they are
- Each jobsite should have laminated COVID-19 safety guidelines and handwashing instructions
- All restroom facilities/porta-potties should be cleaned and handwashing stations must be provided with soap, hand sanitizer and paper towels
- All surfaces should be regularly cleaned, including surfaces, door handles, laptops, etc.
- All common areas and meeting areas are to be regularly cleaned and disinfected at least once a day but preferably twice a day
- Be sure to use your own water bottle, and do not share
- To avoid external contamination, we recommend everyone bring food from home
- Please maintain Social Distancing separation during breaks and lunch.
- Cover coughing or sneezing with a tissue, then throw the tissue in the trash and wash hands, if no tissue is available then cough into your elbow
- Avoid touching eyes, nose, and mouth with your hands
- To avoid sharing germs, please clean up after Yourself. DO NOT make others responsible for moving, unpacking and packing up your personal belongings
- If you or a family member is feeling ill, stay home!

### **Work Site Risk Prevention Practices**

- At the start of each shift, confirm with all employees that they are healthy.
- We will have a 100% glove policy from today going forward. All construction workers will be required to wear cut-resistant gloves or the equivalent.
- Use of eye protection (safety goggles/face shields) is recommended
- In work conditions where required social distancing is impossible to achieve affected employees shall be supplied PPE including as appropriate a standard face mask, gloves, and eye protection.
- All employees shall drive to work site/parking area in a single occupant vehicle. Contractors / State staff shall not ride together in the same vehicle
- When entering a machine or vehicle which you are not sure you were the last person to enter, make sure that you wipe down the interior and door handles with disinfectant prior to entry
- In instances where it is possible, workers should maintain separation of 6' from each other per CDC guidelines.
- Multi person activities will be limited where feasible (two person lifting activities)
- Large gathering places on the site such as shacks and break areas will be eliminated and instead small break areas will be used with seating limited to ensure social distancing.
- Contact the cleaning person for your office trailer or office space and ensure they have proper COVID-19 sanitation processes. Increase their cleaning visits to daily
- Clean all high contact surfaces a minimum of twice a day in order to minimize the spread of germs in areas that people touch frequently. This includes but is not limited to desks, laptops and vehicles

**Wash Stations:** All site-specific projects with outside construction sites without ready access to an indoor bathroom MUST install Wash Stations.

- Install hand wash stations with hot water, if possible, and soap at fire hydrants or other water sources to be used for frequent handwashing for all onsite employees
- All onsite workers must help to maintain and keep stations clean
- If a worker notices soap or towels are running low or out, immediately notify supervisors
- Garbage barrels will be placed next to the hand wash station for disposal of tissues/towels

**Do all you can to maintain your good health by: getting adequate sleep; eating a balanced, healthy diet, avoid alcohol; and consume plenty of fluids.**

**Please Note: This document is not intended to replace any formalized procedures currently in place with the General Contractor.**

**Where these guidance does not meet or exceed the standards put forth by the General Contractor, everyone shall abide by the most stringent procedure available.**

**A site-specific COVID-19 Officer (who may also be the Health and Safety Officer) shall be designated for every site.**

**The approved project Health and Safety Plan (HASP) shall be modified to require that the Contractor's site-specific project COVID-19 Officer submit a written daily report to the Owner's Representative. The COVID-19 Officer shall certify that the contractor and all subcontractors are in full compliance with these guidelines.**

**Any issue of non-compliance with these guidelines shall be a basis for the suspension of work. The contractor will be required to submit a corrective action plan detailing each issue of non-conformance and a plan to rectify the issue(s). The contractor will not be allowed to resume work until the plan is approved by the Owner. Any additional issues of non-conformance may be subject to action against the contractor's prequalification and certification status.**



**APPENDIX H**

***CHAPTER 91 LICENSE***



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

Kathleen A. Theoharides  
Secretary

Martin Suuberg  
Commissioner

January 20, 2022

Town of Plymouth Department of Public Works  
c/o Ziad Kary, Environmental Partners  
1900 Crown Colony Drive, Suite 402  
Quincy, MA 02169

**Re: Request for a Minor Project Modification Approval Pursuant to 310 CMR 9.22(3)(c)**  
Water Street, Filled and Flowed Tidelands of Plymouth Harbor, Plymouth, Plymouth County

Dear Mr. Kary:

The Massachusetts Department of Environmental Protection Waterways Regulation Program (the “Department”) has reviewed the information and representations in the letter dated November 19, 2021 and Attachments A and B, which were submitted as part of the request for a Minor Project Modification for work within filled and flowed tidelands of Plymouth Harbor to install approximately 1,400 linear feet of utilities within an existing right-of-way and to clean, abandon, and remove an existing approximately 1,300 linear foot sewer interceptor, along the Water Street right-of-way between South Park Avenue and Pilgrim Memorial Park and seaward of Water Street between South Park Avenue and Pilgrim Memorial Park, respectively.

This approval of a Minor Project Modification is based on the Department’s evaluation of the scope of work as specified in the plans and project description and is not an affirmation of the representations relative to the Chapter 91 regulations contained within the submitted materials.

The Department determines that the proposed installation of the new sewer interceptor within the Water Street right-of-way meets the standards for a Minor Project Modification to a project exempt from licensing pursuant to 310 CMR 9.05(3)(1)(c) and 310 CMR 9.22(3)(c), and is hereby approved contingent upon the removal of the existing sewer interceptor and all appurtenant structures located seaward of Water Street within one (1) year of completion of the installation and functional use of the proposed new sewer interceptor.

The cleaning, abandonment, and removal activities proposed for the existing sewer interceptor are authorized pursuant to 310 CMR 9.05(3)(m) and are required to be completed as a condition of

This information is available in alternate format. Contact Michelle Waters-Ekanem, Director of Diversity/Civil Rights at 617-292-5751.

TTY# MassRelay Service 1-800-439-2370

MassDEP Website: [www.mass.gov/dep](http://www.mass.gov/dep)

Printed on Recycled Paper

this authorization, independent of the timing of any proposed project (e.g., Water Street Promenade).

Due to the potential regulatory and proprietary requirements that may be necessary for the removal of the existing sewer interceptor and appurtenances, it is recommended that the Town initiate all necessary processes as early as possible in order to have approvals in place to facilitate removal within the 1-year timeframe specified herein. The Department may consider a request for an extension of time for the removal, which should be submitted no less than 60 days prior to the deadline, and which shall be accompanied by a proposed timeframe and justification for any extension request. Please note that in the event the abandoned and dilapidated sewer interceptor is not removed as required herein or any extensions thereto, the Department may pursue enforcement and require its removal pursuant to 310 CMR 9.08.

The Department will retain this correspondence approving the proposed work along with the referenced submittal in our records. The work must conform to and be consistent with all submitted documentation and this authorization. This Departmental action does not relieve or exempt you of the requirement to obtain all other applicable local, State and Federal authorizations necessary to perform said activities.

Should you have any questions please contact us at [dep.waterways@mass.gov](mailto:dep.waterways@mass.gov).

Sincerely,



Daniel J. Padien, Program Chief  
Waterways Regulation Program

cc: Jonathan Beder, Plymouth DPW Director  
Douglas Pinard, Plymouth Wastewater  
Manager Sheila Sgarzi, PE, Town Engineer  
Kendra Martin, PE, Water and Sewer Engineer

**APPENDIX I**

***DAVIS-BACON WAGE RATES***

"General Decision Number: MA20220023 02/25/2022

Superseded General Decision Number: MA20210023

State: Massachusetts

Construction Type: Highway

County: Plymouth County in Massachusetts.

HIGHWAY CONSTRUCTION PROJECTS

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

<p>If the contract is entered into on or after January 30, 2022, or the contract is renewed or extended (e.g., an option is exercised) on or after January 30, 2022:</p>	<ul style="list-style-type: none"> <li>. Executive Order 14026 generally applies to the contract.</li> <li>. The contractor must pay all covered workers at least \$15.00 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 2022.</li> </ul>
<p>If the contract was awarded on or between January 1, 2015 and January 29, 2022, and the contract is not renewed or extended on or after January 30, 2022:</p>	<ul style="list-style-type: none"> <li>. Executive Order 13658 generally applies to the contract.</li> <li>. The contractor must pay all covered workers at least \$11.25 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on that contract in 2022.</li> </ul>

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

Additional information on contractor requirements and worker protections under the Executive Orders is available at <https://www.dol.gov/agencies/whd/government-contracts>.

Modification Number	Publication Date
0	01/07/2022
1	02/25/2022



CARP0330-003 09/01/2017

	Rates	Fringes
CARPENTER (Includes Form Work)...	\$ 39.28	27.90

-----  
ENGI0004-027 12/01/2021

	Rates	Fringes
POWER EQUIPMENT OPERATOR		
Group 1.....	\$ 48.73	29.25+A
GROUP 1.....	\$ 51.38	31.10
Group 2.....	\$ 48.23	29.25+A
GROUP 2.....	\$ 50.83	31.10

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

Group 1: Backhoe/Excavator/Trackhoe; Bobcat/Skid Steer/Skid Loader; Broom/Sweeper; Crane; Gradall; Loader; Post Driver (Guardrail/Fences)

Group 2: Bulldozer; Grader/Blade; Milling Machine; Roller

-----  
IRON0007-026 09/16/2021

	Rates	Fringes
IRONWORKER (ORNAMENTAL AND STRUCTURAL).....	\$ 50.13	34.81

-----  
LABO0133-001 06/01/2018

	Rates	Fringes
LABORER (Concrete Surfacers).....	\$ 33.50	22.92

-----  
LABO0385-002 06/01/2018

	Rates	Fringes
LABORER (Landscape).....	\$ 33.25	22.92

-----  
LABO0385-003 06/01/2018

	Rates	Fringes
LABORER (Fence Erection).....	\$ 33.50	22.92

-----  
LABO0721-002 06/01/2018

	Rates	Fringes
LABORER (Guardrail Installation).....	\$ 33.50	22.92

-----  
LABO0876-001 06/01/2018

	Rates	Fringes
LABORER (Common or General).....	\$ 33.25	22.92

-----  
 PAIN0035-023 07/01/2019

	Rates	Fringes
PAINTER (Steel).....	\$ 50.66	30.90

-----  
 SUMA2014-013 01/11/2017

	Rates	Fringes
CEMENT MASON/CONCRETE FINISHER...	\$ 56.70	21.08
ELECTRICIAN, Includes Traffic Signalization.....	\$ 45.13	13.86
IRONWORKER, REINFORCING.....	\$ 44.52	19.36
LABORER: Asphalt, Includes Raker, Shoveler, Spreader and Distributor.....	\$ 34.32	17.35
LABORER: Concrete Saw (Hand Held/Walk Behind).....	\$ 44.43	14.18
LABORER: Jack Hammer.....	\$ 38.69	17.33
OPERATOR: Forklift.....	\$ 64.67	0.00
OPERATOR: Mechanic.....	\$ 48.74	11.79
OPERATOR: Paver (Asphalt, Aggregate, and Concrete).....	\$ 41.63	23.04
OPERATOR: Piledriver.....	\$ 42.56	17.34
PAINTER: Spray (Linestriping)....	\$ 47.30	6.42
TRAFFIC CONTROL: Flagger.....	\$ 23.00	20.44
TRAFFIC CONTROL: Laborer-Cones/ Barricades/Barrels - Setter/Mover/Sweeper.....	\$ 53.35	12.78
TRUCK DRIVER: Concrete Truck....	\$ 33.69	15.79
TRUCK DRIVER: Dump Truck.....	\$ 37.35	11.00
TRUCK DRIVER: Flatbed Truck.....	\$ 48.53	0.00

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

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

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

Union Rate Identifiers

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

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

Survey Rate Identifiers

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

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 National Office because National Office has responsibility for the Davis-Bacon survey program. If the response from this initial contact is not satisfactory, then the process described in 2.) and 3.) should be followed.

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 DECISIO"

**APPENDIX J**

***AMERICAN RESCUE PLAN ACT (ARPA) BIDDER CERTIFICATIONS;  
NOTICE OF CONTRACTUAL PROVISION***

**Appendix J**  
**American Rescue Plan Act (ARPA) Bidder Certifications;**  
**Notice of Contractual Provisions**

**NOTICE:** The Invitation For Bid 22147, to which this addendum is attached, is an invitation to bid for a contract which shall be partially funded by federal assistance provided to the Town of Plymouth by the United States Department of Treasury under the American Rescue Plan Act (“ARPA”), Sections 602(b) and 603(b) of the Social Security Act, P. L. No. 117-2 (March 11, 2021).

The submission of bids and to-be-awarded contract shall comply with the American Rescue Plan Act; federal Pandemic Relief Programs regulations, 31 CFR Part §§ 35.01 et seq., and any interpretive guidance issued thereto. 31 CFR § 35.9.

The procurement process and resulting contract is, as a general matter, subject to the Uniform Guidance. See Coronavirus State and Local Fiscal Recovery Funds, 86 FR 26786-01.

Bidders shall be required to attest to the certifications listed in Appendix J-1: Bidder Certifications.

Bidders are hereby notified that any contract awarded for Bid 22147 shall include and be subject to certain mandatory provisions pursuant to ARPA and its implementing regulations; and as established by the Treasury Department. Notice of these provisions is provided below in Appendix J-2: Notice of Contractual Provisions.

## **APPENDIX J-1 Bidder Certifications**

### **(A) Byrd Anti-Lobbying Amendment, 31 U.S.C. § 1352, as amended**

Bidder certifies that it will not and has not used Federal appropriated funds to pay any person or organization for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, officer or employee of Congress, or an employee of a Member of Congress in connection with obtaining any Federal contract, grant, or any other award covered by 31 U.S.C. § 1352. Contractor shall also disclose any lobbying with non-Federal funds that takes place in connection with obtaining any Federal award. Such disclosures are forwarded from tier to tier up to the recipient who in turn will forward the certification(s) to the awarding agency.

### **Required Certification (for Awards over \$100,000)**

The undersigned certifies, to the best of their knowledge and belief, that:

1. No Federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of an agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.
2. If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form-LLL, "Disclosure Form to Report Lobbying," in accordance with its instructions.<sup>1</sup>
3. The undersigned shall require that the language of this certification be included in the award documents for all subawards at all tiers (including subcontracts, subgrants, and contracts under grants, loans, and cooperative agreements) and that all contractors shall certify and disclose accordingly.

This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by section 1352, title 31, U.S. Code. Any person who fails to file the required certification shall be subject to a civil penalty of not less than \$10,000 and not more than \$100,000 for each such failure.

Bidder certifies or affirms the truthfulness and accuracy of each statement of its certification and disclosure, if any. In addition, the bidding party understands and agrees that the provisions of 31

<sup>1</sup> Standard Form-LLL available at <https://www.grants.gov/web/grants/forms/post-award-reporting-forms.html>.



U.S.C. Ch. 38, Administrative Remedies for False Claims and Statements, apply to this certification and disclosure, if any.

\_\_\_\_\_  
Signature of [Bidder's] authorized official

Date: \_\_\_\_\_

\_\_\_\_\_  
Name (printed)

\_\_\_\_\_  
Title (printed)

**(B) Davis-Bacon Wage Certification**

Bidder acknowledges that in the event a contract is awarded, Bidder/Contractor and all subcontractors shall provide certified payroll affidavits verifying compliance with MGL c.149 §§26 - 27H and/or federal Davis Bacon and other related acts.

\_\_\_\_\_  
Signature of [Bidder's] authorized official

Date: \_\_\_\_\_

\_\_\_\_\_  
Name (printed)

\_\_\_\_\_  
Title (printed)

## **APPENDIX J-2 Notice of Contractual Provisions**

Bidding party is hereby notified that that pursuant to 2 C.F.R. § 200.327, contract awarded must contain all applicable provisions described in 2 C.F.R. 200 Appendix II — Contract Provisions for Non-Federal Entity Contracts Under Federal Awards.

In addition to other provisions required by the Federal agency or non-Federal entity, all contracts made by the non-Federal entity under the Federal award must contain provisions covering the following, as applicable:

### **(A) Administrative, Contractual, or Legal Remedies for Contractor’s Violation or Breach of Contract Terms**

Contracts for more than the simplified acquisition threshold, which is the inflation adjusted amount determined by the Civilian Agency Acquisition Council and the Defense Acquisition Regulations Council (Councils) as authorized by 41 U.S.C. 1908, must address administrative, contractual, or legal remedies in instances where contractors violate or breach contract terms, and provide for such sanctions and penalties as appropriate.

### **(B) Termination For Cause and Convenience**

All contracts in excess of \$10,000 must address termination for cause and for convenience by the non-Federal entity including the manner by which it will be effected and the basis for settlement.

### **(C) Equal Employment Opportunity**

Equal Employment Opportunity. Except as otherwise provided under 41 CFR Part 60, all contracts that meet the definition of “federally assisted construction contract” in 41 CFR Part 60–1.3 must include the equal opportunity clause provided under 41 CFR 60–1.4(b), in accordance with Executive Order 11246, “Equal Employment Opportunity” (30 FR 12319, 12935, 3 CFR Part, 1964–1965 Comp., p. 339), as amended by Executive Order 11375, “Amending Executive Order 11246 Relating to Equal Employment Opportunity,” and implementing regulations at 41 CFR part 60, “Office of Federal Contract Compliance Programs, Equal Employment Opportunity, Department of Labor.”

### **(D) Davis-Bacon Act**

Davis–Bacon Act, as amended (40 U.S.C. 3141–3148). When required by Federal program legislation, all prime construction contracts in excess of \$2,000 awarded by non-Federal entities must include a provision for compliance with the Davis–Bacon Act (40 U.S.C. 3141–3144, and 3146–3148) as supplemented by Department of Labor regulations (29 CFR Part 5, “Labor Standards Provisions Applicable to Contracts Covering Federally Financed and Assisted Construction”). In accordance with the statute, contractors must be required to pay wages to laborers and mechanics at a rate not less than the prevailing wages specified in a wage determination made by the Secretary of Labor. In addition, contractors must be required to pay

wages not less than once a week. The non-Federal entity must place a copy of the current prevailing wage determination issued by the Department of Labor in each solicitation. The decision to award a contract or subcontract must be conditioned upon the acceptance of the wage determination. The non-Federal entity must report all suspected or reported violations to the Federal awarding agency.

The contracts must also include a provision for compliance with the Copeland “Anti-Kickback” Act (40 U.S.C. 3145), as supplemented by Department of Labor regulations (29 CFR Part 3, “Contractors and Subcontractors on Public Building or Public Work Financed in Whole or in Part by Loans or Grants from the United States”). The Act provides that each contractor or subrecipient must be prohibited from inducing, by any means, any person employed in the construction, completion, or repair of public work, to give up any part of the compensation to which he or she is otherwise entitled. The non-Federal entity must report all suspected or reported violations to the Federal awarding agency.

**(E) Contract Work Hours and Safety Standards Act (40 U.S.C. 3701–3708).**

Where applicable, all contracts awarded by the non-Federal entity in excess of \$100,000 that involve the employment of mechanics or laborers must include a provision for compliance with 40 U.S.C. 3702 and 3704, as supplemented by Department of Labor regulations (29 CFR Part 5). Under 40 U.S.C. 3702 of the Act, each contractor must be required to compute the wages of every mechanic and laborer on the basis of a standard work week of 40 hours. Work in excess of the standard work week is permissible provided that the worker is compensated at a rate of not less than one and a half times the basic rate of pay for all hours worked in excess of 40 hours in the work week. The requirements of 40 U.S.C. 3704 are applicable to construction work and provide that no laborer or mechanic must be required to work in surroundings or under working conditions which are unsanitary, hazardous or dangerous. These requirements do not apply to the purchases of supplies or materials or articles ordinarily available on the open market, or contracts for transportation or transmission of intelligence.

**(F) Rights to Inventions Made Under a Contract or Agreement.**

Rights to Inventions Made Under a Contract or Agreement. If the Federal award meets the definition of “funding agreement” under 37 CFR § 401.2 (a) and the recipient or subrecipient wishes to enter into a contract with a small business firm or nonprofit organization regarding the substitution of parties, assignment or performance of experimental, developmental, or research work under that “funding agreement,” the recipient or subrecipient must comply with the requirements of 37 CFR Part 401, “Rights to Inventions Made by Nonprofit Organizations and Small Business Firms Under Government Grants, Contracts and Cooperative Agreements,” and any implementing regulations issued by the awarding agency.

**(G) Clean Air Act (42 U.S.C. 7401–7671q.) and the Federal Water Pollution Control Act (33 U.S.C. 1251–1387), as amended.**

Contracts and subgrants of amounts in excess of \$150,000 must contain a provision that requires the non-Federal award to agree to comply with all applicable standards, orders or regulations is-

sued pursuant to the Clean Air Act (42 U.S.C. 7401–7671q) and the Federal Water Pollution Control Act as amended (33 U.S.C. 1251–1387). Violations must be reported to the Federal awarding agency and the Regional Office of the Environmental Protection Agency (EPA).

**(H) Debarment and Suspension (Executive Orders 12549 and 12689)**

A contract award (see 2 CFR 180.220) must not be made to parties listed on the government wide exclusions in the System for Award Management (SAM), in accordance with the OMB guidelines at 2 CFR 180 that implement Executive Orders 12549 (3 CFR part 1986 Comp., p. 189) and 12689 (3 CFR part 1989 Comp., p. 235), “Debarment and Suspension.” SAM Exclusions contains the names of parties debarred, suspended, or otherwise excluded by agencies, as well as parties declared in-eligible under statutory or regulatory authority other than Executive Order 12549.

**(I) Byrd Anti-Lobbying Amendment (31 U.S.C. 1352)**

Contractors that apply or bid for an award exceeding \$100,000 must file the required certification. Each tier certifies to the tier above that it will not and has not used Federal appropriated funds to pay any person or organization for influencing or attempting to influence an officer or employee of any agency, a member of Congress, officer or employee of Congress, or an employee of a member of Congress in connection with obtaining any Federal contract, grant or any other award covered by 31 U.S.C. 1352. Each tier must also disclose any lobbying with non-Federal funds that takes place in connection with obtaining any Federal award. Such disclosures are forwarded from tier to tier up to the non-Federal award.

**(J) 2 CFR § 200.323 – Procurement of Recovered Materials**

A non-Federal entity that is a state agency or agency of a political subdivision of a state and its contractors must comply with section 6002 of the Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act. The requirements of Section 6002 include procuring only items designated in guidelines of the Environmental Protection Agency (EPA) at 40 CFR part 247 that contain the highest percentage of recovered materials practicable, consistent with maintaining a satisfactory level of competition, where the purchase price of the item exceeds \$10,000 or the value of the quantity acquired during the preceding fiscal year exceeded \$10,000; procuring solid waste management services in a manner that maximizes energy and resource recovery; and establishing an affirmative procurement program for procurement of recovered materials identified in the EPA guidelines.

**(K) 2 CFR § 200.216 – Prohibited fund expenditures**

(a) Recipients and subrecipients are prohibited from obligating or expending loan or grant funds to:

(A) Procure or obtain;

(B) Extend or renew a contract to procure or obtain; or

- (C) Enter into a contract (or extend or renew a contract) to procure or obtain equipment, services, or systems that uses covered telecommunications equipment or services as a substantial or essential component of any system, or as critical technology as part of any system. As described in Public Law 115–232, section 889, covered telecommunications equipment is telecommunications equipment produced by Huawei Technologies Company or ZTE Corporation (or any subsidiary or affiliate of such entities).
- (i) For the purpose of public safety, security of government facilities, physical security surveillance of critical infrastructure, and other national security purposes, video surveillance and telecommunications equipment produced by Hytera Communications Corporation, Hangzhou Hikvision Digital Technology Company, or Dahua Technology Company (or any subsidiary or affiliate of such entities).
  - (ii) Telecommunications or video surveillance services provided by such entities or using such equipment.
  - (iii) Telecommunications or video surveillance equipment or services produced or provided by an entity that the Secretary of Defense, in consultation with the Director of the National Intelligence or the Director of the Federal Bureau of Investigation, reasonably believes to be an entity owned or controlled by, or otherwise connected to, the government of a covered foreign country.

(b) In implementing the prohibition under Public Law 115–232, section 889, subsection (f), paragraph (1), heads of executive agencies administering loan, grant, or subsidy programs shall prioritize available funding and technical support to assist affected businesses, institutions and organizations as is reasonably necessary for those affected entities to transition from covered communications equipment and services, to procure replacement equipment and services, and to ensure that communications service to users and customers is sustained.

(c) See Public Law 115–232, section 889 for additional information.

(d) See also § 200.471.

**(L) 2 CFR § 200.322 – Domestic Preferences for Procurements**

(a) As appropriate and to the extent consistent with law, the non–Federal entity should, to the greatest extent practicable under a Federal award, provide a preference for the purchase, acquisition, or use of goods, products, or materials produced in the United States (including but not limited to iron, aluminum, steel, cement, and other manufactured products). The requirements of this section must be included in all subawards including all contracts and purchase orders for work or products under this award.

(b) For purposes of this section:

(1) “Produced in the United States” means, for iron and steel products, that all manufacturing processes, from the initial melting stage through the application of coatings, occurred in the United States.

(2) “Manufactured products” means items and construction materials composed in whole or in part of non-ferrous metals such as aluminum; plastics and polymer-based products such as polyvinyl chloride pipe; aggregates such as concrete; glass, including optical fiber; and lumber.

## **BID FORMS**

---

NAME OF BIDDER

Bids must be submitted on this form and the following table. Bids submitted on any other form will not be considered valid. Please return this form and associated documents to:

Town of Plymouth  
ATTN: Procurement  
26 Court Street  
Plymouth, MA 02360

**Bids must be received by 10:00 a.m., Thursday, June 2, 2022.** Postmarks will not be considered. All bids will be publicly opened and read at the above address, date and time. Prices are to include delivery charges unless otherwise specified. All offers are subject to the Invitation for Bids 22147R. Please note the Bid Number on the outside of your submission.

In compliance with the above, the undersigned offers and agrees, if this offer is accepted within thirty (30) business days from date of receipt of offers specified above, to perform herein described work for the prices offered opposite each item, and that said prices will be good for the period of one (1) year.

THE UNDERSIGNED BIDDER HEREBY CERTIFIES:

No person in the employ of the Town of Plymouth has any pecuniary interest in this proposal or in the Contract for work, which is proposed.

Bidder has carefully read and examined all the documents herein referred to, and know and understands the terms and provisions therein. Bidder has satisfied themselves by personal examination of the site, and by such other means as they may wish, as to the actual conditions there existing, the character and requirements of the work, and the difficulties attendant upon its execution.

Bidder agrees that if this bid is accepted, they will contract with the Owner, as provided for in the Bid Documents, and that they will perform all the work, furnish all the material and equipment, and provide all labor, services, plant, machinery, apparatus, appliances, tools, supplies, and all other things required by the documents in the manner and within the time therein prescribed and according to the requirements of the Owner as therein set forth, and that they will take in full payment therefore, the lump sum applicable to the project as offered below.

Bidder understands that information relative to subsurface and other conditions, natural phenomena, existing pipes and other structures (surface and/or subsurface) has been furnished



only for their information and convenience without any warranty or guarantee, expressed or implied, that the subsurface and/or other conditions, natural phenomena, existing pipes and other structures (surface and/or subsurface) actually encountered will be the same as those shown on the drawings or in any of the other Contract Documents, and agrees that the Bidder shall not use or be entitled to any such information made available to them through the Contract Documents or otherwise, or obtained by them in their own examination of the site, as a basis of or ground for any claim against the Owner or Engineer arising from or by reason of any variance which may exist between the aforesaid information made available to or acquired by them and the subsurface and/or other conditions, natural phenomena, existing pipes and other structures (surface and/or subsurface) actually encountered during the construction work, and has made due allowance therefor in this bid.

The foregoing bid is based upon the payment to laborers to be employed on the project of wages in an amount not less than the applicable prevailing wage rates established for the project by the Massachusetts Department of Labor Standards. The undersigned bidder agrees to indemnify the Owner for, from and against any loss, expense, damages, action or claims, including any expense incurred in connection with any delay or stoppage of the project work, arising out of or as a result of (1) the failure of the said bid to be based upon the payment of the said applicable prevailing wage rates or (2) the failure of the bidder, if selected as the Contractor, to pay laborers employed on the project the said applicable prevailing wage rates.

Bidder 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 State Occupation Safety and Health Administration that is at least ten (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 they will comply fully with all laws and regulation applicable to awards made subject to M.G.L. c.149 §44A.

Bidder agrees that they will 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)". 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.

Bidder 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 are 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 BIDDER HEREBY CERTIFIES UNDER THE PAINS AND PENTALTIES OF PERJURY THE FOLLOWING:**

This bid in all respects is 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.

Bidder has complied with all laws of the Commonwealth of Massachusetts relating to taxes, reporting of employees and contractors, and withholding and remitting child support in accordance with M.G.L. c.62C §49A.

Bidder is not presently debarred from doing public construction work in the Commonwealth of Massachusetts under the provisions of M.G.L. c.29 §29F, or any other applicable debarment provisions of any other chapter of the General Laws or any rule or regulation promulgated there under.

**WATER STREET SEWER INTERCEPTOR REPLACEMENT, AS SPECIFIED. PRICES SHALL INCLUDE ALL LABOR, EQUIPMENT, MATERIALS, SERVICES, PLANT, MACHINERY, APPARATUS, APPLIANCES, TOOLS, SUPPLIES AND ALL OTHER REQUIREMENTS NECESSARY TO COMPLETE ALL WORK AS SPECIFIED AND NO ADDITIONAL COMPENSATION WILL BE ALLOWED.**

*QUANTITIES LISTED ARE ESTIMATES ONLY AND NOT GUARANTEED TO APPROXIMATE THE ACTUAL AMOUNTS TO BE USED. A UNIT PRICE SHALL BE ENTERED FOR EACH ITEM TO BE CONSIDERED A RESPONSIVE BID.*

Item #	Item Description and Unit Price	Units	Estimated Quantity	Unit Price	Total
1	Mobilization and Demobilization (No more than 5% of Base Bid)				
	_____ Dollars and _____ Cents	Lump Sum	1	\$	\$
2	Preconstruction Video and Photographs				
	_____ Dollars and _____ Cents	Lump Sum	1	\$	\$
3	Clean and CCTV Inspect Existing 30” RCP Sewer Interceptor				
	_____ Dollars and _____ Cents	Linear Foot	1450	\$	\$
4	Cut and Cap Existing 30” RCP Sewer Interceptor				
	_____ Dollars and _____ Cents	Each	2	\$	\$

Item #	Item Description and Unit Price	Units	Estimated Quantity	Unit Price	Total
5a	Remove and Legally Dispose of Existing 24" RCP Sewer Main  _____ Dollars and _____ Cents	Linear Foot	10	\$	\$
5b	Remove and Legally Dispose of Existing 15" VC Sewer Main  _____ Dollars and _____ Cents	Linear Foot	1,100	\$	\$
5c	Remove and Legally Dispose of Existing 8" PVC Sewer Main  _____ Dollars and _____ Cents	Linear Foot	420	\$	\$
6a	Furnish and Install 30" SDR26 PVC Pipe and Fittings via Open Cut  _____ Dollars and _____ Cents	Linear Foot	1,300	\$	\$
6b	Furnish and Install 24" SDR26 PVC Pipe and Fittings via Open Cut  _____ Dollars and _____ Cents	Linear Foot	20	\$	\$
6c	Furnish and Install 12" SDR26 PVC Pipe and Fittings via Open Cut  _____ Dollars and _____ Cents	Linear Foot	70	\$	\$
6d	Furnish and Install 8" SDR26 PVC Pipe and Fittings via Open Cut  _____ Dollars and _____ Cents	Linear Foot	90	\$	\$
7	Remove and Legally Dispose of Existing Interceptor Manhole Frame, Cover, and Concentric Top Section  _____ Dollars and _____ Cents	Each	4	\$	\$

Item #	Item Description and Unit Price	Units	Estimated Quantity	Unit Price	Total
8	Plug, Flow Fill, and Abandon Existing Interceptor Manholes  _____ Dollars and _____ Cents	Each	4	\$	\$
9	6" C900 PVC Gravity Sewer Chimney and 6" SDR26 PVC Gravity Sewer Service and Cleanout  _____ Dollars and _____ Cents	Each	12	\$	\$
10	Furnish and Install 5' Diameter Precast Gravity Sewer Manholes  _____ Dollars and _____ Cents	Each	6	\$	\$
11	Gravity Sewer Manhole Frame and Cover  _____ Dollars and _____ Cents	Each	6	\$	\$
12	Impervious Clay Dam  _____ Dollars and _____ Cents	Each	6	\$	\$
13a	Removal and Disposal of Unforeseen Asbestos  <u>Fifty Thousand Dollars and Zero Cents</u> _____ Dollars and _____ Cents	Allow	1	\$50,000.00	\$50,000.00
13b	Removal and Disposal of Other Hazardous Materials  <u>Fifty Thousand Dollars and Zero Cents</u> _____ Dollars and _____ Cents	Allow	1	\$50,000.00	\$50,000.00
13c	Soil Management Plans  _____ Dollars and _____ Cents	Lump Sum	1	\$	\$
14a	Exploratory Excavation (Test Pit)  _____ Dollars and _____ Cents	Cubic Yard	260	\$	\$

Item #	Item Description and Unit Price	Units	Estimated Quantity	Unit Price	Total
14b	Rock Excavation <hr/> Dollars and Cents	Cubic Yard	50	\$	\$
15a	12" Processed Gravel Subbase <hr/> Dollars and Cents	Square Yard	1,500	\$	\$
15b	7" Permanent Trench Pavement <hr/> Dollars and Cents	Square Yard	1,900	\$	\$
15c	1.5" Mill and Overlay <hr/> Dollars and Cents	Square Yard	9,000	\$	\$
16a	Remove and Reset Brick Sidewalk <hr/> Dollars and Cents	Square Yard	20	\$	\$
16b	Remove and Reset Granite Curb <hr/> Dollars and Cents	Linear Foot	70	\$	\$
16c	Remove and Replace Concrete Sidewalk <hr/> Dollars and Cents	Square Yard	50	\$	\$
17	Uniformed Police Detail  <u>Two Hundred Thousand Dollars and Zero Cents</u> Dollars and Cents	Allow	1	\$200,000.00	\$200,000.00
18	Traffic Management and Controls <hr/> Dollars and Cents	Lump Sum	1	\$	\$
19	Utility Support and Coordination  <u>One Hundred Thousand Dollars and Zero Cents</u> Dollars and Cents	Allow	1	\$100,000.00	\$100,000.00

Item #	Item Description and Unit Price	Units	Estimated Quantity	Unit Price	Total
20a	12” Diameter Filter Sock				
	Dollars and <span style="float: right;">Cents</span>	Linear Foot	1,500	\$	\$
20b	Silt Sacks				
	Dollars and <span style="float: right;">Cents</span>	Each	40	\$	\$
21	Dewatering and Discharge				
	Dollars and <span style="float: right;">Cents</span>	Lump Sum	1	\$	\$
22	Geotechnical Instrumentation and Monitoring				
	Dollars and <span style="float: right;">Cents</span>	Lump Sum	1	\$	\$
23	Miscellaneous Work and Cleanup				
	Dollars and <span style="float: right;">Cents</span>	Lump Sum	1	\$	\$
<b>TOTAL FOR BASE BID – ITEMS 1 TO 23</b>				<b>\$</b>	

TOTAL BASE BID

Total Amount of Base Bid (**Basis of Award**) (Items 1 through 23 inclusive)

\$ \_\_\_\_\_  
 (Amount in Figures)

\_\_\_\_\_  
 (Amount in Words)

**NOTE:**

- The estimated quantities for unit price pay items are approximate only and are included solely for the purpose of comparison of bids. The quantities are based on estimates of the

work to be performed during the term on the Contract; however, the Owner does not expressly or by implication agree or warrant that the actual amount of work will correspond with such estimates and the Owner reserves the right to increase or decrease the amount of any class or portion of the work as it may deem necessary, without change of price per unit, which unit prices shall be used for increase and decreases (credits) for adjustments in the quantity of work required.

- All prices, except item totals, shall be state both in words and figures. Discrepancies between unit prices and their respective total amounts will be resolved in favor of the unit price. Discrepancies between the indicated sum of any column of figures and the correct sum thereof will be resolved in favor of the correct sum.
- All structural works should be priced for being installed with appropriate finishing works. Shop Drawings may be required for any additional design work.
- The successful bidder shall submit for review by the Owner, documentation to establish a “direct labor mark-up” for change orders which may be executed.
- The Owner reserves the right to withhold the fair market value for work not completed, in addition to the retainage on work completed as described in the Bid Documents.
- Unbalanced bid items will specifically be subject to review and to this potential withholding from periodic payment applications.

**THE FOLLOWING ITEMS ARE TO BE SUBMITTED WITH THE BID:**

- This completed and signed Bid Form
- Bid Security (5%)
- Delegation of Authority Form
- Certificate of Non-Collusion
- Certificate of OSHA Training
- Certificate of Tax Compliance
- Five (5) references for similar projects within the past five (5) years in the Commonwealth of Massachusetts

THE UNDERSIGNED ACKNOWLEDGES RECEIPT OF ADDENDA # \_\_\_\_\_.

\*To be filled in by bidder if addenda are issued.

PLEASE NOT ANY EXCEPTIONS OF SEPARATE CONTRACTOR LETTERHEAD.

BIDDER \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

COUNTY \_\_\_\_\_

STATE OF INCORPORATION \_\_\_\_\_

PHONE \_\_\_\_\_

EMAIL \_\_\_\_\_

TAX I.D. NUMBER \_\_\_\_\_

AUTHORIZED SIGNATURE \_\_\_\_\_

Printed Name and Title \_\_\_\_\_

Date Offered \_\_\_\_\_



**DELEGATION OF AUTHORITY**

To be completed if this business is a Corporation.

At a meeting of the Board of Directors of \_\_\_\_\_ duly called and  
(Name of Corporation)  
held on \_\_\_\_\_ at which a quorum was present, and acting throughout, the  
(Date)

Following vote was duly adopted: VOTED: That \_\_\_\_\_ the  
(Name of Individual)  
\_\_\_\_\_ of the Corporation, hereby is authorized to affix the Corporate  
(Title)

Seal, sign and deliver in the name and on behalf of the Corporation, bids, proposals, contracts, bills of sale, conditional sale agreements, chattel mortgages, leases, bonds, applications, affidavits, certificates, and any other similar documents required in connection with sale of the Corporation's products to any purchaser, including assignments and satisfactions of any such documents.

Any and all applications, affidavits, statements, certificates, and similar documents required by law in connection with the licensing of the Corporation or its representatives for the sale, distribution, and servicing of its commercial products.

The authority is hereby delegated and shall be exercised by the aforesaid person in connection with the duties as \_\_\_\_\_ of \_\_\_\_\_  
(Title) (Name of Corporation)  
and not otherwise.

ATTEST: \_\_\_\_\_ DATE: \_\_\_\_\_

**CERTIFICATE OF NON-COLLUSION**

The undersigned certifies under the penalties of perjury that this bid or proposal has been made and submitted in good faith and without collusion or fraud with any other person. As used in this certification, the word "person" shall mean any natural person, business, partnership, corporation, union, committee, club, or other organization, entity, or group of individuals.

\_\_\_\_\_  
(Signature of person signing bid or proposal)

\_\_\_\_\_  
(Name of business)

**CERTIFICATE OF OSHA TRAINING**

In accordance with M.G. L. C.30, S.39S: The undersigned hereby certifies that all employees of

\_\_\_\_\_ (*Name of Company*) 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 employees begins work and who shall furnish documentation of successful completion of said course with the first payroll report for each employee and that all employees to be employed in the work subject to this bid 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.

\_\_\_\_\_  
(Authorized Signature)

\_\_\_\_\_  
(Title)

\_\_\_\_\_  
(Date)

**CERTIFICATE OF TAX COMPLIANCE**

Pursuant to Chapter 62C of the Massachusetts General Laws, Section 49A(b), I,

\_\_\_\_\_, authorized signatory for \_\_\_\_\_,  
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.

CONTRACTOR

By: \_\_\_\_\_  
(Signature of Authorized Representative)

Title \_\_\_\_\_

Date \_\_\_\_\_

**REFERENCES OF BIDDER**

By signing this page, the bidder certifies that they meet the minimum qualifications specified in the Bid Documents.

Signed:

\_\_\_\_\_  
Signature of Authorized Representative

\_\_\_\_\_  
Title

\_\_\_\_\_  
Date

Please provide the requested reference information on the following pages:

Project Name: _____
Project Location: _____
Contract Amount: \$_____ Completion Date: _____
Owner: _____
Contact Name: _____ Telephone: _____
Architect/Engineer: _____
Contact Name: _____ Telephone: _____

Project Name: \_\_\_\_\_

Project Location: \_\_\_\_\_

Contract Amount: \$\_\_\_\_\_ Completion Date: \_\_\_\_\_

Owner: \_\_\_\_\_

Contact Name: \_\_\_\_\_ Telephone: \_\_\_\_\_

Architect/Engineer: \_\_\_\_\_

Contact Name: \_\_\_\_\_ Telephone: \_\_\_\_\_

Project Name: \_\_\_\_\_

Project Location: \_\_\_\_\_

Contract Amount: \$\_\_\_\_\_ Completion Date: \_\_\_\_\_

Owner: \_\_\_\_\_

Contact Name: \_\_\_\_\_ Telephone: \_\_\_\_\_

Architect/Engineer: \_\_\_\_\_

Contact Name: \_\_\_\_\_ Telephone: \_\_\_\_\_

Project Name: \_\_\_\_\_

Project Location: \_\_\_\_\_

Contract Amount: \$\_\_\_\_\_ Completion Date: \_\_\_\_\_

Owner: \_\_\_\_\_

Contact Name: \_\_\_\_\_ Telephone: \_\_\_\_\_

Architect/Engineer: \_\_\_\_\_

Contact Name: \_\_\_\_\_ Telephone: \_\_\_\_\_

Project Name: \_\_\_\_\_

Project Location: \_\_\_\_\_

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Owner: \_\_\_\_\_

Contact Name: \_\_\_\_\_ Telephone: \_\_\_\_\_

Architect/Engineer: \_\_\_\_\_

Contact Name: \_\_\_\_\_ Telephone: \_\_\_\_\_